

**CURRICULUM DEVELOPMENT FOR NATURAL SCIENCE SECONDARY
SCHOOL THROUGH INTEGRATION VALUE OF CHARACTER BASED ON
CONTEXTUAL TEACHING AND LEARNING**

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Abstract

National education has aim that individual learners have the knowledge, improve technical skills, develop a strong personality and form a strong. Curriculum subjects of Natural Sciences Secondary School expects that students master the concepts and principles of science to develop the knowledge, skill, spiritual and social competences that can be applied in daily life and as a provision to pursue higher degrees. Implementation an integrated character education in science is a new thing, making implementation face many problem, both schools and teachers. This research designed to develop values of character that integrated in Natural Science Secondary School Class VII. This research development consist of three stages: (1) design and development integration model of values and character based on contextual teaching and learning, (2) validation and pilot test, (3) implementation and evaluation. The first year research (2013) has resulted teaching materials for natural science school first semester class VII in the form of lesson plan, student worksheet, learning assessment, and instructional media.

Key words: character, contextual teaching and learning

INTRODUCTION

National education aims to develop student potentials become man who is faithful and devout to god almighty, noble, healthy, knowledgeable, skilled, creative, independent, and become democratic and responsible citizens. Teachers and schools have to integrate the values of personality and character which developed into the Curriculum Education Unit, Syllabus and Lesson Plan which already exist (Ministry of National Education, 2010). In principle, values and character development are not included as a subject, but integrated into the core competencies and/ Basic Competence for each subject, self-development and school cultures.

Curriculum for Natural Science in Secondary school developed as an integrative science and oriented applicative, developing the ability to think, learn, curiosity, and the development of caring and responsible attitude towards the social environment. For implementation of 2013 curriculum the government has provided a syllabus, teacher and student handbooks, while lesson plans, worksheets, assessment are provided by teachers as curriculum implementers. The results of initial survey in 2012 to Pekanbaru city secondary school science teacher, indicated 18 of the 32 teachers (56.25%) have not implemented the character values in learning. Learning device has been used many times, syllabus, lesson plans has been copied and electronic sources (the Internet) used without any adjustment to the conditions of students and school. This will lead to curriculum objectives are not achieved. PPMP Riau (2011) finding that in content standards and process standards teachers have not been able to outline the material and develop syllabus and learning tools, have not still implement active learning and teacher centered.

Based on the above fact it is necessary to develop curriculum and learning tools include:

syllabus, lesson plans, worksheets, assessment sheets, learning materials, and quality learning media in line with the policy and the development of science and technology. Science curriculum development in this study conducted by a team of science education from Department of Mathematic and Natural Science Faculty Teacher Training and Education Riau University in collaborate with Secondary school Natural Science Teacher *SMPN 20 Pekanbaru City*.

Science curriculum emphasizes mastery of concepts, thinking skills, understanding of the basic principles, bring up scientific attitudes and values through learning experiences that are relevant to learners. Character education integrated in the learning process is the practice of values, gained awareness of the importance of values, and internalization of values into the behavior of students daily, through a learning process that takes place both inside and outside the classroom in all subjects. Strategic integration of character education in the learning process implemented starting from the planning stage, learning activity, and evaluation phase of learning in all subjects (Ministry of National Education, 2010). On the secondary school science subjects values of character that was developed include: *Religiousness, honesty, intelligence, toughness, caring, democratic, curiosity, logical thinking, critical, creative, and innovative, honesty, healthy lifestyle, self confidence, respect for diversity, discipline, self-reliance, responsibility, love science, precision and accuracy*.

Constructivism is the philosophy of contextual approach, the philosophy of learning which emphasizes that students learn not just memorize. Martin et al. (2002) states, with constructivism, students will be able to enhance critical thinking skills and problem solving. Students can improve their skills using a scientific attitude to solve various problems, and continues to absorb and process information obtained.

Contextual learning allows the learning process in which students explored the understanding and academic skills in a variety of contexts, inside or outside the classroom, in order to resolve the problems it faces both independently and in groups (Setiawan, 2008). According to Crawford (2001), contextual learning can be implemented through five main strategies: (1) (Relating) (2) (Experiencing) (3) (Applying) (4) (Cooperating) and (5) (Transferring).

According to Johnson (2002), application of contextual learning approach means making connections to discover the meaning, doing significant work, encourages students to be active, setting their own learning, working together in groups, emphasizing creative and critical thinking, managing individually, reaching higher standard, and uses authentic assessment.

Contextual learning is built on seven pillars: constructivism, inquiry, questioning, learning community, modeling, reflection, and authentic assessment. *RANGKA* contextual learning is the development of a modified contextual learning strategies REACT (Relating, Experience, Applying, Cooperating, Transferring) by Crawford (2001). For the development of contextual learning Biological science subjects in Pekanbaru city, has developed *RANGKA* contextual learning, by which it is acronym of *Rumuskan masalah* (state the problem), *Amati melalui kegiatan* (observed through activities), *Nyatakan* (state), *Gabungkan* (merge), *Kerjasama dan Komunikasi* (collaboration and communicate), and *Amalkan* (practice). This model integrates the component science process and problem solving skill. *RANGKA* contextual learning approach was developed based on the philosophy of science learning *RANGKA* it is an easy to remember acronyms. Skeleton in living things serve to reinforce, strengthen and give the body shape, so that *RANGKA* contextual learning is expected to support and benefit the learning science especially biology so that learning becomes meaningful (Evi Suryawati, et.al 2010).

RANGKA contextual learning strategies can be used to as an alternative development for Effective Active Innovative Creative and Fun Learning on various categories of school. Produced teaching materials can be used as a reference in the development of teaching design preparation especially for the novice teacher. *RANGKA* strategies can be used not only limited to the topic of this study but has the potential to be developed in other topics on teaching Biology especially and science teaching in secondary school (Evi Suryawati, 2010). In this research, in line with

government policy, contextual learning has been developed by integrating the values and character suit Indonesian culture.

The research was conducted with the aim of developing an inventory of character values that are integrated in the syllabus for each Core Competence and Basic Competence teaching science secondary school class VII and also designing and developing an active and contextual teaching materials (syllabus, lesson plans, evaluation sheets, teacher handbook, student worksheets, and instructional media) by integrating the values of character and culture according to the characteristics of students and schools.

RESEARCH METHOD

This Research and Development using survey design (Cresswell, 2005). Implemented in secondary school/ junior high school for natural science subjects Class VII. Conducted jointly by the research team with involving teachers in partner schools *SMP 20 Pekanbaru*. The study consisted of two phases (1) the design and development of integration models and character values secondary school science subjects based contextual learning and (2) validation and testing.

The contextual learning teaching materials development procedures used were based on model proposed by Gagne et.al (2005) which composed of Analyze, Design, Develop, Implement, Evaluate (ADDIE) as in Figure 1. Primary data was collected through assessment sheets, observation, and achievement test and secondary data through documentation. Face validity and content validity assessment of teaching materials has been performed by two science teaching and learning strategy specialists and four experienced natural science teacher. Natural science achievement instruments built by researcher according to research topics that were taught, namely: Ecosystem and Measurement. Data processing was done by using descriptive and inferential analysis using t-test.

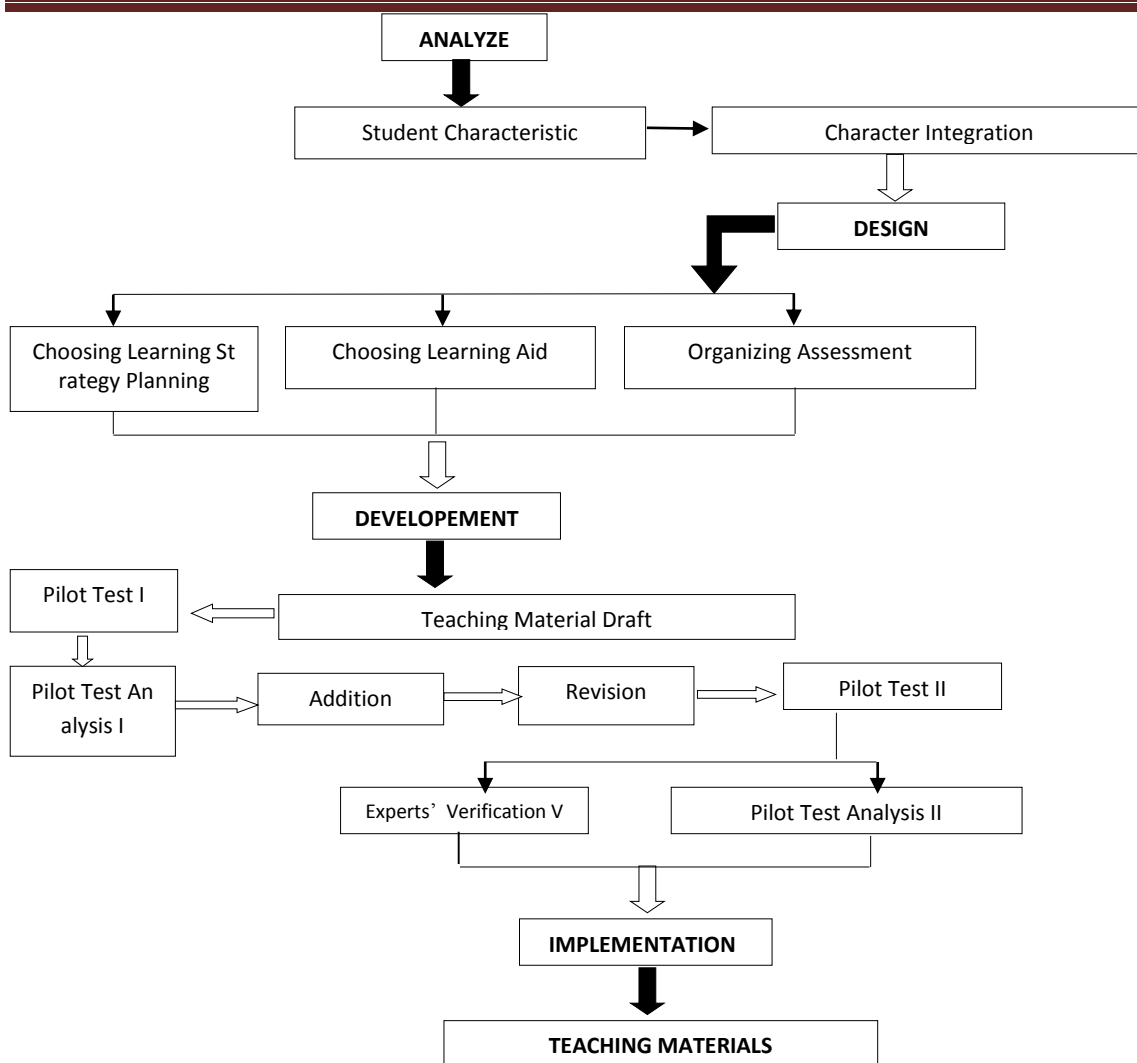


Figure 1
Teaching Materials Development

RESULT AND DISCUSSION

Teaching Materials Development

Table 1

Inventory Integration Character Value in Natural Science (Biology)

No.	Topics	Learning Activity	Characters Developed
	Ecosystem	Direct observation and video show compiler components of ecosystem	Foster responsible behavior, Respect the opinion of friends and fosters thoughtful behavior
		Pay attention to objects (biotic and abiotic) that exist around the school	Marvel at the complexity of God's creation, foster curiosity, honest, careful, and conscientious in observing
		Collate and classify objects found in the biotic and abiotic components of the mark (√)	Foster a critical attitude, thorough, objective, honest, careful, and responsible

	Answering a question by discussing with the group and make conclusions	Cultivate an attitude of prudent, responsible, honest, critical, value the opinions, and communicative
Interdependence in the ecosystem	Pay attention to the surrounding environment and video show	Admire the regularity and complexity of God's creation, critical, foster curiosity
	Discuss the results of observations	Foster responsible behavior, Respect opinions and foster prudent behavior
	Make an example of food chains and food webs	Foster a critical attitude, conscientious, honest, careful, and responsible
	Presenting the results of observations and make conclusions	Foster responsible behavior, Appreciate friends work either individually or in groups and fostering prudent behavior

Table 2
Inventory Integration Character Value in Natural Science (Physics)

No.	Topics	Learning Activity	Characters Developed
	Measurement	Pay attention to the surrounding environment and classification physical quantities toward to physic basic and integral quantities integral	Admire the regularity and complexity of God's creation, critical, foster curiosity.
		Discuss the results of observations	Foster responsibility, self confidence, tolerance, intelligence
		Observe and experiment for determine length quantities of rule use vernier caliper and screw micrometer screw	Foster curiosity, honest, confidence, smart, critical, creative, innovative, concern, tolerance, and responsibility.
		Observe and experiment for determine quantities of mass with O'Haus balance and digital balance	Foster curiosity, honest, confidence, smart, critical, creative, innovative, concern, tolerance, and responsibility.

