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A Study on the Collaborative Model of Academic Early Warning and Support Intervention Mechanisms in Higher Education Institutions

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ABSTRACT
In the context of enhancing higher education quality, the collaborative effectiveness of academic early warning and support mechanisms is crucial for determining educational outcomes. This paper contends that traditional mechanisms suffer from a disconnect between early warning and support, necessitating a shift toward multi-stakeholder closed-loop management. Current core challenges include data silos, ambiguous authority boundaries, and the absence of dynamic evaluation mechanisms. Proposed solutions involve establishing interconnected mechanisms such as intelligent trigger systems, tiered response networks, and continuous adaptation models. These initiatives aim to achieve structural integration between early warning and intervention, thereby advancing the academic support system from fragmented management toward a proactive, collaborative, and systemic transformation. This ultimately fulfills the fundamental goal of fostering virtue and cultivating talent.

KEYWORDS
University academic affairs; Academic early warning; Support intervention; Collaborative model

1 Introduction

Amidst the expansion of higher education, student heterogeneity has become increasingly pronounced. Foundational disparities, adaptation challenges, and motivation deficits trigger profound academic crises. Such predicaments not only impede academic progress but also readily precipitate secondary issues like psychological anxiety and identity confusion. Establishing a scientific early warning and support intervention mechanism has thus become a critical component of talent development systems. Its core strategically shifts educational paradigms from post-hoc remediation toward preemptive control and in-process intervention. The research focus in university student affairs has shifted in paradigm, moving beyond isolated warning or support modules to explore their systemic synergy. This stems from a fundamental realization: neither standalone alert systems nor reactive intervention frameworks can achieve significant educational effectiveness. The core contradiction manifests as an impasse in early warning-support interaction: data silos block information penetration, responsibility drift weakens stakeholder coordination, and process fragmentation disrupts intervention loops. The urgent priority is to resolve the collaborative dilemma by integrating multi-source data, clarifying authority boundaries, and establishing seamless action pathways—constructing an intervention ecosystem where information flow, accountability chains, and response loops are fully coupled.

2 The educational value and construction logic of china's collaborative model for academic early warning and support intervention

2.1 Academic early warning and support intervention: an intrinsic requirement for universities to fulfill the fundamental task of cultivating virtue and nurturing talent

The core of fostering virtue through education is promoting the holistic development of students. The academic early warning and support intervention mechanism institutionalizes this fundamental mission within the educational development domain. Establishing a system for proactive identification and timely intervention signifies a shift in the university's role—from a mere transmitter of knowledge to a caring and supportive partner in students' growth. This transformation reflects respect for the individual value of each student. Second, this mechanism serves as a vital safeguard for educational equity. It provides additional, compensatory support to students disadvantaged academically due to family background, geographic location, or physical/mental health challenges, helping them overcome obstacles and maximizing equal opportunities for success for every student [1]. From a deeper perspective, an adequate early warning and support system aims beyond resolving immediate academic crises. Guiding students to confront challenges, solve problems, and plan for their future provides profound resilience training and empowerment for growth, with impacts that extend throughout their lives.

2.2 Analyzing the inefficiencies of traditional, siloed early warning and support mechanisms

In conventional university student management practices, academic early warning and support interventions are often treated as separate processes managed by different departments, resulting in a fragmented, siloed approach. Academic affairs offices typically issue early warnings based on delayed end-of-term grades, often resulting in a cold, impersonal warning list. Support interventions, meanwhile, are primarily conducted by counselors in student affairs departments after receiving the list, usually relying on conversations and measures based on personal experience. The drawbacks of this linear, fragmented model are evident. The primary issue is the breakdown and delay in information transmission. The time gap between the generation of grades and the list distribution often causes interventions to miss the optimal window of opportunity. Second, problem diagnosis remains superficial. Relying solely on transcripts, counselors struggle to uncover the root causes of academic struggles—whether stemming from study methods or more complex psychological or family issues. Finally, interventions lack professionalism. While counselors excel at ideological guidance, they cannot replace faculty in providing concrete academic support. This workflow results in indiscriminate and inefficient interventions, hindering the formation of a cohesive educational force.

