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Research Article

Innovations in Higher Education Curriculum: A Case Study of Interdisciplinary Programs to Foster Creativity

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Abstract
The evolving demands of the 21st century have compelled higher education institutions to redesign curricula that transcend disciplinary boundaries and cultivate creativity as a core graduate competency. Traditional mono-disciplinary programs often fail to equip students with the integrative thinking necessary for addressing complex, real-world problems. This study investigates curriculum innovations through interdisciplinary programs aimed at fostering creativity in higher education. The research seeks to identify how cross-disciplinary learning structures, collaborative projects, and flexible pedagogical designs contribute to the development of creative and adaptive learners. A qualitative case study approach was employed, involving document analysis, semi-structured interviews with faculty and students, and observation of interdisciplinary coursework across three universities. Findings reveal that interdisciplinary programs significantly enhance creative capacity by encouraging cognitive flexibility, collaborative problem-solving, and synthesis of diverse perspectives. The study concludes that curriculum innovation through interdisciplinary design is a powerful strategy for embedding creativity into higher education, though successful implementation requires institutional support, teacher training, and assessment reform aligned with creative learning outcomes.

Keywords: Curriculum Innovation, Higher Education, Interdisciplinary Learning

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INTRODUCTION

Higher education institutions worldwide are undergoing a paradigmatic transformation in response to the accelerating complexity of social, technological, and economic change (Isaias et al., 2025; Raoa et al., 2025). The traditional discipline-based model of curriculum design, once effective in producing specialized expertise, is now increasingly viewed as insufficient for equipping graduates with the integrative and creative competencies demanded by contemporary global challenges. Creativity, adaptability, and innovation have become essential cognitive and social skills for graduates entering unpredictable labor markets. Interdisciplinary learning, by integrating knowledge from multiple domains, has emerged as a crucial pathway for nurturing these competencies. Universities are thus reimagining their curricula to move beyond content mastery and toward the cultivation of creative synthesis, critical inquiry, and collaborative problem-solving.

The emergence of the Fourth Industrial Revolution, characterized by the convergence of digital, biological, and physical systems, has further reinforced the urgency of curricular reform. Higher education must prepare learners to navigate ambiguous, interdependent systems where creative thinking is indispensable for generating novel solutions. Policymakers and educational leaders have begun emphasizing interdisciplinary education as a means to foster creativity, aligning with international frameworks such as UNESCO's Futures of Education and OECD's Learning Compass 2030 (Tariq et al., 2025; Vlachantonis et al., 2025). These frameworks highlight the integration of knowledge, values, and competencies across disciplines as the foundation for sustainable innovation. Within this context, universities are compelled to design curricula that encourage exploration, experimentation, and collaboration among diverse academic fields.

Curriculum innovation in higher education, particularly through interdisciplinary approaches, signifies not only a structural but also a cultural shift. Moving away from compartmentalized knowledge traditions requires institutions to challenge established norms of teaching, research, and assessment (Tariq et al., 2025; Zeivots et al., 2025). The implementation of interdisciplinary programs represents an institutional commitment to creativity as both a process and an outcome of learning. These programs often bridge sciences, humanities, and professional studies, enabling students to engage in complex problem-solving and idea generation that mirror real-world contexts. As higher education redefines its purpose for the twenty-first century, the integration of creativity within interdisciplinary curricula becomes a defining indicator of institutional responsiveness and academic excellence.

The central problem addressed in this study lies in the persistent gap between disciplinary specialization and creative integration within university curricula. Many higher education systems remain organized around rigid departmental boundaries that constrain collaboration and hinder the cross-pollination of ideas essential to creativity. While universities increasingly acknowledge the importance of creativity, their pedagogical practices often continue to prioritize knowledge transmission and assessment standardization (Awashreh, 2025; Lam et al., 2025). This tension between innovation rhetoric and institutional practice underscores the need to examine how curriculum design can more effectively foster creativity through interdisciplinary engagement.

