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Article

Occupational Undergraduate Students' Entrepreneurship and Innovation Intention: Influencing Factors Investigation — A Case Study of Zibo Vocational and Technical University

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Abstract: To investigate how the innovation and entrepreneurship intention of vocational undergraduate students is formed and cultivated, this study draws on a comprehensive learning survey conducted at Zibo Vocational and Technical University between January and April 2026. The research utilizes a robust dataset comprising 5,969 valid student questionnaires and 484 questionnaires from teachers and administrators. The empirical findings reveal that students demonstrate a relatively high level of identification with innovation and entrepreneurship activities. Furthermore, the results indicate that structured course learning, specialized training programmes, and active competition participation significantly improve their entrepreneurial qualities and overall occupational competence. However, several critical challenges persist that hinder practical application. Specifically, existing courses remain too basic, the practical training chain is fragmented, financial funding and individualized guidance are insufficient, and teaching staff often lack direct enterprise experience. These factors collectively constrain the effective translation of entrepreneurial intention into concrete action. To address these limitations, it is strongly suggested that the university focus on deeply integrating speciality education with innovation education, closely linking training sessions with competitive events, fostering robust school–enterprise collaboration, and providing targeted, personalized support. Implementing these strategic recommendations will substantially improve the overall effectiveness of innovation and entrepreneurship education, ultimately empowering vocational undergraduates to successfully navigate the modern entrepreneurial landscape.

Keywords: vocational education; undergraduate students; entrepreneurship; innovation; influencing factors

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1. Introduction

As the Chinese economy transitions into a new developmental phase characterized by quality-oriented, sustainable, and innovation-led growth, the conventional expansionary model grounded in factor inputs and scale advantages is encountering structural limitations. This shift necessitates a strategic reorientation toward cultivating endogenous growth drivers, particularly through systemic advancement in innovation capacity and entrepreneurial vitality across all levels of education [1, 2]. Within this context, innovation and entrepreneurship education has evolved from a peripheral pedagogical initiative into a core pillar supporting both national innovation-driven development strategies and the deepening reform of vocational education toward high-quality, competency-based outcomes. The formation and strengthening of college students' innovation and entrepreneurship capabilities are shaped by a multidimensional constellation of interrelated factors: demographic variables such as age and developmental stage; cognitive and psychological dimensions including innovative awareness, agile thinking patterns, self-cognition accuracy, and realistic task management proficiency; socio-relational influences like family value orientation and intergenerational

transmission of entrepreneurial mindset; institutional conditions encompassing curriculum architecture, faculty expertise and teaching quality, policy implementation mechanisms, and administrative safeguards; and broader environmental determinants such as local industrial ecology, community support infrastructure, and regional cultural attitudes toward risk, failure, and enterprise creation. Notably, among vocational undergraduate students—whose training emphasizes applied competencies and industry alignment—the strength of entrepreneurial intention is especially sensitive to domain-specific confidence, particularly in professional skill mastery and experiential familiarity with real-world industrial scenarios. Equally critical are the tangible supports provided by higher education institutions, including structured mentorship systems, accessible incubation resources, and responsive administrative frameworks. When instruction remains confined to theoretical exposition and episodic contest preparation, learners often develop declarative knowledge without procedural competence—resulting in a persistent gap between intention and action. Zibo Vocational and Technical University exemplifies a dynamic confluence of two transformative processes: the nationwide advancement of vocational undergraduate education and concurrent regional industrial upgrading. This dual transition renders it an especially instructive case for examining how curricular design, experiential learning integration, resource allocation models, faculty development pathways, and student engagement in applied research collectively shape the evolution of innovation and entrepreneurship intention—which, in this study, is rigorously conceptualized as a multifaceted behavioral tendency emerging from the synergistic interaction of value identification, calibrated self-assessment of capability, accurate perception of available support systems, and sustained practical involvement in authentic innovation or venture-related activities.

