

DEVELOPMENT OF MATHEMATICS LEARNING MODEL USING THE APPROACH FOLLOWING CONTEXT ON SECONDARY SCHOOL OF INDUSTRIAL TECHNOLOGY IN BANDA ACEH

Murni¹

¹Departemen University Of Math Abulyatama Aceh
murniusm@gmail.com

ABSTRACT

Teaching in context is a teaching concept that helps teachers to connect to associate the subject matter they are teaching with real life, and can help students to make connections between science and its application to real life. Thus, the teaching activities in context can lead students to be able to apply mathematical theory more effective (Pearson, 2003) Special Target in this study were: (1) can produce an instrument Mathematics Learning Model with The Approach Following Context Teaching in Secondary Schools of Industrial Technology equipped syllabus and lesson plans with the Learning followed Context; (2) Student Handbook; (3) Student Worksheet; (4) Manual Master (5) International Journal; (6) National Journal; (7) Workshop SMTI Teachers and Secondary School or equivalent in Banda Aceh. This research was conducted with a sample of students SMTI namely Banda Aceh, through learning in context is expected later they can practice it directly in their daily lives, which is improving the quality of students in the era of globalization, especially in the application of mathematics in their everyday lives later. The development of this research was conducted following the 5 (five) stages of development Plomp modified by mixing phase of development of material (product) by Nieveen with attention to three aspects of quality, namely the aspects of validity, practicality aspects, and aspects of effectiveness (Methods). So expect to get an assessment of math word problems that assesses all aspects.

Keyword: Learning Development, Learning Mathematics, The Cost Approach Context, SMTI

I. INTRODUCTION

Mathematics is regarded as a less interesting subject, stiff and boring. (Wan Zah, Sharifah Kartini, Habsah, Ramlah, Mat Rofa, Mohd Majid & Soul, 2005) and Mohd Uzi and Lim (2009). This issue is due to teaching less efficient, as well as failing to associate math with daily life. Tschannen-Moran and Woolfolk Hoy (2007) found that the confidence of a teacher is more influenced by factors follow (as appropriate) context. Use of learning in a context has the potential not only to develop the knowledge and skills of the process, but also to build attitudes, values, and creativity of students in solving problems related to everyday life through interaction build social skills (social skills).

One theory or idea which is very well known with regard to constructivism learning theory is Piaget's theory of mental development. This theory also called theory of intellectual development or the theory of cognitive development. Lev Semionovich vygotky forward two

ideas related to the intellectual development of students. First, the student's intellectual development can be understood only in the context of culture and history and believe that intellectual development relies on a system of signs (sign system), Vygotsky emphasized the importance of utilizing the environment for learning. If so, it is reasonable to create learning situations as closely as possible to the actual situation.

1.1. Problems Research

Based on the background of the problem, then the problem will be sought the answer in this study is "How is the study of mathematics by Approach Following Context Middle School Industrial Technology"?. In detail, the formulation of the issue are presented as follows:

1. Guide and instruments on how to uncover Mathematics Learning Approach Following Context;
2. Free and instruments how to implement the learning of mathematics with Approach Following Context.

1.2. Special Purpose

The specific objectives to be achieved in this activity are:

1. Implement and Evaluate Knowing the process of learning mathematics with Approach Following Context in Middle School Industrial Technology.
2. Student Handbook for learning mathematics with Approach Following Context.
3. Teacher's Handbook of mathematics learning with Approach Following Context.
4. Student Worksheet for learning with Approach Following Context.
5. Seminar / Workshop. Learning Math With Approach Following Context.
6. National and International Journals.

