

**PROFESSIONAL DEVELOPMENT FOR SUPPORTING
PRIMARY SCHOOL TEACHERS IN PROMOTING
STUDENTS' MATHEMATICAL REASONING USING
REALISTIC MATHEMATICS EDUCATION**

(A Design Research for Teacher Professional Development in Primary School)

A Dissertation Submitted in Partial Fulfilment of the Requirements for
Doctor of Elementary Education



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**DEPARTMENT OF ELEMENTARY EDUCATION
SCHOOL OF POSTGRADUATES STUDIES
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Dr. Indonesia University of Education, 2023
M.Sc. Sriwijaya University, FIsme-The Netherlands, 2011

A Dissertation Submitted in Partial Fulfilment of the Requirements for Doctor of
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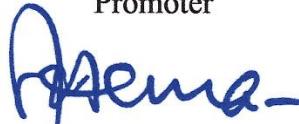
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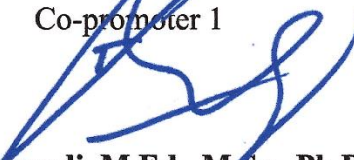
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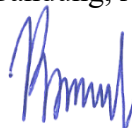


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STATEMENT OF ORIGINALITY

This is to certify that to the best of my knowledge, the content of dissertation entitled “**Professional Development for Supporting Primary School Teachers in Promoting Students’ Mathematical Reasoning using Realistic Mathematics Education**” is my own work. This dissertation has not been submitted for any degree or other purposes. I certify that the intellectual content of this dissertation is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged. I am not plagiarizing or citing in ways that are inconsistent with the ethics of science prevailing in scientific societies. On this statement, I am ready to bear the risks/sanctions if in the future found a violation of scientific ethics or there are claims from others to the authenticity of this work of mine.

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PERNYATAAN

Dengan ini saya menyatakan bahwa disertasi dengan judul “**Professional Development for Supporting Primary School Teachers in Promoting Students’ Mathematical Reasoning using Realistic Mathematics Education**” ini beserta seluruh isinya adalah benar-benar karya saya sendiri. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menanggung resiko/sanksi apabila dikemudian hari ditemukan adanya pelanggaran etika keilmuan atau ada klaim dari pihak lain terhadap keaslian karya saya ini.

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Puri Pramudiani

ABSTRACT

Pramudiani, P. (2023). Professional Development for Supporting Primary School Teachers in Promoting Students' Mathematical Reasoning using Realistic Mathematics Education.

Reasoning is one of the abilities that students must possess in understanding mathematical concept. Through mathematics instruction, teachers play an important role in fostering students' mathematical reasoning. However, attention in developing teachers' ability in this area is still limited. Therefore, there is a need to develop the Teacher Professional Development (TPD) program that is focused on supporting Students' Mathematical Reasoning (SMR). This study aims to analyse the characteristics of an effective TPD program in promoting SMR. The task design was developed as a tool for teachers in classroom practices. The Realistic Mathematics Education (RME) Approach underlies the task design in terms of context and activities. Design research was chosen to reach the research goals. It comprised a lesson material, learning activities, and the classroom setting. This study was conducted in two countries, Indonesia and the Netherlands. There were 3 Dutch RME Experts, 5 Dutch primary school teachers, 3 Indonesian RME Experts, 13 Indonesian primary school teachers, and 320 Indonesian 4th-grade of primary school students from 5 schools in Banten and West Java involved in this study. The results of this study indicated that the task design using RME approach, specified in the Challenging and Realistic (CHANTIC) context, can establish teachers' foundational abilities, namely Teachers' Noticing and Teachers' Reflective Ability (NARA) in promoting SMR. Furthermore, the prototype of Design Principles of the TPD program has proven effective in promoting SMR. Implications of the study's findings can become a reference for TPD program in Indonesia, especially in mathematics.

