

The Integration of Character Education in Junior High School Mathematics Curriculum Based on the ATONG (*Amati Tanya Olah Nalar dan Gagas*) Approach

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Abstract

The implementation of character education in Indonesia show that students have not received proper and maximum character education services because the unavailabilities of integrated character mapped in a tiered and focused manner. This research conducts the integration of character values into the curriculum that is stated in the mathematics syllabus and learning devices for Junior High School grade VII, VIII, and IX that is based on ATONG (*Amati Tanya Olah Nalar dan Gagas*) in a tiered and focused manner. This research aims to design syllabus and learning devices based on the ATONG approach that integrated character education; produce a valid syllabus and learning devices; and test the effectiveness of the coordinate system learning based on the ATONG approach with Eliciting Activities model that integrated hard work character. This research refers to the Borg & Gall model (2003) which is modified into 5 steps. The learning devices test was conducted in sampling method in grade VIII SMP Kartika XII. The result of expert validation shows that the syllabus and learning devices are valid with a score of 3.60 which is considered as very good; the learning devices test results in an effective learning. This research is success to map characters in a focused and tiered manner on innovative mathematics learning. The mapping of specific cognitive and psychomotor abilities is indispensable because the mapping in the syllabus is still general.

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INTRODUCTION

Education according to National Education System Law Number 20 of 2003 is a conscious and planned effort to develop capabilities and build the dignified character and civilization of the nation in order to educate the nation's life. Character education is interpreted as education that develops cultural values and national character in students so that they have positive values and characters and apply these values in their lives (Ministry of National Education, 2010). Mulyasa (2012) states that character education is a continuous and never-ending process, resulting in continuous quality improvements for the realization of a future figure rooted in the nation's character values.

Character education combines and optimizes informal family environment education activities with formal education in schools. The school curriculum not only directs students towards mastering concepts, but also needs to develop student orientation in their lives and their development of science and technology. This curriculum is not arbitrarily made, but adapted to the circumstances and abilities of each level of education and employment needs.

National Education System Law Number 20 of 2003 explains that the curriculum is a set of plans and an arrangement relating to the objectives, content, teaching materials and ways used as a guide in organizing learning activities to achieve a national education goal. Munir (2008) states that the curriculum functions as a student's learning plan, as a learning plan, and as a learning experience gained by students.

Hudojo (2005) states the mathematics curriculum is a curriculum that deals with mathematics and how to organize mathematical material with answer questions: why, what, how, and to whom mathematics is taught at school. According to Graham (2013) one of the main standards of learning mathematics is learning to solve problems. In this case applying an appropriate learning model.

Sukestiyarno (2013) suggested one alternative that can be applied to create appropriate and innovative learning through

ATONG approach. *ATONG* is a learning approach modeled by exploration, elaboration, and confirmation. Students are also always brought to the atmosphere *A (amati)* to all learning situations, then *T (tanya)* on every problem arises, so that they do *O (olah)* on the answers to questions, then *N (nalar)* to continue until the *G (gagas)* a new idea or innovation.

The integration of character education in the mathematics curriculum based on the *ATONG* approach is an education system that instills the values of devotion, honesty, caring, and ethics or good manners that are integrated in mathematics learning activities based on the *ATONG* approach. Therefore, character building is not only at the cognitive level, but on internalization and real practice in their daily life.

Mazzola (2012) conducted research on bullying in schools. The results show that around 160,000 students get bullying at school every day; 1 of 3 respondents surveyed (students at the age of 18) have experienced acts of violence; 75-80% of students have seen acts of violence; 15-35% of students are victims of cyber-bullying. This appalling condition, whether done by teenagers or educated adults, certainly makes us more confident of the importance of character education.

Bulach (2002) states that implementing programs to improve student behaviors associated with character traits is a task well worth undertaking. If the character education program is successful, bullying behavior and incidents of violence should decrease, because students will be more sympathetic, tolerant, kind, compassionate, and forgiving. As faculty and staff model the behaviors associated with the character traits, and as their behavior is "caught" by the students, an improvement in the climate and culture of the school is likely to occur. Zühal (2012) states that the values are included in curriculum of elementary schools, and supportive activities for hidden curriculum in the process of gaining and internalizing values have great importance.

