

**PENGEMBANGAN INSTRUMEN ASESMEN *PEDAGOGICAL CONTENT*
KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS
PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN
PENYELESAIAN MASALAH SAINTIFIK**

DISERTASI

**Diajukan untuk Memenuhi Sebagian Syarat
Memperoleh Gelar Doktor Pendidikan IPA**



PROMOVENDUS

**ERWIN
NIM. 1602921**

**PROGRAM STUDI PENDIDIKAN ILMU PENGETAHUAN ALAM
SEKOLAH PASCASARJANA
UNIVERSITAS PENDIDIKAN INDONESIA
2019**

Pengembangan Instrumen Asesmen *Pedagogical Content Knowledge* Calon Guru Fisika dalam Konteks Pembelajaran Keterampilan Komunikasi dan Penyelesaian Masalah Saintifik

Oleh
ERWIN

Dr. Universitas Pendidikan Indonesia, 2019
M.Pd. Universitas Pendidikan Indonesia, 2005

Sebuah Disertasi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Doktor Pendidikan (Dr.) pada Sekolah Pascasarjana Universitas Pendidikan Indonesia

© Erwin 2019
Universitas Pendidikan Indonesia
Agustus 2019

Hak Cipta dilindungi undang-undang.
Disertasi ini tidak boleh diperbanyak seluruhnya atau sebagian,
dengan dicetak ulang, difoto kopi, atau cara lainnya tanpa ijin dari penulis.

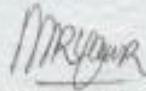
HALAMAN PERSETUJUAN

PENGEMBANGAN INSTRUMEN ASESMEN *PEDAGOGICAL CONTENT KNOWLEDGE* CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

DISERTASI

Diajukan untuk memenuhi sebagian syarat memperoleh gelar Doktor Pendidikan IPA

Promotor



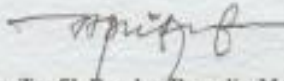
Prof. Dr. Hj. Nuryani Y. Rustaman M. Pd.

Ko-Promotor



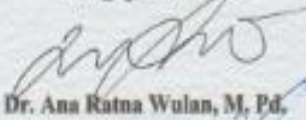
Dr. Harry Firman, M.Pd.

Anggota



Dr. Taufik Ramlan Ramalis, M.Si.

Penguji Internal



Dr. Ana Ratna Wulan, M. Pd.

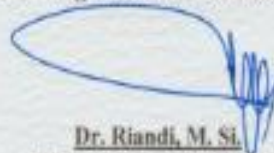
Penguji Eksternal



Paulus Cahyono Tjiang, Ph. D.

Mengetahui,

Ketua Program Studi Pendidikan IPA



Dr. Riandi, M. Si.

NIP. 19630501 198803 1 002

Pengembangan Instrumen Asesmen *Pedagogical Content Knowledge* Calon Guru Fisika dalam Konteks Pembelajaran Keterampilan Komunikasi dan Penyelesaian Masalah Saintifik

Abstrak

Kurikulum Tahun 2013 mengharuskan dilakukannya pengembangan keterampilan Abad-21 terintegrasi dengan pembelajaran konsep/sub pokok bahasan. Keterampilan Abad 21 yang esensial untuk dibelajarkan antara lain keterampilan komunikasi dan penyelesaian masalah saintifik. Oleh karena itu perlu dilakukan pengembangan instrumen untuk mengukur *Pedagogical Content Knowledge (PCK)* calon guru dalam konteks pengembangan keterampilan komunikasi dan penyelesaian masalah saintifik. Penelitian ini menggunakan metode *Design and Development Research (DDR)* dengan tahapan perencanaan, produksi dan evaluasi. Penelitian dilakukan di salah satu Lembaga Pendidikan Tenaga Kependidikan (LPTK) di Sumatera Selatan yang menyelenggarakan Program Studi Pendidikan Fisika. Partisipan penelitian pada ujicoba awal terdiri dari enam calon guru fisika dan lima dosen program studi pendidikan fisika. Pada ujicoba utama, partisipan berjumlah 21 calon guru fisika, lima dosen program studi pendidikan fisika pada LPTK tempat penelitian, ditambah dua dosen program studi pendidikan fisika pada salah satu perguruan tinggi negeri di kota Bandung. Instrumen yang dikembangkan berupa rubrik untuk menilai tugas kinerja (matriks PCK) yang disusun oleh calon guru fisika. Kualitas instrumen diuji menggunakan uji validitas, uji reliabilitas (konsistensi) dan uji kepraktisan. Berdasarkan uji kualitas yang dilakukan, instrumen yang dikembangkan memenuhi syarat validitas yang baik, ditunjukkan dengan indeks $CVR=1$ pada tiap sel rubrik. Instrumen juga memenuhi syarat reliabilitas yang memadai berdasarkan uji statistik indeks *Intraclass Correlation Coefficients (ICC)* dan indeks *Kendall Coefficient Concordance W*, dengan indeks ICC dan W Kendall berada pada kategori sedang sampai dengan sangat tinggi. Kepraktisan instrumen juga baik dari sisi kebermanfaatan, kemudahan menggunakan, meskipun perlu penyediaan alokasi waktu yang lebih banyak dalam melakukan penilaian yang berpedoman pada rubrik PCK. Berdasarkan uji kualitas tersebut, instrumen asesmen PCK yang dikembangkan memiliki kualitas yang baik, sehingga dapat digunakan untuk menilai PCK calon guru fisika dalam konteks pembelajaran keterampilan komunikasi dan penyelesaian masalah saintifik.

Kata Kunci: Instrumen asesmen, *Pedagogical Content Knowledge*, keterampilan komunikasi dan penyelesaian masalah saintifik.

Development of Pedagogical Content Knowledge Assessment Instrument of Prospective Physics Teachers in The Context of Learning of Scientific Communication and Problem Solving Skills

Abstract

The 2013 curriculum requires the development of 21st Century skills integrated with learning concepts / sub-topics, 21st Century skills that are essential for learning included scientific communication and problem solving skills. Therefore it is necessary to develop instruments to measure Pedagogical Content Knowledge (PCK) of prospective teacher in the context of developing scientific communication and problem solving skills. This study uses the Design and Development Research (DDR) method with the stages of planning, production and evaluation. The study was conducted at one of the teacher training and education institutes in South Sumatra that run a Physics Education Study Program. The participants in the initial trial consisted of six prospective physics teacher and five lecturers in physics education study programs. Whereas in the main trial, there were 21 prospective physics teachers, five lecturers of physics education study programs at the education college where the study was conducted and were added by two lecturers of physics education study programs at one of the state universities in the city of Bandung. The instrument developed was in the form of a rubric for assessing performance tasks (PCK matrix) compiled by prospective physics teachers. The quality of the rubric was examined for content validity, reliability (consistency) and practicality. Based on the quality test conducted, the instrument developed fulfills the requirements of good validity, indicated by the CVR index of 1 in each cell of rubric. The instrument also fulfills adequate reliability requirements based on the Intraclass Correlation Coefficients (ICC) index and the Kendall's Coefficient Concordance W index test. with the ICC and W Kendall index in the moderate to very high category. Instrument practicability is also good in terms of usefulness, ease of use, although it is necessary to provide more time allocation in conducting assessments based on the PCK rubrics. Based on the quality examined, the PCK assessment instrument developed has good quality, hence it can be used to assess PCK of prospective physics teachers in context of learning scientific communication and problem solving skills.