Keywords: Design Research, Primary School Teacher, Realistic Mathematics Education, Students' Mathematical Reasoning, Teacher Professional Development

ABSTRAK

Pramudiani, P. (2023). *Pengembangan Profesionalisme Guru Sekolah Dasar dalam Menanamkan Penalaran Matematis Siswa dengan Menggunakan Pendidikan Matematika Realistik.*

Penalaran merupakan salah satu kemampuan yang harus dimiliki siswa dalam memahami konsep matematika. Melalui pembelajaran matematika, guru berperan penting dalam meningkatkan penalaran matematis siswa. Namun perhatian dalam mengembangkan kemampuan guru untuk meningkatkannya masih terbatas. Oleh karena itu, perlu dikembangkan program Pengembangan Profesi Guru yang difokuskan untuk mendukung penalaran matematis siswa. Penelitian ini bertujuan untuk menganalisis karakteristik program Pengembangan Profesi Guru yang efektif dalam menanamkan penalaran matematis siswa. Penelitian desain dikembangkan sebagai alat untuk guru dalam praktek di kelas. Pendekatan Pendidikan Matematika Realistik (PMR) mendasari desain tugas dari segi konteks dan aktivitas. Desain penelitian dipilih untuk mencapai tujuan penelitian yang terdiri dari pengembangan bahan ajar, kegiatan belajar, dan pengaturan kelas. Penelitian ini dilakukan di dua negara, Indonesia dan Belanda. Penelitian ini melibatkan 3 Pakar RME di Belanda, 5 guru SD Belanda, 3 Pakar Pendidikan Matematika Realistik Indonesia, 13 guru SD di Indonesia, dan 320 siswa SD kelas 4 dari 5 sekolah di Banten dan Jawa Barat, Indonesia. Hasil penelitian ini menunjukkan bahwa rancangan tugas dengan pendekatan RME yang dispesifikasikan dalam konteks Challenging and Realistic (CHANTIC) dapat mendukung kemampuan dasar guru yaitu Teachers' Noticing dan Teachers' Reflective Ability (NARA) dalam menanamkan penalaran matematis siswa. Selain itu, prototipe prinsip desain program pengembangan profesi guru telah terbukti efektif dalam menanamkan penalaran matematis siswa. Implikasi dari temuan penelitian ini dapat menjadi acuan bagi program pengembangan profesi guru di Indonesia khususnya dalam bidang matematika.

Kata kunci: *Penelitian Desain, Guru Sekolah Dasar, Pendidikan Matematika Realistik, Penalaran Matematika Siswa, Pengembangan Profesi Guru*

TABLE OF CONTENTS

TITLE	i
STATEMENT OF ORIGINALITY	ii
ACKNOWLEDGEMENTS.....	iv
ABSTRACT	vi
TABLE OF CONTENTS.....	viii
LIST OF FIGURES	x
LIST OF TABLES	xviii
LIST OF ABBREVIATIONS	xix
CHAPTER I INTRODUCTION.....	1
1.1 Background of The Study	1
1.2 Research Question	5
1.3 Aims of This Study	6
1.4 Significance of The Study.....	7
1.5 Limitation of The Study.....	8
1.6 Structure of the Dissertation	8
CHAPTER II LITERATURE REVIEW	9
2.1 Students' Mathematical Reasoning.....	9
2.2 Teachers' Ability	10
2.3 Realistic Mathematics Education.....	16
2.4 Task Design	19
2.5 The Use of Task Design for Teacher Professional Development.....	24
2.6 Terminology.....	27
2.7 Research Roadmap.....	28
CHAPTER III RESEARCH METHOD	31
3.1 Research Design.....	31
3.2 Participants.....	32
3.3 Data Collection	33
3.4 Data Analysis	33
3.4.1 Problem Identification and Needs Analysis	38
3.4.2 Design Development and Implementation.....	38
3.4.3 Evaluation.....	40
3.4.4 Research Procedures	41

3.5 Ethical Issues	43
CHAPTER IV RESULTS AND DISCUSSION	44
4.1 Results.....	44
4.1.1 Phase 1: Problem Identification and Needs Analysis.....	44
4.1.2 Phase 2: Design Development and Implementation	70
4.1.3 Phase 3: Evaluation	183
4.2 Discussion	207
CHAPTER V CONCLUSION	214
5.1 Conclusion	214
5.1.1 What constitutes primary school teachers in promoting students' mathematical reasoning?	214
5.1.2 What is the level of teachers' ability to promote students' mathematical reasoning?.....	215
5.1.3 How tasks with mathematical reasoning orientation be used in the teacher professional development program?.....	215
5.1.4 What activities/ learning pathways and conditions of success are required to implement Primary School Teacher Professional Development in Promoting Students' Mathematical Reasoning?.....	216
5.2 Implication	217
5.3 Recommendation	217
REFERENCES.....	219
APPENDIX	233
APPENDIX I EXPERT JUDGEMENT RESULT	233
APPENDIX II RESEARCH INSTRUMENT.....	235
APPENDIX III <i>TRYING OUT TASK DESIGN MODEL</i>	248
APPENDIX IV CLASSROOM PRACTICES I	264
APPENDIX V REFLECTION CLASSROOM PRACTICES I	295
APPENDIX VI CLASSROOM PRACTICES II	302
APPENDIX VII: REFLECTION CLASSROOM PRACTICES II	375
APPENDIX VIII: THE PROTOTYPE OF TPD BASED ON SMR USING NARA CHANTIC.....	398