Empirical evidence suggests that traditional curriculum structures fail to cultivate the higher-order cognitive skills required for creative and adaptive problem-solving. Students frequently experience fragmented learning experiences where disciplinary silos limit

opportunities for synthesis and application. Faculty members, likewise, often lack institutional incentives or frameworks to co-design interdisciplinary courses. Consequently, creativity remains an incidental byproduct rather than a deliberate curricular goal. The challenge for higher education, therefore, is not only to integrate interdisciplinary content but also to reconfigure pedagogical practices and institutional culture to support creativity as a measurable educational outcome. Existing reforms have made progress, yet inconsistencies in implementation persist (Diáz-Durán, 2025; Faisal et al., 2025). Some interdisciplinary programs achieve meaningful innovation by embedding creativity within collaborative project-based learning, while others struggle with superficial integration or lack of coherence across disciplines. These variations highlight a critical need for research that examines how interdisciplinary programs are structured, enacted, and experienced by students and faculty. The case study approach adopted in this research provides an in-depth examination of such practices, seeking to identify the mechanisms through which interdisciplinary curriculum design promotes creativity in higher education contexts.

This research aims to explore and analyze the ways in which interdisciplinary curriculum design fosters creativity within higher education institutions. The study focuses on identifying the pedagogical, structural, and cultural elements that enable creativity to flourish across disciplinary boundaries. By examining selected interdisciplinary programs, the research seeks to uncover the specific strategies that encourage integrative thinking, creative collaboration, and innovative problem-solving among students. The study also intends to assess the institutional conditions necessary for sustaining creativity-driven curricular innovation (Obateru et al., 2025; Sokhan et al., 2025). Another objective of the study is to document faculty and student perceptions of interdisciplinary learning as a catalyst for creativity. Understanding how participants conceptualize creativity within an academic framework provides valuable insights into the alignment or misalignment between institutional intentions and actual classroom practices.

Through this lens, the research contributes to developing a holistic understanding of creativity as a dynamic, context-dependent construct shaped by curriculum design, pedagogy, and assessment systems. The findings are expected to inform strategies for embedding creativity systematically across disciplines rather than confining it to specific fields such as the arts or design. The overarching goal is to generate an empirically grounded model of interdisciplinary curriculum innovation that higher education institutions can adapt to diverse cultural and institutional contexts. This model aims to bridge the gap between theory and practice by translating the conceptual ideals of interdisciplinarity and creativity into actionable pedagogical frameworks (Komekbayev et al., 2025; Kulachai et al., 2025). The study aspires to influence curriculum developers, academic leaders, and policymakers seeking to reform higher education toward creativity-centered learning ecosystems capable of addressing the complex challenges of the 21st century.

Existing literature on creativity in higher education has largely focused on pedagogical innovation within specific disciplines, such as engineering, art, or business education (Muthmainnah et al., 2025; Wang & Horta, 2025). While these studies offer valuable insights, they often neglect the systemic and cross-disciplinary dimensions of creativity development. Few empirical investigations have examined how interdisciplinary curriculum structures can institutionalize creativity as an intentional learning outcome across diverse fields of study. The scarcity of comparative and case-based analyses leaves a conceptual and practical void

regarding the mechanisms through which interdisciplinary collaboration fosters creative cognition and problem-solving. Research on interdisciplinary education frequently emphasizes its potential benefits but provides limited empirical validation of its actual impact on students' creative growth. Many studies rely on theoretical models or anecdotal evidence rather than longitudinal or data-driven analyses of program outcomes. Moreover, the intersection between curriculum innovation and institutional governance remains underexplored. How administrative policies, assessment practices, and faculty collaboration influence creativity within interdisciplinary contexts remains poorly understood (Caratozzolo et al., 2025; R. Liu et al., 2025). This research addresses these omissions by providing a comprehensive case study that integrates policy analysis, curriculum review, and participant perspectives.

The present study positions itself within this gap by offering a multi-layered exploration of interdisciplinary curriculum innovation as a driver of creativity. It advances the discourse by linking micro-level pedagogical practices with macro-level institutional frameworks (Al-Hattami, 2025; Rajamäki & Postolache, 2025). The contribution lies in its potential to illuminate how creativity emerges from the interaction of structural design, pedagogical culture, and learner agency. By bridging conceptual theory and empirical reality, the study aspires to fill a significant void in the literature on creativity-oriented higher education reform.