1.3. Urgency (Virtue) Research

In mathematics education kurikulum mentioned that one of the goals of mathematics education is to train the way of thinking and reasoning in drawing conclusions. Learning in context embracing constructivism, emphasize to two different principles, namely: cognitive constructivism and social constructivism (Bruning et al., 1995; Eggen & Kauchak, 1996; Richardson, 2006). The first pinsip Piaget berasaskan to work with the main idea is that students who are active in constructing their own knowledge. This idea emphasizes the students interact with the environment and test and adjust to what they earn (Packer & Goicoechea, 2000). The second pinsip influenced by Vygotsky's (1978), which emphasizes that social interaction is very important in building knowledge. The social constructivist emphasis on process rather than the perspective of individuals who share their experiences in learning to build a common understanding (Greeno et al., 1996). Fahaman based on constructivism, students are considered as organisms are active in developing their own knowledge (Nik Aziz, 1995; Packer, 2000). Therefore, in the process of teaching and learning, students will interact with the environment and so on to test and adapt imformasi

acquired through learning (Packer & Goicoechea, 2000). The teacher's role is to ensure that students are responsible for their own learning (Brook and Brook, 1993, in Eggen & Kaucak, 1996). Teachers should wisely to participate in helping students in the learning process. Master function more as facilitators who train, facilitate, support and assist students in developing their understanding and evaluating its own wake (Nor'ain, 2008). According to Lindsay (2000), students are targeted to remember what they have seen, experienced and felt through the use of meaning in a realistic environment. Thus, teaching in context have two tasks in education is as an educational philosophy and as a continuing education strategy. As an educational philosophy, to help students find meaning in learning that they do in a way to apply it to everyday life, to help students understand that they resume practicing it is important. The network of educational strategies in context combining learning techniques that make students more active and become more interested and shows the actual skills, if teaching is seen as a strategy of education, (Siswono, 2002). Furthermore, Parnell (2001) states that learning in context, the main task of the teacher is to help students so that learning becomes easier to understand. To overcome this problem, a learning approach in practice are mathematical learning approaches in context.

The form of the six characteristics of mathematics learning approaches in context in the classroom adapted than (Hull, 1997; Johnson, 2002; Siswono, 2002; Rustana, 2002; Nurhadi, 2002; Suyanto, 2002; National Education, 2003), thus forming like figure 1.1. Six characteristics of teaching in context namely: meaningful learning, inquiry, community learning, modeling, reflection, authentic assessment.