2. Current Situation of Vocational Undergraduate Students' Innovation and Entrepreneurship Intention

In terms of course coverage, innovation and entrepreneurship education has achieved basic institutional coverage across vocational undergraduate institutions, reflecting the systematic integration of such content into the curriculum framework. Survey data indicate that nearly half of the students—48.69%—have completed a compulsory innovation and entrepreneurship course, while an additional 20.62% have engaged exclusively through elective offerings, suggesting a tiered yet uneven access model. The most frequently selected courses include Fundamentals of Innovation and Entrepreneurship (70.02%), Career Planning (66.55%), and Employment and Entrepreneurship Guidance (33.87%), all of which emphasize conceptual grounding and personal development rather than applied practice. However, participation in structured, competency-based entrepreneurship training programmes—such as those designed to simulate real-world venture initiation and management—remains strikingly low: only 4.48% have participated in KAB (Know About Business), 3.47% in IYB (Improve Your Business), 3.99% in SYB (Start Your Business), and 4.29% in GYB (Generate Your Business). This disparity highlights a critical gap between foundational awareness and operational capability. Moreover, 11.21% of respondents reported uncertainty regarding the purpose, learning objectives, or academic value of their innovation and entrepreneurship coursework, pointing to deficiencies in pedagogical transparency, syllabus articulation, and outcome mapping—factors essential for fostering student agency and long-term skill retention [3, 4].

Regarding extracurricular engagement, students report widespread exposure to innovation and entrepreneurship–related activities, indicating a robust institutional climate. Specifically, 77.72% have attended promotional events highlighting entrepreneurial spirit, 72.96% have joined innovation and entrepreneurship societies, 71.34% have listened to entrepreneur lectures, and 70.98% have participated in conferences or seminars on related themes [5, 6]. These figures collectively suggest strong top-down promotion and event-based outreach. Yet this quantitative prevalence does not translate uniformly into qualitative investment: 61.75% of students self-report minimal or

very limited time, cognitive effort, or emotional commitment toward innovation and entrepreneurship coursework, whereas only 38.25% describe their involvement as relatively high or substantial. This divergence reveals a fundamental tension between symbolic participation and substantive learning—where visibility and accessibility do not automatically yield deep cognitive processing, reflective practice, or behavioral change. It further underscores the need to redesign pedagogical strategies that move beyond passive attendance toward active co-creation, iterative prototyping, and sustained mentorship scaffolding.

Entrepreneurial ability functions as a multidimensional construct encompassing opportunity recognition, resource mobilization, risk assessment, adaptive decision-making, and resilience under uncertainty [7]. Empirical evidence consistently demonstrates that higher levels of such ability correlate strongly with both the likelihood of initiating entrepreneurial activity and the probability of sustained venture performance. Within the educational context, structured interventions—including formal coursework, intensive training programmes, and competitive simulations—exert measurable influence on the development of these competencies. A six-point Likert scale assessment revealed that all six dimensions of entrepreneurial quality—including initiative, creativity, perseverance, leadership, networking capacity, and financial literacy—achieved mean scores exceeding 4.50. Similarly, all nine indicators of occupational competence—such as technical proficiency, problem-solving agility, teamwork effectiveness, communication clarity, digital fluency, ethical judgment, project management acumen, customer orientation, and cross-functional adaptability—also registered means above 4.50. Crucially, students who had engaged in at least one form of targeted innovation and entrepreneurship education consistently demonstrated statistically significant advantages over non-participants across every measured dimension, affirming the cumulative and reinforcing nature of experiential learning pathways.

Table 1 shows that the innovation and entrepreneurship intention of vocational undergraduate students does not arise simply from subjective enthusiasm but grows gradually in the process of "having studied, having done, having competed and having been mentored"—a sequential, scaffolded developmental trajectory grounded in progressive responsibility and increasing complexity. Training programmes and competitions in particular raise the means more noticeably, which indicates that real tasks, teamwork, roadshow presentation and market validation can enhance self-efficacy. This pattern reflects Bandura's principle of mastery experience: when students successfully navigate authentic challenges—such as developing a minimum viable product, pitching to industry evaluators, securing mock funding, or iterating based on stakeholder feedback—their belief in their own capacity strengthens substantially. Furthermore, such experiences foster metacognitive awareness, enabling learners to monitor, evaluate, and adjust their strategic approaches in dynamic environments. The longitudinal reinforcement embedded in this cycle—study → application → competition → reflection → mentoring—creates durable neural and behavioral pathways that support not only entrepreneurial action but also broader professional identity formation and lifelong learning dispositions essential for evolving labor market demands [4, 8].

