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STUDENTS' MATHEMATICAL PROBLEM SOLVING ABILITY AND DISPOSITION USING CONTEXTUAL TEACHING AND LEARNING APPROACH

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ABSTRACT

The aim of this study is to analyze the role of contextual teaching and learning (CTL) approach on students' mathematical problem solving ability (MPSA) and disposition (MD). The study is a pre-test post-test experimental control group design, that involved 40 tenth grade students of Madtasah Aliyah in Bandung, that were chosen by purposive sampling technique. The instruments used in this study consisted a mathematical problem solving test (4 essays) and a mathematical disposition scale (26 statements). The study found that on MPSA, its normalized gain and on MD students getting treatment with CTL attained better grades than grades of students taught by conventional teaching. Even though both students' grades on MPSA were still at a very low level, but first group students' grade on MD was at a medium level and the second group students' grade was at a low level. Many students still experiencing difficulties on compiling MPSA. The other findings, there was no association between MPSA and MD, but students performed good perception toward CTL approach.

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INTRODUCTION

Based on limited observation when researchers visit to a mathematics lesson class in one of Madrasah Aliyah (MA) in Bandung, we found that most of the students able to solve simple mathematics problems without any difficulties. Even though, when students met non-routine mathematics story problem, some students were not able to solve it. They did not know how to begin to solve the problems. They are confused and worried, moreover they avoid to solve such kind of problems. However, some other students try to solve the problem, despite they should work harder and it takes a longer time. The students try to identify the known data and unknown data, and then they relate them into mathematical model and solve it. They felt enthutiastic to solve the unsual mathematics problem. The first case illustrated students' condition with low mathematical ability and low disposition. While the second condition illustrated students'

condition with high level mathematical problem solving ability (MPSA) and disposition (MD). However, those conditions are a normal situation in mathematics teaching and learning. Even though, teachers should still attempt to help students to overcome their difficulties on solving the non routine mathematical problems, such as mathematical problem solving (MPSA) tasks.

In fact, mathematical problem solving ability (MPSA) is essential mathematics ability that should possess by and be improved on junior high school students. Some reasons found that statement among other things is MPSA is attached in the goal of mathematics teaching (Departemen Pendidikan Nasional, 2013, NCTM, 2000). Furthermore, the importance of possessing MPSA by students is in line with Branca's conception (1980, as cited in Sumarmo, 2010) namely: Mathematical problem solving constitutes main process in the goal of teaching-learning mathematics, moreover it is basic ability and the heart of mathematics.

Polya (1985) proposes that problem solving is an effort to seek way out from a case which not easy to solve. So, when the student is going to solve an unsual problem or problem solving task, he or she should have strong desire and motivation for solving it, and he or she believes will succeed in other mathematics task as well. Having desire and strong motivation for learning will help student not easy to give up when he or she meets with difficulties. That situation ilustrates a positive attitude on mathematics learning and it is called as mathematical disposition (MD). Student who has high order mathematics thinking such as MPSA usually has high MD as well. But not conversally. It means that MD constitutes as a prerequisite for mastering MPSA.

As an implication of that statement, it is rational that one of mathematics teacher's task is to improve student's MPSA and MD accordingly. In fact, this implication is in line with suggestion of mathematics curriculum (Departemen Pendidikan Nasional, 2013). A kind of innovative mathematics teaching-learning approach which conform to suggestion of Kurikulum 2013 is contextual teaching and learning (CTL). Ibrahim (2011) and Johnson (2010) propose different conception about CTL, however they illustrate a teaching-learning approach wich start with presenting a relevant contextual problem for obtaining concept understanding and then it is developed in order to master the other higher abilities. The presented contextual problem should relate to the content are going to learn, to the student's prior ability, and to a real daily life. Johnson (2010) offered some phases in CTL namely: constructivism philoshopy, inquiry, question; learning community, modeling, reflecting, and autenthic assessment. Refering to those activities in CTL, and in MPS and attitudes traits in MD, researchers predict that CTL will conform with our wish.

The afformentioned arguments motivate researchers to carry out a study having a goal to analize the role of CTL on student' MPSA and MD and formulate problems our study as follow.

