

**PENGARUH PRAKTIKUM PEMODELAN EFEK RUMAH KACA
TERHADAP PEMAHAMAN, KESADARAN, DAN RENCANA AKSI
PERUBAHAN IKLIM PADA SISWA SEKOLAH DASAR**

Untuk Memenuhi Sebagian Persyaratan mencapai Gelar Magister
Program Studi Pendidikan Dasar

TESIS



Oleh

LUNGGUH PURI PRAMSWARI

NIM 2013127

**PROGRAM STUDI PENDIDIKAN DASAR
SEKOLAH PASCASARJANA
UNIVERSITAS PENDIDIKAN INDONESIA
BANDUNG**

2024

**PENGARUH PRAKTIKUM PEMODELAN EFEK RUMAH KACA
TERHADAP PEMAHAMAN, KESADARAN, DAN RENCANA AKSI
PERUBAHAN IKLIM PADA SISWA SEKOLAH DASAR**

LEMBARAN HAK CIPTA

Oleh

Lungguh Puri Pramswari

NIM 2013127

Diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Magister
Pendidikan pada Program Studi Pendidikan Dasar

©Lungguh Puri Pramswari 2024

Universitas Pendidikan Indonesia

Januari 2024

Hak Cipta Dilindungi Undang-Undang

Tesis ini tidak boleh diperbanyak seluruhnya atau sebagian, dengan dicetak ulang,
difotocopy, atau cara lainnya tanpa ijin dari penulis.

LEMBAR PENGESAHAN

LUNGGUH PURI PRAMSWARI
NIM 2013127

**PENGARUH PRAKTIKUM PEMODELAN EFEK RUMAH KACA
TERHADAP PEMAHAMAN, KESADARAN, DAN RENCANA AKSI
PERUBAHAN IKLIM PADA SISWA SEKOLAH DASAR**

Disetujui dan disahkan oleh:

Dosen Pembimbing I



Prof. Dr. phil. H. Ari Widodo, M.Ed.

NIP. 196705271992031001

Dosen Pembimbing II



Dr. Muslim, M.Pd

NIP. 196406061990031003

Mengetahui,

**Ketua Program Studi Pendidikan Dasar
Sekolah Pascasarjana**



Prof. Dr. päd. H. Wahyu Sopandi, M.A.

NIP. 196605251990011001

PENGARUH PRAKTIKUM PEMODELAN EFEK RUMAH KACA TERHADAP PEMAHAMAN, KESADARAN, DAN RENCANA AKSI PERUBAHAN IKLIM PADA SISWA SEKOLAH DASAR

Lungguh Puri Pramswari

2013127

ABSTRAK

Pemahaman, kesadaran, dan rencana aksi perubahan iklim siswa SD masih termasuk ke dalam kategori rendah. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh praktikum pemodelan efek rumah kaca terhadap pemahaman, kesadaran, dan rencana aksi perubahan iklim pada siswa SD. Penelitian ini merupakan penelitian kuantitatif dengan jenis metode kuasi eksperimen yang melibatkan siswa kelas V di Sekolah Dasar Negeri di Kabupaten Sumedang sebanyak 41 siswa kelompok eksperimen dan 37 siswa kelompok kontrol. Instrumen yang digunakan adalah instrumen tes berupa soal pilihan ganda untuk mengukur pemahaman mengenai perubahan iklim, kuesioner dengan skala untuk mengukur kesadaran dan rencana aksi siswa SD yang seluruhnya telah dinyatakan valid dan reliabel oleh ahli maupun hasil uji coba lapangan. Hasil penelitian menunjukkan bahwa pemahaman dan rencana aksi perubahan iklim siswa SD mengalami peningkatan lebih signifikan pada kelompok siswa yang melakukan praktikum pemodelan efek rumah kaca lebih besar dari kelompok siswa yang melakukan pembelajaran konvensional. Kesadaran akan perubahan iklim pada kelompok siswa yang melakukan praktikum pemodelan efek rumah kaca pun mengalami peningkatan namun tidak berbeda secara signifikan dengan kelompok siswa yang melakukan pembelajaran konvensional. Praktik pemodelan efek rumah kaca dapat meningkatkan pemahaman, kesadaran, dan rencana aksi perubahan iklim pada siswa SD.

Kata Kunci: Pemahaman, Kesadaran, Rencana Aksi, Perubahan Iklim, Praktik Pemodelan Efek Rumah Kaca.

THE EFFECT OF GREENHOUSE EFFECT MODELING PRACTICUM ON CLIMATE CHANGE UNDERSTANDING, AWARENESS, AND ACTION PLANS IN ELEMENTARY SCHOOL STUDENTS

Lungguh Puri Pramswari

2013127

ABSTRACT

The understanding, awareness, and action plans of climate change in elementary school students are still in the low category. The purpose of this study was to determine the effect of greenhouse effect modeling practicum on understanding, awareness, and action plans for climate change in elementary school students. This research is a quantitative research with the type of quasi-experimental method involving fifth grade students in public elementary schools in Sumedang Regency as many as 41 experimental group students and 37 control group students. The instruments used are test instruments in the form of multiple choice questions to measure understanding of climate change, questionnaires with scales to measure awareness and action plans of elementary school students, all of which have been declared valid and reliable by experts and the results of field trials. The results showed that the understanding and action plan of climate change of elementary school students increased more significantly in the group of students who did greenhouse effect modeling practicum greater than the group of students who did conventional learning. Awareness of climate change in the group of students who did the greenhouse effect modeling practicum also increased but was not significantly different from the group of students who did conventional learning. Greenhouse effect modeling practicum can increase the understanding, awareness, and action plan of climate change in elementary school students.

Keywords: Understanding, Awareness, Action Plan, Climate Change, Greenhouse Effect Modeling Practicum.

DAFTAR ISI

HALAMAN JUDUL	
LEMBAR PENGESAHAN.....	ii
LEMBAR PERNYATAAN.....	iii
KATA PENGANTAR.....	iv
UCAPAN TERIMA KASIH.....	v
ABSTRAK.....	vii
ABSTRACT.....	viii
DAFTAR ISI.....	ix
DAFTAR GAMBAR.....	xiii
DAFTAR TABEL.....	xv
DAFTAR LAMPIRAN.....	xvii
BAB I PENDAHULUAN.....	1
1.1 Latar Belakang.....	1
1.2 Rumusan Masalah.....	7
1.3 Tujuan Penelitian.....	8
1.4 Batasan Masalah.....	8
1.5 Manfaat Penelitian.....	9
1.6 Definisi Operasional.....	9
1.7 Struktur Organisasi Tesis.....	12
BAB II KAJIAN PUSTAKA	14
2.1 Praktikum Pemodelan Efek Rumah Kaca.....	14
2.1.1 Pengertian Praktikum	14
2.1.2 Efek Rumah Kaca.....	16
2.1.3 Pemodelan Efek Rumah Kaca.....	18
2.2 Perubahan Iklim.....	21
2.3 Pemahaman mengenai Perubahan Iklim.....	23
2.4 Kesadaran akan Perubahan Iklim.....	35
2.5 Rencana Aksi terkait Perubahan Iklim.....	38

2.6	Tinjauan Materi Perubahan Iklim.....	43
2.7	Penelitian yang Relevan.....	45
2.8	Kerangka Pikir Penelitian.....	46
BAB III METODE PENELITIAN.....		49
3.1	Metode Penelitian.....	49
3.2	Desain Penelitian.....	49
3.3	Populasi dan Sampel.....	50
3.4	Variabel Penelitian.....	51
3.5	Teknik Pengumpulan Data.....	51
3.6	Instrumen Penelitian.....	52
3.6.1	Instrumen Pemahaman Mengenai Perubahan Iklim.....	52
3.6.2	Instrumen Kesadaran Akan Perubahan Iklim.....	61
3.6.3	Instrumen Rencana Aksi Terhadap Perubahan Iklim.....	66
3.7	Prosedur Penelitian.....	69
3.8	Analisis Data.....	76
3.8.1	Analisis Data Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Pemahaman Mengenai Perubahan Iklim.....	76
3.8.2	Analisis Data Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Kesadaran akan Perubahan Iklim.....	78
3.8.3	Analisis Data Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Rencana Aksi terhadap Perubahan Iklim.....	80
BAB IV TEMUAN DAN PEMBAHASAN.....		82
4.1	Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Pemahaman Siswa SD mengenai Perubahan Iklim.....	82
4.1.1	Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Pemahaman Siswa SD mengenai Penyebab Perubahan Iklim.....	90
4.1.2	Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Pemahaman Siswa SD mengenai Dampak Perubahan Iklim.....	94
4.1.3	Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Kepekaan akan Kesalahpahaman Perubahan Iklim pada	

Siswa SD.....	98
4.2 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Kesadaran Siswa SD akan Perubahan Iklim.....	101
4.2.1 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Kesadaran Konseptual Siswa SD Mengenai Perubahan Iklim.....	108
4.2.2 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Kesadaran Siswa SD akan Perubahan Iklim Berdasarkan Pengalaman.....	110
4.2.3 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Kesadaran Siswa SD untuk Terlibat.....	113
4.2.4 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Kesadaran Siswa SD untuk Beradaptasi.....	114
4.2.5 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Sikap Peduli akan Perubahan Iklim pada Siswa SD.....	116
4.3 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Rencana Aksi Siswa SD terkait Perubahan Iklim.....	118
4.3.1 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Rencana Aksi Siswa SD terkait Melakukan Pencegahan terhadap Penyebab-penyebab Terjadinya Perubahan Iklim.....	122
4.3.2 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Komitmen Ikut Serta Menjaga Kehidupan di Bumi.....	125
4.3.3 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Memberikan Aksi Pencegahan terhadap Perubahan Iklim dalam Skala Besar dan Kecil.....	126
4.3.4 Pengaruh Praktikum Pemodelan Efek Rumah Kaca terhadap Kepemilikan Rencana Kegiatan Pencegahan Perubahan Iklim secara Kolaboratif dalam Komunitas.....	128
BAB V SIMPULAN, IMPLIKASI, DAN REKOMENDASI	131
5.1 Simpulan.....	131
5.2 Implikasi.....	132
5.3 Rekomendasi.....	133

