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## Exploring the Factors Influencing Faculty Development in Chinese Application-Oriented Universities in the Context of Industry-Education Integration

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**Abstract.** In response to China's higher education reform and the expanding implementation of Industry-Education Integration, application-oriented universities face increasing demands to cultivate a high-quality teaching workforce capable of combining academic knowledge with industrial practice. However, few studies have yet examined faculty development from a holistic, system-level perspective, leaving a research gap in understanding the ecological dynamics that shape teacher growth. Guided by the theoretical framework of Educational Ecology, this study explores the key factors influencing faculty development within the context of Industry-Education Integration. Data were collected through semi-structured interviews with 23 participants, including university teachers and administrators from three application-oriented universities in Jiangsu Province, as well as enterprise representatives. A theory-driven coding process (open, axial, and selective) identified four core categories of influencing factors: individual capability, institutional environment, enterprise collaboration quality, and macro external context. The findings reveal that faculty development is an ecological process shaped by the dynamic interplay of multiple subsystems. Theoretically, this study situates Educational Ecology Theory within the context of China's higher education reform and further reveals the specific mechanisms through which cross-system interactions influence faculty development, thereby extending the theory. Practically, it proposes actionable recommendations, including the design of targeted teacher training models, reforms to institutional evaluation and incentive mechanisms, the improvement of university-enterprise cooperation frameworks, and the strengthening of external policy support. Together, these insights contribute to establishing sustainable faculty development pathways in application-oriented universities and promoting collaborative innovation.

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## 1. Introduction

Amid the ongoing transformation of China's higher education landscape, application-oriented universities have become critical platforms for cultivating highly skilled professionals and supporting regional development and industrial upgrading (Zhuang & Zhou, 2023). In recent years, national policy initiatives – such as the *Implementation Plan for the Reform of Vocational Education* and the *Action Plan for Empowering Industry-Education Integration in Vocational Education (2023–2025)* – have positioned Industry-Education Integration as a foundational strategy in educational reform (Cao et al., 2024). As the primary agents of this reform, faculty members directly influence both the quality of talent cultivation and the effectiveness of education-industry alignment (Shah & Gillen, 2024).

In application-oriented universities, faculty members are expected to combine strong academic competence with practical industry knowledge and skills, enabling them to address the dual demands of teaching and practice (Ahmed et al., 2022). Yet, while previous research has examined such areas as teacher training and instructional competence, it has often treated influencing factors in isolation, overlooking the interdependencies among individual, institutional, industrial, and environmental dimensions (Davis, 2022). This fragmented perspective leaves a critical gap in the form of a lack of a holistic, system-level framework that can capture the complexity of faculty development within Industry-Education Integration.

Educational Ecology Theory provides a valuable lens through which to address this gap, as it emphasizes the dynamic interrelationships within educational systems and their interactions with broader environments (Pentang & Domingo, 2024). Applying an ecological perspective enables a more comprehensive understanding of the ways in which multiple subsystems – teachers, universities, enterprises, and policy contexts – interact to shape faculty development (Chew et al., 2023). In this way, the study not only extends the application of Educational Ecology to the context of higher education reform in China but also illuminates the mechanisms through which cross-system interactions affect faculty growth.

Drawing on semi-structured interviews with faculty members, university administrators, and enterprise representatives from three application-oriented universities in Jiangsu Province, this qualitative study addresses the following research questions:

- RQ1. What ecological factors influence faculty development in the context of Industry-Education Integration?
- RQ2. How do these factors interact across different subsystems (individual, institutional, industrial, and macro-environmental)?
- RQ3. What targeted strategies can be proposed to enhance faculty development in application-oriented universities?

By answering these questions, the study aims to: (1) identify the structural dilemmas faced by faculty members; (2) reveal the mechanisms through which ecological subsystems interact; and (3) provide actionable recommendations for strengthening teacher competencies, reforming institutional mechanisms, deepening enterprise cooperation, and enhancing policy support. Ultimately, this study contributes to both theory and practice by enriching Educational Ecology in higher education contexts and guiding the transformation of faculty members into application-oriented, dual-qualified professionals.