LIST OF FIGURES

Figure 2.1 The missing part context.....	20
Figure 2.2 The fraction context in Alles telt Q Basiswerkschrift (Wetering et al., 2020).....	21
Figure 2.3 The second task design	23
Figure 2.4 NARA – CHANTIC - SMR	23
Figure 2.5 Question for The Teachers.....	25
Figure 2.6 The Theoretical Framework of Professional Development.....	26
Figure 2.7 Research Roadmap Conducted by The Researcher about Realistic Mathematics Education	30
Figure 3.1 Design research, accumulative cyclic process.....	32
Figure 3.2 The Questions for Teachers in Professional Development Design	35
Figure 3.3 Research Flowchart	36
Figure 3.4 The Phases of Design Research for Teacher Professional Development in Primary School.....	37
Figure 3.5 Series of task design developed.....	40
Figure 4.1 FGD with PMRI Experts	45
Figure 4.2 Sharing with PMRI Teachers.....	49
Figure 4.3 Summer School in Utrecht University (Brainstorming of RME from Dutch Perspective)	50
Figure 4.4 Summer School in Utrecht University (Brainstorming of RME).....	51
Figure 4.5 Research Meeting in Freudenthal Institute (RME Context Brainstorming)	51
Figure 4.6 Discussion about PD System in Indonesia and in the Netherlands with DE1.....	52
Figure 4.7 The Various Topics of Mathematics in Context Books.....	55
Figure 4.8 Discussion with DE2 about Mathematics in Context.....	56
Figure 4.9 Discussion with DT1 about experiences in implementing RME in the Netherlands.....	57
Figure 4.10 DT2’s classroom in Utrecht, The Netherlands	58
Figure 4.11 Discussion with DT1 and DT2 about experiences in implementing RME in the classroom.....	60
Figure 4.12 Analysing Indonesian Textbook: <i>Tematik Terpadu</i>	61
Figure 4.13 Analysing Dutch Textbook: <i>Alles telt Q Basiswerkschrift</i>	62

Figure 4.14 Identification of tasks with mathematical reasoning (Pramudiani, Herman, Turmudi, Dolk, Doorman (2022)	63
Figure 4.15 The Question for Dutch Primary School Teachers.....	64
Figure 4.16 Answer of DRT1	64
Figure 4.17 Answer of DRT2	64
Figure 4.18 Answer of DRT3	65
Figure 4.19 The Question for Indonesian Primary School Teachers.....	65
Figure 4.20 Answer IRT1	66
Figure 4.21 Anwer IRT 2.....	66
Figure 4.22 Answer IRT 3	66
Figure 4.23 The Result of Task Design	69
Figure 4.24 The Stages of Task Design Developed (Pramudiani, Herman, Turmudi, Dolk, Doorman, 2022)	69
Figure 4.25 Focus Group Discussion of Research Design (RME Expert Review) in Freudenthal Institute, The Netherlands	71
Figure 4.26 The Trying Out of Model 1 in School A	74
Figure 4.27 The First Question of Model 1.....	75
Figure 4.28 (Translate) The First Question of Model 1	75
Figure 4.29 The Answer of Q1 by Tari.....	77
Figure 4.30 The Answer of Q1 by Rara.....	77
Figure 4.31 The Answer of Q1 by Nana.....	78
Figure 4.32 The Answer of Q1 by Caca	78
Figure 4.33 The Second Question of Model 1	79
Figure 4.34 (Translate) The Second Question of Model 1.....	79
Figure 4.35 The Answer of Q2 by Herry	80
Figure 4.36 The Answer of Q2 by Malik.....	80
Figure 4.37 The Answer of Q2 by Nana.....	81
Figure 4.38 The Answer of Q2 by Putra.....	81
Figure 4.39 The Answer of Q2 by Roni.....	81
Figure 4.40 The Answer of Q2 by Abi	82
Figure 4.41 The Third Question of Model 1	84
Figure 4.42 (Translate) The Third Question of Model 1	84
Figure 4.43 The Answer of Q3 by Caca	86
Figure 4.44 The Answer of Q3 by Malik.....	86

