# Exploring the Path to Standardized Management of the Undergraduate Tutorial System for Computer Science Majors in Local Universities

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**Abstract:** The undergraduate tutorial system constitutes a critical measure for the enhancement of undergraduate education and the cultivation of high-quality innovative talent. This paper explores a standardized management path for this system within computer science programs at local universities, which currently face challenges such as ambiguous tutor responsibilities, resource insufficiencies, and inadequate incentive mechanisms. The study proposes a tripartite methodology encompassing the construction of a standardized institutional framework for role clarification, the implementation of a digital and intelligent transformation to standardize guidance processes, and the establishment of a scientific evaluation system to motivate participants. The findings indicate a comprehensive framework that utilizes digital profiles for precise student-tutor matching, an integrated online platform for process management, and a multi-dimensional, evidence-based evaluation model. It is concluded that the implementation of this standardized, digitally-empowered management path can significantly enhance the educational effectiveness of the tutorial system, thereby effectively supporting the cultivation of application-oriented and innovative computer talent.

***Keywords*:** undergraduate tutorial system, local universities, computer science major, standardized management, digital and intelligent transformation

## 1. Introduction

The undergraduate tutorial system is an essential component of quality-focused higher education, particularly for dynamic disciplines like computer science. However, its implementation in many local universities is hindered by significant challenges, including superficial formalism, resource constraints, ambiguous tutor roles, and the absence of effective incentive mechanisms [1]. These issues severely restrict the system's educational function. This paper hypothesizes that by establishing a standardized management path that integrates institutional design, digital process control, and scientific evaluation, local universities can overcome these challenges and substantially improve the effectiveness of the undergraduate tutorial system for computer science majors.

## 2. The current state and deep-seated dilemmas of the undergraduate tutorial system for computer science majors in local universities

In practice, the implementation of the undergraduate tutorial system in local universities reveals a significant gap between its intended goals and actual outcomes, stemming from several intertwined dilemmas.

### 2.1 Ambiguous role positioning and an inadequate collaborative education mechanism

A primary issue is the frequently unclear demarcation of responsibilities among tutors, counselors, and class advisors. This functional overlap often results in tutors being drawn into routine administrative tasks, detracting from their core academic guidance role. Conversely, some tutors narrowly define their function as research supervision, failing to support the holistic development of students [2]. This ambiguity prevents the formation of a cohesive, collaborative educational force.

### 2.2 Prominent imbalance in faculty supply and demand, and severely diluted guidance efforts

Local universities commonly face an insufficiency of faculty resources, leading to a high student-to-tutor ratio that directly compromises the quality of personalized guidance. Survey data reveal that 41.2% of undergraduates report their tutor simultaneously advises 7-9 students, with an additional 17.7% advising more than 10. This stands in stark contrast to student preferences, where the vast majority hope for a ratio of 1-3 or 4-6 [3]. Such a high workload, compounded by faculty members' existing teaching and research duties, precludes the possibility of providing in-depth, individualized support [4].

### 2.3 Pro forma guidance process and lack of in-depth student-tutor interaction

The guidance process often becomes a mere formality due to the absence of standardized procedures and effective communication platforms. Data indicates that a significant 52.6% of students interact with their tutors only once per semester, which is far below their desired frequency of two to four or more interactions. The primary modes of communication are group meetings (80.4%) and online channels (51.2%), while the most sought-after form of interaction, direct participation in research projects, remains exceptionally rare at only 5.9% [3]. Consequently, such infrequent and superficial contact fails to build an effective mentoring relationship, with 63.4% of students identifying "infrequent communication with tutors and insignificant effects" as the system's primary deficiency [3].

### 2.4 Absence of evaluation and incentive mechanisms, and lack of intrinsic motivation

A critical deficiency is the common absence of effective incentive mechanisms for both tutors and students. Tutor assessments are often perfunctory and disconnected from professional rewards, making commitment dependent on personal responsibility rather than institutional support [1]. Similarly, student participation is not adequately linked to academic incentives, leading to low engagement. This lack of mutual motivation deprives the system of the intrinsic drive necessary for sustained success.