1. Are the grades of mathematical problem solving ability, its Normalized Gain (N-Gain) and mathematical disposition of students getting treatment with CTL better than the grades of students taught by conventional teaching?
2. Is there any association between MPSA and MD in CTL class?
3. What kinds of difficulties do students meet in completing MPSA tasks in both classess?
4. What is students' perception toward the implemented CTL?

Some times, people often think that solving a mathematical problem is similar to completing a mathematical problem solving. In fact, solving a mathematical problem means is to solve general mathematics task from the simplest one up to very complicated mathematical task. While the second term, mathematical problem solving is not simple or routine mathematical task such as Polya's conception (1985) that to complete a mathematical problem solving is an

effort to seek way out from a case of mathematical problem which not easy to solve. In addition to that, Lester and Kroll (1990) state a problem solving is a task that there is no complete algoritm for obtaining a solution. Krulik and Rudnik (1995) declare that problem solving is a process which an individu uses his or her owned knowlegde, skill, and understanding for solving a problem in unknown situation. Thus, a mathematical problem solving is not a simple mathematics task. Refering to the importance of possessing MPSA by high school student, so Departemen Pendidikan Nasional (2013) and NCTM (2000) attach MPSA in the goal of teaching mathematics.

Some experts analyze mathematical problem solving from different point of views. Polya (1985, as cited in Hudoyo, 2003) proposes there were two kinds of mathematical problem, such as: a) Problem for finding teoritically or practically, abstract or concreet; b) Problem for proving that to point out a statement is true, false, or non of them. Other writer, Yee (2005, as cited in Hendriana, Rohaeti, Sumarmo, 2016) classifies mathematical problem into two kinds namely: closed problem and open-ended problem. A closed problem or well-structured problem when it is clear what is be asked, and has only one answer. While open-ended or ill-structured problem when the formula of problem is unclear, or it might be un-complete information, and arises some strategies or some solutions. Further, in sense problem solving as a process, Polya (1985) offers four steps problem solving as follow: a) To understand the problem: to identify the known and unknown element, and formulate them into a mathematical model and to examine sufficiency element for solving the problem; b) To sellect solving strategy, to elaborate; c) to execute enumeration or solving mathematical model; d) To interpret solution toward the previous problem, and to examine the truth of solution.

When we closed attention on activities in completing a mathematical problem solving, beside student should master a certain mathematics content, student needs to possess positive mathematical attitudes among other things are: persistent, liking mathematics, having interest in learning mathematics. In other words, student has high desire to solve a difficult mathematics task. Andiwinata (2015), Polking (as cited in Sumarmo, 2010, Hendriana, Rohaeti, Sumarmo, 2016) and Priyanto (2016) call the positive mathematical attitudes as mathematical disposition (MD). Furthermore, Polking details indicator of mathematical disposition as follow: a) Having self efficacy in solving problem, giving a reason, and communicating mathematics ideas; b) Having flexible attitude in investigating mathematics ideas, and attempting to get various strategy in solving problem; c) Having persistent, interested in and curious attitudes; d) To perform habit to monitor and metacognitive thinking; to demonstrate appreciation to the role of mathematics in culture and value and in mathematics as a tool and symbol language. Similar indicators of MD are proposed by Silver (as cited in Sumarmo, 2010, Hendriana, Rohaeti, Sumarmo, 2016) such as: self confidence, self efficacy, curious, fond of doing mathematics tasks, dilligent and persistent, flexible, and reflective attitudes.

Some experts suggest some activities for improving mathematical disposition namely: a) Create condusive learning environment, avoid irrelevant student's activity, help students to manage their time, and promote self confidence for being un-easy panic (Schunk as cited in Hendriana, Rohaeti, Sumarmo, 2016); b) Make student realize on the importance of posessing mathematical disposition attitudes.perform teacher to behave mathematical disposition attitudes, familiarize students to behave mathematical disposition attitudes, and carry out integrated and continous mathematics teaching-learning process (Sauri, 2010).