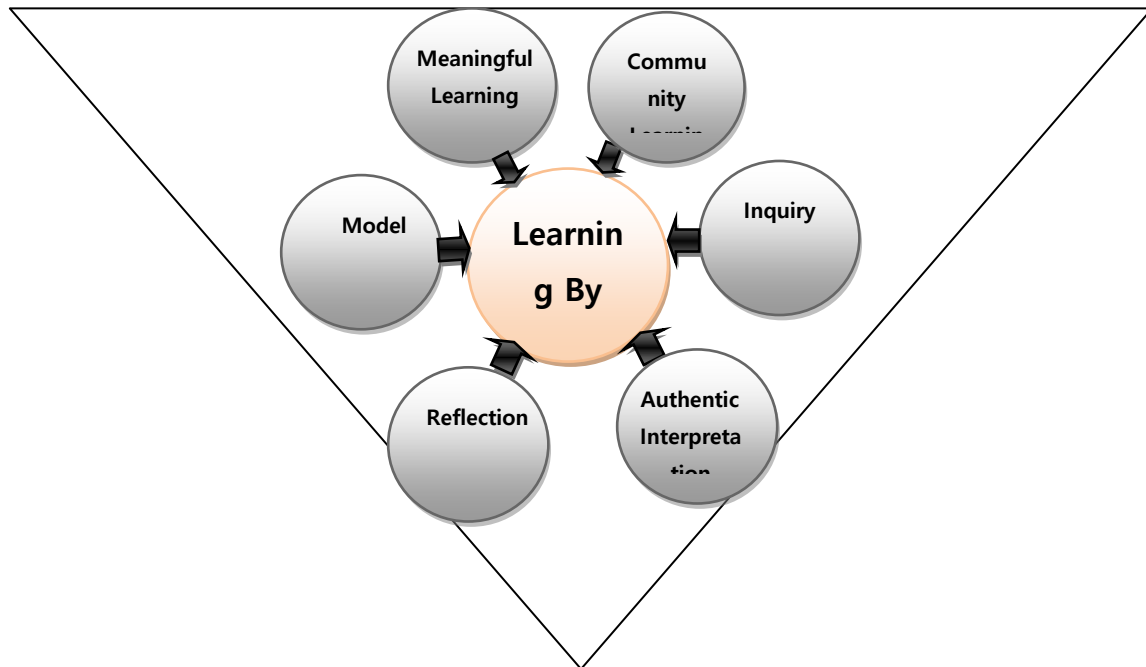


Figure 1.1 The concept of learning mathematics with the approach followed in the context of SMTI Banda Aceh

1.4. Innovation targeted in this study are:

- a) For the teacher, as a material consideration in the selection of learning for learning strategies so as to foster motivation and enthusiasm for learning for students in middle school industrial technology to obtain better learning outcomes,
- b) For the teacher can serve as a guide in the learning of mathematics,
- c) For an institution, as information that can be taken into consideration in determining the curriculum in Mathematics Education FKIP Abulyatama University,
- d) For students SMTI, getting to know and realize mahwa learn math is very important and very useful in their everyday lives.

II. LITERATURE REVIEW

2.1 Learning Approach Following Context

Learning approaches in context brings together all aspects of teaching techniques. Learning is based on the context of the developed first by the Washington State oncornium for Contextual Teaching and Learning which involves 11 universities, 18 schools, 85 teachers and professors, 75 teachers who have been given a briefing before and institutions active in education in America States between 1997 and 2001 (Lynch, Padilla, Harnish, & DiStephano, 2001). Learning in context is the teacher using learning resources from daily life (Siswono, 2002; Nurhadi, 2003; Hull, 1997; Rustana, 2002). Basic development is learning in a context meaningful learning and not by rote. Students must learn the proper knowledge based on existing knowledge in daily life. Learning in context emphasizes learning that is changing the paradigm of teaching into learning. Thus, it can be concluded that the characteristics of learning in context, there are four. First, effective teaching. Second, the relationship between the subjects with daily life. Third, teachers should be creative and seek to bring reform that includes: teachers' skills in selecting effective instructional approach in accordance with the teaching of topics and diversity of student behavior; skills of teachers to teach students to think in resolving the problem of the classroom and real life; skills of teachers to use the media / model adapted to teaching titles and also the diversity of the student; teachers' skills in implementing and running the appropriate learning curriculum; teachers' skills in selecting, connecting and using the facilities / infrastructure that already exists. Fourth, assessment using authentic assessment included: the creativity of students in the class exam results; projects and activities of the students in doing LKS report.

2.2. Actively Learning Experience

Active learning is centered on student (student centered). So that students become active, a teacher must have activities planned to be undertaken by students, are activities that engage the mind as well as activities move. Functions more as a facilitator teachers (Indrawati & Henry, S. 2009). The difference between teaching and learning activities centered and teacher-centered.

Table 2.1 Differences between teaching and learning and teacher-centered to student-centered to (Indrawati & Setiawan, 2009).

Activities teaching and learning centered to the teachers	Activities teaching and learning centered to the learner
<ul style="list-style-type: none"> • Teacher as instructor • Presentation material always with lecture • Teachers who decide what to teach and how students of teaching that allows service information 	<ul style="list-style-type: none"> • Teacher as facilitator • The focus of activity is on student learning • active student learning • interactive teaching and learning activities • students judge their own creation without quoting from the teacher

2.3. Difficulties in learning mathematics

Many students who have difficulty in solving mathematical word problems related to everyday life such as vocational schools related to business and management (Priatna, 1994; Pratiti, 2000; Pure, 2004). Here are some of the difficulties faced by students in solving mathematical word problems related to business in daily life: 1) Difficulty understanding of mathematics questions related to the purchase of goods, delivery of goods and sales of goods. Trouble understanding math question consists of the difficulty in determining Pekara known and asked in a question of mathematics. This difficulty is because students do not understand the language used in mathematical questions. Often the student is difficult to understand a term or concept. Likewise preparation improper sentence structure that is difficult for the students; 2) Difficulties make mathematical modeling. This is evident from the mistakes made mathematical modeling. Difficulties occur when students do not understand the concept or not able to determine the relationship of numbers with the operation be required to complete a math question in the task.

Difficulty carrying out calculations. Because students do not have the skills of the concept of calculation used and do not have the skills to run a certain alkwarizmi difficulty in interpreting the answer of mathematical modeling because students do not have the skills in connecting the answers of a modeling, the real everyday life. The difficulties faced by young people mentioned above can be used as a basic consideration in the teaching plan and teaching plan solutions mathematical questions. That is, teaching solution to the problem must pay attention to the difficulties that may be experienced by students while improving these difficulties so that students do not experience similar difficulties. Steps that can be taken to minimize the causes of such difficulties arise, for example, create math questions in accordance with the real experience of vocational school students skills formation.

III. RESEARCH METHODOLOGY

3.1. The Development of Mathematics Learning Approach Following Context

Development is carried out following the 5 (five) stages of development Plomp modified to guide the development phase material (product) by Nieveen with attention to

three aspects of quality, namely the aspects of validity, practicality aspects, and aspects of effectiveness.

3.1.1. Preliminary Investigation Stage

For this phase, the identification and study of mathematics in SMTI materials, analysis of the condition of the student, concept analysis, task analysis and determination of performance criteria to be achieved through learning mathematics with Approach Following Context. These five activities above can be explained as follows:

- a. Analysis of the front end,
- b. Analysis of the students,
- c. Analysis of the material,
- d. Task analysis, and
- e. specifications competence.

3.1.2 Stage Design

Activities undertaken in the design of this instrument is to choose the format that will be used. The next step is:

Syllabus and RPP Learning mathematics (competence specified) Approach by Context. Basis of preparation of lesson plans are the components of the model (syntax, the social system, the principle of reaction, support systems, and the impact of instructional and impact accompanist), task analysis and analysis of topics elaborated based learning material to reach the sub-sub-competency.

- 1) Selection of media Keja Student Sheet (LKS), Handbook of Student Learning (BPBS), Handbook of Teachers (BPG) In mathematics learning approaches in context. Event media selection is done to determine the appropriate media in the presentation of learning materials, and the competence of problem solving results show the benefits of studying mathematics to students' everyday lives as well as for further development.
- 2) Selection of math learning tool format with Approach Following Context. Selection tool format Approach Following Context to Teaching Mathematics Matri (competence specified) has been adapted from the model of Life Science (Daniel, L., Ortleb, E. P., Biggs, 1995). This selection concerns the content design, selection of learning strategies, and learning resources.

3.1.3 Realization Phase

This stage as the continuation of activities at the design stage. At this stage, produced a prototype 1 (beginning) as a result of the realization of the previous design. The results of construction examined again whether sufficient supporting theories and models have been met well applied to any components of the model so ready to be tested kevalidannya by experts and practitioners from a theoretical rationale and consistency of the construction.

3.1.4. Phase Test and Evaluation, and Revision

Activities undertaken during pembelajaran validate mathematical instruments with Approach Following Context to Matri (competence specified) are as follows:

1. requesting the experts and practitioners on the feasibility study of mathematics by Approach Following Context to Matri mathematics (competency elected) (in prototipe1) that have been realized. For this activity necessary instrument in the form of validation sheet submitted to the validator,
2. analyzing the results of the validation of the validator. If the analysis shows:
 - (1) valid without revision, the next activity is a field trial (study execution).
 - (2) valid with little revision, the next activity is to revise beforehand, then direct field trials.
 - (3) is not valid, then be revised in order to obtain a new prototype. Then back on activities (1), which asked for consideration of experts and practitioners. Here there is the possibility of a cycle (validation activities repeatedly) to get a Learning Plan Following Context valid.