Figure 4.45 The Answer of Q3 by Rara	86
Figure 4.46 The Answer of Q3 by Abi	86
Figure 4.47 The Answer of Q3 by Tania	87
Figure 4.48 The Answer of Q3 by Yuni	87
Figure 4.49 The Answer of Q4 by Caca	87
Figure 4.50 The Answer of Q4 by Tasya	87
Figure 4.51 Birthday Cake Context	88
Figure 4.52 The Fifth Question of Model 1	89
Figure 4.53 The Answer of Q5 by Fuji	89
Figure 4.54 The Answer of Q5 by Roni	90
Figure 4.55 The Answer of Q5 by Jamilah	90
Figure 4.56 The Answer of Q5 by Caca	90
Figure 4.57 The Answer of Q5 by Dul	90
Figure 4.58 The Answer of Q5 by Nana	91
Figure 4.59 The Answer of Q5 by Abi	91
Figure 4.60 The Answer of Q5 by Zaid	91
Figure 4.61 The Answer of Q5 by Dafa	92
Figure 4.62 The Answer of Q5 by Malik	92
Figure 4.63 The Answer of Q5 by Tasya	93
Figure 4.64 The Answer of Q5 by Yuni	93
Figure 4.65 The Answer of Q5 by Lia	93
Figure 4.66 Question 6	94
Figure 4.67 Question 6 (Translate)	94
Figure 4.68 The Answer of Q6 by Abi	94
Figure 4.69 The Answer of Q6 by Jamilah	94
Figure 4.70 The Answer of Q6 by Zaid	94
Figure 4.71 The Answer of Q6 by Lia	95
Figure 4.72 The Answer of Q6 by Tania	95
Figure 4.73 The Answer of Q6 by Herry	95
Figure 4.74 The Answer of Q6 by Tasya	96
Figure 4.75 The Trying Out of Model 2 in School B	97
Figure 4.76 The First Question of Model 2	97
Figure 4.77 (Translate) The First Question of Model 2	97

Figure 4.78 The Answer of Q1 by Dhika.....	99
Figure 4. 79 The Answer of Q1 by Ghaisan	99
Figure 4.80 The Answer of Q1 by Ronald.....	100
Figure 4.81 The Answer of Q1 by Didi	100
Figure 4.82 The Answer of Q1 by Alvaro	100
Figure 4.83 The Answer of Q1 by Sony	101
Figure 4.84 The Class Discussion of Model 2	101
Figure 4.85 The Answer of Q1 by Sony	102
Figure 4.86 The Second Question of Model 2	103
Figure 4.87 (Translate) The Second Question of Model 2.....	103
Figure 4.88 The Answer of Q2 by Dhika.....	103
Figure 4.89 The Answer of Q2 by Roni.....	104
Figure 4.90 The Answer of Q2 by Kiki	104
Figure 4.91 The Third Question of Model 2	104
Figure 4.92 (Translate) The Third Question of Model 2	104
Figure 4.93 The Answer of Q3 by Nano.....	105
Figure 4.94 The Answer of Q3 by Ola.....	105
Figure 4.95 The Answer of Q4 by Alvaro	107
Figure 4.96 The Answer of Q4 by Riri	107
Figure 4.97 The Answer of Q4 by Dhika.....	107
Figure 4.98 Birthday Cake Context	108
Figure 4.99 Pilot Experiment in School A (1)	109
Figure 4.100 The First Question of Model 1.....	110
Figure 4.101 (Translate) The First Question of Model 1	110
Figure 4.102 The Answer of Q1 by Tita	111
Figure 4.103 The Answer of Q1 by Nana.....	111
Figure 4.104 The Second Question of Model 1	112
Figure 4.105 (Translate) The Second Question of Model 1.....	112
Figure 4.106 The Answer of Q2 by Rofa.....	113
Figure 4.107 The Answer of Q2 by Nuh.....	113
Figure 4.108 The Third Question of Model 1	113
Figure 4.109 (Translate) The Third Question of Model 1	113
Figure 4.110 The Answer of Q3 by Rani.....	114

