

**PENGEMBANGAN INSTRUMEN SOAL URAIAN UNTUK
ASESMEN TPACK DENGAN PENSKORAN BERBANTUAN
KOMPUTER**

DISERTASI

Diajukan untuk Memenuhi Sebagian dari Syarat untuk Memperoleh Gelar Doktor
Pendidikan Ilmu Pengetahuan Alam



Oleh

Raden Ahmad Hadian Adhy Permana

NIM. 1707758

**PROGRAM STUDI PENDIDIKAN ILMU PENGETAHUAN ALAM
SEKOLAH PASCA SARJANA
UNIVERSITAS PENDIDIKAN INDONESIA**

2021

Raden Ahmad Hadian Adhy Permana, 2021
*PENGEMBANGAN INSTRUMEN SOAL URAIAN UNTUK ASESMEN TPACK DENGAN PENSKORAN
BERBANTUAN KOMPUTER*
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Oleh:

Raden Ahmad Hadian Adhy Permana

Dr. Universitas Pendidikan Indonesia, 2021

M. Pd. Universitas Negeri Jakarta, 2012

S. Si. Universitas Padjadjaran, 2002

Sebuah Disertasi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar
Doktor Pendidikan (Dr.) pada Program Studi Pendidikan Ilmu Pengetahuan Alam

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HALAMAN PENGESAHAN DISERTASI

Raden Ahmad Hadian Adhy Permana

PENGEMBANGAN INSTRUMEN SOAL URAIAN UNTUK ASESMEN

TPACK DENGAN PENSKORAN BERBANTUAN KOMPUTER

Disetujui dan disahkan oleh panitia disertasi

Promotor



Prof. Dr. Phil. H. Ari Widodo, M. Ed.
NIP. 196705271992031001

Ko-Promotor



Prof. Dr. H. Wawan Setiawan, M. Kom.
NIP. 196601011991031005

Anggota



Dr. Hj. Siti Sriyati, M. Si.
NIP. 196409281989012001

Penguji



Dr. H. Riandi, M. Si.
NIP. 196305011988031002

Penguji



Dr. Rahmawati, S.T., M. Ed.
NIP. 197908232003122002

Mengetahui,
Ketua Program Studi di Pendidikan IPA
Sekolah Pascasarjana Universitas Pendidikan Indonesia



Dr. Ida Kaniawati, M. Si.
NIP. 196807031992032001

PENGEMBANGAN INSTRUMEN SOAL URAIAN UNTUK ASESMEN TPACK DENGAN PENSKORAN BERBANTUAN KOMPUTER

ABSTRAK

Pengukuran pengetahuan sebagai bagian dari evaluasi guru selama ini masih memiliki keterbatasan, khususnya dalam aspek autentisitas, karena menggunakan bentuk instrumen pilihan ganda. Instrumen dalam bentuk esai, sebagai instrumen bersifat respon yang dikonstruksi oleh subjek asesmen, dapat menjadi alternatif yang efektif. Tujuan penelitian ini adalah mengembangkan instrumen soal uraian untuk mengukur pengetahuan konten pedagogis teknologi (TPACK) guru IPA dengan penskoran berbantuan program komputer. Metode penelitian yang diterapkan adalah penelitian dan pengembangan. Subjek penelitian yang terlibat secara keseluruhan adalah 250 orang guru mata pelajaran Ilmu Pengetahuan Alam SMP di wilayah Provinsi Banten. Pengumpulan data dilakukan melalui penyebaran instrumen dalam jaringan berbentuk *Google Form*, yang disebarakan melalui media sosial komunitas guru IPA. Pengujian terhadap instrumen dan penskor otomatis meliputi uji validitas konten secara kualitatif, uji validitas konstruk menggunakan Exploratory Factor Analysis dan Confirmatory Factor Analysis, reliabilitas internal, serta uji reliabilitas antar penskor. Kajian dan analisis dilakukan pula untuk mendeskripsikan kontekstualitas dan efektifitas instrumen serta efisiensi proses asesmen. Pengujian secara kualitatif melibatkan tiga orang validator ahli untuk memvalidasi instrumen soal dan rubrik penskoran. Penskoran jawaban untuk pengujian kuantitatif juga melibatkan tiga orang penilai profesional selain peneliti sendiri. Penskor otomatis yang diuji coba adalah program komputer UKARA yang dimiliki oleh Pusat Asesmen dan Pembelajaran. Hasil penelitian dan pengembangan ini adalah: (1) Instrumen untuk asesmen TPACK guru IPA SMP berupa soal uraian yang valid, handal, dan kontekstual; (2) Instrumen penskoran yang dikembangkan berupa rubrik politomi yang valid dan handal; (3) Nilai reliabilitas ICC dan r antara penskor otomatis UKARA dan penskor manusia termasuk dalam kategori tinggi; (4) Implementasi instrumen penilaian menunjukkan efektifitas dengan nilai rerata TPACK guru IPA SMP termasuk dalam kategori rendah, yaitu 34,55. Penelitian lebih lanjut dapat dilakukan dalam bentuk perluasan materi, subjek penelitian, lintas mata pelajaran, serta pengembangan penskor otomatis lainnya.

Kata kunci: soal uraian, TPACK guru IPA, asesmen autentik, penskor otomatis

DEVELOPMENT OF ESSAY INSTRUMENTS FOR TPACK ASSESSMENT USING COMPUTER-ASSISTED SCORING

ABSTRACT

Measurement of knowledge as a part of teacher evaluation, so far, has still limitations, particularly in the aspect of authenticity, as it uses multiple-choice instruments. Alternatively, an essay as a response instrument constructed by the assessment subject, can be effective. Based on this background, this research is aimed to develop an instrument in the form of an essay to measure the level of technological pedagogical content knowledge (TPACK) in natural science teachers within computer-assisted scoring. The research method applied was research and development, suitable for the development of assessment instruments. The research subjects involved as a whole were 250 teachers of Natural Science subjects in junior high schools in the Banten Province. Data collection was carried out through the online distribution of instruments – the platform of Google Form, within the social media of the natural science teacher community. Testing and analyzing data on instruments and automated scoring include qualitative content validity tests, construct validity tests using Exploratory Factor Analysis and Confirmatory Factor Analysis, internal reliability, and inter-rater reliability. Studies and analyzes were also conducted to describe the contextuality and effectiveness of the instrument as well as the efficiency of the assessment process. Qualitative testing involved three expert validators for validating the question instruments and scoring rubrics. Meanwhile, quantitative testing of the instrument involved three academics to score answers from the subjects. The automated essay scoring for examining was the UKARA computer program, owned by the Center for Assessment and Learning. These research and development results covered (1) the instrument for TPACK assessment of natural science teachers in junior high schools in the form of essays was authentic, contextual, and efficient and had adequate validity and reliability both qualitatively and quantitatively. (2) The scoring rubric developed and used in this study was adequate validity and reliability. (3) The reliability value between the UKARA automatic rater and the human rater belonged in the high category, with ICC = 0.77 and $r = 0.80$. (4) The implementation of the assessment instrument showed that the mean TPACK score of natural science teachers in junior high schools was in a low category, which was 34.55. Further research can be carried out in the form of subject matter expansion, research participants, across subjects, the development of other automated essay scoring, well as.

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