Bello, and Amali (2012) states if character education is taught in Nigeria schools, it will give the young good moral compass, set clear

standards of behavior and enable them to acquire ethical values, such as honesty, integrity, respect, responsibility, self-discipline and reliabilities. Character and moral education will also provide the young and adults with 'other essential virtues' to enable them become good citizens and be successful in the rapidly changing and highly competitive global economy.

The research about character education in mathematics curriculum has been conducted by Munawaroh (2017). The results showed that the implementation of function material learning integrated character education is effective with 89.5% of students achieving mastery learning; the positive influence of students' curiosity character on learning outcomes is 48.9%. Ernawati (2018) show that the character values taught adopt the kinship system which is one of the local cultural centers especially imply piety, belief, discipline, wisdom, policy, decency, manners and social life. Character education can be integrated into every subject and linked to the context of everyday life.

Study about *ATONG* approach also has been conducted by Masriah (2015). The results showed that mathematics learning with the Missouri Mathematics Project (MMP) model based on *ATONG* approach to geometry material is effective on the independent character and students' problem solving abilities. Wulandari (2015) states that mathematics learning with *ATONG* approach can increasing skills of creative thinking mathematically through the test gain with high and medium category. Yaseer (2015) states that learning by Quantum Teaching model with *ATONG* approach can improve character and critical thinking in probabilities material.

Based on interviews with the school principal and mathematics teacher at Kartika XII Junior High School in Magelang Regency, the students experience a low level of character seen from the declining student manners, lack of student perseverance in learning and rampant bullying. According to him the teacher had difficulty in systematically integrating characters because the unavailabilities of a curriculum that integrates characters in tiered and focused manner on each subject matter. In practice,

characters are only integrated as try and error, characters are not seriously measured.

Integrating character education in the mathematics curriculum based on the *ATONG* approach, found gaps in previous research. Zulfi (2017) shows that character education integrated into learning requires assessment. Assessment is carried out continuously, both through observations in the classroom and outside the classroom based on several indicators. Soviawati (2011) revealed that character education was not noticed by mathematics teachers and the *ATONG* approach had not been carried out optimally in the learning process of students.

Based on the description above, it is necessary to look at examining the integration of character education in the mathematics curriculum junior high school based on *ATONG* approach in a tiered and focused manner. This research aims to describe a syllabus designs and junior high school mathematics learning devices based on the *ATONG* approach that integrated character education; to produce a valid syllabus and learning devices; to test the effectiveness of the coordinate system learning devices based on the *ATONG* approach with Eliciting Activities model that integrated hard work character.

METHODS

The development of syllabus and learning devices refers to the Borg & Gall model (2003) which is modified into 5 steps. The steps are including (1) preliminary study; (2) product development; (3) product validation; (4) product revision; and (5) field trials.

The data sources of this study are the Junior High School mathematics curriculum, subject and curriculum expert, teacher and students. This study was conducted in grade VIII of Junior High School of Kartika XII in Magelang Regency in school year 2018-2019. Researcher took the sample by with cluster random sampling so that it is selected that grade VIII A as the experiment class and VIII B as control class. The research instrument used in this study are the validator assessment sheet, problem

solving skill test, problem solving skill observation sheet, and hard work character observation sheet.

Data analysis techniques used were; (1) Data analysis of learning devices validity. (2) Data analysis of problem solving skill test instruments consisting of validity, reliabilities, level of difficulty and different. (3) Data analysis of the effectiveness including the problem solving abilities completeness test; test of the difference of average problem solving abilities; test of hard work character influence and problem solving skill to problem solving abilities; and test of the improvement of hard work character, problem solving skill and problem solving abilities.

RESULTS AND DISCUSSION

Desain of Junior High School syllabus and learning devices based on *ATONG* approach integrated with character education

Character integration in this research was conducted on the syllabus and learning devices on one subject used as a sample. The steps of product development include mapping syllabus components; mapping of character indicators; learning based on the *ATONG* approach; integrated syllabus of character education; coordinate system learning devices based on the *ATONG* approach with Eliciting Activities model that integrated hard work character. These steps are in accordance with Sagala *et al.* (2008) & Zubaidi *et al.* (2015) who compiled the syllabus by reviewing competency standards and basic competencies, identifying subject matter, developing learning activities, formulating competency achievement indicators, determining types of assessment, determining time allocation, and determining learning resources.

The process of integrating characters in junior high school mathematics learning in a tiered and focused manner must be carried out with a well planned strategy. Ajie *et al.* (2018) carried out strategic planning for character-based student development and face obstacles in strategic planning from inside and outside the school. Therefore, the components of the syllabus must be mapped to distribution evenly.

According to the Minister of Education and Culture Regulations No. 24 of 2016, syllabus is arranged from the mapping core competencies, basic competencies, subject matter, indicators and time allocation. The syllabus is arranged in grade VII, VII and IX. As for grade VII and VIII, the number of effective weeks in semester 1 & 2 is 16 and 14 effective weeks. Where as in grade IX, the number of effective weeks in semester 1 & 2 is 16 and 4 effective weeks. Every effective weeks consists of 5 hours of study with details of 2 and 3 hours of study. All core competencies are listed in the syllabus while basic competencies only contain basic competencies from the knowledge' aspect and skills' aspect.

The values of the characters that will be integrated are taken from the Ministry of Education' 18 general character values, 6 values of the special character to mathematics course and 5-character values of character education reinforcement *Nawacita* Policy. With various considerations, 14 character values are chosen to be integrated, they are friendly/communicative, hard work, thorough, curious, never give up, creative, fond of reading, tolerant, mutual cooperation, responsible, hard work, independent, honest, and democratic. Character that will be integrated and the indicators are then created in levels for each grade level and it will be repeated increased.

The character's value is then mapped in a focused manner based on the student's condition and the subject matter to be taught. For example in the 1st and 2nd weeks in grade VII, students will be developed friendly/communicative character because they meet new friends. The 3rd and 4th week, students will be developed tolerant character because they meet new friends with various differences. Then in the 5th and 6th week of material set, students will be developed curiosity character because the material is a new term that has never been received by student when in elementary school.

Learning activities on the syllabus is to use innovative learning activities according to the findings of Sarwi *et al.* (2013) that implementation of innovative learning model very important to developing character values of

Junior High School students. Therefore, learning activities are composed of 14 learning models, those that have been selected to be made based on the *ATONG* approach. The learning model includes the Think Aloud Pair Problem Solving (TAPPS); Think Pair Share (TPS); *Inisiasi Konstruksi, Rekonstruksi, Aplikasi, Refleksi (IKRAR)*; Mathematics Eliciting Activities (MEAs); Mind Mapping; Double Loop Problem Solving (DLPS); Problem Based Learning (PBL);

Teams Games Tournament (TGT); Activities, Class Discussion, Exercises-Action Process (ACE-APOS); Group Investigation (GI); Discovering Learning (DISCO); Ideal Problem Solving (IPS); Learning Cycle 7E; and Team Assisted Individualization (TAI). This learning model is mapped on each basic competency along with 14 character values that have been selected. The sample mapping of character value and learning model are presented in Table 1.

Table 1. The Mapping of Character Value and Learning Model in Grade VII

No.	Subject Matter	Week	Character	Model
The 1 st Semester				
1	Numeric	1 st and 2 nd 3 rd and 4 th	Friendly/Communicative (Meet the new friends) Tolerant (Meet new friends with various differences)	TAPPS TPS
2	Set	5 th and 6 th 7 th , 8 th and 9 th	Curiosity (What is the empty set) Hard work (Try to study the combined slices)	<i>IKRAR</i> MEAs
3	Algebra	10 th and 11 th 12 th and 13 th	Creative (Make a story according to algebraic form) Never give up (trial and error in simplifying complex algebra)	Mind Mapping DLPS
4	One Variable Linear Equation	14 th , 15 th and 16 th	Independent (After make algebraic story itself, of course they can solve one variable linear equation problem)	PBL
The 2 nd Semester				
5	Comparison	1 st and 2 nd 3 rd and 4 th	Democratic (Comparing fairly) Mutual cooperation (Help each other to solve comparison)	TGT ACE-APOS
6	Social Arithmetic	5 th , 6 th and 7 th	Fond of reading (Try to understand the matter of a long story)	GI
7	Lines and Angles	8 th and 9 th	Thorough (Thorough in seeing lines and angles)	DISCO
8	Squares and Triangles	10 th and 11 th 12 th and 13 th	Diligent (Memorize the formula) Responsible (Responsible for applying theory)	IPS Learning Cycle 7E
9	Data Presentation	14 th	Honest (Collect data according to the original)	TAI

The results of the mapping core competencies, basic competencies, core subject, indicators, time allocation combined with the results of the characters mapping and learning models on the core subject or basic competencies. The results of the mapping are equipped with assessment instruments and relevant learning resources so that the focused Junior High School syllabus and learning devices based on *ATONG* approach integrated with character education with a tiered and focused manner is created. In order to know the effectiveness of character integration in mathematics learning, researcher applied a sample of syllabus material. Researcher arranged the coordinate system learning based on the *ATONG* approach with Eliciting Activities model that integrated hard work character.

The integration of character education that focused on one character at every meeting has been conducted by Widiastuti (2014), Faroh (2015), and Sulistiyoningsih (2015). The result show that indicate of the character integration that focus to map one character with one core subject or basic competencies can increase skill, psychomotoric skill, and students' character. Research on the benefits syllabus to implementation in learning that has been done by Sagala (2008) states that the existence of syllabus, teachers are easier to manage learning and easier to understand. It is because the syllabus is a concise description of a series learning activities that must be carried out.

The Syllabus and Learning Devices Validity of Junior High School Syllabus and Learning

Devices Integrated with Character Education Based on ATONG Approach

During product validation phase, the prototype design was validated by 5 experts. The aim of this phase is to produce Junior High School syllabus (grade VII, VIII, and IX) and learning devices in the form of lesson plan, student worksheet, problem solving skill test, problem solving skill observation sheet, and

character observation sheet that has been integrated hard work character based on ATONG approach.

The criteria of learning devices validation assessment use scale 1 to 4. The learning device will be considered as valid and appropriate to be used if the average score obtained is ≥ 3.25 or categorized in very good. The result of validator assessment is presented Table 2.

Table 2. Validator Assessment Recapitulation to Development Product

Devices	Validator Average Score					Average	Category
	V ₁	V ₂	V ₃	V ₄	V ₅		
Syllabus	3.50	3.58	3.25	3.83	3.92	3.62	Very good
Lesson plan	3.58	3.75	3.25	3.75	3.92	3.65	Very good
Student worksheet	3.75	3.75	3.38	3.63	3.75	3.65	Very good
Problem solving skill test	3.50	3.50	3.38	3.75	3.75	3.60	Very good
Problem solving skill observation sheet	3.75	3.63	3.13	3.63	3.63	3.55	Very good
Character observation sheet	3.63	3.88	3.25	3.63	3.63	3.53	Very good
Product assessment average						3.60	Very good

Based on the validator’s assessment recapitulation table to the development product, it presented that the assessment score average result is 3.60 which is in very good category. Based on hypotheses, syllabus and learning devices are stated valid and proper to use if the average value is ≥ 3.25 or categorized as very good. From the assessment result, it can be said that the learning devices are valid and can be used for research. As research conducted by Sulistyaningsih (2012) and Wakhid (2017) that used expert validator to determine the validity of the product validity.

The feedback and suggestions from each expert are then used for product improvement. Problem solving abilities tests that have been stated valid by experts, then conducted empirical validity in class IXA who have gotten the coordinate system material in the previous class.

The analysis results of validity, reliabilities, level of difficulty and different to 16 problem solving abilities question are on the best quality. The questions are divided into pretest and posttest questions based on the quality of the questions.

The Effectivity of Implementation of One of The Subjects on Junior High School Syllabus and Learning Devices Integrated with

Character Education Based On ATONG Approach that has been Developed

The learning devices result is stated as effective when (1) The students’ problem solving abilities in the class that uses Eliciting Activities model based on ATONG approach with hard work character reached minimal completeness criteria of 70 and completeness of 80%, (2) Students’ problem solving abilities in the class that uses Eliciting Activities model based on ATONG approach with hard work character is better than students’ problem solving abilities in the class that uses conventional learning, (3) There is a significant influence between the hard work character and problem solving skills on the students’ problem solving abilities in the class that uses Eliciting Activities model based on ATONG approach with hard work character, (4) There is an increase of hard work character, problem solving skill and problem solving abilities at every meeting.

The completeness test of student’s problem solving abilities consists of normality prerequisite tests and classical completeness of the experiment class value data. Based on normality test with the Kolmogorov-Smirnov gets significance scores is 0.124 where $0.124 > 0.05$. So that, H_0 is received. This means that the data value of problem solving abilities posttest from students experiment class has normal distribution. Next,

the classical completeness test uses a one party proportion test with the z score, based on the calculation results then gets $z_{value} = 1.28 > z_{tables} = 0.9015$ or $1.28 > 0.9015$. So, H_0 is rejected and H_1 is accepted. It can be concluded that the problem solving abilities of students from the experimental class reaches classical completeness more than 80%.

The average difference criteria in this study is that the problem solving abilities in the class that uses Eliciting Activities model based on *ATONG* approach with hard work character better than students in the class that uses conventional learning. Before conducting the final average difference test, the researcher performed the average initial similarity test. Initial similarity test consists of the prerequisite test for normality, homogeneity and independent sample t-test from the control class and experimental pre-test data. Based on the Kolmogorov-Smirnov, the significance score is 0.200 where $0.200 > 0.05$. So that, H_0 is accepted. This means that the data scores of pretest of students in control class and experimental class have normal distribution. Furthermore, the result of pre-test homogeneity with the Levene's Test For Equality of Variance gets 0.525 where $0.525 > 0.05$. So that, H_0 is received. This means the pretest scores of students' problem solving abilities in the control class and the experimental class has homogeneous. Then, the average initial similarity test with the Independent Sample t-test gets 0.952 where $0.952 > 0.05$. So that, H_0 is accepted. This means that the pretest scores of students' problem solving abilities in the control class and the experimental class did not differ significantly.

Difference test of final average consists of the prerequisite test for normality, homogeneity and independent sample t-test against the data score of control class and experiment class posttest. Based on the Kolmogorov-Smirnov, gets 0.200 where $0.200 > 0.05$. So that, H_0 is accepted. This means that the posttest student data scores in the control class and the experimental class are normally distributed. Furthermore, the result of post-

test homogeneity with the Levene's Test For Equality of Variance gets 0.638 where $0.638 > 0.05$. So that, H_0 is received. This means that the post-test score of students' problem solving abilities in the control class and the experimental class has homogeneous. Then, difference test of the final average with independent sample t-test gets 0.00 where $0.00 < 0.05$. So that, H_0 is rejected. The result of difference test is presented in Figure 1.

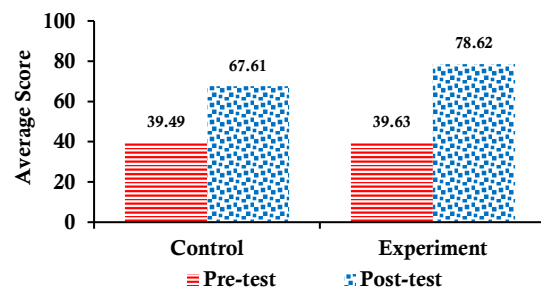


Figure 1. The Result of Students' Different Average

According to the figure above, this means that the average students' problem solving abilities in the class that uses Eliciting Activities model based on *ATONG* approach with hard work character is better than the students' problem solving abilities in conventional learning.