Figure 4.111 The Answer of Q3 by Lia	115
Figure 4.112 Birthday Cake Context	115
Figure 4.113 The Example of Students' Answer of Fair Sharing.....	116
Figure 4.114 Question 5 in Model 1	117
Figure 4.115 The Answer of Q5 by Putra	117
Figure 4.116 Question 6 in model 2.....	118
Figure 4.117 (Translate) Question 6 in model 2	118
Figure 4.118 Pilot Experiment in School A (2)	119
Figure 4.119 The First Question of Model 2.....	120
Figure 4.120 (Translate) The First Question of Model 2	120
Figure 4.121 Pilot Experiment in School A (2)	120
Figure 4.122 The Answer of Q1 by Ahmad.....	122
Figure 4.123 The Answer of Q1 by Greycy.....	122
Figure 4.124 The Second Question of Model 2	123
Figure 4.125 (Translate) The Second Question of Model 2.....	123
Figure 4.126 The Third Question of Model 2	125
Figure 4.127 (Translate) The Third Question of Model 2	125
Figure 4.128 The Answer of Q3 by Fandy	128
Figure 4.129 The Answer of Q3 by Toni.....	128
Figure 4.130 The Answer of Q3 by Billy	128
Figure 4.131 Pilot Experiment in School B (1)	129
Figure 4.132 The First Question of Model 2.....	130
Figure 4.133 (Translate) The First Question of Model 2	130
Figure 4.134 The Answer of Q1 by Edo	131
Figure 4.135 The Answer of Q1 by Farah	131
Figure 4.136 The Second Question of Model 2	132
Figure 4.137 (Translate) The Second Question of Model 2.....	132
Figure 4.138 The Answer of Q2 by Ani	133
Figure 4.139 The Answer of Q2 by Nida.....	133
Figure 4.140 The Third Question of Model 2	134
Figure 4.141 (Translate) The Third Question of Model 2	134
Figure 4.142 The Answer of Q3 by Ani	136
Figure 4.143 The Answer of Q3 by Aldo	136

Figure 4.144 Birthday Cake Context	137
Figure 4.145 The Example of Students' Answers of Fair Sharing Cake	137
Figure 4.146 Question 5 in model 2	138
Figure 4.147 (Translate) Question 5 in model 2	138
Figure 4.148 The Answer of Q3 by Lia	139
Figure 4.149 Question 6 in model 2	139
Figure 4.150 Question 6 (Translate) in model 2	139
Figure 4.151 Pilot Experiment in School B (2)	141
Figure 4.152 The First Question of Model 1	141
Figure 4.153 (Translate) The First Question of Model 1	141
Figure 4.154 The Answer of Q1 by Fatih	143
Figure 4.155 The Answer of Q1 by Lila	143
Figure 4.156 The Second Question of Model 1	144
Figure 4.157 (Translate) The Second Question of Model 1	144
Figure 4.158 The Answer of Q2 by Firman	145
Figure 4.159 The Answer of Q2 by Bitu	145
Figure 4.160 The Third Question of Model 1	146
Figure 4.161 (Translate) The Third Question of Model 1	146
Figure 4.162 The Answer of Q3 by Bitu	147
Figure 4.163 The Answer of Q3 by Lila	147
Figure 4.164 The Answer of Q4 by Arman	148
Figure 4.165 The Answer of Q4 by Lila	149
Figure 4.166 Birthday Cake Context	149
Figure 4.167 Question 5 in model 1	150
Figure 4.168 (Translate) Question 5 in model 1	150
Figure 4.169 The Answer of Q5 by Siska	150
Figure 4.170 Question 6 in model 1	151
Figure 4.171 Question 6 (Translate) in model 1	151
Figure 4.172 The Answer of Q6 by Alya	151
Figure 4.173 Introducing RME Approach	157
Figure 4.174 Doing Mathematics Using Realistic Context	159
Figure 4.175 Analising Video	160
Figure 4.176 The Participants of Workshop	162

Figure 4.177 The coding of SMR's Indicator	184
Figure 4.178 NVivo Students' Answer	184
Figure 4.179 NVivo SMR Case Classification	185
Figure 4.180 NVivo Coding Students' Answer	185
Figure 4.181 NVivo Coding Students' Answer	186
Figure 4.182 NVivo Coding Students' Answer	186
Figure 4.183 NVivo SMR Indicator	187
Figure 4.184 NVivo The Example of Students' Answer	187
Figure 4.185 Graph – SMR – Question 1	188
Figure 4.186 Graph – SMR – Question 2	189
Figure 4.187 Graph – The Students' Answers – Question 2.....	191
Figure 4.188 Graph – SMR – Question 3	191
Figure 4.189 Graph – SMR – Question 4	193
Figure 4.190 Question 5 in Model 1	193
Figure 4.191 Graph – SMR – Question 5	194
Figure 4.192 Graph – SMR – Question 6	195
Figure 4.193 NVivo Coding Transcript Video	196
Figure 4.194 NVivo Lesson Learn (Teacher's Noticing)	197
Figure 4.195 NVivo Transcript of Attending.....	197
Figure 4.196 NVivo Transcript of Interpreting.....	198
Figure 4.197 NVivo Transcript of Deciding	198
Figure 4.198 NVivo TA VS SMR	199
Figure 4.199 NVivo TA Case Classification	199
Figure 4.200 NVivo Transcript of Noticing Ability	200
Figure 4.201 NVivo Transcript of Analising and Defining	200
Figure 4.202 NVivo Transcript of Analising and Attending	201
Figure 4.203 NVivo Interview Teacher' Reflective Ability	201
Figure 4.204 NVivo Transcript of Reflective Ability	202
Figure 4.205 nVIVO SMR Case Classification	202
Figure 4.206 nVIVO TA Case Classification	203
Figure 4.207 nVIVO SMR Case Classification	203
Figure 4.208 Teachers' Noticing Ability for Classroom Practices II	204
Figure 4.209 Teachers' Reflective Ability for Classroom Practices II.....	204

Figure 4.210 Teachers' Noticing Ability for CI and CII	205
Figure 4.211 Teachers' Noticing Ability for CI and CII	206
Figure 4.212 TA – SMR – Task Design Model	207

LIST OF TABLES

Table 2.1	Details of each teachers' level of attending, interpreting, and deciding ability.....	14
Table 3.1	The Quality Criteria of The Stages in Design Research	34
Table 3.2	Research Procedures	41
Table 4.1	The Expert Judgement Result of The Research Design.....	71
Table 4.2	The Distribution of The Use of Model in Classroom Practices.....	163

LIST OF ABBREVIATIONS

A	: Answer
ANL	: Analysing
CHANTIC	: Challenging and Realistic
COA	: Constructing Arguments
CTL	: Contextual Teaching and Learning
DE	: Dutch Educator
DEF	: Defining
DET	: Determining
DRT	: Dutch Research Teacher
DT	: Dutch Primary School Teacher
FGD	: Focus Group Discussion
FIsmE	: Freudenthal Institute of Science and Mathematics Education
HOTS	: Higher Order Thinking Skills
INC	: Investigating Conjecture
IRT	: Indonesian Research Teacher
KKM	: Kriteria Ketuntasan Minimal
MCC	: Making Conclusion
MCJ	: Making Conjecture
MoECRT	: Ministry of Education, Culture, Research and Technology
NARA	: Noticing and Reflective Ability
NCTM	: The National Council of Teachers of Mathematics
NVIVO	: is a qualitative data analysis (QDA) computer software package produced by Lumivero (formerly by QSR International)
PBI	: Problem Based Instruction
PD	: Professional Development
PJOK	: Pendidikan Jasmani, Olahraga dan Kesehatan
PMRI	: Pendidikan Matematika Realistik Indonesia
PPKn	: Pendidikan Pancasila dan Kewarganegaraan
PT	: Pilot Experiment Teacher
PW	: Participant Workshop
Q	: Question
R	: The Researcher
RME	: Realistic Mathematics Education
Rp	: Rupiah
S1	: School 1
S2	: School 2
S3	: School 3
S4	: School 4
S5	: School 5
SA	: one public primary school in Banten
SB	: one private school in Depok, West Java
SC	: one private school in West Bandung, West Java
SD	: one public school in Bandung, West Java
SE	: one public school in Bandung, West Java
SBdP	: Seni Budaya dan Prakarya
SCMT	: School Cyclic Model Teacher

SMR : Students' Mathematical Reasoning
T1 : Teacher 1
T2 : Teacher 2
T3 : Teacher 3
T4 : Teacher 4
T5 : Teacher 5
T6 : Teacher 6
T7 : Teacher 7
T8 : Teacher 8
T9 : Teacher 9
T10 : Teacher 10
T11 : Teacher 11
T12 : Teacher 12
T13 : Teacher 13
TPD : Teacher Professional Development

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