Keywords: Assessment instrument, Pedagogical Content Knowledge, scientific communication and problem solving skills

DAFTAR ISI

HALAMAN JUDUL	i
HALAMAN PERSETUJUAN	ii
PERNYATAAN.....	iii
ABSTRAK	iv
KATA PENGANTAR	vi
UCAPAN TERIMA KASIH	vii
DAFTAR ISI	ix
DAFTAR TABEL	xii
DAFTAR GAMBAR	xiv
DAFTAR LAMPIRAN	xvi
BAB I PENDAHULUAN	1
1.1 Latar Belakang	1
1.2 Rumusan Masalah	11
1.3 Tujuan Penelitian	11
1.4 Manfaat Penelitian	12
1.5 Penjelasan Istilah	12
1.6 Struktur Organisasi Disertasi	13
BAB II KAJIAN PUSTAKA	15
2.1 Pengertian <i>Pedagogical Content Knowledge (PCK)</i>	15
2.2 Pembekalan <i>PCK</i> bagi Calon Guru IPA	18
2.3 Pembelajaran Keterampilan Komunikasi dan Penyelesaian Masalah saintifik	20
2.3.1 Keterampilan Komunikasi Saintifik.....	23
2.3.2 Keterampilan Penyelesaian Masalah Saintifik.....	25
2.4 Pengembangan Keterampilan komunikasi dan Penyelesaian Masalah Saintifik pada Pembelajaran Kinematika.....	28
2.5 Melakukan Asesmen <i>Pedagogical Content Knowledge (PCK)</i>	31
2.6 Asesmen Kinerja	40

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

2.6.1 Tugas kinerja	41
2.6.2 Rubrik	44
2.7 Kinematika.....	48
2.7.1 Gerak satu dimensi	50
2.7.2 Gerak Dua Dimensi (Gerak Parabola)	67
2.8 Penelitian yang relevan	71
BAB III METODOLOGI PENELITIAN	80
3.1 Paradigma Penelitian	80
3.2 Desain Penelitian	85
3.3 Lokasi dan Partisipan Penelitian.....	90
3.4 Prosedur Penelitian	91
3.5 Instrumen penelitian	93
3.6 Analisis Data Pengujian Kualitas Instrumen	94
3.6.1 Validitas Instrumen	95
3.6.2 Ujicoba Awal dan Kepraktisan Instrumen.....	100
3.6.3 Ujicoba Utama dan Reliabilitas Instrumen (<i>interrater reliability</i>)	102
BAB IV TEMUAN PENELITIAN DAN PEMBAHASAN	118
4.1 Draf Awal Instrumen Asesmen <i>PCK</i> dalam Konteks Pengembangan Keterampilan Komunikasi dan Penyelesaian Masalah Saintifik.....	118
4.1.1 Tugas kinerja	118
4.1.2 Rubrik	119
4.2 Ujicoba Tugas kinerja	120
4.3 Validitas Rubrik	130
4.4 Ujicoba Awal Penggunaan Rubrik	146
4.5 Ujicoba Utama dan Uji Reliabilitas Rubrik	148
4.6 Kepraktisan Rubrik	159

4.7 Hasil Pengembangan Instrumen Asesmen <i>PCK</i> dalam Konteks Pengembangan Keterampilan Komunikasi dan Penyelesaian Masalah Saintifik.....	162
4.8 Model Pengembangan Instrumen Asesmen <i>PCK</i> dalam Konteks Pembelajaran Keterampilan Komunikasi dan Penyelesaian Masalah Saintifik	178
4.9 Perbandingan Analisis <i>CoRe</i> pada Penelitian Terdahulu dengan Matriks <i>PCK</i>	182
4.10 Kualitas Instrumen Asesmen <i>PCK</i> dalam Konteks Pengembangan Keterampilan Komunikasi dan Penyelesaian Masalah Saintifik.....	184
4.11 Keterbatasan Penelitian	189
BAB V SIMPULAN, IMPLIKASI DAN REKOMENDASI	190
5.1 Simpulan	190
5.2 Implikasi	191
5.3 Rekomendasi	192
DAFTAR PUSTAKA	194

DAFTAR TABEL

Tabel 2.1	Instrumen Asesmen PCK yang Digunakan dalam Beberapa Penelitian.....	34
Tabel 2.2	Bagian-bagian Rubrik	44
Tabel 2.3	Contoh Rubrik Holistik: Membuat Rangkaian Elektronik Keperluan Rumah Tangga	46
Tabel 2.4	Contoh Rubrik Analitik: Presentasi Makalah	47
Tabel 3.1	Adaptasi Pertanyaan Pedagogi <i>CoRe</i> Loughran dkk (2004) Dalam Penelitian	88
Tabel 3.2	Contoh Indeks Konsistensi Antar Penilai yang Cocok Digunakan Berdasarkan Jenis Data	104
Tabel 4.1	Draf Awal Rubrik <i>PCK</i> Pembelajaran Konsep/Sub Pokok Bahasan	121
Tabel 4.2	Draf Awal Rubrik <i>PCK</i> Pembelajaran Keterampilan Komunikasi Sainifik	124
Tabel 4.3	Draf Awal Rubrik <i>PCK</i> Pembelajaran Keterampilan Penyelesaian Masalah Sainifik	126
Tabel 4.4	Kejelasan Pertanyaan dalam Form Matriks <i>PCK</i>	129
Tabel 4.5	Deskriptor Rubrik untuk Pertanyaan Pedagogi 5 Bagian Konsep/Sub Pokok Bahasan Sebelum dan Setelah Direvisi .	133
Tabel 4.6	Deskriptor Rubrik untuk Pertanyaan Pedagogi 6 Bagian Konsep/Sub Pokok Bahasan Sebelum dan Setelah Direvisi .	134
Tabel 4.7	Hasil Validasi Pertanyaan Pedagogi Rubrik <i>PCK</i> untuk Pembelajaran Konsep/Sub Pokok Bahasan	135
Tabel 4.8	Hasil Validasi Pertanyaan Pedagogi Rubrik <i>PCK</i> untuk Pengembangan Keterampilan Komunikasi Sainifik	138
Tabel 4.9	Deskriptor Rubrik untuk Pertanyaan Pedagogi 5 Bagian Pengembangan Keterampilan Penyelesaian Masalah Sainifik Sebelum dan Setelah Direvisi	140

Tabel 4.10 Hasil Validasi Pertanyaan Pedagogi Rubrik <i>PCK</i> untuk Pengembangan Keterampilan Penyelesaian Masalah Saintifik	143
Tabel 4.11 Hasil Validasi Rubrik Pembelajaran Konsep/ Sub Pokok Bahasan	144
Tabel 4.12 Hasil Validasi Rubrik Pengembangan Keterampilan Komunikasi Saintifik	145
Tabel 4.13 Hasil Validasi Rubrik Pengembangan Keterampilan Penyelesaian Masalah Saintifik.....	146
Tabel 4.14 Tabulasi Pedoman Penskoran Matriks <i>PCK</i>	148
Tabel 4.15 Rekapitulasi Hasil Analisis Konsistensi Penilaian Antar <i>Rater</i> pada Bagian Pembelajaran Konsep/ Sub Pokok Bahasan.....	152
Tabel 4.16 Rekapitulasi Hasil Analisis Konsistensi Penilaian Antar <i>Rater</i> pada Bagian Pengembangan Keterampilan Komunikasi Saintifik.....	156
Tabel 4.17 Rekapitulasi Hasil Analisis Konsistensi Penilaian Antar <i>Rater</i> pada Bagian Pengembangan Keterampilan Penyelesaian Masalah Saintifik.....	159
Tabel 4.18 Rubrik <i>PCK</i> Pembelajaran Konsep/Sub Pokok Bahasan	169
Tabel 4.19 Rubrik <i>PCK</i> Pembelajaran Keterampilan Komunikasi Saintifik	172
Tabel 4.20 Rubrik <i>PCK</i> Pembelajaran Keterampilan Penyelesaian Masalah Saintifik	175
Tabel 4.21 Model Pengembangan Instrumen Asesmen <i>PCK</i> dalam Konteks Pengembangan Keterampilan Komunikasi Saintifik dan Penyelesaian Masalah Saintifik	179