## **2. Literature Review**

### **2.1 Educational Ecology Theory**

First introduced by Ashby (1966), Educational Ecology Theory conceptualizes educational systems as open, dynamic structures composed of interrelated subsystems that co-evolve and influence each other (Ashby, 1966; Davis, 2022). Its core features—systemicity, dynamism, and interconnectivity—highlight that faculty development is embedded within institutional, industrial, and societal contexts (Kinchin, 2022); it evolves with policy and industrial changes (Renn & Smith, 2023); and furthermore, it involves complex interactions among teachers, students, institutions, enterprises, and external environments (Fawns et al., 2021).

As a theoretical lens, this framework enables a holistic examination of multidimensional faculty development and the adaptive mechanisms through which faculty members interact with institutional and industrial environments; thus, it is particularly suitable for analyzing Industry-Education Integration contexts (Pentang & Domingo, 2024).

### **2.2 Industry-Education Integration**

Industry-Education Integration connects academic learning with industrial practice, exemplified by Germany's dual system, America's cooperative education, and the U.K. apprenticeship system (Cai et al., 2023; Cheng et al., 2025). Despite variations in implementation, all of these aim to foster collaboration between educational institutions, enterprises, and government agencies for talent cultivation, research, and technology transfer (Cerver et al., 2021).

In China, Industry-Education Integration has evolved across macro policies, institutional frameworks, and teaching practices (Zhang & Perey, 2024), and is recognized as being key to educational reform and industrial upgrading (Yang, 2020; Milton, 2024). However, practical challenges remain, including weak university-enterprise collaboration, limited faculty preparation for applied pedagogy, and the misalignment of educational supply with industrial needs (Chen, 2022; Borah et al., 2021). Collectively, these issues underscore the importance of faculty development as a central mechanism through which to realize effective Industry-Education Integration.

### **2.3 Faculty Development**

Faculty development is a multidimensional process influenced by factors at the individual, organizational, enterprise, and macro-environmental levels, with each interacting to shape teacher growth in a dynamic context (Dewey et al., 2024). At the individual level, professional competence, developmental motivation,

practical experience, and self-efficacy are the key determinants of sustained development (Menon & Paretto, 2024). Research indicates that a well-defined professional identity and a strong commitment to lifelong learning serve as core drivers of faculty growth, enabling teachers to adapt to evolving educational and industrial demands (Mascarenhas et al., 2022; Palmer & Giering, 2024).

At the organizational level, institutional support, governance mechanisms, resource allocation, evaluation systems, and organizational culture all play crucial roles (Boxall & Purcell, 2022). Effective internal policies and professional development programs have been found to significantly enhance faculty capabilities, whereas an overemphasis on research productivity at the expense of practical engagement often limits the cultivation of industry-relevant skills, particularly in application-oriented universities (Babin et al., 2023; Cai & Ahmad, 2023; Ge, 2022). Therefore, organizational mechanisms that balance research, teaching, and practical training are essential for fostering holistic faculty development (Ross et al., 2024).

The enterprise dimension emphasizes the role of school-enterprise collaboration in faculty growth (Kovacs & Le, 2024). The active engagement of enterprises in teacher training and joint curriculum development can enhance practical learning and align educational outcomes with industrial needs (Rossoni et al., 2024). However, many enterprises prioritize short-term economic benefits over long-term capacity building, which may result in unstable collaboration and limited faculty development opportunities (Evans et al., 2023). Thus, strengthening enterprise commitment and creating sustainable collaboration mechanisms are critical for the success of Industry-Education Integration initiatives.

Finally, the macro-environmental level encompasses factors such as policy frameworks, industrial trends, societal recognition, and regional economic structures, all of which influence the incentives, opportunities, and overall environment for faculty development (Ampo et al., 2025). Despite improvements in institutional support, assessment systems and policy coordination often remain misaligned with the goals of Industry-Education Integration, due to such obstacles as inadequate recognition of teachers' industry experience and insufficient cross-sector engagement (Zhuang & Zhou, 2023).