DAFTAR PUSTAKA.....	134
LAMPIRAN.....	158

DAFTAR GAMBAR

Gambar 2.1	Kerangka Pikir Penelitian.....	48
Gambar 3.1	Diagram Alur.....	75
Gambar 4.1	Rata-rata Skor Pemahaman Penyebab Perubahan Iklim..	91
Gambar 4.2	Cuplikan Rumusan Kesimpulan pada LKPD Praktikum Pemodelan Efek Rumah Kaca.....	93
Gambar 4.3	Rata-rata Skor Pemahaman Dampak Perubahan Iklim....	95
Gambar 4.4	Rumusan Kesimpulan LKPD Praktikum Pemodelan Efek Rumah Kaca.....	97
Gambar 4.5	Rata-rata Skor Kepekaan akan Kesalahpahaman Perubahan Iklim.....	98
Gambar 4.6	Uji Hipotesis LKPD Praktikum Pemodelan Efek Rumah Kaca.....	100
Gambar 4.7	Rata-rata Skor Kesadaran Konseptual Perubahan Iklim..	108
Gambar 4.8	Kesadaran Konseptual Siswa setelah Praktikum Pemodelan Efek Rumah Kaca.....	110
Gambar 4.9	Rata-rata Skor Kesadaran Berdasarkan Pengalaman.....	111
Gambar 4.10	Rata-rata Skor Kesadaran untuk Terlibat.....	113
Gambar 4.11	Rata-rata Skor Kesadaran untuk Beradaptasi.....	115
Gambar 4.12	Rata-rata Skor Sikap Peduli terhadap Perubahan Iklim...	116
Gambar 4.13	Hasil LKPD Siswa terkait Sikap Peduli Terhadap Perubahan Iklim.....	117
Gambar 4.14	Rata-rata Skor Rencana Aksi Terkait Melakukan Pencegahan terhadap Penyebab-penyebab Terjadinya Perubahan Iklim.....	123
Gambar 4.15	Hasil LKPD Siswa.....	124
Gambar 4.16	Rata-rata Skor Rencana Aksi dengan Berkomitmen Ikut Serta Menjaga Kehidupan di Bumi.....	125

Gambar 4.17 Rata-rata Skor Rencana Aksi dengan Memberikan aksi pencegahan terhadap perubahan iklim dalam skala besar dan kecil.....	127
Gambar 4.18 Rata-rata Skor Rencana Aksi dengan Memiliki Rencana Kegiatan Pencegahan Perubahan Iklim Secara Kolaboratif dalam Komunitas.....	129

DAFTAR TABEL

Tabel 2.1	KI dan KD Materi Suhu.....	44
Tabel 3.1	Desain Penelitian.....	50
Tabel 3.2	Hasil Uji Coba Instrumen Pemahaman Mengenai Perubahan Iklim.....	53
Tabel 3.3	Kisi-kisi Penyebaran Soal Pemahaman Mengenai Perubahan Iklim.....	55
Tabel 3.4	Contoh Soal Instrumen Pemahaman Mengenai Perubahan Iklim.....	59
Tabel 3.5	Hasil Uji Coba Angket Kesadaran Akan Perubahan Iklim.....	62
Tabel 3.6	Kisi-kisi Angket Kesadaran Akan Perubahan Iklim.....	64
Tabel 3.7	Contoh Pernyataan Angket Instrumen Kesadaran Akan Perubahan Iklim.....	65
Tabel 3.8	Hasil Uji Coba Angket Rencana Aksi Siswa Terhadap Perubahan Iklim.....	67
Tabel 3.9	Kisi-kisi Rencana Aksi Siswa Terhadap Perubahan Iklim.....	68
Tabel 3.10	Contoh Pernyataan Angket Instrumen Rencana Aksi Siswa Terhadap Perubahan Iklim.....	68
Tabel 3.11	Deskripsi Kegiatan Pembelajaran pada Kelompok Eksperimen dan Kelompok Kontrol.....	70
Tabel 4.1	Data Deskriptif Statistik dan Hasil Uji Hipotesis Pemahaman Perubahan Iklim.....	82
Tabel 4.2	Perbedaan Perolehan Skor Rata-rata Pemahaman Mengenai Perubahan Iklim.....	89
Tabel 4.3	Hasil Analisis Statistik Deskriptif dan Statistik Kesadaran Akan Perubahan Iklim.....	101
Tabel 4.4	Perbedaan Perolehan Skor Rata-rata Kesadaran Akan Perubahan Iklim.....	103

Tabel 4.5	Hasil Analisis Statistik Deskriptif dan Statistik Rencana Aksi Perubahan Iklim.....	118
Tabel 4.6	Perbedaan Perolehan Skor Rata-rata Rencana Aksi Perubahan Iklim.....	120

DAFTAR LAMPIRAN

Lampiran A. Perangkat Penelitian.....	158
Lampiran A. 1a. RPP Kelompok Eksperimen Pertemuan 1.....	158
Lampiran A. 1b. RPP Kelompok Eksperimen Pertemuan 2.....	161
Lampiran A. 1c. RPP Kelompok Eksperimen Pertemuan 3.....	163
Lampiran A. 1d. RPP Kelompok Eksperimen Pertemuan 4.....	165
Lampiran A. 2a. Lembar Kerja Peserta Didik (LKPD) 1.....	167
Lampiran A. 2b. Lembar Kerja Peserta Didik (LKPD) 2.....	173
Lampiran A. 2c. Lembar Kerja Peserta Didik (LKPD) 3.....	179
Lampiran A. 3a. Lembar Validasi Ahli.....	181
Lampiran B. Instrumen Penelitian.....	182
Lampiran B. 1a. Kisi-kisi Soal Pemahaman Mengenai Perubahan Iklim.....	182
Lampiran B. 1b. Distribusi Soal Pemahaman Mengenai Perubahan Iklim.....	211
Lampiran B. 1c. Kisi-kisi Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	214
Lampiran B. 1d. Distribusi Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	220
Lampiran B. 1e. Kisi-kisi Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	222
Lampiran B. 1f. Distribusi Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	225
Lampiran B. 2a. Soal <i>Pretest</i> dan <i>Posttest</i> Pemahaman Siswa SD Mengenai Perubahan Iklim.....	226
Lampiran B. 2b. Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	232
Lampiran B. 2c. Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	233
Lampiran C. Lampiran Hasil Analisis Data.....	234

Lampiran C. 1a. Data <i>Pretest</i> Pemahaman Siswa SD Mengenai Perubahan Iklim Kelompok Eksperimen.....	234
Lampiran C. 1b. Data <i>Posttest</i> Pemahaman Siswa SD Mengenai Perubahan Iklim Kelompok Eksperimen.....	237
Lampiran C. 1c. Data <i>Pretest</i> Pemahaman Siswa SD Mengenai Perubahan Iklim Kelompok Kontrol.....	240
Lampiran C. 1d. Data <i>Posttest</i> Pemahaman Siswa SD Mengenai Perubahan Iklim Kelompok Kontrol.....	243
Lampiran C. 2a. Data Kuesioner <i>Pretest</i> Kesadaran Siswa SD akan Perubahan Iklim Kelompok Eksperimen.....	246
Lampiran C. 2b. Data Kuesioner <i>Posttest</i> Kesadaran Siswa SD akan Perubahan Iklim Kelompok Eksperimen.....	249
Lampiran C. 2c. Data Kuesioner <i>Pretest</i> Kesadaran Siswa SD akan Perubahan Iklim Kelompok Kontrol.....	252
Lampiran C. 2d. Data Kuesioner <i>Posttest</i> Kesadaran Siswa SD akan Perubahan Iklim Kelompok Kontrol.....	255
Lampiran C. 3a. Data Kuesioner <i>Pretest</i> Rencana Aksi Siswa SD Terkait Perubahan Iklim Kelompok Eksperimen.....	258
Lampiran C. 3b. Data Kuesioner <i>Posttest</i> Rencana Aksi Siswa SD Terkait Perubahan Iklim Kelompok Eksperimen.....	261
Lampiran C. 3c. Data Kuesioner <i>Pretest</i> Rencana Aksi Siswa SD Terkait Perubahan Iklim Kelompok Kontrol.....	264
Lampiran C. 3d. Data Kuesioner <i>Posttest</i> Rencana Aksi Siswa SD Terkait Perubahan Iklim Kelompok Kontrol.....	267
Lampiran C. 4a. Data Uji Validitas Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	270
Lampiran C. 4b. Data Uji Validitas Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	273
Lampiran C. 4c. Data Uji Validitas Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	279

Lampiran C. 5a. Data Hasil Uji Validitas Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	286
Lampiran C. 5b. Data Hasil Uji Validitas Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	290
Lampiran C. 5c. Data Hasil Uji Validitas Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	295
Lampiran C. 6a. Hasil Uji Reliabilitas Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	299
Lampiran C. 6b. Hasil Uji Reliabilitas Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	300
Lampiran C. 6c. Hasil Uji Reliabilitas Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	301
Lampiran C. 6d. Hasil Uji Tingkat Kesukaran Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	302
Lampiran C. 6e. Hasil Uji Daya Pembeda Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	302
Lampiran C. 7a. Hasil Uji Normalitas <i>Pretest</i> Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	303
Lampiran C. 7b. Hasil Uji Homogenitas <i>Pretest</i> Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	304
Lampiran C. 7c. Hasil Uji <i>T-test Pretest</i> Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	304
Lampiran C. 7d. Hasil Uji Normalitas <i>Posttest</i> Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	305
Lampiran C. 7e. Hasil Uji Homogenitas <i>Posttest</i> Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	306
Lampiran C. 7f. Hasil Uji <i>T-Test Posttest</i> Soal Pemahaman Siswa SD Mengenai Perubahan Iklim.....	306
Lampiran C. 8a. Hasil Uji Normalitas <i>Pretest</i> Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	307

