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## REVIEWER'S REPORT

**Manuscript No.: IJAR- 58600**

**Title: DECODING COGNITIVE LOAD IN VIRTUAL CLASSROOMS: AN EMPIRICAL ANALYSIS OF CONCEPTUAL BARRIERS IN AC POWER FACTOR AMONG POLYTECHNIC STUDENTS**

**Recommendation:**
Accept

| Rating | Excel. | Good | Fair | Poor |
|---|---|---|---|---|
| Originality | Yes | | | |
| Techn. Quality | | Yes | | |
| Clarity | Yes | | | |
| Significance | Yes | | | |

**Reviewer Name: Dr. Ashish Yadav**

## *Detailed Reviewer's Report*

**Reviewer's Comment for Publication.**
Acceptance Comments are mentioned below suitable for the paper titled "DECODING COGNITIVE LOAD IN VIRTUAL CLASSROOMS: AN EMPIRICAL ANALYSIS OF CONCEPTUAL BARRIERS IN AC POWER FACTOR AMONG POLYTECHNIC STUDENTS"

**Reviewer Comments: Accept**

**Reviewer Comments –**

**Introduction**

The introduction clearly establishes the significance of cognitive load in online engineering education and effectively explains the challenges encountered during emergency remote teaching. The research problem is well motivated and aligned with the needs of polytechnic education. To further strengthen this section, the authors may include additional recent references (2023–2025) on virtual laboratories and cognitive load theory. The research objectives and contributions should also be stated more explicitly at the end of the introduction.

**Literature Review**

The literature review provides a suitable theoretical foundation by discussing cognitive load theory, Revised Bloom's Taxonomy, and online laboratory learning. The cited studies are relevant and adequately support the research context. Nevertheless, the review would benefit from a more critical comparison of

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previous findings, highlighting existing research gaps and demonstrating how the present study advances current knowledge. Incorporating a few recent high-impact studies would further enhance the review.

**Solution Approach**

The research methodology is appropriate for the stated objectives. The single-group pretest-posttest experimental design, conceptual assessment framework, and cognitive load questionnaire are clearly described and suitable for investigating conceptual barriers. The mapping of assessment items to Bloom's Taxonomy is particularly commendable.

**Results and Discussion**

The results are presented systematically using descriptive statistics, paired sample t-tests, and item-level analyses. The identification of cognitive overload, conceptual misconceptions, and learning performance across Bloom's cognitive domains provides meaningful educational insights. The discussion successfully interprets the findings in relation to cognitive load theory.

**Conclusion**

The conclusion effectively summarizes the major findings and emphasizes the educational implications for virtual engineering instruction. The recommendation to integrate synchronous learning strategies and adaptive visual simulations is practical and supported by the results. The conclusion are well written, such as the relatively small sample size and single institutional context, and well-written future research direction involving larger datasets, control groups, and advanced virtual laboratory environments.