

**PENGEMBANGAN BAHAN AJAR IPBA BERBASIS PENDEKATAN
TAFAKUR ALAM UNTUK MENINGKATKAN PEMAHAMAN KONSEP
KETERAMPILAN BERPIKIR REFLEKTIF DAN SIKAP SPIRITUAL
MAHASISWA CALON GURU IPA**

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UNIVERSITAS PENDIDIKAN INDONESIA
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PERNYATAAN KEASLIAN DISERTASI

Dengan ini saya menyatakan bahwa disertasi yang berjudul “Pengembangan Bahan Ajar IPBA Berbasis Pendekatan Tafakur Alam Untuk Meningkatkan Pemahaman Konsep, Keterampilan Berpikir Reflektif dan Sikap Spiritual” beserta seluruh isinya adalah benar-benar karya saya sendiri dan saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam masyarakat keilmuan. Atas pernyataan tersebut, saya siap menanggung resiko yang dijatuhkan kepada saya apabila dikemudian hari ditemukan adanya pelanggaran terhadap etika keilmuan dalam karya saya ini atau ada klaim dari pihak lain terhadap karya saya ini.

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PENGEMBANGAN BAHAN AJAR IPBA BERBASIS PENDEKATAN TAFAKUR ALAM UNTUK MENINGKATKAN PEMAHAMAN KONSEP, KETERAMPILAN BERPIKIR REFLEKTIF DAN SIKAP SPIRITUAL MAHASISWA CALON GURU IPA

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ABSTRAK

Penelitian ini bertujuan untuk menghasilkan bahan ajar Ilmu Pengetahuan Bumi dan Antariksa (IPBA) berbasis pendekatan tafakur alam yang valid dan efektif dalam meningkatkan pemahaman konsep, keterampilan berpikir reflektif, dan sikap spiritual mahasiswa calon guru IPA. Metode yang digunakan adalah Design and Development Research (DDR) jenis *Product and Tool Research* dengan model pengembangan mengadaptasi tahapan Ellis & Levy (*identify the problem motivating the research, describe the objectives, design and develop the artifact, subject the artifact to testing, evaluate the results of testing, dan communicate those results*). Partisipan penelitian terdiri dari 58 mahasiswa semester IV yang mengambil mata kuliah IPBA di salah satu perguruan tinggi di Kota Jakarta. Instrumen penelitian berupa Instrumen tes pemahaman konsep, instrumen tes keterampilan berpikir reflektif dan skala sikap spiritual. Seluruh instrumen melewati tahap validasi ahli dan uji coba sehingga memenuhi kriteria yang valid. Hasil penelitian disimpulkan bahwa; (1) Telah berhasil dikembangkan produk bahan ajar IPBA berbasis pendekatan tafakur alam dalam bentuk bahan ajar digital berbasis web dengan struktur empat tahap pembelajaran tafakur alam: observasi, analisis ilmiah, kekaguman transendental, dan kognisi spiritual. Bahan ajar ini memuat sepuluh fitur utama yang terdiri dari: tujuan pembelajaran, pengamatan video, tes pengetahuan awal, konstruksi pengetahuan, tes penerapan pengetahuan, pengalaman menakjubkan, kognisi spiritual, refleksi kognitif dan spiritual, diskusi kolaboratif AI, dan aktivitas pemecahan masalah; (2) validitas bahan ajar dinyatakan tinggi berdasarkan penilaian ahli; (3) uji coba terbatas menunjukkan keterpakaian yang baik dalam aspek keterbacaan, tampilan, fungsi, dan manfaat; (4) bahan ajar efektif meningkatkan pemahaman konsep mahasiswa calon guru IPA; (5) bahan ajar juga terbukti efektif dalam mengembangkan keterampilan berpikir reflektif; (6) sikap spiritual mahasiswa meningkat lebih tinggi pada kelas eksperimen dibandingkan kelas kontrol; dan (7) mahasiswa memberikan tanggapan positif terhadap kepraktisan, kemudahan penggunaan, daya tarik, dan kebermanfaatan bahan ajar. Berdasarkan hasil penelitian ini bahan ajar IPBA berbasis tafakur alam direkomendasikan untuk diterapkan dalam pembelajaran calon guru IPA yang menekankan penguatan pemahaman konsep, keterampilan berpikir reflektif sekaligus sikap spiritual pada perkuliahan Bumi dan Antariksa. Penelitian lanjutan dapat diarahkan pada pengembangan fitur adaptif berbasis teknologi dan penerapan pada jenjang pendidikan yang lebih luas.

Kata Kunci: bahan ajar IPBA, pendekatan tafakur alam, pemahaman konsep, keterampilan berpikir reflektif, sikap spiritual, calon guru IPA.

DEVELOPING EARTH AND SPACE SCIENCE TEACHING MATERIALS BASED ON *TAFAKUR ALAM* APPROACH TO ENHANCE CONCEPTUAL UNDERSTANDING, REFLECTIVE THINKING SKILLS, AND SPIRITUAL ATTITUDES OF PROSPECTIVE SCIENCE TEACHERS

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ABSTRACT

This study aims to develop valid and effective teaching materials for the Earth and Space Science course based on the *tafakur alam* approach to enhance conceptual understanding, reflective thinking skills, and spiritual attitudes of prospective science teachers. The research employed a Design and Development Research (DDR) approach, specifically a Product and Tool Research type, using the development model adapted from Ellis & Levy, which includes the following stages: identifying the problem motivating the research, describing the objectives, designing and developing the artifact, testing the artifact, evaluating the test results, and communicating the findings. The participants consisted of 58 fourth-semester students enrolled in the Earth and Space Science (IPBA) course at a university in Jakarta. Research instruments included a conceptual understanding test, a reflective thinking skills test, and a spiritual attitude scale. All instruments were validated by experts and tested to ensure their validity. The findings of the study are summarized as follows: (1) A web-based digital teaching material grounded in the *tafakur alam* approach was successfully developed, featuring a four-stage learning structure: observation, scientific analysis, transcendental awe, and spiritual cognition. The teaching material comprises ten main features: learning objectives, video observation, prior knowledge test, knowledge construction, knowledge application test, astonishing experiences, spiritual cognition, cognitive and spiritual reflection, AI-assisted collaborative discussion, and problem-solving activities; (2) expert judgment confirmed its high validity; (3) a limited trial demonstrated good usability in terms of readability, visual design, functionality, and benefits; (4) the material was effective in enhancing pre-service science teachers' conceptual understanding; (5) it also proved effective in developing reflective thinking skills; (6) students' spiritual attitudes improved more significantly in the experimental class than in the control class; and (7) students responded positively regarding the practicality, ease of use, attractiveness, and usefulness of the material. Based on these results, the *tafakur alam*-based IPBA teaching material is recommended for use in the education of prospective science teachers, particularly in courses that aim to strengthen conceptual understanding, reflective thinking, and spiritual development in Earth and Space Science education. Future studies may explore the development of adaptive, technology-based features and the implementation of these materials across broader educational levels.

Keywords: earth and space science teaching material, *tafakur alam*, conceptual understanding, reflective thinking, spiritual attitude, prospective science teachers.

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