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# Students' Learning Needs as an Empirical Foundation for Project-Based Collaborative Learning Model Development toward SDG 4

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## ABSTRACT

**Objective:** To establish an empirical foundation for the development of a Project-Based Collaborative Learning (PjBCL) model by identifying undergraduate students' learning needs, interpreting their instructional significance, and translating the findings into empirical learner design requirements to support SDG 4 (Quality Education). **Method:** The study represents the needs assessment phase of a broader Educational Design Research (EDR) project. Following pilot testing of a preliminary 70-item questionnaire with 35 students, a refined instrument consisting of 49 substantive items, two attention-check items, and three open-ended questions was administered to 677 undergraduate students from 43 study programmes across nine faculties at Universitas Nusa Cendana, Indonesia. Quantitative data were analyzed using descriptive statistics, Cronbach's alpha, and exploratory factor analysis (EFA), while 2,031 qualitative response units were analyzed thematically. Both datasets were integrated through a joint display to derive empirical learner design requirements. **Results:** The findings revealed that local contextual relevance, collaboration and communication, and students' preference for Project-Based Collaborative Learning constitute strong readiness factors for instructional innovation. In contrast, problem-solving and creative-thinking competencies require further instructional support. Qualitative analysis generated six major themes, including authentic contextual learning, structured collaborative inquiry, higher-order cognition, learner agency, digital and information literacy, and instructional support. The integration of quantitative and qualitative findings produced a comprehensive set of learner design requirements for authentic local projects, structured collaboration, higher-order cognitive development, ethical digital learning, continuous instructional support, and learner autonomy. **Novelty:** Demonstrating a transparent evidence-to-design process by systematically integrating quantitative and qualitative findings to generate empirical learner design requirements. These evidence-based requirements provide a robust foundation for the subsequent design and development of an effective Project-Based Collaborative Learning (PjBCL) model.

## INTRODUCTION

Higher education is experiencing a profound transformation driven by rapid technological advancement, digitalisation, the expansion of the knowledge economy, and increasingly complex societal challenges. Contemporary universities are expected not only to transmit disciplinary knowledge but also to prepare graduates who can adapt to uncertain environments, collaborate across disciplinary boundaries, and generate innovative solutions to authentic problems (Beetham & Sharpe, 2019; Biggs et al., 2022; Darling-Hammond et al., 2020). This paradigm shift reflects a broader movement from teacher-centred instruction toward student-centred and competency-based learning, where learning success is measured not merely by content mastery but by students' ability to apply knowledge in complex real-world situations (Biggs et al., 2022; Daryanto & Karim, 2017). In response to these changes, international organisations and educational researchers consistently emphasise that higher education should cultivate higher-order competencies that enable graduates to remain competitive in rapidly evolving professional contexts (World Economic Forum, 2020). Among these competencies, problem-solving and creative-thinking skills have emerged as two of the most essential