

**Pengembangan *Worksheet Revised Argument-Driven Inquiry* Berbasis *Multi-Representasi* untuk Meningkatkan *Scientific Reasoning-Communication Skills*
(SR-CS) Siswa MA**

TESIS

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Magister
Pendidikan Program Studi Pendidikan Fisika



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Sebuah tesis yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Magister Pendidikan pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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Abstrak

Penelitian ini bertujuan untuk menghasilkan produk bahan ajar *revised argument-driven inquiry worksheet* (RADIW) berbasis multi-representasi yang dapat meningkatkan *scientific reasoning skills* dan *scientific communication skills* siswa. RADIW berbasis multi-representasi merupakan worksheet yang mengintegrasikan fase-fase belajar *revised argument-driven inquiry model* dengan pendekatan multi-representasi. Metode yang digunakan dalam penelitian ini adalah *research and development* (RnD) yang mengacu pada model 4D (*Four-D Models*) yang diadopsi dari Thiagarajan. Teknik pemilihan sampel dalam penelitian ini menggunakan *convenience sampling* yang melibatkan siswa kelas X MIPA di salah satu MA (setingkat SMA) di Kabupaten Tangerang. Instrumen penelitian yang digunakan adalah RADIW berbasis multi-representasi, tes *scientific reasoning-communication skills* (SR-CS), dan instrumen penjarangan sikap siswa terhadap RADIW berbasis multi-representasi. Berdasarkan hasil penelitian, RADIW berbasis multi-representasi memenuhi semua kriteria *worksheet* yang baik dan layak untuk digunakan dan diimplementasikan dalam pembelajaran fisika pada topik usaha dan energi. Adapun pada saat implementasinya dilakukan *control group pre-test post-test design* untuk mengetahui *scientific reasoning-communication skills* siswa. Peningkatan *scientific reasoning skills* ditunjukkan oleh rata-rata *gain* ternormalisasi $\langle g \rangle$ pada kelas eksperimen sebesar 0,5 (sedang) dan pada kelas kontrol sebesar 0,28 (rendah). Sedangkan *scientific communication* siswa pada kelas eksperimen sebesar 0,77 (tinggi) dan kelas kontrol sebesar 0,52 (sedang). Adapun keefektifan penggunaan RADIW berbasis multi-representasi ditunjukkan oleh uji *independen t-test* yang menunjukkan adanya perbedaan yang signifikan antara peningkatan kelas kontrol dan kelas eksperimen. Sedangkan analisis *effect size* penggunaan RADIW berbasis multi-representasi terhadap *scientific reasoning skills* adalah 2,084 dan pada *scientific communication skills* adalah 1,57, mengindikasikan bahwa penggunaan *worksheet* yang dikembangkan memberikan dampak pada tingkatan besar dibandingkan dengan penggunaan *worksheet* dari sekolah.

Keywords: *revised argument driven inquiry worksheet*, multi-representasi, *scientific reasoning skills*; *scientific communication skill*

Development of Revised Argument-Driven Inquiry Worksheet Based Multi-Representation to Improve *Scientific Reasoning-Communication Skills* (SR-CS) of MA Students

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Abstract

This study aims to produce a teaching material product revised argument-driven inquiry worksheet (RADIW) based on multi-representation that can improve students' scientific reasoning skills and scientific communication skills. The RADIW based on multi-representation is a worksheet that integrates the learning phases of the revised argument-driven inquiry model with a multi-representation approach. The method used in this study is research and development which refers to the 4D model (Four-D Models) adopted from Thiagarajan. The sample selection technique in this study used convenience sampling involving X MIPA class students in one of the MA (high school level) in Tangerang Regency. The research instruments used were RADIW based on multi-representation, scientific reasoning-communication skills (SR-CS) test, and students' attitude towards RADIW based on multi-representation. Based on the research results, the multi-representation-based RADIW fulfills all the criteria of a good worksheet and is suitable for use and implementation in physics learning on the topic of work and energy. The implementation was based on a control group pre-test post-test design to determine the scientific reasoning-communication skills of students. The increase in scientific reasoning skills is indicated by the average normalized gain $\langle g \rangle$ in the experimental class of 0.5 (medium) and in the control class of 0.28 (low). While students' scientific communication in the experimental class was 0.77 (high) and the control class was 0.52 (medium). The effectiveness of using RADIW based on multi-representation is shown by an independent t-test which shows a significant difference between the improvement of the control class and the experimental class. While the effect size analysis of the use of RADIW based on multi-representation on scientific reasoning skills is 2.084 and on scientific communication skills is 1.57, indicating that the use of worksheets developed has an impact on a large level compared to the use of worksheets from schools.

Keywords: revised argument driven inquiry worksheet, multi-representative, scientific reasoning skills; scientific communication skill

DAFTAR ISI

	Halaman
HALAMAN SAMPUL.....	i
LEMBAR PENGESAHAN	ii
LEMBAR PERNYATAAN.....	iii
KATA PENGANTAR	iv
UCAPAN TERIMAKASIH.....	v
ABSTRAK.....	vi
DAFTAR ISI.....	viii
BAB I Pendahuluan	1
1.1. Latar Belakang Penelitian.....	1
1.2. Rumusan Masalah Penelitian	8
1.3. Tujuan Penelitian.....	8
1.4. Pertanyaan Penelitian	8
1.5. Definisi Operasional.....	9
1.6. Manfaat Penelitian.....	10
BAB II Kajian Pustaka.....	12
2.1. RADIW Berbasis Multi-Representasi	12
2.2. <i>Scientific Reasoning Skills</i>	33
2.3. <i>Scientific Communication Skills</i>	36
2.4. Hubungan RADIW Berbasis Multirepresentasi dengan SR-CS	39
2.5. Penelitian Relevan	41
2.6. Kerangka Berpikir	42
2.7. Hipotesis Penelitian	46
BAB III Metode Penelitian	47
3.1. Metode dan Desain Penelitian	47
3.2. Partisipan	49
3.3. Populasi dan Sampel Penelitian.....	49
3.4. Instrumen Penelitian.....	49
3.5. Prosedur Penelitian.....	68
3.6. Teknik Analisis Data Penelitian	76
BAB IV Temuan dan Pembahasan	83

4.1. Temuan	79
4.2. Pembahasan	112
BAB V Simpulan, Implikasi, dan Rekomendasi	128
5.1. Simpulan.....	128
5.2. Implikasi	129
5.3. Rekomendasi	129
DAFTAR PUSTAKA	131
LAMPIRAN-LAMPIRAN	137

DAFTAR TABEL

	Halaman
Tabel 2.1. Perbandingan ADI dan r-ADI.....	14
Tabel 2.2. Multi-Representasi pada Materi Usaha Dan Energi	21
Tabel 2.3. Indikator <i>Scientific Reasoning Skills</i>	31
Tabel 2.4. Analisis Hubungan RADIW dengan SR-CS.....	39
Tabel 3.1. Instrumen Penelitian	49
Tabel 3.3. Distribusi Tes SRS.....	52
Tabel 3.4. Kriteria Validasi.....	53
Tabel 3.5. Data <i>Summary</i> Validitas Empiris SRS.....	54
Tabel 3.6. Interpretasi <i>Item and Person Reliability</i>	55
Tabel 3.7. Interpretasi Reliabilitas <i>Cronbach Alpha</i>	55
Tabel 3.8. Data <i>Summary</i> Reliabilitas SRS	52
Tabel 3.9. Interpretasi Nilai Logit Validitas Empiris.....	54
Tabel 3.10. Nilai Logit dan Interpretasi Taraf Kesukaran SRS	55
Tabel 3.11. Interpretasi Daya Pembeda	56
Tabel 3.12. <i>Summary</i> Daya Pembeda SRS	56
Tabel 3.13. Indikator Tes <i>Scientific Communication Skills</i>	57
Tabel 3.14. Data <i>Summary</i> Validitas Empiris SCS.....	59
Tabel 3.15. Data <i>Summary</i> Reliabilitas SCS.....	60
Tabel 3.16. Nilai Logit dan Interpretasi Taraf Kesukaran SCS	62
Tabel 3.17. <i>Summary</i> Daya Pembeda SCS	63
Tabel 3.18. Kisi –Kisi Angket Kebutuhan Peserta Didik	65
Tabel 3.19. Kisi –Kisi Pertanyaan Wawancara Guru	66
Tabel 3.20. Kriteria Validasi.....	71
Tabel 3.21. Kriteria Nilai Uji Keterbacaan Menurut Cloze.....	72
Tabel 3.22. Skoring Soal <i>Two-Tier Multiple Choice</i>	72
Tabel 3.23. Kriteria <i>N-gain</i>	73
Tabel 3.24. Interpretasi <i>Effect size Cohen's d</i>	76
Tabel 3.25. Interpretasi Tanggapan Siswa	77
Tabel 4.1. Hasil Validasi Ahli Materi	79
Tabel 4.2. Revisi Draft <i>Worksheet</i>	80

Tabel 4.3. Hasil Validasi Pengguna	87
Tabel 4.4. Contoh Lembar Keterbacaan	89
Tabel 4.5. Aspek SRS <i>Pretest-Posttest</i>	87
Tabel 4.6. Aspek SCS <i>Pretest-Posttest</i>	100
Tabel 4.7. Uji Normalitas Skor <i>N-Gain</i> SRS	102
Tabel 4.8. Uji Homogenitas Rata-Rata Skor <i>N-Gain</i> SRS	103
Tabel 4.9. Uji <i>Independent Sample T Test</i> Skor <i>N-Gain</i> SRS	103
Tabel 4.10. Hasil Perhitungan <i>Effect Size</i> SRS.....	104
Tabel 4.11. Uji Normalitas Skor <i>N-Gain</i> SCS	105
Tabel 4.12. Uji Kesamaan Rata-Rata <i>Skor N-Gain</i> SCS	106
Tabel 4.13. Hasil Perhitungan <i>Effect Size</i> SCS.....	107
Tabel 4.14. Rekapitulasi Tanggapan Siswa Terhadap <i>Worksheet</i>	109
Tabel 4.14. Analisis RADIW Multirepresentasi dengan <i>Worksheet</i> Sekolah.....	112

DAFTAR GAMBAR

	Halaman
Gambar 1.1. Perkembangan Model ADI	4
Gambar 1.2. Dampak Penerapan r-ADI.....	6
Gambar 1.3. Dampak Pembelajaran <i>Multi-Representation</i>	7
Gambar 2.1. Program SCS pada Keterampilan Tingkat Tinggi	38
Gambar 3.1. Item <i>Statistic: Measure Order SRS</i>	54
Gambar 3.2. Derajat Kesukaran Tes SRS	53
Gambar 3.3. Nilai Logit Item Tes SRS	54
Gambar 3.4. <i>Measure Order SRS</i>	56
Gambar 3.5. Item <i>Statistic: Measure Order SCS</i>	59
Gambar 3.6. Derajat Kesukaran Tes SRS	61
Gambar 3.7. Nilai Logit Item Tes SCS	62
Gambar 3.8. <i>Measure Order SCS</i>	63
Gambar 3.9. Langkah-Langkah Model 4D	64
Gambar 3.10. Prosedur Penelitian R&D Model 4D	71
Gambar 3.11. Alur Uji Statistik Inferensial	76
Gambar 4.1. Rekapitulasi Keterbacaan <i>Worksheet</i>	89
Gambar 4.2. <i>Wright Map Pretest-Posttest SRS</i>	91
Gambar 4.3. Diagram Skor Rata-Rata <i>Pretest, Posttest, dan N-gain SRS</i>	92
Gambar 4.4. Rata-Rata Skor <i>Pretest SRS</i>	94
Gambar 4.5. Rata-Rata Skor <i>Posttes SRS</i>	95
Gambar 4.6. Diagram Skor Rata-Rata <i>N-Gain Aspek SRS</i>	96
Gambar 4.7. <i>Wright Map Pretest-Posttest SCS</i>	98
Gambar 4.8. Diagram Skor Rata-Rata <i>Pretest, Posttest, Dan N-Gain SCS</i>	98
Gambar 4.9. Diagram Skor <i>N-Gain Aspek SCS</i>	98
Gambar 4.10. Contoh Jawaban <i>Hypothetical-Deductive Reasoning</i>	119
Gambar 4.11. Contoh Jawaban <i>Causal Reasoning</i>	120
Gambar 4.12. Contoh Jawaban <i>Probability Reasoning</i>	121
Gambar 4.13. Contoh Jawaban <i>Inductive Reasoning</i>	122
Gambar 4.14. Contoh Jawaban <i>Correlational Reasoning</i>	123
Gambar 4.15. Contoh Jawaban <i>Scientific Reading</i>	125

Gambar 4.16. Contoh Jawaban *Information Representation*..... 126

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