Student's Basic Skills of Scientific Work Through *RANGKA Contextual Learning*

Basic skills of scientific work (*Keterampilan Dasar Bekerja Ilmiah/KDBI*) in this study consist of 8 aspect which are observation, classification, communication, responsibility, curiosity, teamwork, honesty, and discipline. The average percentage of students basic skill of scientific work for each observation between the experimental group and the control group can briefly be

seen in Figure 2 below:

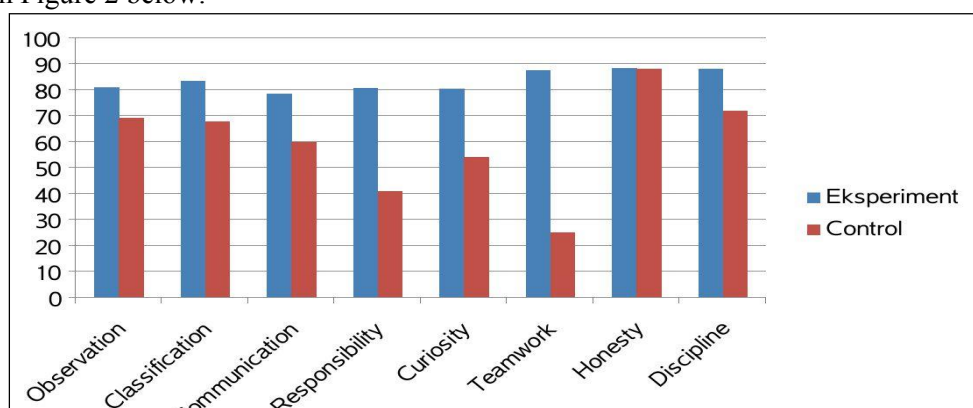


Figure 2
Basic skills profile of scientific work in science lessons

Figure 2 indicates that basic skills of scientific work on the experimental class higher than the control class. In the experimental class average basic skills of scientific work is 83.49% with good category and 59.66% in the control class with less categories. In the experimental class, learning using the *RANGKA* contextual learning at each meeting by applying the sixth phases of the contextual learning. The use of this model allows students to learn actively and get involved in the learning process. *RANGKA* contextual learning is also effective against students basic skills of scientific work, this can be seen in some of the observed indicators, overall students basic skills of scientific work classified as good, it is related with the existing phases on the contextual learning. In the state the problem phase, students are expected to increase the curiosity against material taught, in the observation phase, students should explore knowledge by answering exploration question in the worksheets as a group, so it can train the observation, classification, communication, cooperation and responsibility. Further, in the state, merge and communication phase students should present the results of the discussion to train asking and answering questions, it will establish good communication between the student. In the practice phase students apply the concepts that have been held in the new situation by answering elaboration question so that students' understanding of concepts would be better.

Furthermore on the students basic skills of scientific work data conducted inferential analysis by using t-test, as in Table 3 below:

Table 3

T-test results Students Basic Skills of Scientific Work (BSSW) in SMPN 20 Pekanbaru

Group	BSSW	Category
Experiment	83.49 %	Good
Control	59.66 %	Less
t _{-test}	3.37*	
t _{tab}	1.99	

* =significant

Based on the t-test which shown in Table 3 obtained t test (3.37) > t tab (1.99). This means that there are fundamental differences in the ability of the scientific work of students between experiment group and the control group.

Differences in students' basic skills of scientific work in the experimental group and the control group related to applied learning activities in the experimental group. Through learning model that is applied to experimental class provides opportunities for students to develop the abilities / skills they have, this is because the steps of contextual learning activities which designed

in the lesson plan intensified the students to be active and motivated so that encourages students to get involved directly in the learning process. With the involvement of students in the learning process will bring some students basic skills of scientific work at the time of teaching and learning activities.