3.2. Location Research

The location for research is School of Industrial Technology (SMTI) Banda Aceh

3.3. Indicators of Accomplishment

To measure the success achieved.

1. Use of Mathematics Learning Model Approach Context Following valid, practical, and effective.
2. School Students menengan Industrial Technology (SMTI) Banda Aceh to respond positively to the learning process is carried out by teachers during field trials.

3.4. Implementation of Mathematics Learning by Using Instrument Approach Following Context.

Implementation of this learning is done is to see the extent of the practicality and effectiveness of the use of the instrument in learning. Based on the results of field trials and data analysis results of tests carried out revision. The activities are (1) an analysis of the data results of the implementation of learning, and (2) improvement of instruments based on data analysis results of the implementation.

IV. CONCLUSION

Based on the findings and results of data analysis, we can conclude the following matters.

1. Based on the data of perception and experience of experts concluded that the learning model developed can be applied practically and effectively in the implementation of learning in Vocational High School by using a learning device is provided.
2. Generated learning tools supporting the implementation of learning model in the approach following context namely:
 - a. RPP Teaching approach following context
 - b. Student Handbook for learning mathematics with approach following context.
 - c. Student Worksheet for learning with approach following context.
 - d. Teacher's Handbook of mathematics learning with approach following context.

REFERENCE

- Eggen, P.D. & Kauchak D.P. (1996). *Strategies for Teacher: Teaching Content and Thinking Skills*. Boston: Allyn and Baco.
- Brooks, J.G., and Brooks, M.G. (1993). Alexandria, VA: Association for Supervision and Curriculum Development
- Burhanuddin AG, Pure (2014). *Development of Portfolio assessment Giometri PGSD On Mathematics Learning: Teachers Handbook*
- Bruning, R. H., Schraw, G. J., & Ronning, R. R. (1995). *Cognitive psychology and instruction* (2nd ed.). Englewood Cliffs: Merrill, an imprint of Prentice-Hall.
- MONE. (2002). *Competency-Based Curriculum (CBC), Curriculum and Learning Outcomes Math-MI elementary, junior high-MTs, SMU-MA Curriculum Center, Research and Education Ministry, Jakarta.*
- MONE. (2003) *competency based curriculum (Draft June 2002)*. Jakarta: Research and Development Department of Education.
- Fraenkel & Wallen (2006). *How to Design and Evaluate Research in Education*, (6th Ed.). McGraw-Hill.
- Frank Lyman, 1985. *Learning Model TPS*. Jakarta: University of Maryland
- Greeno, J. G., Collins, A. M., and Resnick, L. B. (1996). Cognition and learning. In *Handbook of Educational Psychology*, edited by D. C. Berliner and R. C. Calfee, pp. 15-46. New York: Macmillan.
- Hull D. (1997). *Who Are You Calling Stupid?* Waco: CORD Communication, Inc
- Indrawati & Henry, S. (2009). *Active learning, kreatif, effective and fun for elementary school teachers*. Centre for Development and Empowerment of Teachers and Education Personnel Natural Sciences (PPPTK IPA) For BERMUTU Program. Jakarta.