DAFTAR GAMBAR

Gambar 2.1	<i>PCK</i> dan komponen-komponen yang harus dimiliki guru	17
Gambar 2.2	Garis bilangan untuk membedakan jarak dan perpindahan	51
Gambar 2.3	Kecepatan sesaat sama dengan gradien kemiringan garis singgung grafik $x - t$ pada $t = t_1$	56
Gambar 2.4	Percepatan merupakan gradien kemiringan Grafik $v-t$	58
Gambar 2.5	Grafik hubungan $v-t$ pada GLB	59
Gambar 2.6	Grafik hubungan $x-t$ pada GLB	60
Gambar 2.7	Grafik hubungan $a-t$ pada GLBB	62
Gambar 2.8	Grafik hubungan $v-t$ pada GLBB	62
Gambar 2.9	Grafik hubungan $x-t$ pada GLBB	63
Gambar 2.10	Dua buah benda berbeda massa jatuh dari ketinggian yang sama	64
Gambar 2.11	Gerak parabola sebuah benda dengan pembandingan sebuah benda jatuh vertikal di sebelah kiri	67
Gambar 2.12	Tendangan bola sepak dan lompat jauh menerapkan konsep gerak parabola	68
Gambar 2.13	Lintasan gerak parabola dengan kecepatan awal v_0 dengan sudut α terhadap horizontal	69
Gambar 3.1	Paradigma Integrasi Asesmen Pengembangan Keterampilan Komunikasi dan Penyelesaian Masalah Saintifik dengan <i>CoRe</i>	81
Gambar 3.2	Adaptasi Aspek-Aspek Keterampilan Komunikasi Saintifik dalam Penelitian	83
Gambar 3.3	Alur Berpikir Asesmen <i>PCK</i> dalam Konteks Pengembangan Keterampilan Komunikasi Saintifik dan Penyelesaian Masalah Saintifik	84
Gambar 3.4	Tahapan-tahapan Penelitian	86
Gambar 3.5	Model Pengembangan Instrumen Asesmen <i>PCK</i>	91
Gambar 3.6	<i>Form Lembar Judgement Validasi Rubrik</i>	93
Gambar 3.7	Lembar Pedoman Wawancara	94

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

Gambar 3.8	Memasukkan Nama Penilai1, Penilai2 dan Seterusnya pada <i>Sheet Variable View</i>	108
Gambar 3.9	Memasukkan Data Pada <i>Sheet Data View</i>	108
Gambar 3.10	Memilih Menu <i>Analyze-Scale-Reliability Analysis</i>	109
Gambar 3.11	Memasukkan Variabel Penilai1, Penilai2, dan seterusnya ke dalam Kotak <i>Item</i>	109
Gambar 3.12	Memilih Model Statistik	110
Gambar 3.13	<i>Output</i> Olahan Data Statistik ICC	110
Gambar 3.14	Memasukkan Nama Mahasiswa1, Mahasiswa2 dan seterusnya pada <i>Sheet Variable View</i>	115
Gambar 3.15	Memasukkan Data pada <i>Sheet Data View</i>	115
Gambar 3.16	Memilih Menu <i>Analyze-Nonparametric Test</i>	116
Gambar 3.17	Memasukkan Variabel Mahasiswa1, Mahasiswa2,... dan seterusnya ke dalam Kotak <i>Test Variables</i> dan Centang <i>Kendall's W</i>	116
Gambar 3.18	<i>Output</i> Olahan Data Statistik <i>Kendall's W</i>	116
Gambar 4.1	Draf Awal Matriks <i>PCK</i> dalam Konteks Pengembangan Keterampilan komunikasi dan penyelesaian masalah saintifik	119
Gambar 4.2	Matriks <i>PCK</i> dalam konteks pengembangan keterampilan komunikasi dan Penyelesaian Masalah Sainifik	163

DAFTAR LAMPIRAN

A. Data Hasil Penilaian Matriks PCK Berpedoman pada Rubrik	210
B. <i>Output</i> SPSS Uji Konsistensi Penilaian Antar <i>Rater</i> pada Pembelajaran Konsep/Sub Pokok Bahasan	232
C. <i>Output</i> SPSS Uji Konsistensi Penilaian Antar <i>Rater</i> pada Pengembangan Keterampilan Komunikasi Saintifik	245
D. <i>Output</i> SPSS Uji Konsistensi Penilaian Antar Rater pada Pengembangan Keterampilan Penyelesaian Masalah Saintifik.....	258
E. Transkrip Wawancara dengan Pengguna tentang Kepraktisan Rubrik	271
F. Daftar Riwayat Hidup Penulis	282

DAFTAR PUSTAKA

- Abbas & Hidayat, M. Y. (2018). Faktor-faktor kesulitan belajar fisika pada peserta didik kelas IPA sekolah menengah atas. *Jurnal Pendidikan Fisika*, 6(1), 45-49.
- Agarwal, G. G., Awasthi, S. & Walter, S. D. (2005). Intra-class correlation estimates for assessment of vitamin a intake in children. *Journal of Health, Population and Nutrition*, 23(1), 66-73.
- Agustin, P. A., Natalina, M. & Suryawati, E. (2018). Profil kompetensi *pedagogical content knowledge* (PCK) guru IPA SMP di Kabupaten Siak. *Jurnal online mahasiswa FKIP Universitas Riau*, 5(2), 1-11.
- Agustina, P., Yusron, F. N. & Muyassarrah, F. (2018). *Pedagogical content knowledge* (PCK) mahasiswa calon guru biologi FKIP UMS pada matakuliah *microteaching* Tahun Akademik 2015/2016. The 7th University Research Colloquium 2018 STIKES PKU Muhammadiyah Surakarta.
- Airasian, P.W. (1991). *Classroom assessment*. New York: McGraw-hill, Inc.
- Aisyah, D. W., Gipayana, M., & Djatmika, E. T. (2017). Mengembangkan kebermaknaan belajar dengan rancangan pembelajaran tematik bercirikan quantum teching. *Prosiding Seminar Nasional Mahasiswa Kerjasama Direktorat Jenderal Guru dan Tenaga Kependidikan Kemendikbud 2016*, 1-7.
- Akker, J., Bannan, B., Kelly, A. E., Nieveen, N. & Plomp, T. (2013). *Educational design research part A, Introduction* (Netherlands Institute for Curriculum Development, Enschede).
- Alonzo, A. C. & Kim, J. (2015). Declarative and dynamic pedagogical content knowledge as elicited through two video-based interview methods. *Journal of Research in Science Teaching*, 53, 1259–1286
- Alvarado, C., Cañada, F., Garritz, A & Mellado, V. (2015). Canonical pedagogical content knowledge by CoRes for teaching acid-base chemistry at high school. *Chemistry Education Research and Practice*, 16(3), 603-618.
- American Association for the Advancement of Science (AAAS) . (1993). *Project 2061: Science for all Americans*. Washington, DC: American association for the advancement of science. Tersedia, <http://www.project2061.org/publications/bsl/online/index.php?chapter=12>
- Anwar, Y., Rustaman, N. Y., & Widodo, A. (2014) . Hypothetical model to developing pedagogical content knowledge (PCK) prospective biology teachers in consecutive approach. *International Journal of Science and Research*, 3, 138-143
- Appleton, K. (2006). *Science pedagogical content knowledge and elementary school teachers'*, in K Appleton (ed.), *Elementary science teacher education, international perspectives on contemporary issues and practice*. Mahwah, NJ: Lawrence Erlbaum Associates.