Table 1. Analysis of the Effects of Innovation and Entrepreneurship Education on Entrepreneurial Qualities and Occupational Competence

Type of participation	Mean of control group	Mean of participating group	Main indicator	F value
Innovation and entrepreneurship courses	4.36	4.79	Entrepreneurial qualities	191.46***
Innovation and entrepreneurship training programmes	4.45	4.98	Entrepreneurial qualities	315.61***

Innovation and entrepreneurship competitions	4.53	4.98	Entrepreneurial qualities	188.06***
Innovation and entrepreneurship courses	4.333	4.803	Occupational competence	214.06***
Innovation and entrepreneurship training programmes	4.425	5.034	Occupational competence	398.89***
Innovation and entrepreneurship competitions	4.515	5.024	Occupational competence	229.07***

Note: *** $p < 0.001$; the scale is scored on six points.

3. Main Factors Influencing Innovation and Entrepreneurship Intention

3.1. Curriculum Provision and Entrepreneurial Cognition

The university currently offers a limited number of specialized courses—approximately ten—that aim to integrate disciplinary knowledge with innovation education. However, the pedagogical design of many such courses remains underdeveloped: instruction often relies on isolated case studies rather than systematic integration of core technical pathways, real-world industrial challenges, cost-benefit analysis frameworks, market feasibility assessment methods, and structured business model development processes. Furthermore, existing career guidance curricula tend to emphasize broad theoretical concepts, with outdated occupational information that fails to reflect rapid advancements in industry dynamics, evolving skill demands from employers, and emerging employment patterns across high-potential sectors [9]. This gap between academic content and practical application hinders students' ability to identify authentic, discipline-anchored problems during their professional training. Consequently, entrepreneurship is frequently misperceived—not as a transferable, learnable set of competencies grounded in domain expertise and iterative problem-solving—but as an extracurricular contest or exceptional endeavor accessible only to a select group of participants. Such a perception undermines the broader educational objective of cultivating entrepreneurial mindset as a foundational graduate attribute, one that supports adaptability, initiative, value creation, and lifelong learning across diverse career trajectories. To strengthen intention formation, curricular reform must prioritize experiential scaffolding, industry-coordinated project work, reflective practice, and longitudinal exposure to innovation ecosystems—thereby transforming entrepreneurship from an abstract concept into an integrated, actionable, and widely attainable dimension of professional identity.

3.2. Practical Experience and Entrepreneurial Self-Efficacy

Science and technology competitions serve as vital platforms for cultivating innovation capacity and entrepreneurial competencies among higher education students. These activities foster systematic thinking, interdisciplinary integration, and solution-oriented problem solving through project-based learning. For vocational undergraduate students in particular, their curriculum emphasizes applied skills, practical operation, and workplace readiness—advantages that lay a solid foundation for technical implementation. However, the translation of such technical proficiency into entrepreneurial capability remains structurally constrained. Without sustained exposure to authentic market dynamics—including structured market research, guided enterprise visits, contextualized customer interviews, extended project internships embedded in industry workflows, and institutional incubation support—their domain-specific expertise often fails to evolve into product awareness, user-centered design sensibility, or business model literacy. Moreover, many existing practice initiatives remain episodic and activity-driven rather than process-oriented, lacking longitudinal engagement across the

full innovation lifecycle. Consequently, students seldom experience the iterative challenges inherent in real-world problem identification, technological adaptation amid evolving industry standards, or commercial validation under competitive market conditions. This gap impedes the development of entrepreneurial self-efficacy—the belief in one's capacity to initiate, manage, and sustain venture-related tasks—thereby limiting long-term career adaptability and contribution to high-quality economic development.