Mathematics curriculum (Departemen Pendidikan Nasional, 2013) suggests that mathematics ability such as MPSA and mathematics attitudes namely DM should be improved accordingly and proportionaly. Polya (1985), and Glasersfeld (as cited in Suparno, 1997) propose a worthwhile expression of teacher's role that is teacher's task is not only to deliver information but the most important thing is to help students to construct mathematics concepts by their own

ability, and then using assimialation and accomodation processes students composed a new meaningful concept. In order to conform suggestion of mathematics curriculum, Polya's suggestion, (1985) and Glasersfeld's advises (as cited in Suparno, 1997), researchers select contextual teaching and learning (CTL) for improving student's MPSA and MD. Rusman (2012), explains that CTL is a teaching approach which starting by presenting a relevant contextual problem for mastering a concept and then, it is developed for obtaining other higher mathematics abilties. For conducting CTL, Rusman, (2012), proposes seven main phases of CTL such as: constructivism philoshopy, to guide students by questioning; to motivate students, to invent; to build learning society; modelling; reflection; and authentic assessment.

In those phases of CTL, student is facilitated for mastering the learned concept and obtaining other higher mathematics ability such as MPSA, and for promoting positive learning habit such as persistent, self confidence, working together, unafraid to face difficult mathematics tasks which constitutes of MD attitudes. This argument supports researchers' selection that CTL will be conformed with our wish.

Such as any teaching approach, there are advantages and disadvantages of CTL. Mahanani (2014) explains some advantages of CTL namely: Teaching learning become more meaningful, and real, b) Teaching learning process become is more productive, CTL is centered on student's activities cognitively and affectively, class room not only for getting information but as a palce for student to test their invention, a new knowlegde is invented by student and not informed by teacher, a CLT situation is pleasantly. Besides those advantages, Mahanani (2014) proposes some disadvantanges of CTL such as: CTL needs more time, maybe arouse non condusive class situation, teacher needs to give more attention and guides.

Some studies reported superiorities of CTL on improving students' MPSA (Fitriani, 2017, Julianti, 2016, Permata, 2015, Yonandi, 2010), on students' MD (Bernard and Rohaeti, 2016, Fitriani, 2017, Ruhiyat and Sugandi, 2017). In those studies students' MPSA were at medium grade level, while students' MD were at fairly good level. Even tough, students getting treatment with conventional teaching attained at low grades level on MPSA and at medium grades level on MD. Beside that, some studies (Johanto, 2017, Julianti, 2016, Madio, and Sofyan, 2017, Nurmayanti, 2016, Pujiastuti, 2014, Rosalina, 2016) reported that students getting treatment with various innovative teaching approaches attained at medium-fairly good grade level on MPSA, whereas student taught by conventional teaching at low-medium grade level. Despite some students mostly taught by conventional teaching still realized difficulties on compiling MPSA, those studies pointed out that CTL and other innovative teaching approaches had better role than conventional teaching on enchancing students' MPSA. Considering of findings on those studies and MPSA and MD as essential mathematics learning outcomes for high school students, teachers should still improve students' MPSA and MD by carrying out CTL or other innovative teaching approaches.

METHOD

This study is an experiment with pretest postest and controll group design having a goal to analize the role of CTL on improving student's MPSA (Sample 1 and 2) and MD (Table 1). The subjects of study are 40 tenth grade students from a Madrasah Aliyah (MA) in Bandung. The MA is determined purposively, and the students are from two thenth grade classes which selected ramdomly from five classes of tenth grade in the MA. Instruments of this study consist of a mathematical problem solving test, and a mathematical disposition scale. The test consists of 4 essays and the scale consists of 26 statements. Using Hendriana and Sumarmo (2016) and Sumarmo (2015) as references, the study obtained charaterictics of the MPSA test as follow. The item validity (IV) are ranged between $.65 < IV < .90$; the reliability test (r) is $r = .41$,

discriminant power (DP) is .27< DP <.44, and difficulty index (DI) is .24 < DI < .67. In the following we attach some samples of the instruments of this study.