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Arbayah. (2013). Model pembelajaran humanistik. *Dinamika Ilmu*, 13(2): 204-220.
- Ariska. (2015). *Pengembangan pedagogical content knowledge (PCK) menggunakan content representation (CoRe) framework pada materi hukum dasar kimia dengan metode inkuiri*. Artikel online. Tersedia, <http://repository.unj.ac.id/1159/3/Artikel.pdf> diakses, 13 Pebruari 2019.
- Arnone, K. A., Araujo, Z., Hanuscin, D., Gillstrom, K. (2015). *Assessing elementary teachers' pck for magnetism, Challenges and insights*. Paper presented at, *the 2015 annual meeting of the Association for Science Teacher Education*. Portland, OR.
- Arter, J & McTighe, J. (2001). *Scoring Rubric in The Classroom (using performance criteria for assessing and improving student performance)*. Thousand Oaks, CA: Corwin Press, Inc.
- Asma, N., Adlis, Ramli, E., Putra, A., Yurnetti, & Masril. (2002). Bimbingan penerapan model pembelajaran untuk menanggulangi miskonsepsi pada guru-guru SMU Negeri di Sumatera Barat. *Laporan Pelaksanaan Kegiatan Pengabdian Kepada Masyarakat*. Padang: Lembaga Pengabdian Kepada Masyarakat, Universitas Negeri Padang.
- Atkin, J. M., & Black, P. (2003). *Inside science education reform, A history of curricular and policy change*. New York: Teachers College Press.
- Aydeniz, M. & Kirbulut, Z. D. (2014). Exploring challenges of assessing preservice science teachers' pedagogical content knowledge (PCK). *Asia-Pacific Journal of Teacher Education*, 42, 147-166
- Azizah, R., Yuliati, L & Latifah, E. (2015) Kesulitan pemecahan masalah fisika pada siswa SMA. *Jurnal Penelitian Fisika dan Aplikasinya*, 5(2), 44-50.
- Azwar, S. (2012). *Reliabilitas dan Validitas*, Yogyakarta: Pustaka Pelajar.
- Bachman, L. F. & Palmer, A.S. (2009). *Language testing in practice, Designing and devloping useful language tests*. New York: Oxford University Press.
- Bahcivan, E. (2012). Assessment of high school physics teachers' pedagogical content knowledge related to the teaching of electricity. Thesis for the degree of Doctor of Philosophy, Middle East Technical University
- Bajpai, S., Bajpai R. & Chaturvedi, H. K. (2015). Evaluation of inter-rater agreement and inter-rater reliability for observational data, an overview of concepts and methods. *Journal of the Indian Academy of Applied Psychology*, 41(3), 20-27.
- Ball, D. L., & McDiarmid, G. W. (1990). The subject-matter preparation of teachers. In W. R. Houston (Ed.), *Handbook of research on teacher education*. New York: Macmillan.
- Bentley, T. G., Cohen, J. T., Elkin, E. B., Julie Huynh, J. M. D., Mukherjea, A., Neville, T. H, *et al.* (2017). Validity and reliability of value assessment frameworks for new cancer drugs. *Value in Health*, 20, 200–205.

- Bertram, A., & Loughran, J. (2012). Science teachers' views on CoRes and PaP-eRs as a framework for articulating and developing pedagogical content knowledge. *Research in Science Education*, 42, 1027–1047.
- Bi, J., & Kuesten, C. (2012). Intraclass correlation coefficient (ICC), A framework for monitoring and assessing performance of trained sensory panels and panelists. *Journal of Sensory Studies*, 27(5), 352–364.
- Bi, J., & Kuesten, C. (2012). Intraclass Correlation Coefficient (ICC): A Framework for Monitoring and Assessing Performance of Trained Sensory Panels and Panelists. *Journal of Sensory Studies*, 27(5), 352–364
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). *Defining twenty-first century skills* (in Griffin P, Barry McGaw & Esther Care. *Assessment and teaching of 21st century skills*. Dordrecht: Springer).
- Bobak, C. A., Barr, P. J., & O'Malley, A. J. (2018). Estimation of an inter-rater intra-class correlation coefficient that overcomes common assumption violations in the assessment of health measurement scales. *BMC Medical Research Methodology*, 18(1), 1-11.
- Bolton J & Ross S. (1997). Developing students' physics problem-solving skills. *Physics Education*. 32, 176-185.
- Brovelli, D., Katrin, B., Markus, R., & Markus, W. (2014). Using vignette testing to measure student science teachers' professional competencies. *American Journal of Educational Research*, 2(7) , 555-558
- Brown, C. & Mevs, P. (2012). *Quality performance assessment, Harnessing the power of teacher and student learning*. tersedia, <http://cce.org/files/Harnessing-the-power-full-report.pdf>. Diakses tanggal 23 Maret 2019
- Brown, H. D. & Abeywickra. P. (2010). *Language assessment, Principles and Classroom Practices*. New York: Pearson Education.
- Butler, S. M., McColskey, W. & O'Sullivan, R. (2005). *How to assess student performance in science: going beyond multiple-choice tests*. Greensboro, NC: The SERVE Center, University of North Carolina
- Cochran, K. F., DeRuiter, J. A., & King, R. A. (1993). Pedagogical content knowing, an integrative model for teacher preparation. *Journal of Teacher Education*, 44(4), 263-272
- Danasasmita, W. (2009). Pentingnya strategi dan metode pembelajaran dalam kegiatan belajar mengajar. Materi pembekalan PLP mahasiswa Jurusan Pendidikan Bahasa Jepang, Bandung: Universitas Pendidikan Indonesia. Tidak diterbitkan.
- Denegar, C. R., & Ball, D. W. (1993). Assessing reliability and precision of measurement, an introduction to intraclass correlation and standard error of measurement. *Journal of Sport Rehabilitation*, 2(1), 35–42.
- Denegar, C. R., & Ball, D. W. (1993). Assessing Reliability and Precision of Measurement: An Introduction to Intraclass Correlation and Standard Error of Measurement. *Journal of Sport Rehabilitation*, 2(1), 35–42

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Deshimer, M. G., & Kent, T. (1999). The complex nature and sources of teachers' pedagogical knowledge. In J. GessNewsome & N.G. Lederman (Eds.), *Examining pedagogical content knowledge*. Dordrecht: Kluwer Academic Publishers
- DeVon, H. A., Block, M. E., Moyle-Wright, P., Ernst, D. M., Hayden, S. J., Lazzara, D. J. (2007). A psychometric toolbox for testing validity and reliability. *Journal of Nursing Scholarship*, 39 (2), 155-164.
- Dharsey, N. (2008). An investigation of access chemistry lecturers' practice of pedagogic content knowledge in chemical equilibrium in an access programme. *A research report submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg*.
- Direktorat Jenderal Pembelajaran dan Kemahasiswaan, Kemenristekdikti. (2019). *Panduan penyusunan kurikulum pendidikan tinggi di era industri 4.0*. Jakarta: Direktorat Jenderal Pembelajaran dan Kemahasiswaan
- Direktorat PSMA Ditjen. Pendidikan Dasar dan Menengah. (2017). *Implementasi pengembangan kecakapan abad 21 dalam perencanaan pelaksanaan pembelajaran (RPP)*. Jakarta: Direktorat Pembinaan SMA Ditjen Dikdasmen.
- Djaali & Muljono, P. (2008). *Pengukuran dalam bidang pendidikan*. Jakarta: PT Gramedia Widiasarana.
- Docktor, J. & Heller, K. (2009). Robust assessment instrument for student problem solving. *Proceedings of the NARST. Annual Meeting*.
- Downing, S. M. (2006). *Twelve steps for effective test development*. Dalam S. M. Downing & T. M. Haladyna (penyunting), *handbook of test development* (hlm. 3-25). Mahwah, NJ: Lawrence Erlbaum Associates.
- Ebel, R. L. & Frisbie, D. A. (1991). *Essentials of educational measurement*. Engelwood Cliffs, NJ: Prentice Hall.
- Edwards, F. (2016). A rubric to track the development of secondary pre-service and novice teachers' summative assessment literacy. *Assessment in Education, Principles, Policy & Practice*. 24, 205-227.
- El-Khalick, F. A. (2006). Preservice and experienced biology teachers' global and specific subject matter structures: implications for conceptions of pedagogical content knowledge. *Eurasia Journal of Mathematics, Science and Technology Education*. 2(1): 1-28.
- Elliot, S.N., Kratchowill, T. R., Liitlefield, J. & Travers, J. F. (1999). *Educational psychology. effective teaching, effective learning*. Madison: Brown & Benchmark Publishers.
- Enfield, M. (2007). *Content and pedagogy, Intersection in the NSTA a standards for science teacher education*. [Online]. Tersedia, <http://www.enfieldm@msu.edu>. diakses tanggal,21 September 2017.
- Ernst, J., Glennie, E., & Songze, L. (2017). Performance-based task assessment of higher-order proficiencies in redesigned STEM highschoools. *Contemporary Issues in Education Research*, 10(1), 13-32.

