



An Analysis of the Difficulties in Learning Mathematics by Using Scientific Approach at SMA Negeri 3 Manyak Payed

Nurul Munawarah^{a*}, Edy Surya^b

^{a,b}*Mathematics Education Post Graduate Program Study, State University of Medan, Jl. Willem Iskandar Pasar
V, Medan 20221, Indonesia*

^a*Email: nurulmunawarah92@gmail.com*

^b*Email: edy_surya71@yahoo.com*

Abstract

The purpose of this study to determine the cause of students experiencing difficulties in the learning process of mathematics with a scientific approach. The type of the study is qualitative descriptive. The subject of the study were 26 students of class X-2 SMA Negeri 3 Manyak Payed 2016/2017 Academic Year. The research instruments used was a questionnaire, and interview guides students. The result showed that the form of learning difficulty ten grade students who appeared in learning mathematics with the approach of the scientific was the difficulty in understanding the problem, the difficulty of asked a question of problems, difficulty in trying, and difficulties in concluding the matter and presentation of problems that have been learned. The cause of the emergence of learning difficulties in mathematics with the approach scientific because of the difficulties caused by teacher such as the teacher wasn't directing students to ask and concluded, the issue of the reasoning given fairly difficult, lack of skills and understanding of teachers in implementing the learning process with the approach of the scientific and the difficulties that arise from the students themselves, such as lack of awareness of students to learn and willing to follow the learning process, the fear that a dominant appears, students experience language impairments, students impaired recall, students impaired reasoning.

Keywords: scientific approach; learning difficulties.

* Corresponding author.

1. Introduction

Education has very important role in efforts to improve the quality of human resources at this time or that will come. Every educational system at every level depends heavily on the human resources for execution of its programme. Reference [1] stated that teachers are the critical resources for effective implementation and realization of the educational police and objectives at the practical level of classroom. Therefore, then education in schools should be given serious attention by the government. Especially mathematics education. Casey [2] stated that Until this time most students still have a negative impression of mathematics, for example mathematics as the scourge, mathematics scare, mathematics difficult and boring, mathematics is not fun.

The Government continues to develop the mathematics curriculum in schools. Such as fixing. The curriculum 2006 become the curriculum 2013. In Australia advice to teachers has been provided in a range of publications including books [3] and professional journals [4], in national curriculum statements [5] as well as in state and territory curriculum documents. Such advice has been accompanied by pre-service and inservice programs to change teaching practices from more traditional approaches to contemporary or reform methods where teachers use non-routine problems and problem centred tasks [6].

The curriculum 2013 (K-13) is the curriculum that occurs in the Indonesian education system. This curriculum is the curriculum still applied by the government to replace the curriculum 2006 (which is often called as education unit curriculum) that have occurred during the approximately 6 years. In the curriculum 2013 stressed on modern pedagogy dimension in learning, namely using the scientific approach. The scientific approach in learning referred to include observing, ensnared, associating, experimenting and shape the networking. Lerner [7] proposed that the curriculum mathematics fields of study should include the three elements is concept, skills and troubleshooting.

According to [8], there are some characteristics of children difficulties learning mathematics, namely: a disorder in relationships, abnormality of visual perception visual association motor, perseveres, difficulty know and understand the symbols, disturbance of the immensity of the body, difficulties in the Bible and read, score performance IQ far lower than on the verbal score IQ.

The development of problem solving ability among school children has been a persistent goal of mathematics education community for over a century; however, the issue of how develop problem solving skills among learners continues to be a major dilemma. This is part, due to lack of specific knowledge about mathematical problem solving practices of children and factors that influence their choices and actions [5].

There are findings related to difficulties with what in the NCTM Principles and Standards [9] are denoted processes, e.g. non-routine problem-solving, proof and proving, reasoning, representing and modelling. Two of the more central, and recurrent, findings in research on problem-solving are: (i) students' focus on the rote learning of routine procedures, which is often not complemented by the development of other task-solving approaches; and (ii) students' extensive difficulties in solving non-routine problems [10]. This unbalance seems to align poorly with most mathematics curricula goals. Although this has been well known for quite a while, this

unbalance seems persistent at all educational levels [11].

2. Learning Difficulties

Reference [12] holds that difficulties learning is not always because of the physical condition and psychology, but also can be caused by ignorance of the individual related how to learn, learning style and how to record. While [13] define difficulties learning in recognition of the federal government that difficulties learning is a basic psychological disorders that includes language disorders, verbal or writing, medengar, think, speak, read, or perform mathematical calculations.

According to Dumont [14] two types of learning problems can be distinguished: a *learning disability* is situated in the child's own cognitive development whereas the cause of a *learning difficulty* is situated outside the child or in another problem in the child. In this study, we focus on mathematics learning difficulties. Or as cited by [15] “*Individuals who exhibit learning difficulties may not be intellectually impaired; rather, their learning problems may be the result of an inadequate design of instruction in curricular materials.*”

In the literature, no concrete numbers are reported about the prevalence of mathematics learning difficulties. In contrast, the prevalence of mathematics learning disabilities is estimated at approximately five to eight percent [16]. Compared to the large number of studies focusing on children with learning disabilities, little systematic evidence-based approaches is available about learners with learning difficulties. The present study is presented as a concrete starting point to develop such a line of research.

Research Gibbs and Cooper [17] on elementary school students found that almost 90 percent from 242 students who have been classified as learning difficulties had difficulty language on the level of mild to medium. Terrel [18] reveals the results of his research bring language barriers can affect the academic performance of the students. Runtukahu and Kandou [19] holds that the cause of the difficulties learning mathematics experienced junior high school and senior high school students because of the form of the understanding of the mathematics is structured. each of the understanding is a prerequisite to the understanding of the next.

3. Scientific Approach

The scientific approach is a learning approach which was first introduced in America in the late of 19th century [20]. The Learning with scientific approach is one of the activities with more effective learning results compared to the traditional learning [21]. The scientific approach can be integrated into several learning models, one of the learning models which can be integrated in scientific learning is cooperative learning model.

According to [22] the scientific approach is closely related to the scientific method which should normally involve examination or observation needed for the formulation of hypotheses or data collection, while [23] mentioned that the learning with scientific approach is a scientific and inquiry approach, where students act directly either individually or in groups to explore the concept and principles during the learning activities and the teacher's task is to direct the learning process performed by the student and provide any corrections to the concepts and principles which the students have been obtained.

Reference [24] stated that, theoretically the learning with scientific approach is the learning which is more emphasis on the inquiry learning, which has relevance to the nature of science, which is not just a collection of facts and principles, but include ways how to get the facts and principles as well as the scientists attitude in the basic science process namely observing, classifying, communicate, measure, predicting, and concluding. According to [25], the scientific approach or method is an approach or method to obtain the knowledge through two channels, namely mind (reason) path and observation.

Based on the explanation above, it can be concluded that the scientific learning is the learning using the scientific method which involves the scientific processes through two channels, namely reason path and observation. The scientific Learning is the learning to adopt the scientific measures in building the knowledge through the scientific methods Kemendikbud-Ministry of Education and Culture [26].

The scientific approach allows teachers or curriculum developers to improve the learning process, namely by breaking the process down into steps or stages in detail which contain any instructions for the students to carry out any learning activities [27]. The required learning model is the one allowing the culture of scientific thinking skills, development of sense of inquiry“ and creative thinking abilities of learners.

The Scientific approach is the approach that is in the curriculum 2013 and is recommended by the government Kemendikbud to apply to the learning. The Regulation Kemendikbud of the number 103 years 2014 explained that the stages of scientific approach consists of observing, questioning, associating, experimenting and communicate. Scientific approach phase scheme in mathematics teaching, the scheme can be formed following.

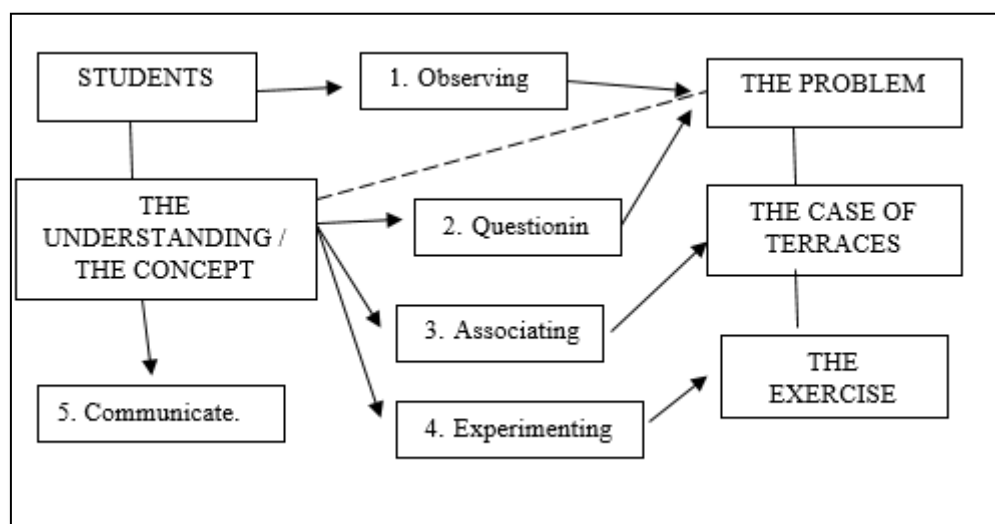


Figure 1: Scientific approach stage

4. Methods

This research is a qualitative descriptive. The purpose of this research to determined the cause of student experiencing difficulties in the learning process of mathematics with a scientific approach. The subject of this

study were 26 students of class X-2 in SMAN 3 Manyak Payed. Data obtained by questionnaires and interviews. The research instrument used was a questionnaire students, as well as interview guides teacher. Questionnaires designed in accordance with the indicator as the basis of the statement. Interview sheet is designed according to the indicator as the foundation in asking questions. Follows the grille questionnaires students and the grilles guidelines interview teachers.

Table 1: The grilles of questionnaires

The Indicator	Namber of Statement
Students interest	
Interest in mathematics	1
The cause of interest in mathematics	2, 3
The opinions about mathematics	4
The stages in the scientific approach	
The problems in stages of observed	5, 6, 7
The attitude students in stages observed	8
The problem in stages of questioning	9, 10, 11, 12
The attitude students in stages questioning	13, 14
The problems in stages of associating	15, 16, 17
The attitude students in stages of associating	18, 19
The problems in stages of communicate	20, 21
The attitude students in stages of communicate	22, 23
How To teachers teach	24, 24

Table 2: The grilles of guidelines interview teachers

The Indicator	Namber of Statement
The preparation of the RPP (Implementation Plan Learning)	1
The teaching using the scientific approach	2
The opinions about the involvement of the students in the learning process	3, 4
Feedback to the teachers and the government	5

5. Results

The subject of this study were 26 students of class X-2 in SMAN 3 Manyak Payed. The interview of this were 5 students of class X SMAN 3 Manyak Payed. Each of the students are asked to explore the information about obstacles that felt during the learning process. The results of the interview, the five students felt that the learning process was conveyed by the teacher fun. They were happy because there was not many rules given by the teacher so that the students feel comfortable. On the stage of observing a student does not observe because drowsiness and hungry, but they understand the lessons, while the other students participate observe. They were

confused and difficult to understand the explanations given by the teacher. On the questioning stage, all students experience problems in asking, this is because they were afraid when humiliated by their friends and they did not know how to ask. On the experimenting stage, students participate tried but not until the end of the discussion and then the students difficult to solve the problem given by the teacher. On the communicate stage the students the students could not be concluded because from the beginning did not notice but he had the courage to conclude the problem that has been studied, then the students tend to feel brave and can be concluded but fear one. The results of the interview with a mathematics teacher that teachers have been preparing the RPP to four meeting and do not experience problems in the making. At the time of the process of learning using the scientific approach, teachers feel students difficult directed to ask the relevant questions, according to the purpose of the lesson. The activity of the students in learning less, more likely to play and speak. Teachers feel the learning process using the scientific approach remains running, but when the evaluation process the value obtained the students did not reach the limit learning in line with that must be done remedial.

From the research data showed results of questionnaires of students are presented in figure as follows:

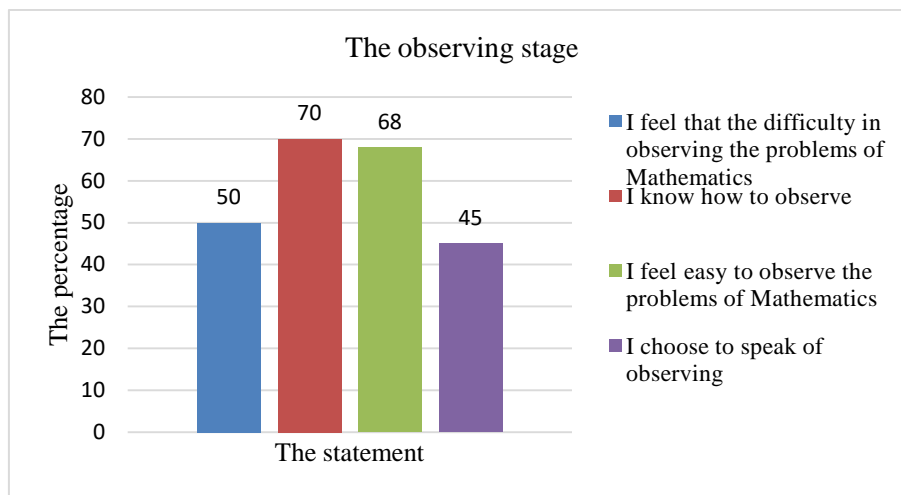


Figure 2: The percentage of the observing stage

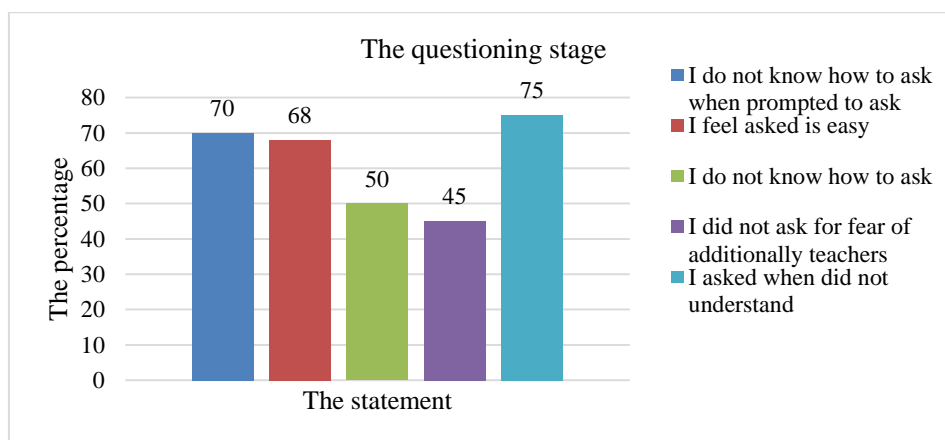


Figure 3: The percentage of the questioning stage

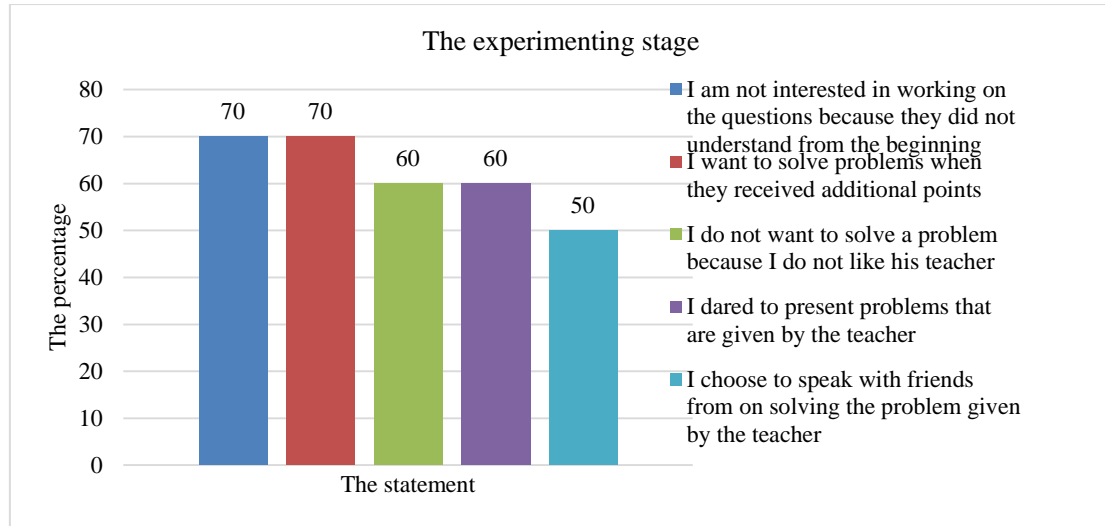


Figure 4: The percentage of the experimenting stage

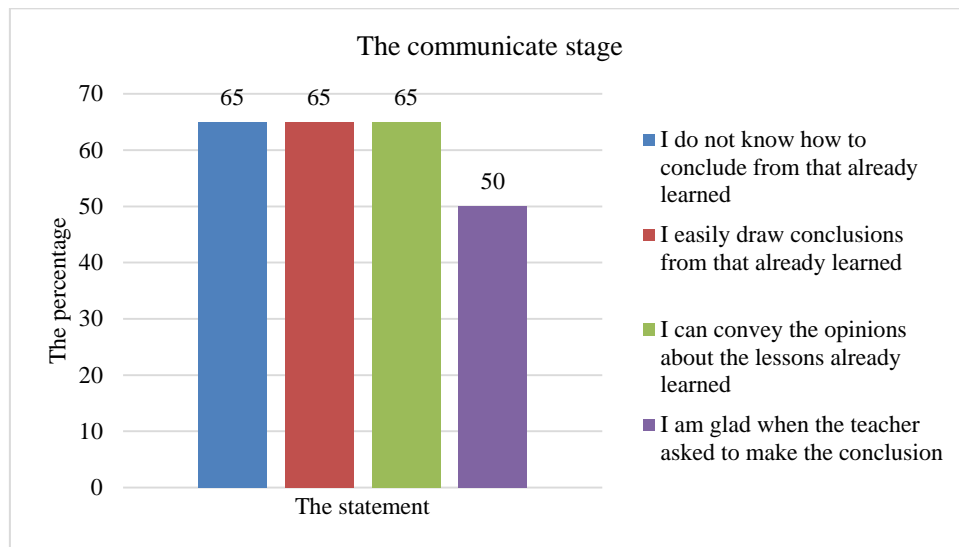


Figure 5: The percentage of the communicate stage

From the picture above, can be obtained as:

- The results of the observed stages on figure 2 shows that the students have no difficulty in observing.
- The results of the questioning stages on figure 3 show that the students have no difficulty asked because the students knew how to ask the students feel asked is easy and the students are not afraid to ask, so that the students will be asked when did not understand.
- The results of the experimenting stages on figure 4 show that the students difficulty when solving problems.
- The results of the communicate stages on figure 5 that students have difficulty in concluded the lesson because students do not know what must be inferred, students feel it is difficult to conclude.

6. Discussions

The ideal learning process need to involve one of the educators who have readiness in running a method. One of the educators have a role as a facilitator of the duty to help students in running the learning process, tackling internal problems students professionally, bring professional learning process, develop students so that the output produces an ideal personal. But the role of teachers as a whole cannot be blamed for the problems in the students so complex to be dealt with. This is in line with the theory of Piaget that mathematics is not accepted passively, mathematics formed and found by children actively. Students learning difficulties can be seen at the following scientific approaches to learning presented by the teacher. After further analysis of the results of research instrument, researchers found the cause of the difficulties experienced by the students, namely students with interest in mathematics based on interview students teachers teach fun and not many rules and not one if students take the attitude of not to follow the learning process with good. The results showed that most students of X grade of SMA Negeri 3 Manyak Payed can observe the problem is given. Teachers prepare stages observed in a maximum so that the information obtained by the students can be stored with the good. Piaget [28] behold the stages observed becomes the base of the learning process so that students can develop cognitive ability and reconstruct the experience that owned [29].

At the time of the process of the lesson the students not difficulty to ask. This is due to the students accompanied and directed by teachers on when asked. Sofa [30] through questioning skills teachers are able to detect obstacles in the process of thinking among students and at the same time can improve and enhance the learning process among students. The students have difficulty in associating. This is due to the disturbance in the students in the form of language disorders, understand and ability so that the role of the teacher in assisting students is very important. Reference [31] the logic of difficulties experienced by students due to power issues remember. Students experiencing problems in understanding the question presented. on stage trying to students shows the attitude of courage to ask independently. students having difficulty trying to specific cases such as problems that need the logic. The students have difficulty concluded because the problem or language disorders and checking fear that appears in the Students.

7. Conclusions

Based on the analysis and discussion of the results of research conducted when referring to the purpose of study, it can be concluded that the form of learning difficulty ten grade students who appeared in learning mathematics with the approach of the scientific was the difficulty in understanding the problem, the difficulty of asked a question of problems, difficulty in trying, and difficulties in concluding the matter and presentation of problems that have been learned. The cause of the emergence of learning difficulties in mathematics with the approach scientific because of the difficulties caused by teacher such as the teacher wasn't directing students to ask and concluded, the issue of the reasoning given fairly difficult, lack of skills and understanding of teachers in implementing the learning process with the approach of the scientific and the difficulties that arise from the students themselves, such as lack of awareness of students to learn and willing to follow the learning process, the fear that a dominant appears, students experience language impairments, students impaired recall, students impaired reasoning.

8. Limitations

This study used only a method that analysis of students' difficulties in learning mathematics by using scientific approach at SMAN 3 Manyak Payed. The scientific approach is analyzed by it's stages. The stages of scientific approach consists of observing, questioning, associating, experimenting and communicate.

9. Suggestions

Based on conclusion and limitation of this study, we have suggestion for teachers to prepare lessons using saintifik approach before the learning process takes place. For students at the time to follow the process of scientific approach students should be seen observing the problem given by the teacher and the students more courage to ask questions and concluded without thinking about one or shame first, students more vigorously trying to question and never gives up, if not then inquired on the teacher. And for other researchers who are interested in researching similar things, it is advisable to expand the scope of the research so that the results obtained research more generalize.

Acknowledgements

The authors acknowledge support from State University of Medan. The authors thank for Mathematics Education Post Graduate Program Study for support.

References

- [1]. Nwaka, N.G. &Ofojebe, W. N (2010), Strategies for coping with Shortage of Resources in Primary School Administration in AnambraState.Journal of Education Leadership, 1 (1) 29-36.
- [2]. Casey, M. Beth., Nuttall, R. L., Pezaris, E, 2001. Spatial Mechanical Reasoning Skills Versus Mathematics Self-Confidence as Mediators of Gender Differences on Mathematics Subtests Using Cross- National Gender-Based Items, Journal for Research in Mathematics Education. 32, 29-56, 2001
- [3]. Lovitt, C., & Clarke, D. (1988). Mathematics curriculum and teaching program, Activity Banks 1 and 2. Carlton, Vic.: Curriculum Corporation.
- [4]. Peter-Koop, A. (2005). Fermi problems in primary mathematics classrooms: Fostering children's mathematical modeling processes. Australian Primary Mathematics Classroom, 10(1), 4–8.
- [5]. Australian Education Council (1991). A national statement on mathematics for Australian schools. Carlton: Curriculum Corporation.
- [6]. Anderson, J. A., & Bobis, J. (2005). Reform-oriented teaching practices: A survey of primary school teachers. In H. L. Chick, & J. L. Vincent (Eds.), Proceedings of the 29th Conference of the International Group for the Psychology of Mathematics Education (Vol 2, pp. 65–72), Melbourne: PME

- [7]. Lerner, RM & Spanier, GB. (1980). *Adolescent Development: A Lifespan Perspectives*. New York: McGraw Hill Co.
- [8]. Lithner, J. (2003). Students' mathematical reasoning in university textbook exercises. *Educational Studies in Mathematics*, 52:29–55.
- [9]. NCTM (2000). *Principles and Standards for School Mathematics*. The Council, Reston, VA.
- [10]. Selden, J. and Selden, A. (1995). Unpacking the logic of mathematical statements. *Educational Studies in Mathematics*, 29:123–151.
- [11]. Hiebert, J. (2003). What research says about the NCTM standards. In Kilpatrick, J., Martin, G., and Schifter, D., (eds.s, *A Research Companion to Principles and Standards for School Mathematics*, pps 5–26. Reston, Va.: National Council of Teachers of Mathematics.
- [12]. DePorter, Bobbi & Hernacki, Mike. 2006. *Quantum Learning: Membiasakan Belajar Nyaman & Menyenangkan*. Bandung: PT.Mizah Pustaka
- [13]. Agrawal, N., dan Smith, S. A., (2013), Optimal Inventory Management for a Retail Chain with Diverse Store Demands, *European Journal of Operational Research*, Vol. 225, pp. 393-403.
- [14]. Dumont, J.J. (1994). *Leerstoornissen. Deel 1: theorie en model [learning disabilities. Part 1: theory and model]*. Rotterdam: Lemniscaat.
- [15]. Carnine, D., Jitendra, A., & Silbert, J. (1997). A descriptive analysis of mathematics curricular materials from a pedagogical perspective. *Remedial and Special Education*, 18, 66-81
- [16]. Desoete, A. (2007). Students with mathematical disabilities in Belgium: from definition, classification and assessment to STICORDI devices. In T.E. Scruggs & M.A. Mastropieri (Eds.), *Advances in Learning and Behavioral Disabilities*. (pp. 181-222). Amsterdam & Oxford: Elsevier Press.
- [17]. Gibbs, C.J.N. 1989. *Agricultural system Reseaarch in Asia: A Comparative Discussion of Human Ecology, Agroecosystem Research, Farming Systems Research, and Cropping System Research*. In Sajise, P.E., and A.T. Ramboo (EDS.). Pesam-UPLB, Laguna, Philippines.
- [18]. Terrel, R.T., dan J.L Walter. 1986. "Modified Asphalt Pavement Materials- The Europe Experience. 'Proceedings. From the Association of Asphalt Paving Technologies, Vol. 55.
- [19]. Runtukahu, T dan Kandou, S. (2014). *Pembelajaran Matematika Dasar Bag Anak Berkwsultan Belajar*. Yogyakarta: Ar-Ruzz Media.
- [20]. Hodson, D. Laboratory work as scientific method: Three decades of confusion and distortion, 1996. *Journal of Curriculum Studies(Online)*, <http://65.54.113.26/Publication/3305623/laboratory-work-as->

scientific-method-three-decades-of-confusion-anddistortion,

- [21]. Atsnan, M.F., &Gazali, R.Y. 2013. PenerapanPendekatan Scientific dalamPembelajaranMatematika SMP Kelas VII MateriBilangan (Pecahan). Makalah dipresentasikan dalam Seminar Nasional Matematika dan Pendidikan Matematika dengan tema "Penguatan Peran Matematika dan Pendidikan Matematika untuk Indonesia yang Lebih Baik" pada tanggal 9 November 2013 di Jurusan Pendidikan Matematika FMIPA UNY
- [22]. Sani, R.A., 2014. Pembelajaran Sainifik untuk Implementasi Kurikulum 2013. Jakarta: PT. BumiAksara.
- [23]. Hidayah,N, Pengertian dan Langkah-langkah Pembelajaran Sainifik. [http://www.nurulhidayah.net/879pengertian-dan langkah pembelajaran saintifik. html#!](http://www.nurulhidayah.net/879pengertian-dan%20langkah%20pembelajaran%20sainifik.html#!) Pretty Photo (Online).
- [24]. Marjan, J., 2014, Pengaruh Pembelajaran Pendekatan Sainifik Terhadap Hasil Belajar Biologi dan Keterampilan Proses Sains Siswa MA Mu'allimat NW Pancor Selong Kabupaten Lombok Timur Nusa Tenggara Barat. e-Journal Program Pascasarjana Universitas Pendidikan Ganesha Program Studi IPA.
- [25]. Ibrahim, M., 2010, Dasar-dasar Proses Belajar Mengajar. (Surabaya: Unesa University Press,).
- [26]. Kementrian Pendidikan dan Kebudayaan, 2013, Lampiran Peraturan Menteri Pendidikan dan Kebudayaan Nomor 81A tahun 2013, Jakarta
- [27]. Varelas, M and Ford M. 2009, The scientific method and scientific inquiry: Tensions in teaching and learning. USA: Wiley Inter Science.
- [28]. Enose, M, W. 2010. Piaget's theory of intellectual development and its implication for instructional management at presecondary school level. Journal Educational Research and Reviews, Vol. 5(7), pp. 366-371, July 2010. <http://www.academicjournal.org/ERR2>
- [29]. Randler,C. and Bogner,F.X.(2008). Planning Experiments in Science Education Research: Comparison of a Quasi-Experimental Approach with a Matched Pair Tandem Design. International Journal of Environmental & Science Education 3. (3),95-103
- [30]. Sofa, Pakde. 2008. Keterampilan Bertanya, Mendengar dan Evaluasi dalam pembelajaran Fisika, (online), (<http://massofa.wordpress.com/2008/02/04/keterampilan-bertanya-mendengar-dan-evaluasi-dalam-pembelajaran-fisika>)
- [31]. Wlodkowski Raymond J., 2004, Hasrat Untuk Belajar, Jakarta, Pustaka Pelajar.