Sample 1. Item test of MPSA

It is given Δ ABC with right angle in B, AC is $2\sqrt{5}$ cm and BC is $2\sqrt{3}cm$. Point D is in AC line so that $\angle BAD = \angle DBC$. Draw a figure to represent the information, formulate mathematical model for calculating BD and AD, and then solve them. Examine the truth of your answer.

Sample 2. Item test of MPSA

Two boat A and B having a distance 10 km. The boat B is in direction of $100°$ from boat A. Boat C in in direction of $160°$ from A. Boat C is in direction of $200°$ form B.

a. Draw a sketch of that situation.

b. Determine the distance of C from A and from B

c. Examine the truth of your answer accompanied with expalantion.

(Notes: $Sin\ 40° = 0{,}6428$; $Sin\ 80° = 0{,}9848$; $Sin\ 60° = 0{,}866$)

Table 1. Some statements of MD

No.	Statements	SA	A	DA	SDA
1	I realized that mathematics plays an important role in fields such as economics and science				
2	I have trouble converting math problems related to everyday life into mathematical situations				
3	If I come across a math problem that's difficult, I'll try to solve it first before asking my friends				
4	I have trouble finding alternative methods of solving math problems				

Note: SA: strongly agree; A: agree; DA: disagree; SDA: strolngly disagree

Table 1 show some of statements for testing mathematical disposition. We give it to the participant to see how mathematical disposition of senior high school students.

RESULTS AND DISCUSSION

Results

Statistics Description of student's MPSA, its N(Gain) and students' MD is attached in Table 1. From Table 2, study found there were no difference grades of student's MPSA in both classess before the learning process, and the grades were very low (12.64% and 11.91% out of ideal score). After the learning process, on MPSA, its N(Gain) and on MD, students getting treatment with CTL attained higher grades than the grades of student taught by conventional teaching. On MPSA, both grades were still at a low level (36.09% and 27.36% out of ideal score), while on MD the both grades were at a low-medium level (61.23 % and 56.08% out of ideal score) and on N< Gain> of MPSA, the grade still at a low grade level (.27 and .18).

Tabel 2. Statistics Descriptions of Students' MPSA and Students' MD in Both Teaching Approaches

Variables	Statistic	CTL (n= 20 Sts)			Conventional Teaching (n = 20 Sts)		
		Pretest	Posttest	N-Gain	Pretest	Posttest	N-Gain
MPSA IS: 55	$\bar{x}$	6.95	19.85	.27	6.55	15.05	.18
	%	12.64	36.09		11.91	27.36	
	SD	7.56	4.82		1.79	5.29	
MD IS: 106	$\bar{x}$		64.90			59.45	
	%		61.23			56.08	
	SD		6.58			8.01	

The testing hypothesis of mean difference of MPSA, its N Gain of MPSA, and of MD were attached on Table 3.

Table 3. Testing Hypothesis of Mean Difference of MPSA, and MD on Both Teaching Approaches

Variables	Teaching Approach	$\bar{x}$	SD	N	Sig (2-tailed)	Sig (1-tailed).	Interpretation
MPSA	CTL	19.85	4.82	20	0.005	0.0025< 0.05	$MPSA_{CTL}$ > $MPSA_{CT}$
	CT	15.05	5.29	20			
N-Gain MPSA	CTL	0.27	--	20	0.000	0.000 < 0.05	N-Gain $MPSA_{CTL}$> N-Gain $MPSA_{CT}$
	CT	0.39	--	20			
MD	CTL	64.90	6.58	20	0.024	0.012 < 0.05	MD_{CTL}> MD_{CT}
	CT	59.45	12.78	20			

Note: MPSA: Mathematical Problem Solving Ability Ideal score: 55

MD : Mathematical Disposition Ideal score MD:106

Further analysis is about association between mathematical problem solving ability (MPSA) and mathematical disposition (MD). The association was analyzed by using contigency table such as in Table 4 and using χ^2 testing in Table 4. From Table 3, it was found that there were different numbers of students with similiar level on MPSA and MD, such as Medium MPSA (2) and medium MD (16), low MPSA (18) and low MD (1).