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Erwin, E. (2005). *Asesmen kinerja praktikum penemuan dan hubungannya dengan pemahaman siswa tentang konsep rangkaian hambatan listrik dan hukum Kirchoof*. Tesis Magister pada PPs UPI Bandung: Tidak diterbitkan.
- Erwin, E. and Rustaman, N. Y. (2017). Understanding of prospective physics teachers students toward pedagogical content knowledge on optical geometry materials. *Journal of Physics, Conference Series*. 895, 012102.
- Erwin, E., Rustaman, N. Y., Firman, H. & Ramalis, T. R. (2019). Profile of the prospective teachers response to the development of scientific communication skills through physics learning. *Journal of Physics, Conference Series*. 1157, 032040.
- Erwin, E., Rustaman, N. Y., Firman, H. & Ramalis, T. R. (2019b). Analisis persepsi calon guru terhadap pengembangan keterampilan *problem solving* melalui pembelajaran fisika. *Jurnal Inovasi Pendidikan Fisika dan Riset Ilmiah*, 3(1), 20-28.
- Espinosa-Bueno, J. S., Labastida-Pina, D. V., Padilla-Martínez, K., & Garritz, A. (2011). Pedagogical content knowledge of inquiry, an instrument to assess it and its application to high school in-service science teachers. *US-China Education Review*, 8(5), 599-614.
- Fairuzabadi, A., Prihandono, T. & Putra, P. D. A. (2017). Penerapan model pembelajaran inkuiri terbimbing dengan video berbasis kontekstual dalam pembelajaran IPA pada materi suhu dan pengukurannya di SMP. *Jurnal Pembelajaran Fisika*, 6(1), 100-106.
- Firman, H. (1994). *Pedagogical Content Knowledge (PCK), Konsep dan implikasinya untuk penelitian dan pengembangan program pendidikan guru*. Makalah diseminarkan dalam Seminar Staf FPMIPA IKIP Bandung tanggal 30 Maret 1994.
- Fisher, R.A. (1950). *Statistical methods for research workers, 11th Ed*. Edinburgh, UK: Oliver & Boyd.
- Foshay, R. (2003). Principles for teaching problem solving. *Technical Paper*. Bloomington: Indiana University.
- Foster, T. (2000). *The development of students' problem-solving skills from instruction emphasizing qualitative problem-solving*. (Unpublished doctoral dissertation, University of Minnesota, Twin Cities.)
- Gardner, A. L. & Gess-Newsome, J. (2011). A PCK rubric to measure teachers' knowledge of inquiry-based instruction using three data sources. A paper presented within, *Annual Meeting of the National Association for Research in Science Teaching*, Orlando, FL April 6, 2011.
- Garritz, A., Labastida-Piña, D. V., Espinosa-Bueno, S. & Padilla, K. (2010). Pedagogical content knowledge of inquiry, An instrument to document it and its application to high school science teachers. *Proceedings of the NARST 2010*. Annual Meeting.
- Gearhart, D. A, Booth, T., Sedivec, K. & Schauer, C. (2013). Use of Kendall's coefficient of concordance to assess agreement among observers of very high resolution imagery. *Geocarto International*, 28(6), 517-526.

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- George, J., Phun, Y-T., Bailey, M. J., Kong, D. C. M. & Stewart, K. (2004). Development and validation of the medication regimen complexity index. *Ann Pharmacother*, 38,1369–1376.
- Gess-Newsome, J. & Lederman, N. G. (Eds.) (1999). *Examining pedagogical content knowledge*. Dordrecht: Kluwer Academic.
- Giancoli, D. C. (2001). *Fisika*, Jilid I. Jakarta : Erlangga
- Gisev, N., Bell J. S. & Chen, T. F. (2013). Interrater agreement and inter-rater reliability, Key concepts, approaches, and applications. *Research in Social and Administrative Pharmacy*. 9, 330–338.
- Gisev, N., Bell, J. S., O'Reilly, C. L., Rosen, A. & Chen, T. F. (2010). An expert panel assessment of comprehensive medication reviews for clients of community mental health teams. *Social Psychiatry and Psychiatric Epidemiology*, 45,1071–1079.
- González, N. & Rossi, A. (2016). Examining pedagogical knowledge content on mitosis in a University context. *Multidisciplinary Journal for Education, Social and Technological Sciences*, 3(2), 79-106.
- Grossman, P. L. & Richert, A. E. (1988). Unacknowledged knowledge growth, A re-examination of the effects of teacher education. *Teaching and Teacher Education*, 4(1) , 53-62.
- Grothe & Schmid (2011). Kendall's Reconsidered. *Communications in Statistics - Simulation and Computation*, 40(2), 285–305.
- Haladyana, T. M. & Rodriguez, M. C. (2013). *Developing and validating test item*. New York, NY: Routledge.
- Halliday, D. & Resnick, R. (1992). *Fisika Jilid I Edisi Ketiga*. Jakarta : Erlangga
- Han-Tosunoglu, C., & Lederman, N. G. (2016, April).The development of an instrument for assessing pedagogicalcontent knowledge for socioscientific knowledge (PCK-SSI). *Paper presented at NARST*. Baltimore, USA
- Harlen, W. (1997). Primary teachers' understanding in science and its impact in the classroom. *Research in Science Education*, 27, 323–337.
- Harlen, W., & Holroyd, C. (1997). Primary teachers' understanding of concepts of science, Impact on confidence and teaching. *International Journal of Science Education*, 19, 93–105.
- Haynes, S. N., Richard, D. C. S., & Kubany, E. S. (1995). Content validity in psychological assessment, A functional approach to concepts and methods. *Psychological Assessment*, 7(3), 238–247.
- Heller, K & P. Heller. (2010). *Cooperative problem solving in physics a user's manual*. [Online]. Tersedia, <http://www.aapt.org/Conferences/newfaculty/upload/Coop-Problem-Solving-Guide.pdf>. diakses tanggal 12 Mei 2018.
- Heller, P., Keith, R., & Anderson, S. (1992). Teaching problem solving through cooperative grouping. Part 1, Group versus individual problem solving. *American Journal of Physics*, 60(7), 627-636.

- Herman, J. L., Aschbacher, P.R. & Winters, L. (1992). *A practical guide to alternative assessment*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Holt-Reynolds, D. (2000). What does the teacher do? Constructivist pedagogies and prospective teachers' beliefs about the role of a teacher. *Teaching and Teacher Education*, 16, 21-32.
- Hume, A. (2010). CoRes as tools for promoting pedagogical content knowledge (PCK) of novice chemistry teachers. *Chemistry Education in New Zealand*, 119, 13-19.
- Hume, A., & Berry, A. (2010). Constructing CoRes—a strategy for building PCK in pre-service science teacher education. *Research in Science Education*, 41(3), 341–355.
- Iksan, ZH, Zakaria, E, Meerah, TSM, Osman, K, Lian, DKC, Mahmud, SND & Krish, P. (2012), Communication skills among university students. *Procedia, Social and Behavioral Sciences*, 59, 71–76.
- Jalal, F., & Supriadi, D. (2001). *Reformasi pendidikan dalam konteks otonomi daerah*. Yogyakarta: Adi Cita.
- Jeon, S. & Park, J. (2013). Analysis on Communication Skills in Science Education. *Advanced Science and Technology Letters*, 36, 18-21.
- Jimoyiannis, A. (2010). Designing and implementing an integrated technological pedagogical science knowledge framework for science teachers professional development. *Computers & Education*, 55(3) , 1259–1269.
- Jüttner, M. & Neuhaus, B. J. (2013). Validation of a paper-and-pencil test instrument measuring biology teachers' pedagogical content knowledge by using think-aloud interviews. *Journal of Education and Training Studies*, 1(2), 113-125.
- Jüttner, M., Boone, W., Park, S. & Neuhaus, B. J. (2013). Development and use of a test instrument to measure biology teachers' content knowledge (CK) and pedagogical content knowledge (PCK). *Educational Assessment, Evaluation and Accountability*, 25(1), 45–67.
- Kadir, J. S., Zaim, M. & Refnaldi. (2018). Developing instruments for evaluating validity, practicality, and effectiveness of the authentic assessment for speaking skill at junior high school. *Advances in Social Science, Education and Humanities Research*, 276, 98-105.
- Kapyla, M., Heikkinen, J-P. & Asunta, T. (2009). Influence of content knowledge on pedagogical content knowledge, the case of teaching photosynthesis and plant growth. *International Journal of Science Education*, 31, 1395-1415.
- Kirschner, S., Andreas, B., Hans, E. F., Julie, G. N., & Claudia, V. A. (2016). Developing and evaluating a paper-and-pencil test to assess components of physics teachers' pedagogical content knowledge. *International Journal Of Science Education*, 38, 1-30.
- Kirschner, S., Borowski, A., Fischer, H. E., Gess-Newsome, J. & Aufschnaiter, C. (2016). Developing and evaluating a paper-and-pencil test to assess