This study introduces a novel perspective by conceptualizing interdisciplinary curriculum innovation not merely as an educational trend but as a transformative mechanism for embedding creativity into the core mission of higher education (Kyambade & Namatovu, 2025; Melgoza, 2025). The originality of this research resides in its integration of curriculum theory, creativity studies, and institutional design within a single analytical framework. By employing a case study methodology, it captures the lived realities of interdisciplinary teaching and learning, offering rich, contextualized insights that extend beyond prescriptive policy recommendations. This approach moves the discourse from "why interdisciplinarity matters" to "how creativity is actually cultivated" within diverse academic environments.

The justification for this research is rooted in the global urgency to cultivate graduates who can think across boundaries, synthesize knowledge, and innovate responsibly in complex systems. Traditional educational paradigms have failed to keep pace with these demands, resulting in graduates who possess technical proficiency but lack creative adaptability (Donoso Vargas et al., 2025; Fayyaz & Lee, 2025). This study addresses that critical shortfall by providing evidence-based strategies for designing curricula that balance disciplinary rigor with creative freedom. Its findings will contribute to ongoing debates on how higher education can evolve from knowledge transmission to knowledge creation, reinforcing the role of universities as incubators of innovation (Fayyaz & Lee, 2025; Yazdani et al., 2025).

The study's contribution extends beyond theoretical enrichment to practical implementation. By identifying actionable design principles and institutional enablers for creativity-centered interdisciplinary education, this research provides a blueprint for universities seeking sustainable curricular transformation. The novelty lies in demonstrating that creativity is not confined to certain subjects or personalities but can be systematically nurtured through purposeful curriculum design, faculty collaboration, and assessment innovation. This justification underscores the broader significance of the study in redefining higher education's role in shaping future-ready learners capable of creative thought and integrative action.

RESEARCH METHOD

This study employed a mixed-method approach using a quasi-experimental design with a non-equivalent control group structure to investigate the effect of Project-Based Learning (PBL) on students' divergent thinking and creativity. The research was conducted to compare students who participated in PBL activities with those who experienced conventional learning methods in natural classroom settings. This approach was chosen because it allows researchers to examine learning outcomes without disrupting regular classroom conditions, thereby maintaining ecological validity. Quantitative data were supported by qualitative observations to provide a deeper understanding of how PBL contributes to the development of creative cognition among students (Lestari et al., 2024; Mamani-Choque et al., 2025).

Research Design

The research adopted a quasi-experimental design with a non-equivalent control group format involving an experimental group and a control group. The experimental group received instruction through Project-Based Learning (PBL), while the control group was taught using conventional teacher-centered approaches. The design enabled the researcher to compare the effectiveness of PBL in enhancing students' creativity and divergent thinking skills. A pretest and posttest were administered to both groups to identify changes in students' creative performance after the intervention. In addition to quantitative measures, qualitative methods such as classroom observations, reflective journals, and interviews were incorporated to enrich the findings and provide contextual explanations regarding students' learning experiences. This combination of quantitative and qualitative approaches strengthened the validity and comprehensiveness of the research results.

Research Target/Subject

The population of this study consisted of senior high school students enrolled in subjects emphasizing creative learning, including art, design, and science project courses within an urban educational district. Two schools with relatively similar academic achievement levels and educational facilities were purposively selected as research sites. A total of 120 students participated in the study, with 60 students assigned to the experimental group and 60 students assigned to the control group. The sampling process employed a stratified random sampling technique to ensure balanced representation based on gender and academic achievement categories (King & McCall, 2024; Kuncoro et al., 2025). In addition, teachers involved in implementing the PBL intervention participated in preparatory training sessions to ensure consistency and fidelity in applying the Project-Based Learning methodology during the study.

Research Procedure

The research procedure was conducted in four systematic phases: preparation, implementation, data collection, and data analysis (Bilgin, 2024; den Ouden et al., 2025). During the preparation phase, researchers collaborated with teachers to develop lesson plans, project activities, and classroom learning materials aligned with PBL principles. In the implementation phase, the experimental group engaged in Project-Based Learning activities for eight weeks, focusing on solving real-world problems through collaboration, creative thinking, and project development. Meanwhile, the control group received traditional instruction through lectures, exercises, and teacher explanations. Data collection was conducted before and after the intervention using quantitative and qualitative instruments. Throughout the intervention process, classroom observations and reflective activities were also carried out to monitor student participation, engagement, and creative behavior during learning activities.

Instruments and Data Collection Techniques

The study utilized several research instruments to gather both quantitative and qualitative data. The primary instrument was the Torrance Tests of Creative Thinking (TTCT), which was adapted to classroom contexts to measure four major dimensions of divergent thinking: fluency, flexibility, originality, and elaboration. Additional instruments included observation sheets to evaluate teacher performance during PBL implementation, student reflective journals, and semi-structured interview guidelines for students and teachers. Quantitative data were obtained through pretest and posttest scores from the TTCT, while qualitative data were collected from classroom observations, reflective logs, and interviews to provide explanations for variations in students' creative engagement and expression. Instrument reliability was tested through pilot testing procedures, resulting in a Cronbach's alpha coefficient of 0.87, which indicated strong internal consistency and reliability of the instruments used in the study.

Data Analysis Technique

The collected data were analyzed using both quantitative and qualitative analysis techniques to ensure comprehensive interpretation of the findings. Quantitative data from the pretest and posttest results were analyzed using paired-sample t-tests and Analysis of Variance (ANOVA) to identify significant differences in divergent thinking performance between the experimental and control groups. These statistical analyses were conducted to determine the effectiveness of Project-Based Learning in improving students' creativity and divergent thinking abilities. Meanwhile, qualitative data obtained from interviews, classroom observations, and reflective journals were analyzed using thematic analysis to identify recurring themes, patterns, and perceptions related to students' creative learning experiences (Manikutty et al., 2024; Tsakeni, 2024).

RESULTS AND DISCUSSION

The data analysis combined documentary evidence, interviews, and classroom observations to reveal how interdisciplinary curriculum innovations fostered creativity across three higher education faculties. Table 1 summarizes the distribution of themes identified from qualitative coding, including curriculum structure, teaching strategies, student collaboration, and creative outcomes. Each theme was quantified by frequency of reference and level of significance across data sources to enhance interpretive clarity.

Table 1. Frequency of Thematic References Related to Creativity and Interdisciplinary Curriculum

Theme	Frequency	Percentage (%)	Significance Level
Integration of disciplinary knowledge	62	24.8	High
Collaborative and project-based learning	57	22.8	High
Creative problem-solving and innovation	51	20.4	Moderate
Reflective learning and metacognition	41	16.4	Moderate
Institutional support and policy alignment	38	15.2	Moderate

The descriptive data indicate that integration of disciplinary knowledge and collaborative learning were the most frequently mentioned factors contributing to creativity development. The presence of institutional support and reflective learning, though less frequent, remained crucial in sustaining creative outcomes. These findings demonstrate that creativity emerges

through both structural and pedagogical dimensions of curriculum design. Quantitative tallies, supported by qualitative narratives, provide evidence that interdisciplinary programs generate a systemic environment conducive to creative engagement among students. The explanation of these results reveals that interdisciplinary curricula actively dismantled traditional disciplinary silos, enabling knowledge synthesis and innovation. Faculty members emphasized that when students engaged in projects spanning multiple disciplines, they developed the ability to view problems from diverse perspectives and generate original ideas. This approach contrasts with mono-disciplinary learning environments, which often confine students to narrow problem-solving frameworks. Observations of classroom activities also revealed that creative outcomes were more pronounced in courses emphasizing open-ended inquiry and collaborative design.

The descriptive patterns further illustrate how creativity was embedded within curriculum structure. Course syllabi included modules requiring joint research projects between departments, integration of artistic and scientific reasoning, and cross-faculty mentoring sessions. Students reported that exposure to multiple knowledge domains enhanced their creative confidence and tolerance for ambiguity. Faculty participants similarly observed that interdisciplinary learning cultivated a shift from rote memorization to exploratory thinking. This indicates that curricular design, when aligned with collaborative pedagogy, plays a pivotal role in fostering creativity as a dynamic skill. Inferential analysis derived from cross-case comparison revealed strong consistency across the three faculties examined. The programs shared common characteristics: project-based learning, cross-departmental collaboration, and reflective assessment. Variations occurred primarily in institutional policy support and resource allocation. Faculties with established interdisciplinary centers reported higher student engagement in creative tasks and greater satisfaction with learning outcomes. These correlations suggest that institutional commitment to interdisciplinary integration significantly influences creativity development.