## 3. Deepening the exploration of a standardized management path for the computer science undergraduate tutorial system

To address the aforementioned dilemmas, and by leveraging the "digital and intelligent" characteristics of the computer science discipline, local universities should construct a closed-loop, standardized management path that integrates institutions, processes, and evaluations.

### 3.1 Constructing a standardized institutional framework: Clarifying responsibilities and ensuring precise matching

A scientific, top-down design constitutes the cornerstone of the successful implementation of the tutorial system.

#### 3.1.1 Clarifying the "trinity" of responsibilities to form a collaborative educational force

At the institutional level, a clear division of responsibilities among undergraduate tutors, counselors, and class advisors must be established. By referencing the "Three-All Education" concept, the following collaborative model can be constructed. The position of Undergraduate tutor is the "Guide for academic and professional development." Core responsibilities are focused on academic and professional development areas, including course selection, research initiation, innovation competitions, and career planning [2]. The position of Counselor is the "Guardian of ideological and personal growth." Core responsibilities encompass students' ideological and political education, party and league activities, mental health, financial aid, and safety and stability [3]. The position of Class advisor is the "Coordinator for class building and affairs." This role is primarily responsible for fostering a positive class and academic atmosphere, managing daily class affairs, and building cohesion. Through this refined division of labor, the three roles can perform their respective duties, complement each other's strengths, and collectively serve the holistic development of students.

#### 3.1.2 Establishing a "digital profile"-driven precise student-tutor mutual selection mechanism

Traditional student-tutor matching methods are often imprecise and fail to meet personalized needs. The computer science department can leverage its professional advantages to establish a data-driven, precise matching mechanism. The first step is constructing tutor digital profiles. A "digital profile" should be created for each tutor on an information platform, detailing their research direction, technology stack, publications, available research projects, competition experience, and personal teaching style [5]. The second step is constructing student digital profiles. A dynamic "digital profile" should be created for each student by analyzing their academic performance, course preferences, competition history, technical interests (e.g., AI, Big Data, Cybersecurity), personality traits, and career plans [5]. The final step is implementing intelligent recommendation and mutual selection. The system should employ algorithms to calculate the match score between student and tutor profiles and recommend 3-5 suitable tutors for each student. Students may then review the information and submit their preferences. Tutors make their selections based on student profiles and their own advising capacity, thereby completing the mutual selection process. This mechanism not only enhances matching efficiency but also establishes a solid foundation for subsequent personalized guidance.

### 3.2 Relying on digital and intelligent transformation: Standardizing the guidance process and phased content

The application of information technology to reshape the guidance process can serve as a catalyst for enhancing the

management efficiency and educational quality of the tutorial system.

**3.2.1 Building an integrated and intelligent mentoring management platform**

The development of an integrated online platform is recommended to achieve digital management of the entire tutorial system process. The platform should possess the following core functionalities: Interaction and scheduling to support online instant messaging, email communication, and scheduling of "Office Hour" slots; Process recording for automatic recording of the frequency and duration of student-tutor interactions, with functionality for students to submit study reports and project updates online, forming a traceable guidance archive; Resource sharing through a repository where tutors can upload professional literature, course recordings, and study materials to establish a team knowledge base; and Task and collaboration via integration of project management tools such as Git and Trello to facilitate task assignment and progress tracking for innovation projects. This platform not only provides a convenient means for student-tutor communication but also accumulates objective data for subsequent "digital evidence-based evaluation" [5].

**3.2.2 Implementing a phased and differentiated "ladder-style" guidance model**

A progressive set of guidance content and goals should be designed to align with the different developmental needs of students throughout their four years of university.

***3.2.2.1 Freshman year: Adaptation and initiation stage***

The core task of the tutor is "navigation." Through freshman seminars, lab tours, and sharing sessions with senior students, tutors can assist students in building a macroscopic understanding of the computer science major, mastering university study methods, and formulating a preliminary academic plan.

***3.2.2.2 Sophomore and junior years: Deepening and practice stage***

The core task of the tutor is "leadership." This period is critical for cultivating students' innovative abilities and engineering practice skills. Tutors should actively involve students in research teams or project groups to foster their research literacy through a "learning by doing" approach [4]. Concurrently, they should focus on guiding students in high-level disciplinary competitions, enabling the translation of course knowledge into the ability to solve complex engineering problems.