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- components of physics teachers' pedagogical content knowledge. *International Journal of Science Education*, 38, 1-30.
- Kocoglu, Z. (2009). Exploring the technological pedagogical content knowledge of pre-service teachers in language education. *Procedia Social and Science [Online]*, 1, 2734-2737.
- Koehler, M. J. & Mishra, P. (2009). What is technological pedagogical content knowledge? Contemporary issues in *Technology and Teacher Education (CITE Journal)*, 9(1), 60–70.
- Koo, T. K. & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine*, 15, 155-163.
- Koppelman, H. (2008). Pedagogical content knowledge and educational cases in computer science, An exploration. *Proceedings of the Informing Science + IT Education Conference*.
- Kumano, Y. (2001). *Authentic assessment and portfolio assessment-its theory and practice*. Japan: Shizuoka University.
- Laverty, D. P. (2015). *Investigating teachers' content knowledge and pedagogical content knowledge in a middle school physical science curriculum on force and motion*. Thesis of Master in Science Education, The University of Maine. Orono.
- Lawshe, C. H. (1975). The quantitative approach to content validity. *Personnel Psychology*, 28, 563–575.
- Lee, E., Brown, M. N., Luft, J. A., & Roehrig, G. H. (2007). Assessing beginning secondary science teachers' PCK: Pilot year results. *School Science and Mathematics*, 107, 52-60.
- Legendre, P. (2005). Species associations: the Kendall coefficient of concordance revisited. *Journal of Agricultural, Biological, and Environmental Statistics*, 10(2), 226–245.
- Levitan, B., Yee, C. L., Russo, L., Bayney, R., Thomas, A. P., & Klineciewicz, S. L. (2008). A model for decision support in signal triage. *Drug Safety*, 31, 727–735.
- Levy, S. O., Eylon, B-S., & Scherz, Z. (2008). Teaching communication skills in science, tracing teacher change. *Teaching and Teacher Education*, 24, 462–477.
- Levy, S. O., Eylon, B-S., & Scherz, Z. (2009). Teaching scientific communication skills in science studies, does it make a difference?. *International Journal of Science and Mathematics Education*, 7, 875-903.
- Liu, X. (2010). *Using and developing measurement instrument in science education, a Rasch modeling approach*. Charlotte: IAP-Information Age Publishing.
- Loughran, J., Berry, A., & Mulhall, P. (2012). *Understanding and developing science teachers' pedagogical content knowledge*. Rotterdam: Sense Publishers.

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Loughran, J., Pamela, M., & Amanda, B. (2004). In search of pedagogical content knowledge in science, Developing ways of articulating and documenting professional practice. *Journal of Research in Science Teaching*, 41(4), 370–391.
- Lundeberg, V. J. (2016). Pedagogical implementation of 21st century skills. educational leadership and administration, *Teaching and Program Development*, 27, 82-100.
- Lutfiyah, A. & Supardi, Z. A. I. (2019). Practicality of performance assessment instruments in measurement topic 10th grade secondary school. *Journal of Physics, Conference Series*. 1171, 012047
- Madjid, A. (2007). *Perencanaan Pembelajaran*. Bandung, Remaja Rosdakarya.
- Madjid, A. (2014). *Pembelajaran tematik terpadu*. Bandung: PT Remaja Rosydakarya Offset
- Magnusson, S., Krajcik, J., & Borko, H. (1999). Nature, sources and development of pedagogical content knowledge for science teaching. In Gess-Newsome J & N. G. Lederman (Eds.), *Examining pedagogical content knowledge, The construct and its implications for science education*. Dordrecht: Kluwer Academic.
- Manen, V. M. (1999). The language of pedagogy and primacy of student experience. Dalam J. Loughran (Ed.), *Researching teaching, Methodologies and practices for understanding pedagogy*. London: Falmer Press.
- Maries, A. & Singh, C. (2013). Exploring one aspect of pedagogical content knowledge of teaching assistants using the test of understanding graphs in kinematics. *Physics Education Research*, 9, 020120.
- Marks, R. (1990). Pedagogical content knowledge, From a mathematical case to a modified conception. *Journal of Teacher Education*, 41(3), 3-11.
- Marzano, R. J. (2006). *Classroom assessment & grading that work*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Marzano, R. J., Pickering, D. J., & McTighe, J. (1993). *Assessing student outcomes, performance assessment using the dimensions of learning model*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Masole, T. M. & Howie, S. (2013). Exploring teacher's assessment practices of performance tasks in agriculture and factors influencing their choice. *Journal of Agricultural & Food Information*, 14, 209-224.
- Matthew, G., Milanowski, A., & Miller, J. (2012). *Measuring and promoting inter-rater agreement of teacher and principal performance ratings*. Center for Educator Compensation Reform. Available online, <https://files.eric.ed.gov/fulltext/ED532068.pdf>.
- Mavhunga, E., Ibrahim, B., Qhobela, M., & Rollnick, M. (2016). Student teachers' competence to transfer strategies for developing PCK for electric circuits to another physical sciences topic. *African Journal of Research in Mathematics, Science and Technology Education*, 1, 1-15.

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Mayer, R. E., & Wittrock, M. C. (2006). Problem solving. Dalam Alexander, P. A & Winne, P. H. *Handbook of educational psychology*. Mahwah, NJ: Erlbaum.
- McGraw, K. O. & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological Methods*, 1, 30-46.
- Meador, K.S. (2003). Thinking creativity about science – suggestions for primary teachers. *Gifted Child Today*, 26(1), 25-30.
- Metin, M. (2013). Teachers' difficulties in preparation and implementation of performance task. *Educational Sciences, Theory & Practice*, 13(3), 1664-1673.
- Minero, M., Costa, E. D, Dai, F., Murray, L. A. M., Canali, E., Wemelsfelder, F. (2016). Use of qualitative behavior assessment as an indicator of welfare in donkeys. *Applied Animal Behaviour Science*, 174, 147–153.
- Moskal, B. M. (2003). Recommendations for developing classroom performance assessments and scoring rubrics. *Practical Assessment, Research & Evaluation*, 8(14), 1-5.
- MTD Training. (2010). *Advanced communication skills*. London: MTD Training & Ventus Publishing ApS.
- Mukhopadhyay, R. (2013). Problem solving in science learning - some important considerations of a teacher. *IOSR Journal of Humanities and Social Science*, 8, 21-25.
- Murti, B. (2011). "Validitas dan reliabilitas pengukuran," *Matrikulasi Program Studi Doktoral, Fakultas Kedokteran*. Surakarta: Universitas Sebelas Maret.
- National Research Council (NRC). (1996). *National Science Education Standards*. Washington, DC: The National Academies Press
- National Science Teachers Association (NSTA). (1998). *NSTA pathways to the science standards: middle school edition*. Arlington, VA: National Science Teachers Association
- National Science Teachers Association (NSTA). (2003). *Standards for science teacher preparation*. Department of Teaching, Learning and Teacher Education University of Nebraska-Lincoln: Faculty Publications.
- Nieven, N. & Folmer, N. (2013). *Formative evaluation in educational design research*. Enschede: Netherlands Institute for Curriculum Development (SLO).
- Nilsson, P. & Karlsson, G. (2019). Capturing student teachers' pedagogical content knowledge (PCK) using CoRes and digital technology. *International Journal of Science Education*, 41, 419-447
- Nilsson, P. & Vikström, A. (2015). Making PCK explicit-capturing science teachers' pedagogical content knowledge (PCK) in the science classroom. *International Journal of Science Education*, 37(17), 2836-2857.

