KETERAMPILAN *COMPUTATIONAL THINKING* MAHASISWA MELALUI PENERAPAN DESAIN DIDAKTIS DENGAN MEMANFAATKAN PERANGKAT LUNAK-R PADA MATA KULIAH STATISTIKA

DISERTASI

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar
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ABSTRAK

Edi Irawan. (2024). *Keterampilan Computational Thinking Mahasiswa melalui Penerapan Desain Didaktis dengan Memanfaatkan Perangkat Lunak-R pada Mata Kuliah Statistika*. Universitas Pendidikan Indonesia.

Computational thinking (CT) merupakan keterampilan penting dan mendasar pada abad ke-21, yang berkaitan erat dengan statistika sekaligus dengan penggunaan berbagai bahasa pemrograman. Penelitian ini bertujuan untuk merancang *hypothetical learning trajectory* (HLT) dan desain didaktis pemanfaatan perangkat lunak-R pada mata kuliah Statistika Dasar untuk mengasah dan mengembangkan keterampilan CT mahasiswa calon guru matematika. Melalui pendekatan kualitatif dengan metode fenomenologi hermeneutik, penelitian ini menggunakan *framework didactical design research* (DDR), yang melibatkan tahap analisis prospektif, analisis metapedadidaktik, dan analisis retrospektif. Temuan penelitian ini adalah diperolehnya HLT dan desain didaktis pada materi statistika deskriptif yang secara khusus untuk mengasah keterampilan CT mahasiswa. Implementasi desain didaktis hipotetis memperlihatkan bahwa seluruh rangkaian HLT dapat dilalui mahasiswa, demikian juga dengan respons mahasiswa terhadap situasi didaktis yang dihadirkan, sesuai dengan prediksi respons mahasiswa sehingga antisipasi didaktis pedagogis yang telah disiapkan dapat mengatasi setiap respons yang muncul. Penggunaan perangkat lunak-R dalam proses pembelajaran terbukti mampu mengasah dan mengembangkan keterampilan CT mahasiswa, yang mencakup aspek dekomposisi, pengenalan pola, abstraksi, dan juga algoritma. Menariknya, dalam pemanfaatan perangkat lunak-R pada materi statistika deskriptif, tidak ditemukan terjadinya *learning obstacle*, baik *ontogenic obstacle, didactical obstacle,* maupun *empirical obstacle*. Selanjutnya, evaluasi dan refleksi yang dilakukan terhadap HLT dan desain didaktis hipotetis, berpijak pada hasil implementasi, menghasilkan HLT modifikasi dan desain didaktis empiris pemanfaatan perangkat lunak-R pada materi statistik deskriptif yang berorientasi untuk mengembangkan CT mahasiswa. Secara keseluruhan, penelitian ini menegaskan pentingnya suatu desain didaktis dalam pembelajaran matematika, khususnya pada pembelajaran statistika berbantuan perangkat lunak-R dan berorientasi untuk mengembangkan CT.

Kata kunci: *computational thinking*, desain didaktis, *hypothetical learning trajectory*, perangkat lunak-R, statistik deskriptif

ABSTRACT

Edi Irawan. (2024). *Students' Computational Thinking Skills through the Application of Didactical Design Utilizing R Software in Statistics Course.* Universitas Pendidikan Indonesia.

Computational thinking (*CT*) *is an essential and fundamental skill in the 21st century, closely related to statistics and programming languages. This research aims to design a hypothetical learning trajectory* (*HLT*) *and didactical design utilizing R software in the Basic Statistics course to sharpen and develop the CT skills of prospective mathematics teachers. Through a qualitative approach employing the phenomenological hermeneutics method, this study utilizes a didactical design research* (*DDR*) *framework involving prospective, metapedadidactic, and retrospective analysis stages. A finding of this research is the development of HLT and didactical design on descriptive statistics material specifically tailored to hone students' CT skills. The implementation of the hypothetical didactical design demonstrates that the entire sequence of HLT can be traversed by students, along with their responses to the didactical situations presented, consistent with predicted student responses. Thus, pedagogical didactical anticipation can address any emerging response. Using R software in the learning process effectively sharpens and develops students' CT skills, encompassing decomposition, pattern recognition, abstraction, and algorithms. Interestingly, no learning obstacles were found in using R software in descriptive statistics material, including ontogenic, didactical, or empirical obstacles. Furthermore, evaluation and reflection conducted on the HLT and hypothetical didactical design, grounded in implementation results, yield modified HLT and empirical didactical design utilizing R software in descriptive statistics material to develop students' CT skills. Overall, this research underscores the importance of didactical design in mathematics education, particularly in statistics learning aided by R software and oriented toward CT development.*

Key words: computational thinking, didactical design, hypothetical learning trajectory, R software, descriptive statistics

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DAFTAR GAMBAR

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