Lampiran C. 8b. Hasil Uji Homogenitas <i>Pretest</i> Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	308
Lampiran C. 8c. Hasil Uji <i>T-Test Pretest</i> Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	308
Lampiran C. 8d. Hasil Uji Normalitas <i>Posttest</i> Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	309
Lampiran C. 8e. Hasil Uji Homogenitas <i>Posttest</i> Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	310
Lampiran C. 8f. Hasil Uji Mann-Whitney <i>Posttest</i> Kuesioner Kesadaran Siswa SD akan Perubahan Iklim.....	310
Lampiran C. 9a. Hasil Uji Normalitas <i>Pretest</i> Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	311
Lampiran C. 9b. Hasil Uji Homogenitas <i>Pretest</i> Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	312
Lampiran C. 9c. Hasil Uji <i>T-Test Pretest</i> Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	312
Lampiran C. 9d. Hasil Uji Normalitas <i>Posttest</i> Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	313
Lampiran C. 9e. Hasil Uji Homogenitas <i>Posttest</i> Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	314
Lampiran C. 9f. Hasil Uji <i>T-Test Posttest</i> Kuesioner Rencana Aksi Siswa SD Terkait Perubahan Iklim.....	314
Lampiran D. Lampiran Dokumentasi.....	315
Lampiran D. 1a SK Pembimbing.....	315
Lampiran D. 2a Surat Keterangan Melaksanakan Penelitian Kelompok Eksperimen.....	317
Lampiran D. 2b Surat Keterangan Melaksanakan Penelitian Kelompok Kontrol.....	318
Lampiran D. 3a Dokumentasi Jawaban LKPD.....	319
Lampiran D. 3b Dokumentasi Jawaban <i>Pretest</i> Soal Pemahaman mengenai Perubahan Iklim Kelompok Eksperimen.....	333

Lampiran D. 3c Dokumentasi Jawaban <i>Posttest</i> Soal Pemahaman mengenai Perubahan Iklim Kelompok Eksperimen.....	339
Lampiran D. 3d Dokumentasi Jawaban <i>Pretest</i> Soal Pemahaman mengenai Perubahan Iklim Kelompok Kontrol.....	345
Lampiran D. 3e Dokumentasi Jawaban <i>Posttest</i> Soal Pemahaman mengenai Perubahan Iklim Kelompok Kontrol.....	351
Lampiran D. 3f Dokumentasi Jawaban <i>Pretest</i> Kuesioner Kesadaran akan Perubahan Iklim Kelompok Eksperimen.....	357
Lampiran D. 3g Dokumentasi Jawaban <i>Posttest</i> Kuesioner Kesadaran akan Perubahan Iklim Kelompok Eksperimen.....	358
Lampiran D. 3h Dokumentasi Jawaban <i>Pretest</i> Kuesioner Kesadaran akan Perubahan Iklim Kelompok Kontrol.....	359
Lampiran D. 3i Dokumentasi Jawaban <i>Posttest</i> Kuesioner Kesadaran akan Perubahan Iklim Kelompok Kontrol.....	360
Lampiran D. 3j Dokumentasi Jawaban <i>Pretest</i> Kuesioner Rencana Aksi terkait Perubahan Iklim Kelompok Eksperimen.....	361
Lampiran D. 3k Dokumentasi Jawaban <i>Posttest</i> Kuesioner Rencana Aksi terkait Perubahan Iklim Kelompok Eksperimen.....	362
Lampiran D. 3l Dokumentasi Jawaban <i>Pretest</i> Kuesioner Rencana Aksi terkait Perubahan Iklim Kelompok Kontrol.....	363
Lampiran D. 3m Dokumentasi Jawaban <i>Posttest</i> Kuesioner Rencana Aksi terkait Perubahan Iklim Kelompok Kontrol.....	364
Lampiran D. 4a. Dokumentasi Kegiatan Penelitian.....	365

DAFTAR PUSTAKA

- Adedeji, O., Reuben, O., & Olatoye, O. (2014). Global Climate Change. *Journal of Geoscience and Environment Protection*, 25–42.
https://doi.org/10.1007/978-94-007-7353-0_3
- Afandi, R. (2013). Integrasi pendidikan lingkungan hidup melalui pembelajaran IPS di sekolah dasar sebagai alternatif menciptakan sekolah hijau. *PEDAGOGIA: Jurnal Pendidikan*, 2(1), 98–108.
- Agustini, M. P., Meilinda, Aisyah, N., Ismet, & Sriyanti, I. (2022). Pemahaman Guru IPA Pra Jabatan Terhadap Mitigasi dan Isu Perubahan Iklim. *Jurnal IPA dan Pembelajaran IPA*, 6(1), 11–19.
<https://doi.org/10.24815/jipi.v6i1.23796>
- Alfarizi, M. & Yuniarty. (2022). Literature Review of Climate Change and Indonesia's SDGs Strategic Issues in a Multidisciplinary Perspective. *IOP Conference Series: Earth and Environmental Science*, 1105(1), 012040.
<https://doi.org/10.1088/1755-1315/1105/1/012040>
- Alina, K., Annemarie, K., Johann, S., Lars, K., Maximilian, R., & Anna, O. (2019). Strengthening Personal Concern and the Willingness to Act Through Climate Change Communication. Dalam W. Leal Filho, B. Lackner, & H. McGhie (Ed.), *Addressing the Challenges in Communicating Climate Change Across Various Audiences* (hlm. 65–79). Springer International Publishing. https://doi.org/10.1007/978-3-319-98294-6_5
- Amalia, A., Hariyono, E., Wetan, J. L., & Lakarsantri, K. S. (2022). Penerapan Experiential Learning pada Materi Perubahan Iklim untuk Melatihkan Keterampilan Berpikir Kritis Siswa. *Briliant: Jurnal Riset dan Konseptual*, 7(1), 134.
- Andersson, B., & Wallin, A. (2000). Students' Understanding of the Greenhouse Effect, the Societal Consequences of Reducing CO₂ Emissions and the Problem of Ozone Layer Depletion. *Journal of Research in Science Teaching*, 37(10), 1096–1111.

- Andre, P., Boneva, T., Chopra, F., & Falk, A. (2022). *Misperceived Social Norms and Willingness to Act Against Climate Change*. www.econtribute.de
- Ariska, U. Y., Haryono, T., & Rosdiana, L. (2016). Kelayakan Media Efek Rumah Kaca Berorientasi Scientific Approach pada Materi Pemanasan Global. *PENSA E-JURNAL: PENDIDIKAN SAINS*, 4(2).
- Arslan, H. O., Cigdemoglu, C., & Moseley, C. (2012). A Three-Tier Diagnostic Test to Assess Pre-Service Teachers' Misconceptions about Global Warming, Greenhouse Effect, Ozone Layer Depletion, and Acid Rain. *International Journal of Science education*, 34(11), 1667–1686.
- Astuti, R., Setianingsih, G. M., & Rahayu, S. (2021). Efektivitas Praktikum Biokimia berbasis Laboratory Virtual di Masa Pandemi COVID-19: Studi Komparasi Praktikum Luring dan Daring untuk Meningkatkan Pemahaman Konsep Materi Protein pada Mahasiswa. *JURNAL INOVASI PENDIDIKAN DAN SAINS*, 2(1), 13–18. <https://doi.org/10.51673/jips.v2i1.498>
- Azizah, N. (2015). Pelaksanaan Sekolah Lapangan Iklim (SLI) dalam Memberikan Pemahaman Mitigasi dan Adaptasi Perubahan Iklim pada Petani di Kelurahan Banyurip Ageng Kecamatan Pekalongan Selatan. *Edu Geography*, 3(6).
- Baiardi, D., & Morana, C. (2021). Climate Change Awareness: Empirical Evidence for the European Union. *Energy Economics*, 96, 105163. <https://doi.org/10.1016/j.eneco.2021.105163>
- Barber, L., & Israel, R. (2017). Results from Climate Change Public Opinion Surveys in Countries Around the World. *Climate Scorecard*.
- Barreda, A. B. (2018). Assessing the Level of Awareness on Climate Change and Sustainable Development Among Students of Partido State University, Camarines Sur, Philippines. *Journal of Sustainability Education*, 17, 1–12.
- Bhattacharya, D., Steward, K. C., & Forbes, C. (2021). Climate Education in Secondary Science: Comparison of Model-Based and Non-Model-Based Investigations of Earth's Climate. *International Journal of Science Education*, 43(13), 2226–2249. <https://doi.org/10.1080/09500693.2021.1958022>

- Boaventura, D., Faria, C., & Guilherme, E. (2020). Impact of An Inquiry-Based Science Activity About Climate Change on Development of Primary Students' Investigation Skills and Conceptual Knowledge. *Interdisciplinary Journal of Environmental and Science Education*, 16(4). <https://doi.org/10.29333/ijese/8554>
- Bodzin, A. M., Anastasio, D., Sahagian, D., Peffer, T., Dempsey, C., & Steelman, R. (2014). Investigating Climate Change Understandings of Urban Middle-Level Students. *Journal of Geoscience Education*, 62(4), 417–430.
- Bofferding, L., & Kloser, M. (2015). Middle and High School Students' Conceptions of Climate Change Mitigation and Adaptation Strategies. *Environmental Education Research*, 21(2), 275–294. <https://doi.org/10.1080/13504622.2014.888401>
- Bohensky, E. L., Smajgl, A., & Brewer, T. (2013). Patterns in Household-Level Engagement with Climate Change in Indonesia. *Nature Climate Change*, 3(4), 348–351. <https://doi.org/10.1038/nclimate1762>
- Boyes, E., Chuckran, D., & Stanisstreet, M. (1993). How Do High School Students Perceive Global Climatic Change: What Are Its Manifestations? What Are Its Origins? What Corrective Action Can Be Taken? *Journal of Science Education and Technology*, 2(4), 541–557.
- Boyes, E., Skamp, K., & Stanisstreet, M. (2009). Australian Secondary Students' Views About Global Warming: Beliefs About Actions, and Willingness to Act. *Research in Science Education*, 39(5), 661–680. <https://doi.org/10.1007/s11165-008-9098-5>
- Boyes, E., & Stanisstreet, M. (1993). The Greenhouse Effect—Childrens Perceptions of Causes, Consequences and Cures. *International Journal of Science Education*, 15(5), 531–552.
- Boyes, E., & Stanisstreet, M. (1997). The Environmental Impact of Cars: Children's Ideas and Reasoning. *Environmental Education Research*, 3(3), 269–282.
- Boyes, E., Stanisstreet, M., & Yongling, Z. (2008). Combating Global Warming: The Ideas of High School Students in the Growing Economy of South East

- China. *International Journal of Environmental Studies*, 65(2), 233–245.
<https://doi.org/10.1080/00207230701284543>
- Budiyoko, B., Rachmah, M. A., Verrysaputro, E. A., & Wulandari, E. R. (2023). Persepsi Petani Padi terhadap Perubahan Iklim di Kecamatan Kembaran Kabupaten Banyumas. *Proceedings Series on Physical & Formal Sciences*, 5, 195–202. <https://doi.org/10.30595/pspfs.v5i.723>
- Bush, D., Sieber, R., Seiler, G., & Chandler, M. (2018). Examining Educational Climate Change Technology: How Group Inquiry Work with Realistic Scientific Technology Alters Classroom Learning. *Journal of Science Education and Technology*, 27(2), 147–164.
- Calvo, E. D., & Apilado, M. S. (2015). Awareness, Knowledge & Attitude on Climate Change: Input for the Development of ICM on Climate Change. *International Journal of Current Research*, 7(5).
- Campo-Pais, B., Morales-Hernández, A. J., Morote-Seguido, Á., & Souto-González, X. M. (2021). Environmental Problems and Geographic Education. A Case Study: Learning about the Climate and Landscape in Ontinyent (Spain). *Humanities and Social Sciences Communications*, 8(1), 90. <https://doi.org/10.1057/s41599-021-00761-6>
- Carman, J., Zint, M., Burkett, E., & Ibanez, I. (2021). The Role of Interest in Climate Change Instruction. *Science Education*, 105(2), 309–352.
- Carroll Steward, K., Bhattacharya, D., Chandler, & Forbes, C. T. (2021). Secondary Science Teachers' Implementation of A Curricular Intervention When Teaching with Global Climate Models. *Journal of Geoscience Education*. <https://doi.org/10.1080/10899995.2021.1980706>
- Cetin, G., & Nisanci, S. H. (2010). Enhancing Students' Environmental Awareness. *Procedia - Social and Behavioral Sciences*, 2(2), 1830–1834. <https://doi.org/10.1016/j.sbspro.2010.03.993>
- Chang, C. H., & Pascua, L. (2016). Singapore Students' Misconceptions of Climate Change. *International Research in Geographical and Environmental Education*, 25(1), 84–96.

- Chen, J. W., & Chen, X. S. (2016). No Rosy Picture for Net-Zero Emissions Goal by Century End. *Sino-Global Energy*, 21(6), 1–7.
- Chopel, Y. (2021). Global Warming and Climate Change (GWCC) Realities. *IntechOpen*.
- Chopra, R., Joshi, A., Nagarajan, A., Fomproix, N., & Shashidhara, L. S. (2019). *Climate Change Education Across the Curriculum in Book Climate Change and the Role of Education*. Springer International Publishing. https://doi.org/10.1007/978-3-030-32898-6_4
- Clarke, B., Otto, F., Stuart-Smith, R., & Harrington, L. (2022). Extreme Weather Impacts of Climate Change: An Attribution Perspective. *Environmental Research: Climate*, 1(1), 012001. <https://doi.org/10.1088/2752-5295/ac6e7d>
- Cloy, J. M. (2018). Greenhouse Gas Sources and Sinks. Dalam *Encyclopedia of the Anthropocene* (Vol. 2, hlm. 391–400).
- Copsey, T., Dalimunthe, S., Hoiijtink, L., & Stoll, N. (2012). Indonesia: How the People of Indonesia Live with Climate Change and What Communication Can Do. *BBC*.
- Cutter-Mackenzie, A., & Rousell, D. (2019). Education for What? Shaping the Field of Climate Change Education with Children and Young People as Co-Researchers. *Children's Geographies*, 17(1), 90–104. <https://doi.org/10.1080/14733285.2018.1467556>
- Daniel, B., Stanisstreet *, M., & Boyes, E. (2004). How Can We Best Reduce Global Warming? School Students' Ideas And Misconceptions. *International Journal of Environmental Studies*, 61(2), 211–222. <https://doi.org/10.1080/0020723032000087907>
- Darmayanti, N. W. S. (2020). *Evaluasi Pembelajaran IPA*. Nilacakra.
- Dawson, V. (2015). Western Australian High School Students' Understandings About the Socioscientific Issue of Climate Change. *Journal of Science Education*, 37(7), 1024–1043.

- Delaware. (2014). Climate Change Impact Assessment. *In Delaware Climate Change Impact Assessment*, 16(1).
<https://doi.org/10.1017/S1466046613000598>
- Demaidi, M. N., & Al-Sahili, K. (2021). Integrating SDGs in Higher Education—Case of Climate Change Awareness and Gender Equality in a Developing Country According to RMEI-TARGET Strategy. *Sustainability*, 13(6), 3101. <https://doi.org/10.3390/su13063101>
- Dessai, S., Adger, W. N., Hulme, M., Turnpenny, J., Kohler, J., & Warren, R. (2004). Defining and Experiencing Dangerous Climate Change. *Climatic Change*, 64, 11–25.
- Dewi, R. P., & Khoirunisa, N. (2018). *Middle School Student's Perception of Climate Change at Boyolali District, Indonesia*. 200.
<https://doi.org/10.1088/1755-1315/200/1/012061>
- Do, W. Y. C. (2009). *Action Plan*. City.
- Dogru, M., & Sarac, E. (2013). Metaphors of Primary School Students Relating to the Concept of Global Warming. *Global Journal of Education*, 1(1), 92–103.
- Dutt, V., & Gonzalez, C. (2012). *Decisions from Experience Reduce Misconceptions about Climate Change*. 32(1), 19–29.
- Ekayanti, N. E., & Hariyono, E. (2020). SETS Vision: How To Develop Students' Climate Literacy Through Physics Learning? *Inovasi Pendidikan Fisika*, 9(2), 215–222.
- Elbar, W., & Tampubolon, K. (2020). Pengaruh Campuran Silikon Pada Aluminium Terhadap Kekerasan dan Tingkat Keausannya. *Journal of Mechanical Engineering, Manufactures, Materials and Energy*, 4(2), 183–196.
- Eze, E. (2020). Sociographic Analysis of Climate Change Awareness and Pro-Environmental Behaviour of Secondary School Teachers and Students in Nsukka Local Government Area of Enugu State, Nigeria. *International Research in Geographical and Environmental Education*, 29(1), 89–105.
<https://doi.org/10.1080/10382046.2019.1657683>

- Flora, J. A., Saphir, M., Lappe, M., Roser-Renouf, C., Maibach, E. W., & Leiserowitz, A. A. (2014). Evaluation of a National High School Entertainment Education Program: The Alliance for Climate Education. *Climatic Change*, *127*(3–4), 419–434. <https://doi.org/10.1007/s10584-014-1274-1>
- Frappart, S., Moine, M., Jmel, S., & Megalakaki, O. (2016). Exploring French Adolescents' and Adults' Comprehension of the Green House Effect. *Environmental Education Research*, *24*(3), 1–28.
- Gallen, L. (2020). Konsekuensi dari Kebijakan Perubahan Iklim yang Buruk: Peringatan dari Tetangga Indonesia. *Habibie Center*, *12*.
- Garg, A., & Lal, P. (2013). Perception of Causes, Consequences and Solutions to Global Warming Among School Children in Delhi. *Indian Journal of Public Health Research and Development*, *4*(3), 27–32.
- Gouvea, J., & Passmore, C. (2017). 'Models of' versus 'Models for': Toward an Agent-Based Conception of Modeling in the Science Classroom. *Science & Education*, *26*(1–2), 49–63. <https://doi.org/10.1007/s11191-017-9884-4>
- Gowda, M. V. R., Fox, J. C., & Magelky, R. D. (1997). Students' Understanding of Climate Change: Insights for Scientists and Educators. *Bulletin of the American Meteorological Society*, *78*(10), 2232–2240. <https://doi.org/10.1175/1520-0477-78.10.2232>
- Grafakos, S., Viero, G., Reckien, D., Trigg, K., Viguie, V., Sudmant, A., Graves, C., Foley, A., Heidrich, O., Mirailles, J. M., Carter, J., Chang, L. H., Nador, C., Liseri, M., Chelleri, L., Orru, H., Orru, K., Aelenei, R., Bilska, A., ... Dawson, R. (2020). Integration of Mitigation and Adaptation in Urban Climate Change Action Plans in Europe: A Systematic Assessment. *Renewable and Sustainable Energy Reviews*, *121*, 109623. <https://doi.org/10.1016/j.rser.2019.109623>
- Gunamantha, I. M., & Dantes, N. (2019). Climate Change Literacy of Elementary School Students in Buleleng District, Bali Province, Indonesia. *In Journal of Physics: Conference Series*, *1254*.

- Haidar, D. A., Prastiti, T. D., Novianti, I., Wahyuningrum, E., Dafik, & Ridlo, Z. R. (2023). *Aktivitas Pembelajaran RBL dengan Pendekatan STEAM: Pemanfaatan Toples Kaca Bekas dalam Pengembangan Terarium dengan Konsep Keseimbangan Ekosistem Berbantuan Games Simulasi untuk Meningkatkan Literasi Perubahan Iklim*. Ebook CGANT Universitas Jember.
- Haifaturrahmah, H., & Nizaar, M. (2017). Pemanfaatan Botol Plastik Bekas sebagai Media Tanam Hidroponik dalam Meningkatkan Kesadaran Siswa Sekolah Dasar terhadap Lingkungan Sekitar. *JMM (Jurnal Masyarakat Mandiri)*, 1(1), 10–16.
- Haines, A., & Patz, J. A. (2004). Health Effects of Climate Change. *JAMA*, 291(1), 99–103. <https://doi.org/10.1001/JAMA.291.1.99>
- Halofsky, J. E., Peterson, D. L., & Harvey, B. J. (2020). Changing Wildfire, Changing Forests: The Effects of Climate Change on Fire Regimes and Vegetation in the Pacific Northwest, USA. *Fire Ecology*, 16(1), 4. <https://doi.org/10.1186/s42408-019-0062-8>
- Handayani, R. D., & Putra, P. D. (2019). Student cognition in the context of a climate system: Global warming and greenhouse effect. *Momentum: Physics Education Journal*, 69-77.
- Harlow, D. B., Bianchini, J. A., Swanson, L. H., & Dwyer, H. A. (2013). Potential Teachers' Appropriate and Inappropriate Application of Pedagogical Resources in A Model-Based Physics Course: A "Knowledge in Pieces" Perspective on Teacher Learning: Potential Teachers' Pedagogical Resources. *Journal of Research in Science Teaching*, 50(9), 1098–1126. <https://doi.org/10.1002/tea.21108>
- Harness, H., & Drossman, H. (2011). The Environmental Education Through Filmmaking Project. *Environmental Education Research*, 17(6), 829–849. <https://doi.org/10.1080/13504622.2011.618626>
- Hartati, M., & Hariyono, E. (2020). Efektifitas Pembelajaran Fisika Terintegrasi Dengan Aksi Iklim Pada Prinsip Sdgs (Sustainable Development Goals)

- Dalam Meningkatkan Karakter Peduli Lingkungan. *Inovasi Pendidikan Fisika*, 9(3).
- Haslett, S., France, D., & Gedye, S. (2011). *Pedagogy of Climate Change: An Introduction*.
- Hastuti, A. (2014). *Penerapan Pembelajaran Berbasis Praktikum untuk Meningkatkan Motivasi dan Hasil Belajar Biologi Materi Pokok Sistem Reproduksi Manusia*. UIN Sunan Kalijaga Yogyakarta.
- Heinrich, V. H. A., Dalagnol, R., Cassol, H. L. G., Rosan, T. M., De Almeida, C. T., Silva Junior, C. H. L., Campanharo, W. A., House, J. I., Sitch, S., Hales, T. C., Adami, M., Anderson, L. O., & Aragão, L. E. O. C. (2021). Large Carbon Sink Potential of Secondary Forests in the Brazilian Amazon to Mitigate Climate Change. *Nature Communications*, 12(1), 1785. <https://doi.org/10.1038/s41467-021-22050-1>
- Hermans, M., & Korhonen, J. (2017). Ninth Graders and Climate Change: Attitudes Towards Consequences, Views on Mitigation, and Predictors of Willingness to Act. *International Research in Geographical and Environmental Education*, 26(3), 223–239. <https://doi.org/10.1080/10382046.2017.1330035>
- Hestness, E., McGinnis, J. R., & Breslyn, W. (2019). Examining the Relationship Between Middle School Students' Sociocultural Participation and Their Ideas About Climate Change. *Environmental Education Research*, 25(6), 912–924. <https://doi.org/10.1080/13504622.2016.1266303>
- Hudzaifah, I. S. (2021). *Pengaruh Inkuiri Berbasis Simulasi Model Perubahan Iklim Terhadap Kemampuan Penalaran Ilmiah dan Miskonsepsi Siswa* [Universitas Pendidikan Indonesia]. <http://reader-repository.upi.edu/index.php/display/file/65176/6/16>
- Idrus, S. W. A., Mutiah, M., Rahmawati, R., Junaedi, E., & Anwar, Y. A. S. (2021). Sosialisasi Prinsip Green Chemistry untuk Meningkatkan Kesadaran Akan Bahaya Limbah Kimia Terhadap Lingkungan pada Mahasiswa Prodi Pendidikan Kimia FKIP UNRAM. *Jurnal Pengabdian Masyarakat Sains Indonesia*, 3(2). <https://doi.org/10.29303/jpmsi.v3i2.135>

- IPCC. (1997). *An Introduction to Simple Climate Model Used in the IPCC Second Assessment Report*.
- Iriyadi, I., & Antonio, Y. (2021). Climate Change Disclosure Impact on Indonesian Corporate Financial Performance. *Jurnal Dinamika Akuntansi dan Bisnis*, 8(2), 117–127. <https://doi.org/10.24815/jdab.v8i2.20424>
- Iturriza, M., Labaka, L., Ormazabal, M., & Borges, M. (2020). Awareness-Development in the Context of Climate Change Resilience. *Urban Climate*, 32, 100613. <https://doi.org/10.1016/j.uclim.2020.100613>
- Jackson, L., & Pang, M.-F. (2017). Secondary School Students' Views of Climate Change in Hong Kong. *International Research in Geographical and Environmental Education*, 26(3), 180–192. <https://doi.org/10.1080/10382046.2017.1330036>
- Jones, M. D. H., & Henderson-Sellers, A. (1990). History of the Greenhouse Effect. *Progress in Physical Geography: Earth and Environment*, 14(1), 1–18. <https://doi.org/10.1177/030913339001400101>
- Karpudewan, M., & Mohd Ali Khan, N. S. (2017). Experiential-Based Climate Change Education: Fostering Students' Knowledge and Motivation Towards the Environment. *International Research in Geographical and Environmental Education*, 26(3), 207–222. <https://doi.org/10.1080/10382046.2017.1330037>
- Karpudewan, M., Roth, W. M., & Chandrakesan, K. (2015). Remediating Misconception on Climate Change Among Secondary School Students in Malaysia. *Environmental Education Research*, 21(4), 631–648. <https://doi.org/10.1080/13504622.2014.891004>
- Khan, Z. A. A., & Nawaz, A. (2020). Impact of Climate Change Awareness on Climate Change Adaptions and Climate Change Adaptation Issues. *Pakistan Journal of Agricultural Research*, 36(3). <https://doi.org/10.17582/journal.pjar/2020/33.3.619.636>
- Kilinc, A., Stanisstreet, M., & Boyes, E. (2008). Turkish Students' Ideas About Global Warming. *International Journal of Environmental and Science Education*, 3(2), 89–98.

- Knight, K. W. (2016). Public Awareness and Perception of Climate Change: A Quantitative Cross-National Study. *Environmental Sociology*, 2(1), 101–113. <https://doi.org/10.1080/23251042.2015.1128055>
- Koulaidis, V., & Christidou, V. (1999). Models of Students' Thinking Concerning the Greenhouse Effect and Teaching Implications. *Science Education*, 83(5), 559–576. [https://doi.org/10.1002/\(SICI\)1098-237X\(199909\)83:5<559::AID-SCE4>3.0.CO;2-E](https://doi.org/10.1002/(SICI)1098-237X(199909)83:5<559::AID-SCE4>3.0.CO;2-E)
- Kumala, C. I. (2017). Pengembangan Lembar Kerja Siswa Berbasis Inkuiri Terbimbing pada Materi Pemanasan Global untuk Melatihkan Keterampilan Proses Sains di SMA Negeri 1 Kedungwaru. *IPF: Inovasi Pendidikan Fisika*, 6(3).
- Kurnia, A., & Sudarti. (2021). Efek Rumah Kaca Oleh Kendaraan Bermotor. *GRAVITASI: Jurnal Pendidikan Fisika Dan Sains*, 4(2), 1–9.
- Kurniawan, K., Supriatna, J., Sapoheluwakan, J., Soesilo, T. E. B., Mariati, S., Gunarso, G., & Fatimah. (2022). The Analysis of Forest and Land Fire and Carbon and Greenhouse Gas Emissions on the Climate Change in Indonesia. *AgBioForum*, 24(2).
- Kusmianty, D., Widiyanto, B., & Kusuma, M. (2020). Efektivitas Model Pembelajaran Sets Metode Praktikum pada Materi Pemanasan Global dalam Meningkatkan Kemampuan Berpikir Kritis. *Cakrawala: Jurnal Pendidikan*, 14(1), 41–51. <https://doi.org/10.24905/cakrawala.v14i1.218>
- Kusumawati, R. M., & Wulandari, K. (2023). Edukasi Perubahan Iklim untuk Menambah Pemahaman Tentang Kondisi Iklim Saat Ini. *Jurnal Pengabdian kepada Masyarakat*, 5(1), 64–67.
- Kuthe, A., Keller, L., Körfgen, A., Stötter, H., Oberrauch, A., & Höferl, K. M. (2019). How Many Young Generations Are There?—A Typology of Teenagers' Climate Change Awareness in Germany and Austria. *Journal of Environmental Education*, 50(3), 172–182. <https://doi.org/10.1080/00958964.2019.1598927>