3.3. Resource Support and the Perception of Entrepreneurial Risk

Empirical data indicate that among the various forms of institutional support perceived by students, career development advice is the most widely accessed, reported by 70.67% of respondents, followed by mentor guidance (46.67%), skills training (42.55%), access to premises or physical facilities (36.37%), and work internship opportunities (33.00%). While these non-financial supports collectively lower structural barriers and enhance students' readiness to engage in innovation and entrepreneurship, critical resource gaps persist—particularly in financial assistance, personalized advisory services, and strategic ecosystem linkages. Notably, direct funding support reaches only 25.21% of students, and access to one-to-one expert consultation or structured opportunities for engagement with industry practitioners, business incubators, or investment intermediaries remains markedly limited. Entrepreneurial intention is a multifaceted construct shaped not solely by motivational factors—such as personal interest or perceived desirability—but also by cognitive appraisals of feasibility and resilience. Students continuously evaluate the anticipated cost of failure, adequacy of start-up capital, complexity of administrative and policy procedures, availability of complementary team competencies, and the institutional tolerance for iterative experimentation. In the absence of early-stage micro-grants, sustained mentor accompaniment, and systematic resource-matching mechanisms—including access to prototyping labs, legal advisory services, or market validation platforms—many promising ideas remain unrealized [10]. High perceived risk functions as a psychological gatekeeper, deterring action even when motivation and creativity are present, thereby constraining the effective translation of academic potential into tangible entrepreneurial outcomes.

3.4. Composition of Teaching Staff and the Professionalism of Guidance

Survey data collected from frontline educators and school administrators reveal notable gaps in the capacity of teaching staff to support innovation and entrepreneurship education. Specifically, fewer than half—only 44.63%—of responding teachers reported having directly guided student teams in innovation or entrepreneurship projects or competitions. Furthermore, nearly half (44.21%) indicated that their involvement in related educational activities—including curriculum delivery, pedagogical design, or administrative coordination—has spanned less than one year, suggesting limited institutional continuity and accumulated expertise in this domain. A substantial majority—55.99%—have never undertaken temporary assignments or secondments within enterprises, thereby lacking firsthand exposure to real-world operational dynamics, market-oriented R&D processes, and industry-standard project management practices. These findings collectively point to structural constraints in faculty development pathways, particularly concerning experiential learning, cross-sectoral collaboration, and applied pedagogy. Strengthening the teaching workforce thus requires systematic investment in dual-qualification training, sustained enterprise immersion programs, mentorship frameworks linking academic and industrial experts, and institutional incentives for long-term engagement in high-impact student guidance. Such measures would enhance competencies in identifying viable innovation opportunities, facilitating technology transfer, navigating intellectual property considerations, and preparing students for national and international competitive platforms.

3.5. Research Participation and Opportunity Identification

A substantial proportion of teaching staff—32.02%—report that student involvement in faculty-led research initiatives remains limited, while an additional 7.44% characterize

such participation as critically insufficient. This pattern is particularly pronounced in vocational undergraduate institutions, where applied research activities are closely aligned with industry practice: commissioned research projects, technical service assignments, production process optimization, equipment modernization efforts, and direct enterprise-identified challenges collectively constitute the primary empirical foundation for student innovation and entrepreneurship project development. When students are excluded from these authentic, context-embedded research experiences, their capacity to cultivate essential scholarly competencies is significantly constrained. Specifically, they encounter persistent difficulties in recognizing real-world problems embedded within industrial workflows, rigorously framing those problems through analytical and domain-specific lenses, and designing methodologically sound, implementable solutions grounded in evidence-based reasoning. Moreover, reduced exposure to iterative research cycles—including hypothesis generation, data collection, validation, and refinement—undermines the development of critical thinking, adaptive problem-solving, and collaborative inquiry skills. Strengthening structured pathways for undergraduate engagement—such as scaffolded research apprenticeships, co-supervised industry-academia projects, and credit-bearing research practicums—represents a strategic priority for enhancing both pedagogical quality and workforce readiness in the vocational higher education ecosystem.

4. Practical Pathways for Enhancing Innovation and Entrepreneurship Intention

4.1. Restructuring Courses That Integrate Speciality and Innovation Education

Universities should systematically restructure their curriculum by organizing courses around interdisciplinary programme clusters rather than isolated disciplines, thereby enabling more authentic integration of innovation and entrepreneurship competencies into subject-specific learning. This involves identifying representative industrial scenarios—such as smart manufacturing systems, digital health service design, or sustainable urban infrastructure development—and deliberately embedding core innovation competencies—including design thinking methodologies, user-centered research techniques, lifecycle cost analysis, intellectual property strategy, lean business model development, and agile project management—into the foundational, intermediate, and advanced courses of each major. Assessment mechanisms must evolve beyond traditional examinations to include authentic, practice-oriented tasks: first-year students may develop initial project proposals grounded in real-world challenges; second-year cohorts could refine functional prototypes through iterative testing and stakeholder feedback; and final-year learners might deliver comprehensive process optimization plans, evidence-based market feasibility analyses, or investor-ready roadshow presentations aligned with actual industry partners. Such a vertically integrated, scaffolded approach ensures cognitive scaffolding across academic years—beginning with conceptual awareness and problem framing, progressing to applied project execution under guided supervision, and culminating in enterprise-level problem solving, incubation support, and translational readiness for commercialization or social impact implementation [11, 12].