- Nilsson, P. (2008). Teaching for understanding – The complex nature of PCK in pre-service teacher education. *International Journal of Science Education*, 30(10), 1281–1299.
- Niño, L. V. M., Vicente, M., & Florentina, C. (2015). Initial characterization of colombian high school physics teachers' pedagogical content knowledge on electric fields. *Research in Science Education*, 47, 25–48.
- Nurmatin, S. (2015). *Analisis kemampuan pedagogical content knowledge (PCK) calon guru pada materi kalor dan perpindahannya melalui penggunaan CoRe dan PaP-eRs*. (Tesis). Universitas Pendidikan Indonesia: Tidak diterbitkan.
- O'Malley, K. J., Moran, B. J., Haidet, P., Seidel, C. L., Schneider, V., Morgan, R. O., Kelly, P. A. & Richards, B. (2003). Validation of an observation instrument for measuring student engagement in health professions settings. *Evaluation & The Health Professions*, 26(1), 86-103.
- Organisation for Economic Co-operation and Development (OECD). (2013). *PISA 2012 Assessment and Analytical Framework: Mathematics, Reading, Science, Problem Solving and Financial Literacy*. Paris: OECD Publishing.
- Orsbon, C. P., Kaiser, R. S. & Ross, R. S. (2014). Physician opinions about an anatomy core curriculum, a case for medical imaging and vertical integration. *Anatomical Sciences Education*, 7,251–261.
- P21. (2011). *Framework for 21st century learning*. Washington DC: Partnership for 21st Century Skills.
- Park, S., Jang, JY., Chen, YC. & Jung, J. (2011). Is pedagogical content knowledge (pck) necessary for reformed science teaching?, Evidence from an empirical study. *Research in Science Education*, 41(2), 245–260.
- Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 20 Tahun 2016 tentang Standar Kompetensi Lulusan Pendidikan Dasar dan Menengah.
- Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 21 Tahun 2016 tentang standar isi pendidikan dasar dan menengah
- Popham, W. (2011). *Classroom assessment: what teachers need to know*. Boston, MA: Pearson Education, Inc.
- Puntis, A. (2011). An interconnected world. Paper presented at 'What kind of education enables us to cope with an interconnected world?' London: A Cambridge Assessment Conference.
- Qhobela, M. & Moru, E. K. (2014). Examining secondary school physics teachers' beliefs about teaching and classroom practices in lesotho as a foundation for professional development. *International Journal of Science and Mathematics Education*, 12,1367-1392.
- Quellmalz, E. S., Timms, M. J., Silberglitt, M. D. & Buckley, B. C. (2012). Science assessment for all, intergarting science simulation into balanced state science assessment systems. *Journal of Research in Science Teaching*, 49(3), 363-393

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Reichel, A.G. (1994). "Performance Assessment, Five Practical Approach". *Journal Science & Children*, 32(2), 21-25.
- Reyes-C, F. & Garritz, A. (2010). Inquiry pedagogical content knowledge of mexican basic education teachers in a special program. *Proceedings of the NARST 2010 Annual Meeting*.
- Richey, R. C., & Klein, J. D. (2007). *Design and Development Research Methods, Strategies, and Issues*. Mahwah, NJ: Lawrence Eelbaum Associates.
- Rollnick, M., Bennett, J., Rhemtula, M., Dharsey, N. & Ndlovu, T. (2008). The place of subject matter knowledge in PCK - A case study of South African teachers teaching the amount of substance and equilibrium. *International Journal of Science Education*, 30(10), 1365-1387.
- Rustaman, N. Y. & Widodo, A. (2013). Profile of prospective science teachers' pedagogical content knowledgeas documented from videotapes and thesis. *Paper presented on Mathematics, Science, and Computer Science Education International Seminar (MSCEIS) 2013*. FPMIPA Universitas Pendidikan Indonesia.
- Saavedra, A. R. & Opfer, V. D. (2012). *Teaching and learning 21st century skills, lessons from the learning sciences*. Sydney: The Joint AARE/APERA Conference.
- Safriana, M. (2019). Analisis kemampuan *pedagogical content knowledge* (PCK) calon guru fisika pada mata kuliah *microteaching*. *Jurnal Pendidikan, Sains, dan Humaniora*, 7(3), 312-320.
- Sardi, Rizal, M. & Mansyur, J. (2018). Behaviour of mathematics and physics students in solving problem of Vector-Physics context. *Journal of Physics: Conference Series*, **1006** 012019.
- Schmidt, R. C. (1997). Managing delphi surveys using nonparametric statistical techniques. *Decision Science*. 28,763–774.
- Schneider, G. M., Jull, G., Thomas, K., Smith, A., Emery, C., Faris, P., Schneider, K., Salo, P. (2013). Intrarater and interrater reliability of select clinical tests in patients referred for diagnostic facet joint blocks in the cer-vical spine. *Archives of Physical Medicine and Rehabilitation*, 94, 1628-1634.
- Schneider, R. M., Krajcik, J., Marx, R. W., & Soloway, E. (2002). Performance of students in project-based science classrooms on a national measure of science achievement. *Journal of Research in Science Teaching*, 39, 410–422.
- Selcuk, G. S., Çaliskan, S., & Erol, M. (2008). The Effects of Problem Solving Instruction on Physics Achievement, Problem Solving Performance and Strategy Use. *Latin American Journal of Physics Education*, 2(3), 151-166.
- Seung, E., Lynn, A. B., & Mark, P. H. (2012). Examining physics graduate teaching assistants' pedagogical content knowledge for teaching a new physics curriculum. *Jornal Science Teacher Education*, 23, 451–479.
- Shrout, P. E. & Fleiss, J. L. (1979). Intraclass correlations, uses in assessing rater reliability. *Psychological Bulletin*, 86, 420–428.

- Shulman, L. S. (1986). Those who understand, Knowledge growth in teaching. *Educational Research*, 15(2), 4-14.
- Shulman, L. S. (1987). Knowledge and teaching, Foundations of the new reform. *Harvard Educational Review*, 57, 1-22.
- Sickel, A. J, Carlson, J., & Driel, J. H. V. (2015). Examining PCK research in the context of current policy initiatives. In Berry, A., Friedrichsen, P., & Loughran, J. (2015). *Re-Examining Pedagogical Content Knowledge In Science Education*. New York, NY: Routledge.
- Siegel, S. & Castellen, N. J. Jr. (1988). *Nonparametric statistics for the behavioral sciences*. 2nd ed. New York: McGraw-Hill Book Company.
- Sing, T. K. (2014). *A literature review of science communication*. Tersedia, <http://singteach.nie.edu.sg/issue50-research03/>. Diakses tanggal, 29 September 2017.
- Siregar, N. (1998). *Penelitian kelas, teori, metodologi dan analisis*. Bandung: IKIP Bandung press
- Sothayapetch, P., Lavonen, J., & Juuti, K. (2013). Primary school teachers' interviews regarding pedagogical content knowledge (PCK) and general pedagogical knowledge (GPK). *European Journal of Science and Mathematics Education*, 1(2) , 84-105.
- Stausberg, J., Halim, A., & Färber, R. (2011). Concordance and robustness of quality indicator sets for hospitals: an analysis of routine data. *BMC Health Services Research*, 11(1). 1-9.
- Stevens, D. D. & Levi, A. J. (2005). *Introduction to rubrics, an assessment tool to save grading time, convey effective feedback, and promote student learning*. Herndon, VA: Stylus Publishing.
- Stiggins, R. J. & Chappuis, J. (2012). *An introduction to student-involved Assessment for learning*. Boston, MA: Pearson Education, Inc.
- Stiggins, R. J. (1994). *Student-centered classroom assessment*. New York, NY: Macmillan College Publishing Company.
- Sudijono, A. (2003). *Pengantar evaluasi pendidikan*, Cetakan Keempat. Jakarta: PT Raja Grafindo Persada.
- Sugiyono. (2011). *Metode penelitian pendidikan pendidikan; Pendekatan Kuantitatif, Kualitatif, dan R&D*, Bandung: Alfabeta.
- Sukadi, E., Cari, & Sarwanto. (2015). Implementasi *pedagogical content knowledge* pada materi listrik dinamis untuk meningkatkan kompetensi calon guru fisika. *Jurnal Inkuiri*, 4(1), 37-46.
- Sukaesih, S., Ridlo, S. & Saptono, S. (2017). Profil kemampuan *pedagogical content knowledge* (PCK) calon guru biologi. *Lembaran Ilmu Kependidikan*, 46(1), 68-74.
- Sukardi, R. R., Widodo, A., & Sopandi, W. (2016). Describing teachers' pedagogic content knowledge about reasoning development and students' reasoning test. *Advances in Social Science, Education and Humanities Research (ASSEHR)*, 57, 14-20.