- Kwon, S. A. (2022). Where Does an Individual's Willingness to Act on Alleviating the Climate Crisis in Korea Arise from? *Sustainability*, *14*(11), 6664. <https://doi.org/10.3390/su14116664>
- Lahay, R. J., Koem, S., & Nasib, S. K. (2020). Adaptasi Perubahan Iklim Berbasis Masyarakat Melalui Pendekatan Ekosistem di Desa Ilodulunga Kabupaten Gorontalo Utara. *Jurnal Penelitian dan Pengabdian Kepada Masyarakat UNSIQ*, *7*(2), 170–178. <https://doi.org/10.32699/ppkm.v7i2.980>
- Latkin, C. A., Dayton, L., Lee, D.-I., Yi, G., & Uzzi, M. (2021). Correlates of Levels of Willingness to Engage in Climate Change Actions in the United States. *International Journal of Environmental Research and Public Health*, *18*(17), 9204. <https://doi.org/10.3390/ijerph18179204>
- Lee, K., Gjersoe, N., O'Neill, S., & Barnett, J. (2020). Youth perceptions of climate change: A narrative synthesis. *WIREs Climate Change*, *11*(3), e641. <https://doi.org/10.1002/wcc.641>
- Lee, O., Lester, B. T., Ma, L., Lambert, J., & Jean-Baptiste, M. (2007). Conceptions of the Greenhouse Effect and Global Warming among Elementary Students from Diverse Languages and Cultures. *Journal of Geoscience Education*, *55*(2), 117–125. <https://doi.org/10.5408/1089-9995-55.2.117>
- Lee, T. M., Markowitz, E. M., Howe, P. D., Ko, C. Y., & Leiserowitz, A. A. (2015). Predictors of Public Climate Change Awareness and Risk Perception Around the World. *Nature Climate Change*, *5*(11), 1014–1020. <https://doi.org/10.1038/nclimate2728>
- Leiserowitz, A., Smith, N., & Marlon, J. R. (2011). American Teens' Knowledge of Climate Change. *Yale University. New Haven, CT: Yale project on climate change communication*, 5.
- Lewington, J. (2021). Are Canadian Schools Raising Climate-Literate Citizens? *Corporate Knights*. <https://www.corporateknights.com/education/are-canadian-schools-raising-climate-literate-citizens/>
- Li, R., & Wong, T. (2018). Teaching Them before We Teach: The Effectiveness of Conducting Classroom Experiments before Teaching the Underlying

- Theory. *IAFOR Journal of Education*, 6(3), 79–92.
<https://doi.org/10.22492/ije.6.3.05>
- Linn, M. C., & Eylon, B.-S. (2011). *Science Learning and Instruction* (0 ed.).
 Routledge. <https://doi.org/10.4324/9780203806524>
- Lueddecke, S. B., Pinter, N., & McManus, S. A. (2001). Greenhouse Effect in the
 Classroom: A Project- and Laboratory-Based Curriculum. *Journal of
 Geoscience Education*, 49(3), 274–279.
- Lustiyati, E. D. L., Pascawati, N. A., Rusyani, Y. Y., Untari, J., Melliani, A. P., &
 Yanuardo, A. C. (2023). Pemberdayaan Peran Mahasiswa Menanggapi
 Perubahan Iklim Melalui Gaya Hidup Berkelanjutan (Sustainable Lifestyle)
 Peduli Lingkungan. *Jurnal Pengabdian Nasional (JPN) Indonesia*, 4(1),
 41–50. <https://doi.org/10.35870/jpni.v4i1.100>
- Luthfia, A. R., & Alkhajar, E. N. S. (2018). Strengthening Public Awareness on
 Climate Change: Lesson Learned from a Youth Social Movement in
 Yogyakarta, Indonesia. *IOP Conference Series: Earth and Environmental
 Science*, 200, 012033. <https://doi.org/10.1088/1755-1315/200/1/012033>
- Maiziani, F. (2016). Efektivitas Computer Based Testing sebagai Sarana Tes Hasil
 Belajar. *Jurnal Kiprah*, 4(1), 15–32.
- Malgwi, P. G., & Joshua, W. K. (2021). Assessment of the Perception and
 Awareness of Climate Change and the Influence of Information Amongst
 Tertiary Education Students in North-East Nigeria. *Library and Information
 Science Digest*, 14(1), 14–24.
- Manolas, E., & Filho, W. L. (2011). The Use of Cooperative Learning in Dispelling
 Student Misconceptions on Climate Change. *Journal of Baltic Science
 Education*, 10(3), 168–182.
- Margunayasa, I. G. (2014). Pengaruh Petunjuk Praktikum IPA Bermuatan
 Perubahan Konseptual Terhadap Peningkatan Pemahaman Konsep IPA
 Pada Mahasiswa PGSD. *JPI (Jurnal Pendidikan Indonesia)*, 3(1).
- Mason, L., & Santi, M. (1998). Discussing the Greenhouse Effect: Children's
 Collaborative Discourse Reasoning and Conceptual Change. *Environmental*

- Education Research*, 4(1), 67–85.
<https://doi.org/10.1080/1350462980040105>
- Mavrodieva, Rachman, Harahap, & Shaw. (2019). Role of Social Media as a Soft Power Tool in Raising Public Awareness and Engagement in Addressing Climate Change. *Climate*, 7(10), 122. <https://doi.org/10.3390/cli7100122>
- McGrath, M. (2021). Climate Change: Big Increase in Weather Disasters Over the Past Five Decades. *BBC*. <https://www.bbc.com/news/science-environment-58396975>
- McNamara, K. E. (2013). Raising Awareness About Climate Change in Pacific Communities. *Raising Awareness about Climate Change in Pacific Communities*, 19(6), 864–871.
<https://doi.org/10.1080/13504622.2013.769046>
- McNeal, K. S., Walker, S. L., & Rutherford, D. (2014). Assessment of 6- to 20-Grade Educators' Climate Knowledge and Perceptions: Results from the Climate Stewardship Survey. *Journal of Geoscience Education*, 62(4), 645–654. <https://doi.org/10.5408/13-098.1>
- Measey, M. (2010). Indonesia: A Vulnerable Country in the Face of Climate Change. *Global Majority E-journal*, 1(1), 31–45.
- Mikhaylov, A., Moiseev, N., Aleshin, K., & Burkhardt, T. (2020). Global Climate Change and Greenhouse Effect. *Entrepreneurship and Sustainability Issues*, 7(4), 2897–2913. [https://doi.org/10.9770/jesi.2020.7.4\(21\)](https://doi.org/10.9770/jesi.2020.7.4(21))
- Miladan, N. (2009). *Kajian Kerentanan Wilayah Pesisir Kota Semarang Terhadap Perubahan Iklim*. Universitas Diponegoro.
- Mitchell, J. F. B. (1989). The “Greenhouse” Effect and Climate Change. *Reviews of Geophysics*, 27(1), 115. <https://doi.org/10.1029/RG027i001p00115>
- Mochizuki, Y., & Bryan, A. (2015). Climate Change Education in the Context of Education for Sustainable Development: Rationale and Principles. *Journal of Education for Sustainable Development*, 9(1), 4–26.
<https://doi.org/10.1177/0973408215569109>

- Mohyeden, J. (2021). Meningkatkan Pemahaman Konsep Cahaya Melalui Penerapan Metode Praktikum Pada Siswa Kelas V SDI Paupanda 3. *Ekspektasi: Jurnal Pendidikan Ekonomi*, 6(2), 143–147.
- Mufida, A. A., Widodo, A., & Solihat, R. (2022). Students' Understanding of Climate Change After Learning Using Immersive Virtual Learning. *Jurnal Pendidikan MIPA*, 23(2), 642–650. <https://doi.org/10.23960/JPMIPA/V23I2.PP642-650>
- Mulder, Y. G., Bollen, L., De Jong, T., & Lazonder, A. W. (2016). Scaffolding Learning by Modelling: The Effects of Partially Worked-Out Models: Scaffolding Learning By Modelling. *Journal of Research in Science Teaching*, 53(3), 502–523. <https://doi.org/10.1002/tea.21260>
- Müller, P. (2010). Constructing Climate Knowledge with Computer Models. *Wiley Interdisciplinary Reviews: Climate Change*, 1(4), 565–580. <https://doi.org/10.1002/wcc.60>
- Nisa, U. M. (2017). Metode Praktikum untuk Meningkatkan Pemahaman dan Hasil Belajar Siswa kelas V MI YPPI 1945 Babat pada Materi Zat Tunggal dan Campuran. In *Proceeding Biology Education Conference: Biology, Science, Enviromental, and Learning*, 15(1), 62–68.
- Nugraha, M. F., Nurfitriani, M., Gumi, G., Yosiva, A., & Ismail, I. (2022). Integrasi Muatan Pendidikan Lingkungan Hidup Pada Mata Pelajaran IPA Materi Suhu Dan Kalor Berbantuan Media Video Pembelajaran Praktikum Sederhana Untuk Siswa Kelas V Sekolah Dasar. *Naturalistic: Jurnal Kajian dan Penelitian Pendidikan dan Pembelajaran*, 6(2), 1243–1247.
- Nugroho, A. W. (2020a). What Students Know About Climate Change? A Case Study of High School Students in Samboja, Indonesia. *IOP Conference Series: Earth and Environmental Science*, 487(1), 012001. <https://doi.org/10.1088/1755-1315/487/1/012001>
- Nugroho, A. W. (2020b). *What Students Know About Climate Change? A Case Study of High School Students in Samboja, Indonesia*. IOP Conference Series: Earth and Environmental Science.

- Nugroho, P. A., & Puspitasari, Y. D. (2019). Pengembangan Modul Praktikum Pencemaran Lingkungan Berbasis Inkuiri Terbimbing Berkolaborasikan Video untuk Meningkatkan Sikap Peduli Lingkungan dan Hasil Belajar Mahasiswa. *Jurnal IPA dan Pembelajaran IPA*, 3(2), 42–61.
- Nurfatimah, S. A., Hasna, S., & Rostika, D. (2022). Membangun Kualitas Pendidikan di Indonesia dalam Mewujudkan Program Sustainable Development Goals (SDGs). *Jurnal Basicedu*, 6(4), 6145-6154.
- Nursofa, R., & Hamdu, G. (2021). Analisis Ketersediaan dan Gambaran Media Pembelajaran Isu Perubahan Iklim Berbasis ESD di Sekolah Dasar. *COLLASE (Creative of Learning Students Elementary Education)*, 4(5), 660–664.
- Nusantari, E. D. N. (2022). *Pengaruh Pembuatan Video Dokumenter Pantai dan Laut terhadap Pemahaman dan Kesadaran Perubahan Iklim Siswa SMA*. Universitas Pendidikan Indonesia.
- Ochieng, M., & Koske, J. (2013). The Level of Climate Change Awareness and Perception among Primary School Teachers in Kisumu Municipality, Kenya. *International Journal of Humanities and Social Science*, 3(21), 174–179.
- Oruonye, E. D. (2011). An Assessment of the Level of Awareness of the Effects of Climate Change Among Students of Tertiary Institutions in Jalingo Metropolis, Taraba State Nigeria. *Journal of Geography and Regional Planning*, 4(9), 513–517. <http://www.academicjournals.org/JGRP>
- Ovuyovwiroye, P. A. (2013). Analysis of Climate Change Awareness in Nigeria. *Academic Journals*, 8(26), 1203–1211. *Journal of Geography and Regional Planning*, 4(9), 513– 517. <http://www.academicjournals.org/JGRP>
- Owolabi, H. O., Gyimah, E. K., & Amponsah, M. O. (2012). Assessment of Junior High School Students Awareness of Climate Change and Sustainable Development in Central Region , Ghana. *Educational Research Journal*, 2, 308–317.
- Özdem, Y., Dal, B., Öztürk, N., Sönmez, D., & Alper, U. (2014). What is That Thing Called Climate Change? An Investigation Into the Understanding of

- Climate Change by Seventh-Grade Students. *International Research in Geographical and Environmental Education*, 23(4), 294–313.
<https://doi.org/10.1080/10382046.2014.946323>
- Pallant, A., & Lee, H. S. (2015). Constructing Scientific Arguments Using Evidence from Dynamic Computational Climate Models. *Journal of Science Education and Technology*, 24(2–3), 378–395.
<https://doi.org/10.1007/s10956-014-9499-3>
- Parks, S. A., & Abatzoglou, J. T. (2020). Warmer and Drier Fire Seasons Contribute to Increases in Area Burned at High Severity in Western US Forests From 1985 to 2017. *Geophysical Research Letters*, 47(22), e2020GL089858.
<https://doi.org/10.1029/2020GL089858>
- Permana, I. (2021). Peningkatan Kesadaran Generasi Z Terhadap Perubahan Iklim di Indonesia. *Rural Development For Economic Resilience (RUDENCE)*, 45–48.
- Pidgeon, N. F., Lorenzoni, I., & Poortinga, W. (2008). Climate Change or Nuclear Power—No thanks! A Quantitative Study of Public Perceptions and Risk Framing in Britain. *Global Environmental Change*, 18(1), 69–85.
<https://doi.org/10.1016/j.gloenvcha.2007.09.005>
- Prudente, M. S., Aguja, S. E., & Jovito, C. A. (2015). Exploring Climate Change Conceptions and Attitudes: Drawing Implications for a Framework on Environmental Literacy. *Advanced Science Letters*, 21(7), 2413–2418.
<https://doi.org/10.1166/asl.2015.6294>
- Pruneau, D., Gravel, H., Bourque, W., & Langis, J. (2003). Experimentation with a Socio-Constructivist Process for Climate Change Education. *Environmental Education Research*, 9(4), 429–446.
<https://doi.org/10.1080/1350462032000126096>
- Pruneau, D., & Khattabi, A. (2010). Challenges and Possibilities in Climate Change Education. *US-China Education Review*, 7(9), 15–24.
- Punter, P., Ochando-Pardo, M., & Garcia, J. (2011). Spanish Secondary School Students' Notions on the Causes and Consequences of Climate Change.

- International Journal of Science Education*, 33(3), 447–464.
<https://doi.org/10.1080/09500693.2010.492253>
- Putrawidjaya, M. (2008). Mapping Climate Education in Indonesia: Opportunities for Development. *In British Council*.
- Putri, A. A. (2022). *Pengaruh Aktifitas Eksperimen yang Diikuti Penggunaan Pemodelan Iklim terhadap Pemahaman dan Kesadaran Perubahan Iklim Siswa SMA*. Universitas Pendidikan Indonesia.
- Putri, W. A., Astalini, A., & Darmaji, D. (2022). Analisis Kegiatan Praktikum untuk Dapat Meningkatkan Keterampilan Proses Sains dan Kemampuan Berpikir Kritis. *EDUKATIF: JURNAL ILMU PENDIDIKAN*, 4(3), 3361–3368.
<https://doi.org/10.31004/edukatif.v4i3.2638>
- Puttick, G., Kies, K., Garibay, C., & Bernstein, D. (2015). Learning and Behavior Change in a Girl Scout Program Focused on Energy Conservation: Saving Energy to “Save the Planet.” *Journal of Sustainability Education*, 8(1).
- Radhiyah, R., & Hariyono, E. (2022). Pemanfaatan Terrarium Sederhana dengan Model Problem Based Learning untuk Melatihkan Keterampilan Berpikir Kritis Siswa pada Materi Perubahan Iklim. *Briliant: Jurnal Riset Dan Konseptual*, 7(1), 299–311.
- Rahmadania, N. (2022). Pemanasan Global Penyebab Efek Rumah Kaca dan Penanggulangannya. *Jurnal Ilmu Teknik*, 2(3).
- Rahmah, D. M. (2022). Perubahan Iklim dalam Pendidikan IPA Berkelanjutan. *Jurnal Sains Edukatika Indonesia (JSEI)*, 4(2).
- Rahman, M. I. (2013). Climate Change: A Theoretical Review. *Interdisciplinary Description of Complex Systems*, 11(1), 1–13.
<https://doi.org/10.7906/indecs.11.1.1>
- Rahmawati, R., Haryani, S., & Kasmui. (2014). Penerapan Praktikum Berbasis Inkuiri untuk Meningkatkan Keterampilan Proses Sains Siswa. *Jurnal Inovasi Pendidikan Kimia*, 8(2).
- Rima, Munandar, A., & Anggraeni, S. (2020). Pengembangan Kegiatan Praktikum Pemodelan Efek Rumah Kaca untuk Siswa SMA pada Materi Perubahan Lingkungan. *Assimilation: Indonesian Journal of Biology Education*, 3(1).

- Rini, E. F. S., Darmaji, D., & Kurniawan, D. A. (2022). Identifikasi Kegiatan Praktikum dalam Meningkatkan Keterampilan Proses Sains di SMPN Se-Kecamatan Bajubang. *EDUKATIF : JURNAL ILMU PENDIDIKAN*, 4(2), 2476–2481. <https://doi.org/10.31004/edukatif.v4i2.2360>
- Rini, S. A., Bambang, S., & Tina, S. N. (2014). Analisis relevansi lembar kerja siswa terhadap kompetensi dasar pada konsep protista. *Formica Education Online*, 1(1).
- Rocha, V. T. D., Brandli, L. L., & Kalil, R. M. L. (2020). Climate Change Education in School: Knowledge, Behavior and Attitude. *International Journal of Sustainability in Higher Education*, 21(4), 649–670. <https://doi.org/10.1108/IJSHE-11-2019-0341>
- Rustaman, N. Y., Dirdjosoemarto, S., Yudianto, S. A., Achmad, Y., Subekti, R., Rochintaniawati, D., & K. M. N. (2005). *Strategi Belajar Mengajar Biologi*. Universitas Negeri Malang.
- Sari, G. M. A., Antika, V. Y., Wisutama, R. A., Syiami, L. N., Sulaeman, N. F., Nuryadin, A., & Subagio, L. (2022). New Indonesian Science Curriculum for Junior High School: A Content Analysis to Support STEM SDGs. *Jurnal Literasi Pendidikan Fisika (JLPF)*, 3(2), 176–182.
- Schneider, S. H. (1989). The Greenhouse Effect: Science and Policy. *Science*, 243(4892), 771–781. <https://doi.org/10.1126/science.243.4892.771>
- Scott-Parker, B., & Kumar, R. (2018). Fijian Adolescents' Understanding and Evaluation of Climate Change: Implications for Enabling Effective Future Adaptation. *Asia Pacific Viewpoint*, 59(1), 47–59. <https://doi.org/10.1111/apv.12184>
- Sen, L. T. H., Bond, J., Phuong, L. T. H., Winkel, A., Tran, U. C., & Le, N. Van. (2021). The Importance of Climate Change Awareness for the Adaptive Capacity of Ethnic Minority Farmers in the Mountainous Areas of Thua Thien Hue Province. *Local Environment*, 26(2), 239–251. <https://doi.org/10.1080/13549839.2021.1886064>

- Setiadi, R. (2010). *Mengarusutamakan Perubahan Iklim dalam Kurikulum Pendidikan Perencanaan Wilayah dan Kota di Indonesia*. The 9th Annual Seminar of Indonesian Planning School Association (ASPI).
- Shepardson, D. P., Niyogi, D., Choi, S., & Charusombat, U. (2009). Seventh Grade Students' Conceptions of Global Warming and Climate Change. *Environmental Education Research*, 15(5), 549–570. <https://doi.org/10.1080/13504620903114592>
- Shepardson, D. P., Niyogi, D., Choi, S., & Charusombat, U. (2011). Students' Conceptions About The Greenhouse Effect, Global Warming, and Climate Change. *Climatic Change*, 104(3–4), 481–507. <https://doi.org/10.1007/s10584-009-9786-9>
- Shepardson, D. P., Niyogi, D., Roychodhury, A., & Hirsch, A. (2012). Conceptualizing climate change in the context of a climate system: Implications for climate and environmental education. *Environmental Education Research*, 18(3), 323–352.
- Shivanna, K. R. (2022). Climate Change and Its Impact on Biodiversity and Human Welfare. *Proceedings of the Indian National Science Academy*, 88(2), 160–171. <https://doi.org/10.1007/s43538-022-00073-6>
- Sinatra, G. M., Kardash, C. A. M., Taasobshirazi, G., & Lombardi, D. (2012a). Promoting attitude change and expressed willingness to take action toward climate change in college students. *Instructional Science*, 40, 1–17.
- Sinatra, G. M., Kardash, C. M., Taasobshirazi, G., & Lombardi, D. (2012b). Promoting Attitude Change and Expressed Willingness to Take Action Toward Climate Change in College Students. *Instructional Science*, 40(1), 1–17. <https://doi.org/10.1007/s11251-011-9166-5>
- Siwi, D. A., Sari, N. K., & Prasetya, K. (2016). Desain Model Praktikum IPA Berbasis JAS (Jelajah Alam Sekitar) Di Sekolah Dasar Se-Kecamatan Bendosari. *Premiere Educandum Jurnal Pendidikan Dasar*, 6(2).
- Sofiyan, S., Aksa, F. I., & Saiman, S. (2019). An Analysis Climate Change of the Curriculum in Indonesia. *Journal of Physics: Conference Series*, 1321(2). <https://doi.org/10.1088/1742-6596/1321/2/022121>

- Sollberger, S., Bernauer, T., & Ehlert, U. (2017). Predictors of Visual Attention to Climate Change Images: An Eye-Tracking Study. *Journal of Environmental Psychology, 51*, 46–56. <https://doi.org/10.1016/j.jenvp.2017.03.001>
- Solomon, S., Plattner, G. K., Knutti, R., & Friedlingstein, P. (2009). Irreversible Climate Change Due to Carbon Dioxide Emissions. *Proceedings of the National Academy of Sciences of the United States of America, 106*(6), 1704–1709. <https://doi.org/10.1073/pnas.0812721106>
- SPC. (2018). *Learning about Climate Change the Pacific Way A Guide for Pacific Teachers*. Secretariat of the Pacific Community (SPC).
- Stevenson, K. T., Peterson, M. N., & Bradshaw, A. (2016). How Climate Change Beliefs among U.S. Teachers Do and Do Not Translate to Students. *PLOS ONE, 11*(9), e0161462. <https://doi.org/10.1371/journal.pone.0161462>
- Stevenson, R. B., Nicholls, J., & Whitehouse, H. (2017). What Is Climate Change Education? *Curric Perspect, 37*(1), 67–71. [https://doi.org/10.1007/s41297-017](https://doi.org/10.1007/s41297-017-017)
- Stone, B., Vargo, J., & Habeeb, D. (2012). Managing Climate Change in Cities: Will Climate Action Plans Work? *Landscape and Urban Planning, 107*(3), 263–271. <https://doi.org/10.1016/j.landurbplan.2012.05.014>
- Stroupe, D. (2015). Describing “Science Practice” in Learning Settings. *Science Education, 99*(6), 1033–1040.
- Sulistiyawati, S., Mulasari, S. A., & Sukesu, T. W. (2018). Assessment of Knowledge Regarding Climate Change and Health Among Adolescents in Yogyakarta. *Journal of Environmental and Public Health*. <https://doi.org/10.1155/2018/9716831>
- Sunardi, O., & Suchyadi, Y. (2020). Praktikum Sebagai Media Kompetensi Pedagogik Guru Sekolah Dasar. *Jurnal Pendidikan dan Pengajaran Guru Sekolah Dasar (JPPGuseda), 3*(2), 124–127.
- Suphachalasai, S., Zhuang, J., Samson, J. N., Boer, R., & Hope, C. (2012). Making Indonesia’s Growth Green and Resilient. Dalam H. Hill, M. E. Khan, & J. Zhuang (Ed.), *Diagnosing the Indonesian Economy* (1 ed., hlm. 429–466). Anthem Press. <https://doi.org/10.7135/UPO9781843313786.014>

- Supriatno, B. (2018). *Praktikum untuk Membangun Kompetensi*. 15, 1–18.
- Suryadi, Y., Nugroho Sugianto, D., & Hadiyanto. (2018). Climate Change In Indonesia (Case Study: Medan, Palembang, Semarang). *E3S Web of Conferences*, 31, 09017. <https://doi.org/10.1051/e3sconf/20183109017>
- Susanti, Y. (2016). Upaya Meningkatkan Pemahaman Konsep Sifat Asam dan Basa dengan Menggunakan Metode Praktikum. *Utile: Jurnal Kependidikan*, II(1).
- Susetya, B. (2017). Meningkatkan Kemampuan Guru dalam Menyusun Silabus dan RPP Melalui Supervisi Akademik Di SDN Gambiran Yogyakarta Tahun 2016. *Jurnal Taman Cendekia*, 1(2), 134–141.
- Svihla, V., & Linn, M. C. (2012). A Design-Based Approach to Fostering Understanding of Global Climate Change. *International Journal of Science Education*, 34(5), 651–676. <https://doi.org/10.1080/09500693.2011.597453>
- Syahriani, S., Dalifa, D., & Resnani, R. (2018). Penanaman Sikap Peduli Lingkungan Terhadap Sampah Pada Siswa Kelas I di SDN 09 Kota Bengkulu. *JURIDIKDAS: Jurnal Riset Pendidikan Dasar*, 1(2).
- Syamsu, F. D. (2017). Pengembangan penuntun praktikum ipa berbasis inkuiri terbimbing untuk peserta didik smp peserta didik kelas vii semester genap. *BIONatural*, 4(2), 13–27.
- Taber, F., & Taylor, N. (2009). Climate of Concern A Search for Effective Strategies for Teaching Children about Global Warming. *International Journal of Environmental and Science Education*, 4(2), 97–116.
- Tandoh, I., Duffour, K. A., Essandoh, M., & Mensah, E. O. (2022). Perception of Public Relations Practice Among Selected Chief Executive Officers (CEOs) In Ghana. *Communicare : Journal of Communication Studies*, 8(1), 44. <https://doi.org/10.37535/101008120214>
- Tang, Z., Brody, S. D., Quinn, C., Chang, L., & Wei, T. (2010). Moving from Agenda to Action: Evaluating Local Climate Change Action Plans. *Journal of Environmental Planning and Management*, 53(1), 41–62. <https://doi.org/10.1080/09640560903399772>

- The Royal Society. (2020). Climate Change Evidence & Causes An overview from the Royal Society and the US National Academy of Sciences. *In National Academy Of Sciences*. <https://doi.org/10.4324/9781315744520-37>
- Trolliet, M., Barbier, T., & Jacquet, J. (2019a). From Awareness to Action: Taking into Consideration the Role of Emotions and Cognition for a Stage Toward a Better Communication of Climate Change. *Addressing the Challenges in Communicating Climate Change Across Various Audiences*, 47–64.
- Trolliet, M., Barbier, T., & Jacquet, J. (2019b). From Awareness to Action: Taking into Consideration the Role of Emotions and Cognition for A Stage Toward A Better Communication of Climate Change. Dalam W. Leal Filho, B. Lackner, & H. McGhie (Ed.), *Addressing the Challenges in Communicating Climate Change Across Various Audiences* (hlm. 47–64). Springer International Publishing. https://doi.org/10.1007/978-3-319-98294-6_4
- UNESCO. (2019). *Country Progress on Climate Change Education, Training and Public Awareness*. <https://unesdoc.unesco.org/ark:/48223/pf0000372164/PDF/372164eng.pdf.multi>
- UNITAR. (2013). *Resource Guide For Advanced Learning On Integrating Climate Change In Education At Primary And Secondary Level*. In UN CC: Learn.
- Varma, K., & Linn, M. C. (2012). Using Interactive Technology to Support Students' Understanding of the Greenhouse Effect and Global Warming. *Journal of Science Education and Technology*, 21, 453–464.
- Wahyuni, H. I. (2017). Mainstreaming Climate Change Issues: Challenges for Journalism Education in Indonesia. *Pacific Journalism Review*, 23(1), 80–95.
- Walker, S. L., & Mcneal, K. S. (2012). Development and Validation of an Instrument for Assessing Climate Change Knowledge and Perceptions: The Climate Stewardship Survey (CSS). *International Electronic Journal of Environmental Education*, 3(1), 57–73. <https://doi.org/10.18497/iejee-green.79359>

- Wang, Z., Rasool, Y., Zhang, B., Ahmed, Z., & Wang, B. (2020). Dynamic Linkage Among Industrialisation, Urbanisation, and CO₂ Emissions in APEC Realms: Evidence Based on DSUR Estimation. *Structural Change and Economic Dynamics*, 52, 382–389. <https://doi.org/10.1016/j.strueco.2019.12.001>
- Widodo, A. (2021). *Pembelajaran Ilmu Pengetahuan Alam*. UPI PRESS.
- Widodo, A., Maria, R. A., & Fitriani, A. (2016). Peranan praktikum riil dan praktikum virtual dalam membangun kreatifitas siswa. *Jurnal Pengajaran MIPA*, 21(1), 92–102.
- Widodo, W., Hidayati, & Rahmadiarti. (2016). *Ilmu Pengetahuan Alam Edisi Revisi*. Kementerian Pendidikan dan Kebudayaan.
- Windyariani, S. (2017). Pembelajaran ipa dengan praktikum berbasis konteks dan literasi sains: Perspektif guru sd di sukabumi. *Jurnal Pendidikan Matematika dan IPA*, 8(1), 23–33.
- WMO. (2021, Agustus 31). *Weather-Related Disasters Increase Over Past 50 Years, Causing More Damage But Fewer Deaths*. <https://public.wmo.int/en/media/press-release/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer#:~:text=The%20number%20of%20disasters%20has,deaths%20decreased%20almost%20three%2Dfold>.
- Xu, X., Jia, G., Zhang, X., Riley, W. J., & Xue, Y. (2020). Climate Regime Shift and Forest Loss Amplify Fire in Amazonian Forests. *Global Change Biology*, 26(10), 5874–5885. <https://doi.org/10.1111/gcb.15279>
- Yovina, A. (2022). *Pengaruh Penggunaan Model Iklim dan Aktivitas Eksperimen terhadap Kesadaran Perubahan Iklim dan Intensi Pro Lingkungan Siswa*. Universitas Pendidikan Indonesia.
- Zahara, R., Wahyuni, A., & Mahzum, E. (2017). Perbandingan pembelajaran metode praktikum berbasis keterampilan proses dan metode praktikum biasa terhadap prestasi belajar siswa. *Jurnal Ilmiah Mahasiswa Pendidikan Fisika*, 2(1), 170-174.