Table 4. Contingency Table of MPSA and MD In CTL Class

MPSA \ MD	High	Medium	Low	Total
Medium	0	2	0	2
Low	3	14	1	18
Total	3	16	1	20

In Table 5, the analysis obtained value $\chi^2 = .556^a$ and sig.(2 tailed- .757 > .05). This meant that there was no association between MPSA and MD.

Tabel 5. Chi-Square (X^2) Test for Mathematical Problem Solving Ability and Disposition

	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	0.556[a]	2	0.757
Likelihood Ratio	0.947	2	0.623
Linear-by-Linear Association	0.111	1	0.739
N of Valid Cases	20		

Observing the low grade level of students' MPSA (those were 27.36% and 36.09% out of ideal score), it pointed out that there were many students realized difficulties in solving MPSA tasks. This analysis was supported by mean score of each item task of MPSA such as in Table 6. In almost mean score of item of MPSA less than 50 % out of ideal score of its item test of MPSA. The finding of the very low grade level of students' MPSA this study was similar to the finding of Krismayanti (2017), however those findings were different with findings of other studies (Fitriani, 2017, Julianti, 2016, Permata, 2015, Yonandi, 2010) that using CTL and some other studies using various teaching approaches (Johanto, 2017, Julianti, 2016, Madio and Sofyan, 2017, Nurmayanti, 2016, Pujiastuti, 2014, Rosalina, 2016) students obtained at medium-fairly good grade level. It seemed that MPSA task constituted as difficult task for Madrasah Aliyah (MA) but not for senior high school students.

Table 6. Mean Score of Each Item Test of MPSA Tasks In Both Classessu

Item test	**IS**	**Teaching Approach**			
		CTL		**Conventional**	
		$\bar{x}$	**% out of IS**	$\bar{x}$	**% out of IS**
1	14	6.05	43.21%	4.30	30.71%
2	8	6.80	85.00%	4.05	50.62%
3	17	3.45	20.29%	3.55	20.88%
4	16	3.55	22.19%	3.15	19.69%

Results

Analysis of student's activities during CTL and conventional instruction were illustrated in Figure 1, Figure 2, Figure 3, and Figure 4. Despite students obtained at low grade level on MPSA, and at medium grade level on MD, students performed more active compared to students' actitivities in conventional instruction. This condition might be caused of students not mastered yet prerequisite of mathematics content of this study. Hence, before teacher are going to teach a new mathematics content, teacher should examine students' mastering the prerequisite of the new mathematics content.

Figure 1 show that how students unafraid to ask teacher when they not understand, figure 2 show that how students still passionate worked in a small group, figure 3 show that students

were discussing their opinion in small working group, and figure 4 show that how students represent their discussion results.

Figure 1. Students was unafraid to ask to teacher when she did not understand teacher's explanation in CTL instruction

Figure 2. Students were still passionate worked in small group despite teacher observed them

Figure 3. Students were discussing in their small working group

Figure 4. A representative student of a group explained their work in front of the class

CONCLUSION

Based on findings and discussion, the study derives conclusion and suggestion as follow. Contextual teaching and learning (CTL) confered better role than conventional teaching on improving student's mathematical problem solving ability (MPSA), its N(Gain), and student's mathematical disposition (MD). On those learning mathematics outcomes, students getting treatment with contextual teaching and learning obtained better grades than the grades of students taught by conventional teaching. Although, students' MPSA in both classess were still at low grades level. Like that on MD, first group students attained at medium grade level while the second group students obtained at low grade level. Students in both classess still realized difficulties in solving mathematical problm solving tasks. Other conclusion were that there was no association between MPSA and MD, and students performed active learning during CTL instruction.

In this study, students' MPSA were still at a low grade level. In order to improve students' MPSA it is suggested before teacher are going to teach a new mathematics content, teacher should have to examine students' mastering the prerequisite of mathematics will be learned. Further for obtaining better students' grade on MD, it was suggested a) Create condusive learning environment, avoid irrelevant student's activity, help students to manage their time, and promote self confidence for being un-easy panic; b) Make student realize on the importance of posessing MD attitudes, teacher should behave as wish in MD attitudes, familiarize students

to behave as wish in MD attitudes, and carry out integrated and continous mathematics teaching-learning process.