Taken together, these dimensions illustrate the interdependent nature of faculty development, which aligns closely with the principles of Educational Ecology. By viewing teacher growth through an ecological lens, this study highlights the ways in which individual capabilities, institutional structures, enterprise engagement, and macro-environmental conditions interact adaptively, shaping faculty trajectories within the dynamic context of Industry-Education Integration.

## **2.4 Research Gap**

Although prior studies have addressed isolated aspects of faculty development, few to date have adopted a systemic, ecological perspective integrating individual, institutional, enterprise, and macro-environmental dimensions (Li & Mao, 2021; Squires & Hamilton, 2024). Existing research often focuses on policy

directives or management strategies, neglecting interactional mechanisms among faculty, institutions, enterprises, and external contexts (Luu & Nguyen, 2024). Furthermore, traditional paradigms rarely capture the dynamic evolution and adaptive processes that are central to sustainable faculty development (Trinidad, 2024). Therefore, applying Educational Ecology as a holistic framework can elucidate the mechanisms by which cross-system interactions influence faculty development, thereby offering both theoretical advancement and actionable insights for policy and practice in Industry-Education Integration contexts (Zhao et al., 2024).

### 3. Methodology

#### 3.1 Research Design

This study adopts a qualitative research methodology, utilizing Educational Ecology Theory as the analytical framework through which to explore the influencing factors of faculty development in the context of Industry-Education Integration in Chinese application-oriented undergraduate universities. By combining a multi-case study with semi-structured interviews, the study seeks to investigate the interactive relationships and influence pathways among individual faculty members, universities, enterprises, and the broader macro-environment in the process of faculty development. The study's qualitative design allows for an in-depth exploration of complex, context-dependent phenomena that may not be fully captured through quantitative approaches (Dessler, 2020).

#### 3.2 Participant Selection

A purposive sampling strategy was employed to select participants who could provide rich, relevant insights into faculty development in Industry-Education Integration practices. The research data were primarily derived from interview materials collected during the doctoral research phase, involving a total of 23 participants, including nine university teachers (coded as T1-T9), nine university administrators (coded as D1-D9), and five enterprise representatives (coded as M1-M5).

The faculty and administrative participants were affiliated with three application-oriented universities in Jiangsu Province. These universities were selected because they are representative of the Chinese application-oriented higher education context in terms of institutional scale, disciplinary coverage, and engagement with industry partners, thus providing typical insights into faculty development challenges and practices across similar institutions. Enterprise representatives were drawn from companies that closely collaborate with these universities.

All participants shared the following characteristics:

**Direct Involvement:** Participants were actively engaged in Industry-Education Integration-related activities and possessed practical experience and first-hand knowledge. For example, participants included university administrators who were responsible for policymaking and implementation; faculty members who had participated in enterprise projects and co-developed courses; and enterprise

representatives who were involved in university liaison and joint platform construction.

**Information Richness:** Participants needed to be able to articulate the current situation, challenges, and improvement needs regarding faculty development in Industry-Education Integration. Faculty members described specific teaching and research difficulties in university-enterprise collaboration, while enterprise representatives provided expectations for faculty competencies.

**Representativeness:** The sample demonstrated diversity in relation to job roles, disciplinary backgrounds, professional ranks, and enterprise scale/type, offering a variety of typical perspectives.

### 3.3 Research Instrument and Validity Assurance

The primary research instrument was a semi-structured interview guide, which was developed on the basis of an extensive review of the relevant literature and aligned with the study's research objectives (Ruslin et al., 2022). Following initial pilot interviews, the guide was refined to enhance the relevance, clarity, and openness of questions.

Furthermore, in order to ensure reliability and validity, the following measures were implemented:

**Expert Validity:** Five Industry-Education Integration experts evaluated the content validity of the interview guide. Their feedback was used to optimize the wording and structure of questions.

**Triangulation:** Data were collected from multiple sources and across different participant groups to enhance the consistency, stability, and credibility of the findings.

### 3.4 Data Collection

Data were collected through in-person and online interviews conducted between March and May 2025, each lasting approximately 40 to 60 minutes. Informed consent was obtained prior to the interviews, which were audio-recorded with participant authorization. The recordings were transcribed verbatim and reviewed with each participant to ensure completeness and accuracy. To protect confidentiality, all data were anonymized using coded identifiers.