2.3 Building a multi-stakeholder collaborative closed-loop management model is essential for enhancing educational effectiveness

To overcome the shortcomings of traditional approaches and provide targeted support for academically struggling students, it is imperative to establish a closed-loop management model featuring multi-stakeholder collaboration and bidirectional information flow. This model integrates the previously isolated actions of "early warning" and "support" into a dynamic, organic educational system. Multi-stakeholder collaboration necessitates breaking down departmental silos to establish a working alliance involving academic affairs, student affairs, academic departments, libraries, mental health centers, and other relevant units. Within this alliance, information flows are shared rather than unidirectional, and responsibilities are interconnected rather than compartmentalized [2]. Closed-loop management emphasizes process-oriented workflows and continuous improvement. It requires the entire process—from risk identification and root cause diagnosis to plan formulation, process tracking, and finally outcome evaluation and feedback—to form a complete management loop. Only by constructing such a system can we ensure that every student flagged by early warning is "taken over" by a professional team, receives personalized, comprehensive support, and has their support outcomes continuously tracked and optimized, thereby maximizing the effectiveness of educational outcomes.

3 Coordination challenges in the operation of academic early warning and support mechanisms in China's higher education institutions

3.1 Limited data sources and departmental silos lead to inaccurate and untimely risk identification

The primary coordination challenge in current early warning mechanisms stems from fragmented and insufficient data, which directly results in severe deficiencies in the accuracy and timeliness of risk identification. Most institutions' warning models rely heavily on course grades- a purely outcome-based metric- as their sole data source. This inherently retrospective indicator means that students' academic issues have often accumulated significantly by the time a warning is triggered, making intervention considerably more difficult. Meanwhile, process-based data that could reflect earlier changes in student status—such as class attendance, assignment submissions, library borrowing frequency, campus card spending patterns, and dormitory access times—objectively exist across different departmental information systems. However, due to long-standing departmental silos and data silos, these valuable data points remain ineffective for integrated analysis. This fragmentation renders the early warning system akin to a driver relying solely on a rearview mirror—unable to identify risks early or make forward-looking predictions, thereby missing numerous critical intervention windows.

3.2 Fragmented intervention measures due to unclear responsibilities and lack of coordination mechanisms

Even when warning signals are triggered, subsequent support efforts often face coordination challenges due to ambiguous responsibilities and absent collaborative frameworks. Many universities lack a student-centered, cross-departmental support accountability system in their institutional design. After the early warning list is issued, it is often tacitly regarded as counselors' "exclusive" responsibility. However, the causes of students' academic difficulties are complex and diverse, making it difficult for counselors alone to provide comprehensive professional support [3]. When a student's core issue stems from problems understanding specialized coursework, the most effective intervention should

come from faculty members in that discipline. When the problem lies in psychological anxiety, professional intervention from the mental health center is required. In practice, however, the absence of formal, institutionalized referral and coordination processes means collaboration between counselors and other support entities often relies on informal communication. This leads to fragmented, random, and unsustainable intervention measures.

3.3 Lack of process tracking and effectiveness evaluation hinders closed-loop support and continuous improvement

A comprehensive collaborative management system requires effective implementation, scientific tracking, and evaluation to inform optimization. Yet this link remains the weakest in current support practices. Most universities manage support efforts at the "task assignment" level, where counselors receive warning lists and conduct interviews, then consider the work complete. There is a widespread lack of institutionalized, ongoing tracking mechanisms to assess how students' conditions change or whether their academic performance improves after these interviews. Simultaneously, comprehensive evaluations of the overall effectiveness of support interventions are largely absent. It remains difficult to scientifically determine: Which support measures are most effective for which student groups? Have allocated resources yielded expected outcomes? This oversight in process monitoring and failure to evaluate effectiveness prevent support work from forming a feedback-driven, self-learning, and continuously improving closed loop. Efforts often repeat at a low level, valuable experiences and lessons cannot be systematically summarized and passed on, and optimizing the entire mechanism becomes impossible.