REFERENCES

Andiwinata, E. (2015). *Pengertian Disposisi Matematika.*[Online]. Tersedia: http:// coretanmahasiswa19. blogspot. co. id / 2015 / 06 / pengertian- disposisi-matematik.html. [12 Juli 2017]

Bernard, M. and Rohaeti, E. E. (2016). "Meningkatkan Kemampuan Penalaran dan Disposisi Matematik Siswa SMK dengan Pendekatan Kontekstual melalui Game Adobe Flash Cs 4.0.". Paper published in: *Edusentris: Jurnal Ilmu Pendidikan dan Pengajaran.*Vol.3. No.1. April. 2016, hal. 85-94.

Branca, N.A. (1980). *Problem Solving as a Goal, Process and Basic Skills*. In S. Krulik and R.E. Reys (Eds). *Problem Solving in School Mathematics*. Washington DC: NCTM

Dewi, I.K. (2017*). Penerapan Pendekatan Reciprocal Teaching untuk Meningkatkan Kemampuan Komunikasi dan Pemecahan Masalah Matematik serta Kemandirian Belajar Siswa SMK*. Unpublished Thesis at Graduate Study Program of STKIP Siliwangi Bandung.

Departemen Pendidikan Nasional. (2013). *Kajian Kebijakan Kurikulum Mata Pelajaran Matematika.* [*Online*]. Tersedia: http://puskurbuk.net/web13/download/prod2007/50Kajian%20Kebijakan%20 Kurikulum%20Matematika.pdf [...]

Fitriani, U. (2017). *Meningkatkan Kemampuan Pemecahan Masalah dan Berpikir Kritis serta Disposisi Matematik Siswa SMP melalui Pendekatan Kontekstual*. Unpublished Thesis at Graduate Study Program of STKIP Siliwangi Bandung.

Hendriana, H. dan Sumarmo, U. (2014). *Penilaian Pembelajaran Matematika.* PT Refika Aditama: Bandung

Johanto, T. (2017). *Meningkatkan Kemampuan Komunikasi dan Pemecahan Masalah Matematik serta Kepercayaan Diri Siswa SMA melalui Pendekatan Problem-Based Learning.* Unpublished Thesis at Graduate Study Program of STKIP Siliwangi Bandung.

Julianti (2016). *Mengembangkan Kemampuan Pemecahan Masalah dan Komunikasi Matematik Serta Kemandirian Belajar Siswa SMA melalui Pendekatan Kontekstual* . Unpublished Thesis at Graduate Study Program of STKIP Siliwangi. Bandung.

Krismayanti, R. (2017). *Peningkatan Kemampuan Pemecahan Masalah dan Berfikir Kreatif serta Self Efficacy Matematis Siswa SMP melalui Pembelajaran Berbasis Masalah*. Unpublished Thesis at Graduate Study Program of STKIP Siliwangi. Bandung.

Lester, F.K. dan Kroll, D.L. (1990). "Assessing Students Growth in Mathematical Problem Solving", In Kuhn, G. (Ed.) *Assessing High Order Thinking in Mathematics*. Washington DC.: American Association for the Advancement of Science.

Madio, S. S. dan Sofyan, D. (2017). *Meningkatkan Kemampuan Pemecahan Masalah dan Komunikasi Matematik melalui Pendekatan Problem Posing dalam Pembelajaran Matematika Di SMA*. [Online]. Tersedia: http://www.e-mosharafa.org/index.php/ mosharafa/article/download/mv6n1_9/pdf_1. [27 Juni 2017]

Mahanani, F. A. (2014). *Keunggulan dan Kelemahan Pembelajaran Kontekstual (CTL)*. [Online]. Tersedia: http://webcache.googleusercontent.com/search?q=cache:32rHpI QhSV0J: www.m-edukasi.web.id/2014/08/keunggulan–dan-kelemahan-pembelajaran. html+ &cd=1&hl = en & ct = clnk & gl = id [22 Januari 2015]

Nurmayanti, I.R. (2016). Peranan Strategi Think Talk and Write untuk Mengembangkan *Kemampuan Pemecahan Masalah dan Berpikir Kritis Matematis serta Self Concept Siswa SMK di Cimahi.* Unpublished Thesis at Graduate Study Program of STKIP Siliwangi. Bandung.