4.2. Building a Continuous Chain of "Curriculum–project–competition–incubation"

Empirical evidence indicates that well-structured training programmes and competitively oriented learning activities exert a statistically significant positive influence on the development of students' entrepreneurial mindset, innovation capacity, and occupational competence. To maximize pedagogical impact, universities must strategically broaden access to competition-based learning beyond elite student cohorts, transforming such activities from selective showcases into inclusive, curriculum-integrated experiential platforms. This entails embedding competition frameworks—such as challenge-based assignments, peer-reviewed project milestones, and interdisciplinary team formation—directly within core and elective courses, while also coordinating with student societies to foster grassroots idea generation and iterative prototyping.

Institutional support mechanisms should be tiered and scalable: for early-stage ideation, digital ideation portals, faculty mentoring circles, and modular workshops on design thinking and market validation serve as low-barrier entry points; for teams demonstrating technical feasibility and social relevance, targeted resources—including seed funding up to RMB 50,000, shared maker-spaces equipped with 3D printers and microcontroller kits, co-working incubation zones, legal clinics offering intellectual property strategy consultations, and structured go-to-market coaching—must be made systematically available [13, 14]. Such integrated scaffolding significantly compresses the developmental timeline between conceptualization and functional prototype, and further bridges the critical gap between prototype validation and initial commercial deployment, thereby cultivating a robust, sustainable innovation pipeline aligned with national strategic priorities in high-quality talent development and technological self-reliance.

4.3. Building Collaborative Guidance by Dual-Professional Teachers

Within the university, systematic capacity-building initiatives for faculty members should be implemented to strengthen collaborative guidance in innovation and entrepreneurship education. These initiatives include regularly scheduled interdisciplinary teacher workshops focused on pedagogical integration of real-world problem solving, structured short-term industry immersion programs—such as semester-long secondments in technology firms, manufacturing enterprises, or digital service providers—to deepen practical domain knowledge, rigorous project review mechanisms involving cross-sectoral feedback loops, and standardized training modules for guiding student teams in national and provincial innovation competitions. Crucially, performance evaluation frameworks for teaching staff must explicitly incorporate measurable contributions to innovation and entrepreneurship education, including mentorship quality, student project outcomes, curriculum co-development with industry partners, and successful student venture formation. Beyond campus, a diversified industry mentorship pool should be formally established, drawing upon practicing engineers, serial entrepreneurs, distinguished alumni with proven operational experience, and professionals from venture capital, angel investment, and government-backed incubation platforms. This external cohort collaborates with academic faculty under a clearly defined functional division: subject-matter experts assess technical viability and scientific rigor; industry mentors evaluate commercial applicability, scalability, and market readiness; entrepreneurship specialists refine value proposition articulation, revenue model design, and go-to-market strategy; while university counsellors and administrative officers ensure alignment with national higher education policy directives, institutional governance standards, and student support protocols.

4.4. Improving the Targeted Support System

Most entrepreneurial projects undertaken by vocational undergraduate students remain in the early developmental phases—specifically idea validation and technical trial production—where structural, financial, and advisory support must be carefully calibrated to match their nascent capacity. Consequently, effective institutional intervention requires mechanisms that are low-threshold in entry requirements, rapid in response time, and consistently available across academic semesters and project lifecycles. To meet these needs, universities can establish a dedicated seed fund for innovation and entrepreneurship, with clearly defined eligibility criteria, transparent disbursement protocols, and built-in flexibility for iterative funding based on milestone achievement rather than rigid stage-gating. Tiered funding models—such as micro-grants for concept testing, scaled-up awards for prototype development, and matching funds for market pilot phases—enable proportional resource allocation aligned with project maturity. Concurrently, a comprehensive one-stop digital consultation platform should integrate real-time updates on national and provincial policy incentives, university-organized competitions, application procedures for incubation spaces, industry-partnered challenge briefs, and an online mentor-matching system with verified expertise profiles [15–17]. Furthermore, academic recognition systems must evolve beyond traditional coursework:

innovation and entrepreneurship credits should be formally embedded in degree requirements through standardized evaluation rubrics for research participation, enterprise-based field investigations, intellectual property filings—including utility models and software copyrights—technical service delivery to small and medium enterprises, documented competition outcomes at provincial or national levels, and verifiable progress in incubated project development. Such integration strengthens intrinsic motivation, reinforces experiential learning outcomes, and cultivates long-term entrepreneurial identity among students.

4.5. Embedding Education in Regional Industrial Development

Zibo possesses a well-established industrial foundation spanning multiple strategic sectors, including intelligent manufacturing, advanced new materials, modern service systems, digital economy infrastructure, and biomedicine innovation. To strengthen the alignment between higher education and regional economic transformation, the university is actively cultivating deep collaborative mechanisms with local enterprises—co-developing dynamic project libraries that reflect real-world technical challenges, comprehensive case libraries grounded in authentic industrial scenarios, and high-fidelity practice bases equipped with industry-standard facilities and workflows [17]. This integrated approach systematically guides students to engage with tangible operational improvements: enhancing job-specific competencies through targeted skill development; optimizing production processes via data-driven analysis and automation integration; upgrading product functionality, sustainability, and market adaptability through interdisciplinary R&D; and advancing service models using digital platforms, user-centered design, and intelligent analytics. The resulting project ecosystem emphasizes small-scale, high-impact entry points that address verifiable industrial pain points—ensuring academic rigor, practical relevance, and measurable outcomes. Furthermore, the university fosters a robust entrepreneurial ecosystem by offering structured incubation pathways, access to prototyping laboratories, mentorship from seasoned industry practitioners, seed funding mechanisms, intellectual property guidance, and regulatory compliance support—thereby empowering student innovators to translate theoretical knowledge into scalable, socially valuable ventures within Zibo's evolving industrial landscape.

5. Conclusion

The innovation and entrepreneurship intention exhibited by vocational undergraduate students emerges from a complex interplay of multiple interdependent factors: the structure and pedagogical quality of educational provision; the development of domain-specific professional abilities; the depth, authenticity, and duration of hands-on practical experience; the availability, accessibility, and responsiveness of institutional and external resource support systems; and the nuanced perception of entrepreneurial risk—including financial uncertainty, skill gaps, market volatility, and social legitimacy. Empirical observations conducted at Zibo Vocational and Technical University reveal a robust foundational infrastructure: a well-articulated curriculum framework integrating core technical competencies with foundational innovation concepts, a vibrant extracurricular ecosystem featuring incubation initiatives, maker spaces, and interdisciplinary project teams, and measurable gains in students' self-efficacy, problem-framing capacity, and occupational adaptability following sustained engagement in applied learning activities such as industry-linked capstone projects and regional innovation competitions. Nevertheless, persistent structural limitations hinder full realisation of potential: course content often lacks vertical integration across academic years, resulting in fragmented conceptual development; practice opportunities remain episodic rather than scaffolded and longitudinal, limiting iterative skill refinement; financial mechanisms for student-led ventures are underdeveloped, with limited seed funding, micro-grants, or matched-investment schemes; mentoring is frequently generic rather than tailored to individual career trajectories, disciplinary interests, or venture-

stage needs; and faculty members—while technically proficient—often possess limited direct exposure to enterprise operations, supply chain dynamics, or commercialisation pathways. Consequently, future reform must pivot decisively from broad-based awareness-raising toward precision-oriented developmental scaffolding—shifting emphasis from participation metrics to capability maturation, from competition-driven performance to context-embedded problem solving aligned with local industrial ecosystems, and from isolated interventions to integrated, multi-year learning journeys that cultivate opportunity recognition, solution design, stakeholder negotiation, and adaptive resilience. Such an evolution would enable students not only to translate intention into tangible prototypes, service models, or process innovations but also to anchor those outcomes within sustainable career identities and sectoral contributions.

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