### 3.5 Data Analysis

Data were analyzed through a three-stage coding process including open, axial, and selective coding, supported by MAXQDA software to ensure systematic and traceable procedures.

**Open Coding:** Line-by-line conceptual coding of transcripts was conducted to extract keywords, phrases, and primary concepts.

**Axial Coding:** Core phenomena were analyzed to identify causal relationships, contextual conditions, strategies, and outcomes, forming a subcategory structure.

**Selective Coding:** Focusing on the core phenomenon, "Factors Influencing Faculty Development," interrelationships among four core categories – individual competencies, university organizational environment, quality of university-enterprise collaboration, and macro external environment – were integrated into a theoretical model.

Over 200 initial concepts were identified in the open coding phase; these were subsequently grouped and refined into intermediate categories during axial coding. Selective coding integrated these categories into the final framework, reflecting the dynamic interplay of individual, institutional, enterprise, and macro-environmental factors in faculty development under Industry-Education Integration.

### 3.6 Methodological Limitations

While this qualitative approach provides in-depth insights into faculty development processes, several limitations should be acknowledged. First, the purposive sample limits the generalizability of the findings to all Chinese universities. Second, participant responses may be influenced by self-reporting bias or social desirability. Third, focusing on only three universities in Jiangsu may not capture regional variations across China, although they are representative of typical application-oriented institutions. Despite these limitations, the study's design, triangulation, and expert validation enhance the credibility and trustworthiness of the findings.

## 4. Results and Findings

Based on an Educational Ecology perspective, faculty development is conceptualized as a multi-level, dynamic, and interactive ecosystem (Kinchin, 2022). As a result of the coding analysis of interview data, the following four core categories of influencing factors were identified: individual capability; institutional environment; quality of university-enterprise collaboration; and macro-environment. Not only do these factors act independently but they also interact to form a complex ecological network that shapes the trajectory and depth of faculty development. Table 1 summarizes the key dimensions, sub-factors, roles in faculty development, and ecological interactions.

**Table 1: Influencing Factors of Faculty Development and Ecological Interactions**

Category	Core Dimensions	Key Sub-Factors	Role in Faculty Development	Interaction with Other Factors
Individual Capability	Intrinsic motivation, learning ability, practical & technical competence, communication & collaboration skills	Self-directed exploration, career-driven motivation, technical application skills, teamwork ability	Supports role transformation and professional growth	Enhanced individual capability promotes proactive engagement in university-enterprise projects and positively

Category	Core Dimensions	Key Sub-Factors	Role in Faculty Development	Interaction with Other Factors
				interacts with institutional support and enterprise collaboration
Institutional Environment	Platform development & resource allocation, training mechanisms, evaluation systems, incentive mechanisms, institutional innovation	Collaborative platforms, training programs, performance evaluation, reward policies, institutional reform	Provides organizational support and structural guarantees	Guides individual capability development and enterprise collaboration through resource allocation, training, and evaluation incentives
University-Enterprise Collaboration Quality	Internal conditions, platform development, resource investment & sharing mechanisms, cooperation willingness	Enterprise scale, technological capacity, platform openness, resource sharing, collaboration stability	Determines practical learning opportunities and depth of faculty engagement	High-quality collaboration enhances practical skills, promotes institutional optimization, and reinforces individual capability, forming ecological feedback loops
Macro-Environment	Policy support, industry trends & environment, regional resources & economic structure, social environment	Policy incentives, industry dynamics, regional economic level, public perception	Provides external driving forces and resources	Influences institutional policies, collaboration models, and faculty development direction; serves as a key external regulator in the ecological system

#### 4.1 Individual Capability

Individual capability serves as the intrinsic foundation for teachers' role transformation and professional growth within the context of Industry-Education Integration (Fawns et al., 2021). It comprises intrinsic motivation, learning and collaboration ability, as well as practical and technical competence, and

communication and collaboration skills. These factors not only determine the quality and speed of individual development but also interact with institutional and enterprise factors to shape ecosystem dynamics.

