

INTISARI

STUDI PENGARUH PENERAPAN *NIELSEN'S USABILITY HEURISTICS* TERHADAP BEBAN KOGNITIF MAHASISWA DALAM PENGGUNAAN *LEARNING MANAGEMENT SYSTEM (LMS)*

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Learning Management System (LMS) merupakan salah satu platform pembelajaran daring yang banyak digunakan, tetapi kompleksitas antarmuka dan kurangnya penerapan prinsip desain dapat menimbulkan peningkatan beban kognitif pengguna. Berbagai penelitian terdahulu telah menelaah keterkaitan antara beban kognitif dan aspek desain antarmuka seperti *usability*. Namun, sebagian besar berfokus pada prinsip atau elemen desain tertentu sehingga belum menggambarkan penerapan heuristik secara komprehensif. Pada konteks LMS, sebagian besar penelitian bersifat observasional dan tidak melibatkan intervensi desain. Penelitian ini bertujuan untuk memberikan evidensi eksperimental mengenai pengaruh penerapan *Nielsen's Usability Heuristics* terhadap beban kognitif mahasiswa dalam penggunaan LMS. Pada penelitian ini, objek yang diteliti merupakan tiga LMS *Moodle-based*. Tahapan penelitian dimulai dengan *heuristic evaluation* untuk mengidentifikasi pelanggaran *usability*, diikuti redesign antarmuka berdasarkan rekomendasi evaluasi tersebut, lalu dilakukan eksperimen *within-subject* dengan 48 partisipan. Eksperimen dilakukan dengan membandingkan antarmuka eksisting dan versi modifikasi menggunakan NASA-TLX (*NASA Task Load Index*) sebagai pengukuran subjektif, metrik performa tugas berupa *completion time* dan *excessive mouseclicks* sebagai pengukuran objektif, serta dukungan data kualitatif melalui observasi dan *think-aloud*. Hasil analisis menunjukkan adanya penurunan signifikan pada seluruh indikator beban kognitif dengan *effect size* kategori besar (*large effect*). Hasil tersebut relevan dengan permasalahan *Nielsen's Usability Heuristics* yang ditemukan dari hasil *heuristic evaluation* dan data kualitatif eksperimen. Hal ini menandakan bahwa redesign berbasis heuristik mampu meningkatkan efisiensi kognitif saat pengguna berinteraksi dengan LMS. Temuan ini memberikan evidensi empiris bahwa penerapan *Nielsen's Usability Heuristics* mampu menurunkan beban kognitif secara nyata dan dapat dijadikan dasar dalam perancangan antarmuka pembelajaran daring yang lebih efektif.

Kata kunci : beban kognitif, *Cognitive Load Theory (CLT)*, *Nielsen's Usability Heuristics*, *Learning Management System (LMS)*, *heuristic evaluation*, NASA-TLX (*NASA Task Load Index*).

ABSTRACT

EVALUATING THE IMPACT OF NIELSEN'S USABILITY HEURISTICS ON STUDENTS' COGNITIVE LOAD IN THE USE OF LEARNING MANAGEMENT SYSTEMS

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Learning Management System (LMS) is one of the most widely used online learning platforms. However, interface complexity and the lack of proper design principles may increase users' cognitive load. Previous studies have examined the relationship between cognitive load and interface design aspects such as usability. Nonetheless, most of them focused on specific principles or interface elements, thus failing to capture a comprehensive application of heuristics. In the context of LMS, the majority of studies are observational and do not involve design interventions. This study aims to provide experimental evidence regarding the effect of applying Nielsen's Usability Heuristics on students' cognitive load in using LMS. The objects of investigation consist of three Moodle-based LMS. The research procedures began with heuristic evaluation to identify usability violations, followed by interface redesign based on the recommendations from the evaluation, and subsequently a within-subject experiment involving 48 participants. The experiment compared the existing interfaces with the modified versions using NASA-TLX (NASA Task Load Index) as a subjective measure, task performance metrics including completion time and excessive mouse-clicks as objective measures, as well as qualitative data through observation and think-aloud. The analysis revealed a significant decrease across all cognitive load indicators with a large effect size. These results align with the usability issues identified from the heuristic evaluation and qualitative findings of the experiment. This indicates that heuristic-based redesign substantially enhances cognitive efficiency during interaction with the LMS. The findings provide empirical evidence that applying Nielsen's Usability Heuristics can effectively reduce cognitive load and may serve as a basis for designing more effective online learning interfaces.

Keyword: cognitive load, Cognitive Load Theory (CLT), Nielsen's Usability Heuristics, Learning Management System (LMS), heuristic evaluation, NASA-TLX (NASA Task Load Index).