4 Implementation pathways for establishing an integrated academic early warning and support intervention model in China

4.1 Establishing a multi-dimensional information fusion platform for intelligent academic risk early warning based on big data technology

To fundamentally address the issues of delayed and inaccurate risk identification, it is essential to leverage the deep application of information technology as a breakthrough point. This involves establishing a multi-dimensional information fusion platform for intelligent academic risk early warning based on big data and artificial intelligence. The prerequisite for platform construction is dismantling "data silos" across campus departments. While ensuring data security and student privacy, unified data standards and shared interfaces must be established to aggregate and integrate student data scattered across systems like academic affairs, student services, campus cards, libraries, and online behavior [4]. Building upon this foundation, machine learning algorithms should be employed to construct a dynamic, multi-factor academic risk prediction model. This model incorporates traditional academic performance data and multidimensional student behavior data—including classroom engagement, study habits, daily routines, spending patterns, and social interactions—as key predictive variables. The platform enables early, precise identification of potential academic risks by continuously monitoring and correlating shifts in student behavior patterns. It automatically generates "early warning profiles" detailing risk levels, probable causes, and intervention recommendations, providing scientific decision support for targeted assistance.

4.2 Establishing a tiered, categorized, and targeted support response mechanism integrating counselors, class advisors, and faculty

Building upon precise early warning, it is essential to establish a tiered, categorized, and targeted support response mechanism characterized by clear responsibilities, standardized processes, and multi-stakeholder collaboration. First is a tiered response: different response levels are initiated based on the risk grades generated by the intelligent early warning platform. For low-risk students, routine monitoring by class advisors or peer mentors suffices. Counselors must conduct in-depth interviews and preliminary diagnoses within specified timeframes for medium-risk students. Second is categorized referral: based on counselors' preliminary diagnoses, standardized referral procedures are initiated according to the core issues causing students' academic difficulties. A seamless connection to an academic guidance team composed of subject teachers and academic mentors is provided for study methods or foundational knowledge issues. For psychological distress, referral to the university's Mental Health Education and Counseling Center is initiated. For financial hardship, connection to the Student Financial Aid Management Center is facilitated.

4.3 Refining the process-based dynamic tracking system with individualized files and the multi-

stakeholder collaborative effectiveness evaluation feedback system

To achieve closed-loop management of support efforts, an information-based dynamic tracking and effectiveness evaluation feedback system spanning the entire support process must be established. First, a standardized electronic personal growth file should be created for each student receiving support. This file dynamically records every step from the initial warning trigger, including interview content, diagnostic conclusions, support plans, interventions by various stakeholders, and the student's phased progress. Counselors should manage these files, with all participating support entities collaborating on updates to ensure information integrity and continuity. Second, establish a multi-stakeholder collaborative effectiveness evaluation mechanism combining qualitative and quantitative approaches. Upon completion of the support cycle, organize joint assessment meetings involving counselors, subject teachers, and the student themselves. These meetings should comprehensively evaluate support outcomes by integrating subsequent academic performance, behavioral data changes, and subjective satisfaction levels [5]. Finally, the university should regularly aggregate and analyze all support case data to systematically evaluate the effectiveness of different support strategies. This process should identify successful models, uncover common challenges, and enable continuous, data-driven optimization and iteration of the collaborative support framework.

5 Conclusion

The core of reforming higher education academic support systems lies in establishing a coordinated early warning and assistance mechanism. Structural barriers primarily constrain current educational effectiveness: data silos obstruct risk identification, lack of multi-stakeholder coordination weakens intervention efficacy, and absence of process tracking disrupts feedback loops. The solution requires building an intelligent early identification system with automated triggers, implementing a multi-tiered response network involving multiple stakeholders, and constructing a dynamic, full-cycle adaptive model. This mechanism achieves risk prediction through data integration, ensures targeted support via restructured responsibilities, and drives system evolution through continuous feedback. Ultimately, it propels academic support from fragmented management toward a proactive educational system.

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