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Suskie, L. (2009). *Assessing student learning (a common sense guide)*. San Fransisco, CA: Jossey-Bass.
- Suto, I. (2013). Suto, I. (2013). 21st Century skills: Ancient, ubiquitous, enigmatic? *Research Matters*, 15, 2–8.
- Sutrisno (1996). *Fisika dasar : mekanika*. Bandung: ITB.
- Tipler, P.A. (1998). *Fisika Untuk Sains dan Teknik Jilid I*. Jakarta : Erlangga
- Tognetto, D., Pastore, M. R., Giacinto, C. D., Merli, R., Franzon, M., D’Aloisio, R. *et al.* (2019). Swept-source optical coherence tomography biometer as screening strategy for macular disease in patients scheduled for cataract surgery. *Scientific Reports*, 9(1). 1-7.
- Tran, D., Dolgun, A., & Demirhan, H. (2018). Weighted inter-rater agreement measures for ordinal outcomes. *Communications in Statistics - Simulation and Computation*, 46, 1–15. DOI: 10.1080/03610918.2018.1490428
- Trianita, M., Zaim, M. & Refnaldi. (2018). Developing instruments for evaluating validity, practicality, effectiveness of the authentic assessment for writing skill at junior high school. *Advances in Social Science, Education and Humanities Research*, 301, 213-219.
- Tritiyatma, H., Putri, G. E. W., Hayatunnufus, R., & Paristiwati, M. (2016). Pengembangan pedagogical content knowledge (PCK) calon guru kimia menggunakan content representation (CoRe) framework dan pedagogical and professional - experience repertoires (PaP-eRs) pada pembelajaran larutan penyangga dan reaksi reduksi-oksidasi (REDOKS). *Prosiding Seminar Nasional Kimia dan Pembelajarannya*. Universitas Negeri Surabaya.
- Ulfa, M & Saifuddin. (2018). Terampil memilih dan menggunakan metode pembelajaran. *Suhuf*, 30(1), 35-56.
- Utomo, A. B., Samsudi & Djuniadi. (2015). Pengembangan instrumen penilaian kinerja guru produktif teknik kendaraan ringan. *Journal of Educational Research and Evaluation*, 4(2), 72-81.
- VIF International Education. (2014). *Global-ready teacher competency framework, standart and indicators*. Tersedia, [http://learn.vifprogram .com/rs/vifinternationaleducation/images/Teacher Standards and Indicators.pdf](http://learn.vifprogram.com/rs/vifinternationaleducation/images/Teacher_Standards_and_Indicators.pdf). diakses 20 Mei 2017.
- Wangsatorntanakhun, J.A. (2004). *Designing performance assessments, challenges for the three-story intellect* [online]. tersedia online, <http://www.oocities.org/athens/parthenon/8658/> . diakses tanggal 2 April 2019.
- Warimun, E. S. (2012). Penerapan model pembelajaran problem solving fisika pada pembelajaran topik optika pada mahasiswa pendidikan fisika. *Jurnal Exacta*, 10 (2), 111-114.
- Wibowo, A. E. (2012). *Aplikasi praktis SPSS dalam penelitian*. Yogyakarta, Gava Media.

- Widhiarso, W. (2005). *Mengestimasi reliabilitas*. Yogyakarta: Fakultas Psikologi UGM.
- Widiharso, W. (2012). *Melibatkan rater dalam pengembangan alat ukur*. Yogyakarta: Fakultas Psikologi UGM.
- Wiggins, G. (1990). "The case for authentic assessment." *Practical Assessment, Research & Evaluation*, 2(2). Available online, <http://pareonline.net/getvn.asp?v=2&n=2>.
- Williams, J. & Lockley, J. (2012). Using CoRes to develop the pedagogical content knowledge (PCK) of early career science and technology teachers. *Journal of Technology Education*, 24(1), 34-53.
- Williams, J., Eames, C., Hume, A., & Lockley, J. (2012). Promoting pedagogical content knowledge development for early career secondary teachers in science and technology using content representations. *Research in Science & Technological Education*, 30(3), 327–343.
- Williams, P. J., Lockley, J. & Mangan, J. (2016). Technology teacher's use of a CoRe to develop their PCK. *PATT-32 Proceedings Technology Education for 21st Century Skills*. Utrecht, The Netherlands, August 23-26, 2016, 489-498.
- Wilson, F. R., Pan, W. & Schumsky, D. A. (2012). Recalculation of the critical values for lawshe's content validity ratio. *Measurement and Evaluation in Counseling and Development*, 45(3), 197-210.
- Wulan, A R. (2018). *Menggunakan asesmen kinerja untuk pembelajaran sains dan penelitian*. Bandung: UPI Press.
- Wulan, A. R. (2003). *Permasalahan yang dihadapi dalam pemberdayaan praktikum biologi di SMU dan penanggulangannya, penelitian kolaboratif dengan menggunakan asesmen bervariasi pada siswa dan asesmen portofolio pada guru*. Tesis, Bandung, PPS UPI: Tidak diterbitkan.
- Wulan, A. R. (2007). *Pembekalan kemampuan performance assessment kepada calon guru biologi dalam menilai kemampuan inkuiri*. Disertasi Doktor. Bandung, SPS UPI: Tidak diterbitkan.
- Wulan, A. R. (2015b). *Pengembangan kreativitas pada pembelajaran sains melalui asesmen autentik*. Makalah keynote speaker pada seminar Nasional Pendidikan MIPA. FKIP, Universitas Lampung, 12 September 2015.
- Xu, Y. & Brown, G.T.L. (2016). Teacher assessment literacy in practice, a reconceptualization. *Teaching and Teacher Education*, 58, 149-162.
- Yudianto, S. A. (2005). *Manajemen Alam Sumber Pendidikan Nilai*. Bandung: Mughni Sejahtera.
- Yuenyong, C. & Thathong, K. (2015). Physics teachers' constructing knowledge base for physics teaching regarding constructivism in thai contexts. *Mediterranean Journal of Social Sciences*, 6(2), 546-553.
- Yuliati, L. (2017). Membangun *pedagogical content knowledge* calon guru fisika melalui praktek pengalaman lapangan berbasis *lesson study*. *Momentum: Physisc Education Journal*, 1(1), 16-30.

Zainul, A. (2011). *Alternative assessment*. Jakarta: Dirjen Dikti.

Zeidler, D.L. (2002). Dancing with maggots and saints, visions for subject matter knowledge, pedagogical knowledge and pedagogical content knowledge in science teacher education reform. *Journal of ScienceTeacher Education*, 13(1), 27-42.

Erwin, 2019

PENGEMBANGAN INSTRUMEN ASESMEN PEDAGOGICAL CONTENT KNOWLEDGE CALON GURU FISIKA DALAM KONTEKS PEMBELAJARAN KETERAMPILAN KOMUNIKASI DAN PENYELESAIAN MASALAH SAINTIFIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu