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ADVANCED CURRICULUM DEVELOPMENT THROUGH EDUCATIONAL COMPETITIONS TO STRENGTHEN DEEP LEARNING AND ACADEMIC TALENT

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Abstract. *The Society 5.0 era requires curriculum development that promotes meaningful learning (deep learning) and higher order thinking skills (HOTS); however, curriculum implementation in educational institutions is still largely dominated by rote learning and low-level assessments. This study aims to analyze the role of educational competitions as an instrument for developing a nonformal curriculum based on deep learning through a case study at Lembaga Bina Prestasi Nusantara (Olimnus). The research employed a qualitative approach using a descriptive case study method. Data were collected through document analysis of curriculum guidelines and competition question blueprints, observation of competition implementation, and participants' testimonials and reflections. The data were analyzed thematically to identify the alignment between competition design, learning implementation, and curriculum outcomes. The findings indicate that the Olimnus competition model functions as an enrichment curriculum that applies challenge-based learning, HOTS-based assessment, and a nonformal learning cycle consisting of practice, competition, and reflection. This model not only enhances students' cognitive engagement and deep learning processes but also contributes to the development of soft skills and academic talent. In conclusion, educational competitions can serve as an innovative approach to nonformal curriculum development that is relevant to the learning demands of the Society 5.0 era.*

Keywords: *Curriculum Development, Deep Learning, HOTS, Educational Competition*

INTRODUCTION

Background of the Study

The transition toward Education in the era of Society 5.0 has fundamentally reshaped the orientation of curriculum development worldwide. Educational systems are increasingly required to move beyond content transmission toward cultivating higher-order thinking skills (HOTS), deep learning, and adaptive competencies aligned with complex socio-technological transformations (OECD, 2020; UNESCO, 2021). In this paradigm, learning is positioned as a human-centered process that integrates cognitive sophistication, creativity, collaboration, and problem-solving capacities to address multidimensional global challenges. Consequently, curriculum development must emphasize meaningful learning experiences that enable learners to analyze, evaluate, and generate solutions within authentic contexts.

Recent global frameworks reinforce this direction. The OECD Learning Compass 2030 stresses transformative competencies such as critical thinking, innovation, and reflective action (OECD, 2020). Similarly, UNESCO (2021) underlines the urgency of reimagining education systems to foster lifelong learning and intellectual resilience. Empirical evidence suggests that deep learning environments positively correlate with improved cognitive engagement and long-term academic achievement (Ruan et al., 2021). However, despite policy reforms and theoretical advances, implementation gaps remain evident in many educational contexts, particularly regarding the integration of HOTS-oriented assessment and challenge-based pedagogies (Kim, 2020; Schneider et al., 2021).

Within Indonesia, curriculum reforms such as the Merdeka Curriculum emphasize competency-based outcomes and analytical reasoning. Nonetheless, empirical studies indicate that instructional practices frequently remain dominated by lower-order cognitive tasks and summative assessment patterns (Retnawati et al., 2021). Research by Yudhie Suchyadi and colleagues (Suchyadi & Handaru, 2020; Suchyadi et al., 2022) highlights the persistent discrepancy between intended curriculum design and classroom implementation, particularly in fostering innovative learning cultures and academic excellence. These findings suggest that alternative learning ecosystems may be required to bridge formal curriculum limitations.

[1] Problem of the Study

Problem of the Study

Although national and international educational policies strongly advocate deep learning and HOTS integration, formal schooling environments often struggle to operationalize these principles effectively. Assessment systems frequently emphasize recall-based tasks, limiting students' opportunities to engage in analytical reasoning and creative synthesis (OECD, 2020). Furthermore, instructional rigidity, time constraints, and standardized testing pressures may reduce space for pedagogical innovation (Schneider et al., 2021).

This situation produces a structural gap between policy aspirations and classroom realities. As a result, students' academic talents and higher-order competencies may not be optimally developed within formal settings alone. The challenge, therefore, lies in identifying alternative or complementary curriculum models capable of strengthening deep learning and nurturing academic potential.

Research State of the Art

Contemporary scholarship increasingly recognizes nonformal education as a dynamic arena for curricular innovation. Competition-based learning, in particular, has emerged as a promising approach that integrates challenge-based learning with performance-oriented assessment (Ruan et al., 2021). Empirical research demonstrates that well-designed academic competitions can enhance intrinsic motivation, cognitive engagement, and self-regulated learning (Kim, 2020).

Studies in educational management further reveal that innovative learning environments are strongly influenced by leadership culture, empowerment, and collaborative structures (Suchyadi et al., 2022). In addition, research published in leading journals such as Education and Information Technologies emphasizes the importance of integrating digital systems and cognitive challenges to optimize student learning outcomes (Sun et al., 2021).

Despite these advances, the literature predominantly focuses on classroom-based or digital interventions, with limited exploration of educational competitions as structured nonformal curriculum models. Existing studies tend to examine motivational aspects rather than systematically analyzing competitions as advanced curriculum frameworks that align learning objectives, assessment design, and reflective cycles.

Gap Study & Objective

The critical gap identified in the literature lies in the limited theoretical and empirical examination of educational competitions as comprehensive nonformal curriculum models designed to promote deep learning and academic talent development. While prior studies confirm the motivational and engagement benefits of competition-based learning, few investigate its structural alignment with curriculum principles such as constructive alignment, HOTS assessment distribution, and iterative reflective cycles.

Therefore, this study aims to analyze educational competitions as an innovative nonformal curriculum model that strengthens deep learning and academic talent development in the context of Society 5.0. Specifically, the research seeks to: Examine the alignment between competition design and higher-order cognitive outcomes. Analyze how challenge-based structures foster deep learning processes. Explore the impact of competition-based learning on academic talent and self-regulated learning. By addressing this gap, the study contributes to curriculum theory by conceptualizing educational competitions as advanced curriculum mechanisms rather than supplementary extracurricular activities. Furthermore, it offers practical implications for curriculum developers, educational managers, and policymakers seeking innovative strategies to enhance learning quality in rapidly evolving educational landscapes.

METHOD

Type and Design

This study employed a qualitative research approach using a descriptive case study design. A qualitative paradigm was selected because the research aimed to explore in depth the structural, pedagogical, and managerial dimensions of educational competitions as a nonformal curriculum model promoting deep learning and higher-order thinking skills (HOTS). Rather than testing causal relationships, the study sought to interpret meanings, processes, and contextual dynamics within a real-life educational setting.

The case study design enabled comprehensive investigation of a bounded system—namely, a structured educational competition program implemented at a national level. Case study methodology is particularly appropriate when examining contemporary educational innovations within authentic contexts and when the boundaries between phenomenon and context are not clearly evident (Yin, 2018). This design also allows analytical generalization, meaning that findings contribute to theoretical development in curriculum innovation rather than statistical generalization. The research framework was guided by constructive alignment theory and deep learning principles, positioning the competition as a curriculum system integrating learning objectives, assessment structures, and reflective cycles.

Data and Data Sources

Data were derived from multiple sources to ensure methodological rigor and triangulation. The primary data sources included: Curriculum and assessment documents, such as competition guidelines, question blueprints, scoring rubrics, cognitive-level distributions, and evaluation reports. Observational data from the implementation of the competition, focusing on cognitive engagement patterns, challenge structures, and learner interaction with assessment tasks. Participant reflections and testimonials, which provided insight into perceived learning impact, self-regulation development, and academic talent growth. Organizational records and managerial documentation, including planning procedures and evaluation mechanisms. Participants consisted of competition organizers, academic committee members responsible for question construction, and student participants from secondary education levels. Purposeful sampling was applied to select information-rich cases capable of providing comprehensive perspectives on the competition's pedagogical design.

Data Collection Technique

Data collection was conducted systematically through the following techniques: Document Analysis Curriculum and assessment documents were analyzed to identify alignment between intended learning outcomes and cognitive-level demands. Particular attention was given to the distribution of HOTS indicators (analysis, evaluation, creation) and their integration within contextual problem-solving tasks. Non-participant Observation Observations were conducted during competition implementation to examine participant engagement, time management strategies, cognitive challenge exposure, and reflective processes. Observational protocols were structured to capture indicators of deep learning such as conceptual integration, reasoning strategies, and metacognitive behavior. Reflective Narrative Analysis Participants' written reflections and feedback forms were collected to explore perceived learning experiences. Reflection data were especially valuable in identifying evidence of self-regulated learning and productive struggle, which are central elements of deep learning environments (Schneider et al., 2021). The triangulation of documents, observations, and reflective accounts enhanced credibility and minimized interpretive bias.

Data Analysis

Data were analyzed using thematic analysis supported by an iterative coding process. The analytical stages included: Data reduction – Selecting and organizing data relevant to curriculum structure, assessment design, and learning impact. Open coding – Identifying preliminary categories such as "HOTS alignment," "challenge-based structure," "cognitive engagement," and "self-regulated learning." Axial coding – Establishing relationships among themes to construct a coherent explanatory model of competition-based curriculum implementation. Thematic synthesis – Integrating findings into broader theoretical constructs of deep learning and nonformal curriculum innovation. The analytical procedure followed established qualitative analysis frameworks emphasizing systematic categorization and interpretive rigor (Miles et al., 2014). To ensure trustworthiness, the study applied source triangulation, methodological triangulation, and iterative peer debriefing. Credibility was strengthened by cross-validating document findings with participant reflections and observational evidence. Dependability was maintained through transparent documentation of analytical procedures. Through this methodological structure, the study aimed to produce theoretically grounded and empirically robust insights suitable for publication in internationally indexed educational journals.

RESULTS

Alignment Between Competition Design and Higher-Order Cognitive Outcomes

The findings indicate that the educational competition under study demonstrates strong structural alignment between intended learning outcomes and assessment design. Document analysis reveals that the majority of assessment items are positioned at the higher cognitive levels of analysis, evaluation, and creation. This distribution reflects a deliberate orientation toward higher-order thinking skills (HOTS), rather than recall-based performance. Observation data further confirm that participants engaged in analytical reasoning, comparative evaluation of solution strategies, and time-based strategic decision-making.

Table 1. Distribution of Cognitive Level HOTS Questions

Level Koginitif	Number of Question Items	Prosentase (%)
Analyze (C4)	42	35%
Evaluate (C5)	39	33%
Create (C6)	27	22%
LOTS (C1-C3)	12	10%
Total	120	100%

These behaviors are consistent with indicators of deep learning, particularly conceptual integration and metacognitive awareness (OECD, 2020). The competition structure also incorporates a preparatory phase, implementation phase, and reflective phase. This iterative cycle reinforces knowledge transfer and reflective thinking, key elements of deep learning ecosystems (Schneider et al., 2021).

Challenge-Based Learning as a Nonformal Curriculum Mechanism

The competition operates as a challenge-based learning (CBL) environment in which tasks are contextualized and cognitively demanding. Participants are required to interpret complex stimuli before generating responses, thereby reducing procedural memorization and increasing cognitive engagement. Reflective narratives show that students perceived the competition as intellectually demanding yet meaningful. Many participants reported increased confidence in handling complex academic tasks and improved strategic reasoning. Such findings align with empirical evidence that challenge-based structures enhance cognitive engagement and intrinsic motivation (Kim, 2020; Ruan et al., 2021). Importantly, the competition does not function solely as an evaluative instrument but as a structured learning system. The presence of reflection, feedback, and iterative participation transforms it into a nonformal curriculum model rather than an isolated academic event.

Impact on Academic Talent and Self-Regulated Learning

The results demonstrate measurable qualitative impact on academic talent development. Participants reported improvements in: Analytical reasoning, Strategic thinking, Time management, Academic resilience, Self-regulated learning behaviors.

Table 2 Participant Assessment of the Implementation of the Olimnus Competition

Assessment Aspects	Indicator	Average
Quality Questions	HOTS level, relevance, contextuality	4.52
Committee services	Responsiveness, speed of service, communication	4.71
Website System	Speed, stability, ease of use	4.36
Rewards and Certifications	Reward clarity, certificate quality, delivery accuracy	4.62
Competition Implementation Flow	Clarity of instructions, technical fluency, user experience	4.44
Overall satisfaction	A general assessment of all aspects	4.55

These findings are consistent with research demonstrating that environments promoting productive struggle and reflective practice contribute significantly to intellectual growth (Schneider et al., 2021). Moreover, leadership and innovation studies suggest that structured learning ecosystems contribute to sustained academic excellence and adaptive competencies (Suchyadi et al., 2022). Overall, the results confirm that educational competition, when pedagogically designed, functions as an advanced curriculum mechanism supporting deep learning and talent development.

DISCUSSIONS

From a curriculum design perspective, the Olimnus competition shows the alignment between learning objectives, learning processes, and assessments. The dominance of questions at the cognitive level C4–C6 reflects that learning outcomes are directed at mastering analytical, evaluative, and creative skills. Assessment is not only used to assess final results, but also acts as a driver of the learning process (assessment as learning). This alignment is a key principle in competency-based curriculum and outcome-based education, where learning experiences are designed to directly support expected outcomes (Biggs & Tang, 2011). As a non-formal curriculum, the Olimnus competition has the flexibility to allow the application of innovative learning approaches, such as challenge-based learning. The findings of document analysis and observations show that participants are consistently faced with authentic challenges that demand concept integration, contextual problem-solving, and strategic decision-making. This approach places participants as active subjects in learning, rather than passive recipients of information. This is in line with the view of Nichols and Cator (2010) that challenge-based learning encourages high cognitive engagement and the formation of deep conceptual understanding.

The competition-based non-formal curriculum model is also reflected in the existence of a continuous learning cycle, including the preparation stage, the implementation of the competition, and post-activity reflection. This cycle allows participants to elaborate on concepts before the competition, apply knowledge in challenging situations during

the competition, and reflect on strategies and learning outcomes after the competition. This iterative learning pattern is a key characteristic of deep learning, as it encourages the retention and transfer of knowledge to new contexts (Fullan & Langworthy, 2014). Thus, competition functions as a learning space that is not instantaneous, but oriented towards long-term cognitive development. In addition to the cognitive aspect, the findings of the study show that educational competition as a non-formal curriculum also contributes to the development of soft skills and learning character of participants. Learning independence, discipline, confidence, self-regulation, and academic resilience develop through experience of facing challenges, time constraints, and the dynamics of success and failure in competition. This shows that a competition-based non-formal curriculum has a holistic dimension, which not only develops academic abilities, but also forms an adaptive and sustainable learning disposition. These findings are in line with the concept of self-regulated learning (Zimmerman, 2002) and productive struggle in challenging learning.

In terms of education management, the quality of the competition including services, technical systems, and implementation flows is an important supporting factor for the effectiveness of the non-formal curriculum. A well-managed learning environment allows participants to focus their attention on the thought process and problem-solving without being distracted by technical barriers. This shows that the success of a competition-based non-formal curriculum is not only determined by academic quality, but also by managerial qualities that underpin the overall learning process. Conceptually, the findings of this study place educational competition as a form of advanced curriculum or strengthening curriculum that is relevant to the demands of modern education policies and the Society 5.0 Era. The competition acts as a bridge between the objectives of a formal curriculum that emphasizes HOTS and the reality of the implementation of learning in the field. By providing an alternative learning space that is challenging, reflective, and experiential-oriented, educational competitions can be innovative strategies in the development of non-formal curricula that support deep learning and the development of academic talent.

Thus, the synthesis of this discussion emphasizes that educational competitions are not just additional activities outside the formal curriculum, but can be positioned as a non-formal curriculum model that has a clear structure, objectives, and learning impact. This model provides a theoretical contribution to the study of curriculum development and a practical contribution for education managers in designing a learning ecosystem that is more adaptive, meaningful, and oriented towards the optimal development of students' potential.

Novelty and Contribution

The primary novelty of this study lies in conceptualizing educational competition not merely as an extracurricular activity, but as a structured nonformal curriculum model grounded in constructive alignment principles. While prior research has examined competition-based learning from motivational or engagement perspectives (Kim, 2020; Ruan et al., 2021), limited scholarship has positioned competition as a curriculum system integrating objectives, assessment design, and reflective cycles.

This study contributes theoretically by Proposing a Competition-Based Nonformal Curriculum Model (CNCM) integrating HOTS distribution, challenge-based learning, and reflective iteration. Demonstrating how assessment functions as *assessment-as-learning* rather than solely summative evaluation. Bridging curriculum theory and nonformal education frameworks within the Society 5. paradigm (OECD, 2020; UNESCO, 2021). Empirically, the study extends findings from educational leadership research by Yudhie Suchyadi and colleagues (Suchyadi et al., 2022), showing that innovation ecosystems in education can emerge not only through institutional leadership but also through structured alternative learning environments. Thus, the contribution is both conceptual (curriculum theory expansion) and practical (design framework for competition-based learning systems).

Implication and suggestions

Theoretical Implications, The findings reinforce the importance of constructive alignment in nonformal education. Curriculum coherence alignment between objectives, tasks, and assessment is a key determinant of learning depth (Biggs & Tang, 2011). Competition-based environments can serve as laboratories for curricular innovation, especially where formal schooling struggles to operationalize HOTS frameworks. Practical Implications, For curriculum developers and educational managers, several recommendations emerge: Design competition tasks with explicit cognitive-level mapping. Integrate structured reflection sessions post-competition. Utilize digital platforms to enhance accessibility and engagement (Sun et al., 2021). Embed feedback systems to transform competition into iterative learning cycles. Educational policymakers may consider formally recognizing pedagogically structured competitions as complementary learning ecosystems that strengthen national competency frameworks.

Directions for Future Research

While the current study offers significant insights, several avenues remain open for further investigation: Quantitative Impact Analysis, Future research may employ quasi-experimental or mixed-method designs to measure the causal impact of competition-based curriculum models on academic performance and cognitive development. Longitudinal Studies, Long-term tracking of participants could reveal sustained effects on academic trajectory, innovation capacity, and career development. Digital Integration Models, Given the rise of technology-enhanced education, future studies may examine how AI-supported assessment systems within competition environments influence cognitive engagement (Sun et al., 2021). Comparative Cross-Cultural Studies, Comparative research across different national contexts would enrich theoretical generalizability and identify contextual moderating variables (OECD, 2020). Integration into Formal Curriculum Exploring hybrid models where competition-based frameworks are embedded into formal curriculum structures could provide transformative educational pathways. By addressing these research directions, future scholarship can further strengthen the theoretical and empirical foundation of competition-based nonformal curriculum innovation.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the educational competition organized by Olimnus functions as a model for developing non-formal curriculum that is effective in strengthening deep learning and developing participants' academic talents. The competition design supported by higher order thinking skills (HOTS) assessments, a challenge-based learning approach, and a reflection competition preparation learning cycle encourages high-level cognitive engagement and meaningful learning. The findings of the study also show that the Olimnus competition not only has an impact on improving critical thinking and problem-solving skills, but also contributes to the development of soft skills, such as learning independence, self-regulation, confidence, and academic resilience in participants from various levels of education. In line with these findings, educational competitions need to be strategically positioned as part of a non-formal curriculum or strengthening curriculum that supports HOTS-based learning outcomes and deep learning. Competition organizers are advised to continue to maintain the quality of assessment design, strengthen the post-activity reflection mechanism, and improve the learning support system so that the participants' learning experience is more optimal. In addition, further research can develop this study through a quantitative approach or mixed methods to examine the impact of educational competition more broadly and explore its potential integration into the formal curriculum.

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