Test of hardwork character and the problem solving skills' influence together on the problem solving abilities of experimental class with multiple regressions. Based on the results of standard residual' experimental class with Kolmogorov Smirnov gets 0.200 where $0.200 > 0.05$. So that, H_0 is received. This means that the standard residual value data in experiment class is distributed normally. Next, the influence test of the hardwork character and problem solving skill to posttest problem solving abilities with ANOVA gets 0.000 where $0.000 < 0.05$. So that, H_1 is accepted. This means that there is a positive influence of hard work character variable (X_1) and problem solving skill (X_2) together on the posttest problem solving abilities (Y). The R square score gets $0.882 = 88.2\%$, this means that the problem solving abilities post-test

is influenced jointly by the hard work character and problem solving skill 88.2 % and 11.8 % influenced by other factors. Then gets $a = -4.721$, $b = 0.162$, $c = 0.870$. So that, the equation regression is $-4.721 + 0.162X_1 + 0.870X_2$.

The improvement test used the average normalized gain score. Tests to improve the character of hard work were analyzed classically and individually. Based on the calculation result, the score of the hard work character gain at the first meeting to the second meeting and the second meeting to the third meeting are in the low category with score of 0.20 and 0.28. While at the third meeting to the fourth meeting, it was in the medium category with a value of 0.42. Then, in the first meeting to the fourth meeting there was an increase in the medium category with score of 0.66. So, it can be concluded that the character of students' hard work increased from the first meeting to the fourth meeting with the details of 14 students (64%) gets a medium category gain score and 8 students (36%) gets a high category gain score.

Tests of problem solving skill improvement are analyzed classically and individually. Based on the calculation results, the gain score of problem solving skills at the first meeting to the second meeting, the second meeting to the third meeting, and the third to the fourth meeting are in the low category with the score of 0.28; 0.20; and 0.15. Then, at the first meeting to the fourth meeting there was also an increase in the medium category with score of 0.51. So, it can be concluded that the problem solving skills of students increased from the first meeting to the fourth meeting with the details of 18 students (82%) getting a medium category gain score and 4 students (18%) getting a high category gain score.

A test for problem solving abilities improvement is analyzed classically and individually. The classical test for problem solving abilities used average score of pretest and posttest. Based on the test, problem solving abilities gets a gain score 0.65 on the medium category. So, it can be concluded that students' problem solving abilities has increased from pretest to posttest with 14 students (64 %)

gets a medium category and 8 students (36 %) gets high category. The result of improvement is presented in Figure 2.

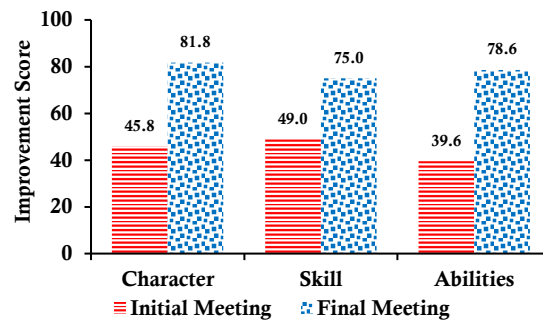


Figure 2. The Result of Students' Improvement

According to the Figure 2, there an improvement of hard work character, problem solving skill and problem solving abilities from the first meeting to the last which is very significant. So, can be stated that mathematics learning with Eliciting Activities based on *ATONG* approach can increase students' hard work character, problem solving skill and problem solving abilities. This is in accordance with the results from Dzulfikar (2012), Maisyaroh (2017) and Wulandari (2015).

CONCLUSION

The conclusion of this research is the syllabus and learning devices were developed in the junior high school mathematics curriculum based on the *ATONG* approach that integrated character education are valid and effective. This research is success to map characters in a tiered and focused manner on innovative mathematics learning. The mapping of specific cognitive and psychomotor abilities is indispensable to considerate that the mapping in the syllabus is still general.

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