***3.2.2.3 Senior year: Diversion and sprint stage***

The core task of the tutor is "support." Tutors should provide targeted guidance based on students' divergent paths, whether pursuing graduate studies, entering the workforce, or studying abroad. This may include offering review strategies and supervisor recommendations for graduate school applicants, or providing resume editing, interview skills training, and industry networking assistance for job-seeking students.

## 3.3 Improving scientific evaluation and incentives: Stimulating both internal and external motivation

A scientific and fair evaluation and incentive system is fundamental to ensuring the sustained and efficient operation of the tutorial system.

**3.3.1 Introducing a "digital evidence-based" multi-dimensional evaluation system**

It is necessary to move beyond singular, subjective evaluation methods and establish a multi-dimensional, comprehensive evaluation model based on objective data [5]. This includes Process evaluation (40% weight) based on objective data recorded by the mentoring management platform, such as guidance frequency, duration, student participation, and resource sharing volume; Outcome evaluation (40% weight) which assesses the landmark achievements of students under the tutor's guidance, such as published academic papers, patents, awards in provincial or higher-level competitions, and offers from high-quality graduate programs or employers; and Satisfaction evaluation (20% weight) through anonymous student questionnaires, assessing student satisfaction with the tutor's attitude, ability, and the quality of the relationship. This evaluation method combines the tutor's "soft input" with the student's "hard output," rendering the evaluation results more scientific and fair.

**3.3.2 Establishing a long-term mutual incentive mechanism for tutors and students**

The linkage of evaluation results with tangible benefits is crucial for creating a positive feedback loop. For incentives for tutors, the evaluation results of tutoring work should be formally incorporated into the annual faculty assessment, serving as an important basis for title evaluation, promotion, performance-based salary distribution, and awards. Honorary titles such as "Gold Medal Tutor" should be awarded to outstanding tutors, accompanied by additional performance bonuses or research funding to ensure their efforts are appropriately recognized and rewarded. For incentives for students, their participation in the tutorial system (e.g., engagement, project contributions, achievements) should be incorporated into the comprehensive quality assessment system with corresponding credits. Priority consideration should be given to outstanding students in scholarship selections, "Triple-A Student" awards, and recommendations for graduate school admission to stimulate their

enthusiasm and initiative.

## 4. Conclusion

This study has proposed a systematic framework for standardizing the undergraduate tutorial system in computer science programs at local universities. Its theoretical contribution lies in integrating digital transformation concepts with educational management to form a holistic, technology-driven paradigm. Practically, it provides an actionable blueprint for administrators to enhance educational outcomes. The proposed model is, however, conceptual and requires empirical validation. Limitations include potential challenges such as the digital divide, data privacy concerns, and the institutional resources required for implementation. Future research should therefore focus on case studies to test the framework's effectiveness and explore its adaptability. Ultimately, the proposed path of standardized, digitally-empowered management has the potential to transform the tutorial system from a mere formality into a powerful engine for student growth.

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## References

[1] Duan, X., Deng, Y., Huang, Z. Thoughts and explorations on why the undergraduate tutorial system is difficult and how to make it not difficult. Education and Teaching Forum. 2025; (10): 113-116.
[2] Zhang, M., Han, C. Investigation and countermeasure analysis of the practice of the undergraduate tutorial system under the "three-all education" concept in universities. Heilongjiang Education (Theory & Practice). 2025; 79(5): 37-39.
[3] Ma, Z., Peng, Y., Chen, C., et al. Research on the effect evaluation of the undergraduate tutorial system in applied universities in assisting students' personalized growth. Journal of Beijing Union University. 2025; 39(4): 38-43.
[4] Jia, S., Xu, N., Zhang, B., et al. Exploration and practice of the undergraduate mentorship system oriented towards the cultivation of innovative engineering talents. Chinese Geological Education. 2025; 34(2): 42-45.
[5] Zhang, Y., Jiang, J., Ling, K., et al. Exploring the path of digital and intelligent transformation of the undergraduate tutorial system under digital governance. Journal of Higher Education. 2025; 11(22): 87-90.

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