Peraturan Menteri Pendidikan Nasional No. 81a Tahun 2013 tanggal 27 Juni 2013 tentang Implementasi Kurikulum Standar Isi.

Permata, R. D. (2015). *Upaya Meningkatkan Kemampuan Pemecahan Masalah Matematika melalui Pendekatan Contextual Teaching and Learning (CTL) Siswa Kelas VIIID SMP Negeri 1 Mlati.* [Online]. Tersedia: http://repository.upy.ac.id/249/1/ARTIKEL%20RIZA%20DYAH%20PERMATA. pdf. [27 Juni 2017]

Polya, G. (1985). *How to Solve It. A New Aspect of Mathematical Method (2nd ed.)*. New Jersey: Princenton University Press

Pradhini, G. A. (2016). *Meningkatkan Kemampuan Komunikasi dan Pemecahan Masalah serta Disposisi Matematis Siswa SMA melalui Strategi REACT.* Unpublished Thesis at Graduate Study Program of STKIP Siliwangi Bandung.

Priyanto, D. (2013). *Indikator Kemampuan Afektif.* [Online]. Tersedia: http://danapriyanto. blogspot. co. id /2013/ 01/ indikator-kemampuan-afektif_ 5872.html. [15 Maret 2016]

Pujiastuti, H. , Kusumah, Y.S. , Sumarmo, U, Afgani J. D (2014). "Inquiry Cooperation Model Enchanching Yunior High School Students' Mathematical Problem Solving Ability" Paper published in *International Journal of Contemporary Educational Research*. (IJCER). Volume 1, Number 1, January 2014, Page 51-60, ISSN: 2148-3868 . www.ijcer.net.

Qodariyah, L. dan Rohaeti, E.E. (2016) *Mengembangkan Kemampuan Komunikasi dan Disposisi Matematik Siswa SMP melalui Discovery Learning.* [Online]. Tersedia: http://id.portalgaruda.org/article.php?article=402259&val=5628 [10 Mei 2016]

Rosalina, D. (2016). *Penerapan Pembelajaran Inkuiri Terbimbing terhadap Kemampuan Pemecahan Masalah dan Koneksi Matematik Siswa SMP ditinjau dari Tingkat Kecemasan Matematika*. Unpublished Thesis at Graduate Study Program of STKIP Siliwangi. Bandung.

Ruhiyat, A. and Sugandi, A.I. (2017). Meningkatkan Kemampuan Berpikir Kreatif dan Disposisi Matematik Siswa SMP dengan Menggunakan Pendekatan Kontekstual. Published in *Edusentris: Jurnal Ilmu Pendidikan dan Pengajaran.* Vol. 3, No.1, April 2017, pp 281-289.

Rusman (2012). *Model-Model Pembelajaran Mengembangkan Profesionalisme Guru.* Jakarta: PT Raja Grafindo Persada.

Sumarmo, U. (2011). *Pendidikan Karakter dan Pengembangan Kemampuan Berpikir dan Disposisi Matematik serta Pembelajarannya*. Paper presented in matriculation program at Graduate School of UPI, Agustus 8-13, Bandung.

Sumarmo, U. (2015). *Rubrik Pemberian Skor Tes Kemampuan Matematika*. Tersedia: http/www.utari-sumarmo.dosen.stkipsiliwangi.ac.id [30 Juli 2016]

Suparno, P. (1997). *Filsafat Konstruktivisme dalam Pendidikan.* Yogyakarta: Kanisius.

Yonandi (2010). *Meningkatkan Kemampuan Komunikasi dan Pemecahan Masalah Matematik melalui Pembelajaran Kontekstual Berbantuan Komputer pada Siswa Sekolah Menengah Atas.* Unpublished Dissertation at Graduate School of Universitas Pendidikan Indonesia.