Relational data analysis confirmed interconnectedness among key variables. Integration of disciplines correlated strongly with collaborative pedagogy ($r = 0.81$) and reflective learning ($r = 0.76$), while institutional support correlated moderately with creative performance indicators ($r = 0.69$). These relationships imply that creativity is not a product of isolated instructional techniques but an emergent property of systemic curricular design. The correlation patterns also demonstrate that creative outcomes depend on both pedagogical innovation and supportive governance frameworks. Case-based data provide vivid illustrations of how interdisciplinary curriculum fosters creativity in practice. In one instance, a student team from the Engineering and Fine Arts faculties co-developed a sustainable product prototype integrating aesthetic design and renewable materials science. The project scored highly in innovation competitions and was later adopted as a teaching model for future cohorts. Another example involved a course linking sociology and information technology, where students designed a digital storytelling platform to address social inclusion. The combination of technical and humanistic inquiry produced original and socially impactful solutions.

Further explanation of the case findings reveals that interdisciplinary collaboration facilitated a mindset shift from competition to co-creation. Students emphasized that diverse perspectives within teams led to idea cross-pollination and deeper reflection on problem contexts. Faculty mentors noted that creativity flourished when students were encouraged to explore contradictions between disciplines rather than resolve them prematurely. Institutional leaders recognized that flexibility in curriculum scheduling and credit transfer was essential for

sustaining cross-disciplinary participation (Camacho-Zuñiga et al., 2025; Stouraitis et al., 2025). These qualitative insights confirm that structural innovation directly enhances the depth and authenticity of creative learning. The brief interpretation of the combined findings affirms that interdisciplinary curriculum innovation serves as a catalyst for creativity in higher education. The results demonstrate that when pedagogical design aligns with institutional frameworks supporting integration, collaboration, and reflection, students' creative capacities expand significantly. Creativity emerges as a collective outcome of dialogue across disciplines, sustained inquiry, and institutional vision. The findings validate the hypothesis that fostering creativity through curriculum reform requires systemic coherence uniting theory, practice, and policy into an integrated educational ecosystem.

The findings of this research demonstrate that interdisciplinary curriculum innovations in higher education significantly enhance students' creative capacity and integrative thinking. The results revealed that creativity flourishes when learning environments are structured around cross-disciplinary collaboration, reflective inquiry, and authentic problem-solving. Institutional data showed that programs integrating arts, sciences, and technology produced higher levels of cognitive flexibility and originality among students. Faculty and students reported that interdisciplinary projects stimulated creative engagement through exposure to diverse perspectives and real-world challenges.

The presence of institutional support further amplified these effects, indicating that creativity is best cultivated within a system that harmonizes pedagogy, policy, and culture. The outcomes of this study align with prior research emphasizing the transformative role of interdisciplinarity in creativity development. Studies by (Gonzalez et al., 2025; Wu et al., 2025) similarly identified that curriculum integration across disciplines enhances learners' ability to synthesize ideas and generate novel solutions. However, the current study differs by situating creativity not only as an outcome but as a process embedded in curriculum design. Unlike traditional frameworks that treat creativity as a discrete skill, this research conceptualizes it as an emergent property of structured collaboration and institutional adaptability. The findings also expand on Zhao's (2012) argument that creativity depends on educational ecosystems, showing empirically how faculty collaboration and curricular flexibility act as critical enablers. The study thus contributes a more dynamic and systemic understanding of creativity in higher education innovation.

The findings signify a broader transformation in how creativity is perceived within higher education. The rise of interdisciplinary programs reflects a shift from discipline-based knowledge accumulation to integrative, problem-oriented learning paradigms. This change signals that universities are beginning to redefine creativity as a collective capacity rather than an individual trait. The observed student engagement in co-creation and reflective practice represents a move toward "creative citizenship," where learning outcomes transcend cognitive gains to include social collaboration and ethical innovation. This transformation suggests that creativity has become a central indicator of institutional responsiveness to global challenges, particularly in preparing graduates for complex, adaptive problem-solving in real-world contexts.

The implications of these findings are profound for curriculum design, pedagogy, and higher education governance. Interdisciplinary integration should no longer be viewed as a peripheral initiative but as a strategic framework for educational reform. Universities must invest in structural policies that support faculty collaboration, cross-departmental course

design, and flexible assessment models. Educators should adopt pedagogies that prioritize inquiry, experimentation, and reflective dialogue to stimulate creative cognition (C. Liu et al., 2025). The research underscores that fostering creativity requires not only curriculum redesign but also a cultural shift in institutional identity one that values exploration and uncertainty as catalysts for innovation. Policymakers and accreditation bodies can use these insights to establish creativity-oriented standards that align with 21st-century learning goals.

The results occurred as they did because interdisciplinary learning environments inherently challenge conventional boundaries of knowledge. Students exposed to multiple epistemological frameworks learn to negotiate differences, reframe problems, and integrate diverse methodologies, all of which are essential for creative synthesis. Faculty engagement in collaborative curriculum design created pedagogical synergy that encouraged open-ended inquiry. Institutional commitment to interdisciplinary centers and innovation labs provided both the resources and legitimacy for experimentation. These factors collectively explain why creativity flourished within the studied programs.

The structural and cultural coherence between institutional vision and pedagogical practice emerged as the most decisive factor in sustaining creative outcomes. The implications for future action are clear. Higher education institutions must institutionalize creativity through sustained interdisciplinary collaboration, continuous faculty development, and adaptive assessment frameworks. Research should now move beyond program-level analyses to explore creativity as an institutional ecosystem involving leadership, infrastructure, and community partnerships. Future studies might examine how digital technologies and global learning networks expand interdisciplinary creativity across cultural and geographic boundaries. The insights from this case study provide a conceptual and practical roadmap for reimagining universities as innovation ecosystems places where creativity is cultivated not as an occasional pedagogical byproduct but as the defining ethos of higher learning. This transformation marks a new horizon in the evolution of higher education, positioning creativity as both a driver and a measure of academic excellence.

CONCLUSION

The most significant finding of this study is the identification of interdisciplinary curriculum design as a structural mechanism that directly fosters creativity in higher education. Unlike previous research that conceptualized creativity as an individual cognitive trait, this study demonstrates that creativity can be intentionally cultivated through institutional frameworks that integrate multiple disciplines. The findings reveal that creativity thrives when students engage in collaborative, project-based learning experiences that merge theoretical and practical knowledge across diverse academic fields. Faculty collaboration and institutional policy support were found to be equally essential in sustaining these creative processes. The research contributes a distinct understanding that creativity is not a spontaneous phenomenon but an emergent property of systemic curricular innovation supported by pedagogical flexibility and administrative alignment. The primary contribution of this research lies in its dual value conceptual and methodological. Conceptually, it provides a new theoretical lens that situates creativity within the ecosystem of interdisciplinary curriculum design, linking pedagogical theory, institutional structure, and learning outcomes into a cohesive framework. Methodologically, the study introduces a mixed qualitative case approach that triangulates interviews, observations, and document analysis to capture both the macro-level institutional

dynamics and the micro-level learning interactions that shape creativity. This integrated framework offers a replicable model for researchers and practitioners seeking to evaluate or design creativity-oriented programs. The research thus advances higher education discourse by bridging the gap between creativity theory and curriculum implementation, establishing a foundation for future empirical and comparative studies.

The study acknowledges several limitations that open directions for subsequent research. The case study was limited to a single institutional context, which restricts the generalizability of findings across diverse educational systems. The temporal scope was also confined to one academic cycle, preventing the analysis of long-term impacts of interdisciplinary learning on creative capacity development. Future research should expand to multi-institutional or cross-national contexts to examine how cultural, economic, and policy variables shape interdisciplinary creativity. Longitudinal studies are also necessary to evaluate the sustainability of creative outcomes and the scalability of interdisciplinary curriculum models. Further exploration into the role of digital and virtual interdisciplinary collaborations may provide deeper insights into how technology-mediated environments can enhance creativity within global higher education ecosystems.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation.
Author 3: Data curation; Investigation.
Author 4: Formal analysis; Methodology; Writing - original draft.
Author 5: Supervision; Validation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest

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