Mastery of facts, concepts, and procedures

Based on the results of pre and post-test in the experimental group and the control group, it can be seen the value of students' for concept mastery. Average student concept mastery in both class are presented in Figure 3:

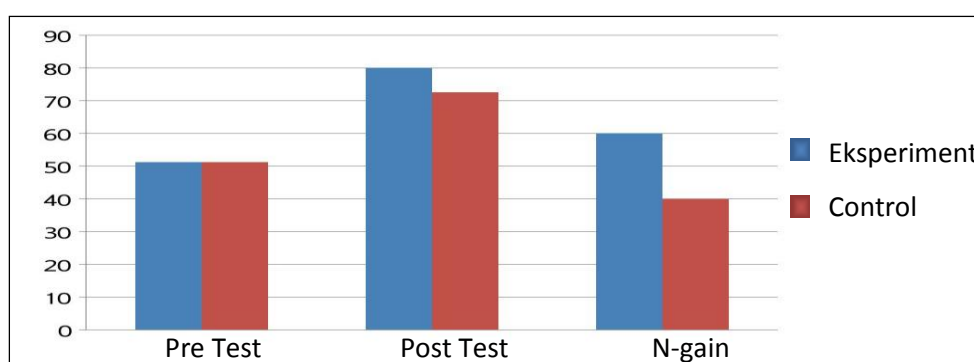


Figure 3

The mean value of the pretest, post-test and N-gain for experimental and control class

Based on Figure 3 it can be seen that the initial knowledge (pre-test) students between the experimental class and the control class, the value of pre-test in the experimental group, is 51.18% (less) and a control group is 51.28% (less). This value suggests that the two classes have the same ability in the cognitive.

Figure 3 also shows an increase in the average value of mastery of concepts in the experimental class, which is 80.13% (Good) higher than the control class is 73.70% (Enough). This is because the experimental class, is used Learning cycle model of learning which the students are required to actively discover their own concepts of the material being studied. Students also comes with worksheets that lead them to seek and find their own information and concepts from the book, so that the knowledge and information students learned not only obtained from teachers.

In the both class of the samples (experimental and control), average post test score higher than the average pre-test. Experimental classes increased by 28.95% while the control class is 22.42%. Results of analysis of N-gain calculations show that increasing mastery of concepts in the experimental class 0.60 and 0.40 in the control classes, both received moderate category. Use contextual learning Cycle Modeling the experimental class could further enhance the students' mastery of concepts. Further, on the data of mastery of concepts conducted inferential analysis by using t-test, as shown in Table 4 below:

Table 4
Student's Mastery of Concepts

Group	Mastery of Concepts	Category
Experiment	80,13	Good
Control	73,70	Moderate
t-test	3,73*	
t _{tab}	1,99	

* =significant

Based on the results of the t-test calculation shown in Table 4 obtained 3.73 t test > t tab 1.99 (significant), from these results can be explained that there are differences in students' mastery of concepts between experimental and control group, students learn by applying contextual learning cycle mastery of concepts better than students who learn using conventional learning (lecture) submitted by teachers. According (Harwell, 1999) contextual learning can encourage students to have more positive attitude in learning. When students can relate the concepts they have learned to real-life situation.

The character development and spiritual values are integrated in all subjects (National Ministry of Education 2011). The implementation 2013 curriculum is an improvement from the Competency Based Curriculum. The 2013 curriculum emphasizes experience catering to the expansion of scientific process skills and attitude in order for students to understand science concepts and thinking skills through problem solving activities.

CONCLUSION AND SUGGESTION

Research on contextual learning should be developed continuously. *RANGKA* contextual learning can be used as an alternative strategy in the Active Learning, Innovative, Creative, Effective, and Fun (*Pembelajaran aktif inovatif kreatif efektif dan menyenangkan/PAIKEM*) integrative with character value and basic skill of scientific work. *RANGKA* strategy is a student centered learning, with emphasis on learning activities that encourage students to think critically and creatively as part of the life skills students should possess. Effect of *RANGKA* strategy can be further extended in different situations and circumstances by science education researchers.

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