**Intrinsic Motivation:** Teachers' intrinsic motivation is often driven by career development, pursuit of academic achievement, and a sense of social responsibility. This motivation fuels their active participation in Industry-Education Integration and helps sustain their long-term engagement in new teaching and research contexts. Teachers with strong internal drives are more willing to step outside traditional academic roles and embrace dual responsibilities in education and practice.

*“Industry-Education Integration has stimulated my intrinsic motivation, bringing me closer to industry technologies and expanding my research and collaboration resources.” (T3)*

**Learning Ability:** Given the rapid pace of industrial change, teachers must possess strong learning abilities to continuously acquire new knowledge and adapt to evolving contexts. This includes engaging in industry-related training, monitoring technological trends, and responding to diverse student needs. A high level of learning ability ensures that teachers' professional knowledge remains aligned with market requirements and supports innovation in terms of curriculum and pedagogy.

*“Continuous learning is essential; I follow industry trends, participate in corporate training and forums, ensuring that my teaching aligns with industry demands.” (T4)*

**Practical and Technical Competence:** Application-oriented universities emphasize the translation of theory into practice. Therefore, teachers' ability to acquire and apply technical competence is crucial for improving both teaching and research. Hands-on industrial experience, professional certifications, and participation in enterprise projects enable teachers to integrate practice into classrooms and research activities, thereby enhancing their professional identity as dual-role educators.

*“During breaks, I work in enterprises to gain hands-on experience and earn industry certifications, integrating technical skills into course content.” (T8)*

**Communication and Collaboration Skills:** Industry-Education Integration requires teachers to serve as mediators between universities and enterprises. Effective communication and collaboration skills allow teachers to coordinate with enterprise managers, engineers, and technical staff to ensure smooth project implementation. Additionally, these skills foster the exchange of resources and knowledge, contributing to long-term and effective partnerships.

*“Teachers act as bridges in university-enterprise collaboration; effective communication and cooperation are essential for resource and information exchange.” (T4)*

#### **4.2 Institutional Environment**

The institutional environment provides organizational support for faculty development, encompassing platform construction and resource allocation, training mechanisms, evaluation systems, incentive policies, and institutional innovation (Hou et al., 2021). Furthermore, it directly influences teacher participation in Industry-Education Integration and interacts with individual capability and enterprise collaboration to form ecological feedback loops.

**Platform Development and Resource Allocation:** Universities must provide stable collaboration platforms and sufficient resources to ensure meaningful engagement between teachers and enterprises. Such platforms include university-enterprise joint laboratories, interdisciplinary research centers, and project-based collaborations. Adequate allocation of funding, equipment, and administrative support fosters teachers’ practical engagement and enhances their research capacity.

*“The existence of dedicated university-enterprise collaboration platforms and cross-college project initiatives significantly affects faculty development.” (T3)*

**Training Mechanisms:** Systematic training mechanisms are essential for helping teachers to keep pace with industrial advances. Beyond traditional academic training, institutions should organize enterprise internships, certification programs, and interdisciplinary workshops to promote the integration of theory and practice. Training such as this can strengthen teachers’ industry-oriented thinking and enrich their teaching approaches.

*“Regular training programs, including internships, certifications, and interdisciplinary workshops, help teachers master advanced technologies and adopt industry thinking.” (T5)*

**Evaluation Systems:** Evaluation mechanisms serve as both guidance and motivation for faculty development. By embedding Industry-Education Integration outcomes into performance reviews and promotion criteria, universities can acknowledge diverse contributions, including research output, enterprise collaboration, and student mentoring. Such systems promote balanced growth between academic achievements and industrial engagement.

*“Incorporating Industry-Education Integration outcomes into performance reviews and promotion criteria recognizes the multidimensional contributions of dual-qualified teachers.” (T4)*

**Incentive Mechanisms:** Incentive policies directly affect teachers’ motivation and depth of involvement. Universities should provide performance-based rewards, accelerated promotion opportunities, and other forms of recognition for

outstanding contributions to integration initiatives. By linking tangible benefits to participation, these mechanisms will ensure sustained enthusiasm and long-term engagement.

*“Performance-based rewards, promotion opportunities, and recognition increase teacher motivation and deepen engagement in Industry-education integration.” (T9)*

**Institutional Innovation:** Innovative reforms in governance structures and career pathways can enhance faculty enthusiasm and improve the outcomes of Industry-Education Integration. Examples include appointing teachers to enterprise management roles (e.g. associate CTOs), revising rigid evaluation frameworks, and introducing fast-track promotion schemes for dual-qualified teachers. These innovations reduce structural barriers and foster dynamic collaboration between academia and industry.

*“Appointing teachers as associate CTOs in key enterprises, reforming evaluation systems, and establishing fast-track promotion channels significantly enhance faculty enthusiasm and Industry-Education Integration achievements.” (D9)*

#### **4.3 University-Enterprise Collaboration Quality**

The quality of collaboration between university and enterprise plays a pivotal role in faculty development, directly influencing teachers’ practical skills, engagement depth, and professional growth opportunities (Hou et al., 2021). Effective collaboration relies on multiple interconnected dimensions that collectively determine how well teachers can integrate industry knowledge into their teaching and research.

**Internal Conditions :** The internal conditions of enterprises, including their technological expertise, project experience, and managerial capacity, directly affect the quality of collaboration platforms. Enterprises with a strong capacity for research and development as well as advanced technical projects provide teachers with authentic environments for both learning and practice. This, in turn, enhances their ability to integrate industrial knowledge into both their teaching and research.

*“Enterprise technology and project experience directly determine the quality of practical platforms and teachers’ ability to integrate industry knowledge.” (T4)*

**Platform Development :** Collaboration quality is further enhanced when enterprises establish accessible and inclusive platforms for joint participation. Platforms may include shared laboratories, innovation hubs, and co-designed project spaces that enable teachers and students to jointly engage in research and development, curriculum design, and applied innovation. Furthermore, such platforms also strengthen knowledge transfer between academia and industry.

*“Partner enterprises should open practice platforms for teachers and students, supporting R&D participation and joint curriculum design.”*  
(T7)

**Resource Investment and Sharing Mechanisms :** Sustained collaboration requires enterprises to invest resources and share access to real production environments, technological projects, and industry expertise. Resource sharing not only creates opportunities for teachers to engage in product iteration, process optimization, and problem-solving but also ensures that curricula remain closely aligned with market trends. Transparent mechanisms for resource allocation and reciprocal benefits increase the efficiency and effectiveness of collaboration.

*“Enterprise resource openness—such as access to real production environments, technical projects, and industry expert networks—provides teachers with opportunities to participate in product iteration and process optimization. Additionally, enterprises can share trends in technology and workforce demand, and engage in course design and evaluation, ensuring teaching content dynamically aligns with industry needs.”* (T9)

**Cooperation Willingness :** The willingness of universities and enterprises to establish long-term, trust-based partnerships is a decisive factor in ensuring the sustainability of collaboration. When both sides commit to stable and continuous cooperation, teachers gain ongoing access to practical experiences, cutting-edge technologies, and research opportunities. Continuity creates feedback loops that not only enhance individual teacher competencies but also contribute to institutional capacity building and innovation.

*“Long-term, trust-based cooperation allows teachers to gain continuous practical experience, access cutting-edge information, and engage in joint research.”* (M2)

#### **4.4 Macro-environment**

The macro-environment—including policy support, industry trends, regional resources, and the social environment—serves as a critical external driver, shaping faculty development, institutional policies, and university-enterprise collaboration models (Messeni & Murgia, 2020).

**Policy Support:** National and regional policies establish the foundation for institutional engagement in Industry-Education Integration. Through targeted funding, regulatory guidance, and the creation of collaborative platforms, government policies actively encourage enterprises to participate in faculty development and innovation. Policies also provide incentives for universities to prioritize practice-oriented training and dual-qualified teacher development.

*“Government policies encourage enterprise participation in faculty development through funding, institutional guidance, and platform support.”* (M4)

**Industry Trends and Environment:** Dynamic changes in industrial structures and emerging technologies necessitate teachers continuously updating their knowledge base. Monitoring technological frontiers and industry evolution helps educators to adapt curricula and align talent cultivation with labor market needs. This responsiveness ensures that teaching content remains relevant and that graduates are equipped with skills that are in demand among employers.

*“Teachers must stay informed on emerging technologies to update curricula and align talent cultivation with market needs.” (M2)*

**Regional Resources and Economic Structure:** Economic and other resources in different regions significantly influence the opportunities available for faculty development. Regions with strong industrial clusters and higher levels of economic development provide more platforms, funding, and enterprise partners for collaborative training. Conversely, underdeveloped regions may face constraints in terms of resources and opportunities, requiring differentiated strategies for faculty development.

*“Regional economic development affects university investment and faculty development opportunities.” (D1)*

**Social Environment:** The broader social environment also shapes the way in which Industry-Education Integration is perceived and implemented. By promoting successful collaboration cases and showcasing exemplary role models, universities and governments can enhance the public recognition and professional value of teachers who engage in integration efforts. Such societal support creates a favorable atmosphere that encourages more teachers and enterprises to participate.

*“Promoting successful Industry-Education Integration cases and role models enhances [the] public recognition and professional value of teachers.” (D2)*

## 5. Discussion

From the perspective of Educational Ecology, faculty development is conceptualized as a multi-level, multi-agent interactive ecological process. It not only involves the enhancement of individual capabilities but also relies on the synergistic effects of organizational support, external resources, and the broader social environment (Kinchin, 2022). Tseng et al. (2020) argue that, by incorporating ecological thinking, Educational Ecology emphasizes the dynamic interrelations among elements within the education system and aims to reveal the structural relationships and underlying mechanisms of educational phenomena.

Based on this theoretical foundation as well as an in-depth analysis of interview data, this study constructed an analytical framework through which to examine the factors influencing faculty development. The framework encompasses four ecological subsystems: individual; organization; enterprise; and macro-environment. Specifically, the study identified and categorized four core

dimensions: individual competencies; organizational environment within universities; quality of enterprise collaboration; and macro external environment.

### **5.1 Addressing the Research Question**

This study set out to answer the research question: What factors influence faculty development in application-oriented universities within the context of Industry-Education Integration? The findings reveal that faculty development is not a linear process of skill acquisition but rather an ecological interaction shaped by four subsystems. Individual competencies form the foundation, the organizational environment provides institutional support, enterprise collaboration serves as a critical bridge, and the macro-environment establishes the structural boundaries and cultural atmosphere. Together, these subsystems create a dynamic ecosystem in which faculty development can occur.

### **5.2 Interpretation of Key Findings**

First, individual competencies form the core element of faculty development, encompassing teachers' basic abilities and willingness to actively adapt and respond to educational change (Renn & Smith, 2023). However, this intrinsic drive must rely on institutional guarantees and resource provision from universities to ensure sustainable growth. Institutional elements – such as platform construction, professional training mechanisms, faculty evaluation systems, and incentive policies – form the basic support system that enables internal activation, technological advancement, and identity transformation, acting as the proximal subsystem for realizing individual potential.

Second, the relationship between universities and enterprises determines whether teachers can truly engage with industry contexts and build practical competencies (Wang, 2023). As a critical intermediary ecology linking higher education and industry, the quality of enterprise collaboration is key for teachers in shifting into practice-based settings and reshaping their roles. If enterprise resources are insufficient, willingness to collaborate is weak, or platform mechanisms are ineffective, even highly capable individuals with strong institutional support may struggle to achieve an effective transformation from academic to dual-role professionals. Thus, the enterprise subsystem plays a bridging role, and its openness and synergy directly influence the outreach and connectivity of the faculty development ecosystem.

Finally, the macro external environment provides the institutional boundaries and cultural atmosphere for the entire educational ecosystem (Sun & Yao, 2022). Policy support serves as the top-level driver that activates all ecological elements, while industry trends and regional structures provide directional guidance for faculty development. Social recognition and cultural context, in turn, shape the ecological positioning and identity perception of teachers. Although this layer does not directly determine the path of faculty development, it nevertheless exerts structural embedding and regulatory functions on the other three subsystems, either reinforcing or weakening their effectiveness and thereby influencing the overall stability and sustainability of the educational ecosystem.

### 5.3 Comparison with Non-Chinese Contexts

The findings of this study resonate with international research highlighting the importance of institutional support, industry partnerships, and policy frameworks in faculty development (Palmer & Giering, 2024). However, the Chinese context presents some unique characteristics. First, policy frameworks in China exert stronger top-down influence, shaping institutional strategies and enterprise engagement more directly than in many Western contexts, where bottom-up initiatives are more prevalent. Second, the rapid economic transformation and the emphasis on application-oriented higher education in China make university-enterprise collaboration a particularly urgent priority. While the ecological framework developed in this study may be generalizable, its emphasis on state-driven policy and structural reforms reflects the distinctive features of China's higher education reform.

### 5.4 Theoretical and Practical Implications

Theoretically, this study enriches Educational Ecology Theory by situating it in the context of Chinese higher education reform and revealing the mechanisms of cross-system interaction in faculty development. Moreover, it demonstrates the ways in which individual, organizational, enterprise, and macro subsystems interact dynamically to co-construct an adaptive faculty development ecosystem. Practically, the study offers several actionable implications: designing targeted faculty training models; reforming evaluation and incentive systems; establishing sustainable collaboration platforms with enterprises; and strengthening policy coordination and support. These measures can help to build a sustainable pathway for faculty development in application-oriented universities and promote collaborative innovation.

### 5.5 Limitations and Future Directions

This study has several limitations. First, the research is based on data collected from three universities in Jiangsu Province, which, although representative of application-oriented universities in Eastern China, may not fully capture the diversity of faculty development conditions across different regions. Second, the study employs a qualitative methodology with a relatively small sample, which limits the generalizability of the findings. Participant perspectives may also carry inherent biases, shaped by the interviewees' institutional roles and experiences. Future research could address these limitations by incorporating larger-scale quantitative studies, cross-provincial comparative analyses, and longitudinal designs to capture the evolving dynamics of faculty development in Industry-Education Integration.

## 6. Conclusion

This study demonstrates that faculty development in application-oriented universities is an ecological process shaped by the interaction of individual competencies, institutional environments, enterprise collaboration, and macro-level conditions. By employing Educational Ecology Theory, the research provides a holistic understanding of the mechanisms through which these subsystems interact, filling an important gap in existing studies that often adopt fragmented or linear perspectives.

Theoretically, the findings extend the localized application of Educational Ecology by illustrating its relevance to the Chinese higher education reform context. Practically, the study offers several actionable insights. Universities should design systematic faculty training models, revise evaluation and incentive mechanisms, and establish sustainable cooperation platforms with enterprises. Enterprises, in turn, should enhance their openness to resource sharing, engage faculty in authentic research and development and innovation projects, and develop long-term collaborative strategies. Policymakers should strengthen policy coordination, create supportive regulatory frameworks, and provide financial incentives to encourage sustained industry-education collaboration.

In the future, research on this topic can move beyond qualitative case studies by incorporating large-scale quantitative data and comparative studies across different provinces and countries. Such approaches will allow for greater generalizability of findings and reveal whether the ecological mechanisms identified here are uniquely Chinese or applicable in broader international contexts. In addition, the integration of longitudinal and action research designs may capture in more detail the evolving dynamics of faculty development under the pressures of global industry and educational change.

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## Appendices

### Appendix 1: Interview Questions

1. What are the sources of motivation for faculty members at application-oriented universities to enhance their capabilities in Industry-Education Integration?
2. In the context of Industry-Education Integration, what internal institutional factors affect faculty development?
3. What institutional policies or mechanisms has the university designed to support faculty development? How effective are they?
4. What impact do partner enterprises have on faculty development?
5. What competencies should university faculty members possess in order to better meet the needs of university-enterprise collaboration?
6. In the context of Industry-Education Integration, what external environmental factors affect faculty development?
7. In your opinion, does faculty development require broader support (e.g. government policies, industry support, societal recognition)? Why?