- Joyce, B. R., & Weil, M. (2002). Models of Teaching and Learning; Where Do They Come From and How Are They Used? In Models of Teaching (6th ed., Pp. 13-28). Allyn and Bacon.
- Johnson, E.B. (2002). Contextual Teaching and Learning: What it is and Why it is. Here to stay. Thousand Oaks, California: Corwin Press, Inc.
- Lindsay, L. N. (2000). Transformation of learners in a community of practice occupational therapy fieldwork environment. Unpublished doctoral dissertation, University of Georgia.
- Lim, C. S. (1999). Public images of mathematics. Unpublished Doctoral Dissertation, University of Exeter, U. K
- Lynch, R. L., Padilla, M. J., Harnish, D., & DiStephano, C. (2001). A contextual models of excellence for teaching and learning in preservice teacher education: Final and summative report. (Contract # ED-98-CO-0085, 1998 to 2001) .: Washington, DC: U.S. Department of Education. Retrieved from <http://www.coe.uga.edu/ctl/research/toc.pdf>
- Mohd Uzi, D & Sam, L.C. (2009). Implementation of Value of Mathematics Education in Mathematics Teaching in the Middle School. Journal of Science and Mathematics Vol.1 No.2: 29-40
- Mohd. Uzi, D. (2006). Teaching and Learning Mathematics through Problem Solving. Discussion and Library Board, Kuala Lumpur. Dewan Bahasa dan Pustaka.
- Pure. (2004). Polya Model Problem Solving Ability To Enhance Students in Grade 2 Math Story Problem Solving Material Perimeter and Area of Circles. Unpublished thesis. Malang: Graduate UM.
- Pure. (2013). Mathematical Model Development Learning Oriented On Vocational Skill To Increase Creativity of Students in Vocational
- Pure. (2015). Following Context Approach Teaching Mathematics in Vocational Schools: A Case Study. Unpublished Dissertation .Perak Malaysia .: Program PhD Mathematics Education University Pendidikan Sultan Indris (UPSI).
- Pure, Roslina. (2015). Metacognitive Approach To Improve Quality of Student Critical Thinking Ability PGSD In Learning Math Story Problem: Developing Learning Model
- Nor'ain mohd. Tsjudin. (2008). Effects Of Using Graphic Calculators In The Teaching And Learning Of Mathematics On Student's Performance And metacognitive Awareness. Doctor of Philosophy thesis.
- Nurhadi. (2002). Contextual Approach (Contextual Teaching and Learning (CTL). Malang: State University of Malang (UM) .pres.
- Nurhadi. (2003). Contextual approach (Contextual Teaching Learning.) Jakarta: Ministry of National Education.

- Nurhadi. (2004). *Curriculum 2004*. Jakarta: Gramedia.
- Packer, M., & Goicoechea, J. (2000). Sociocultural and constructivist theories of learning: Ontology, not just epistemology. *Educational Psychologist*, 35 (4), 227-241.
- Parnell, D. (2001). *Contextual Teaching Works!* Waco, Texas: CCI Publishing
- Pearson Malaysia. (2003). *Contextual Teaching Works!* Waco, Texas: CCI Publishing.
- Richardson, J. (2006). *Learning Assessment (lesson study): Learn How to Improve Teacher instruction*. National Staff Development Council: www.nsd.org. 03/05/2006 assessed.
- Roslina, Pure. (2013). *Mathematics Learning Open Ended Problem To Improve Students Creative Thinking Ability: Learning Model Development*
- Rustana, Cecelia. E. (2002). *Based Quality Improvement Management and Secondary Schools*. Jakarta: Direktorat Junior High School.
- Siswono, Tatag Y.E. (2002). Authentic assessment in contextual learning. *Journal of Mathematics or Learning was*. VII (Special Edition): 608: 612.
- Suyanto, Kasiani K.E .. (2002). *Contextual Teaching and Learning (CTL)*. Papers Lecture Material Department of English Faculty of Arts. Malang: MONE-UM Faculty of Literature.
- Vygotsky, L. (1978). *Interaction Between Learning and Development*. From *Mind and Society* (ms. 79-91). Cambridge, MA: Harvard University Press.
- Zah Wan, W. A., Sharifah Kartini, S. H., Habsah, I., Ramlah, H., Mat Rofa I., MohdMajid, K., & Spiritual, A. T. (2005). Kefahaman teachers about the value of mathematics. *Universiti Teknologi Malaysia Technology Journal*, 43 (E) Dis. 2005: 45-62.