Strategies for Enhancing the Information Technology Proficiencies of Educators in Higher Education Institutions within the Context of Smart Education

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Abstract: Smart education embodies a transformative paradigm of learning in the digital age, catalyzing the digitization of educational practices and methodologies. At present, the training initiatives for college educators in information technology reveal a phenomenon reminiscent of 'old wine in new bottles', predominantly marked by superficial pedagogical insights, stratified instructional competencies, formulaic teaching applications, and standardized assessment frameworks. In light of the context illuminated by smart education, it is essential for higher education instructors to transcend traditional cognitive patterns, seamlessly weave distinctive elements of informational pedagogy throughout their instruction, elevate both efficiency and quality, and ultimately realize intelligent teaching and learning outcomes.

Keyword: Intelligent Education; College Teachers; Informatization

1. Introduction

First, we are witnessing the emergence of the era of wisdom education. The introduction of the 'Education Information 2.0 Action Plan' signifies the onset of an intelligent educational landscape. Smart education is poised to transcend traditional school boundaries, fostering a multifaceted integration of diverse educational types, resources, and elements. It will enhance collaborative efforts among schools, families, and society at large while establishing a high-quality personalized lifelong learning system that enables everyone to learn anytime and anywhere [1]. In this context of smart education, information technology serves as a foundational support; core components include intelligent learning environments, innovative teaching applications, and efficient management services—all aimed at cultivating high-quality talents endowed with innovative spirit, practical skills, and social responsibility [2]. This backdrop necessitates not only external conditions such as 'smart' teaching environments and technologies but also specific competencies for internal users—namely college educators—who must possess educational informatization capabilities aligned with these external 'smart' settings. Consequently, the teaching process is progressively evolving towards intelligence in learning methodologies, instructional strategies, assessment techniques, and management practices to ultimately achieve optimal solutions in pedagogical intelligence.

Currently enrolled college students are born after 2000; they have grown up immersed in an increasingly 'intelligent' world characterized by their affinity for novelty and diversity—they are true digital natives. Their preferred learning styles and cognitive approaches favor efficient innovation within intelligent teaching environments alongside advanced pedagogical methods. Therefore, it has become imperative to stimulate student motivation for learning by identifying gaps in their knowledge acquisition processes while systematically organizing knowledge graphs to facilitate scientific management of students efficiently.

2. The "Intelligent" Embodiment of Teaching Informatization

2.1 Intelligent Teaching Resources

The advent of the "Internet + education" paradigm has significantly facilitated the accessibility and sharing of data resources, thereby accelerating the digital transformation within educational contexts. The 'intelligence' of teaching resources is manifested in the dissemination of information, which not only

addresses the 'information gap' arising from national and regional disparities but also enhances the integration of resource bases for teaching materials such as courseware.

College educators leverage various learning applications like Super Star Learning Pass, Classroom Pai, and Rain Classroom to render learning resources both informational and instantaneous. The intelligence embedded in these teaching tools permeates all stages of instruction—pre-class, in-class, post-class, and beyond. Prior to class sessions, instructors can disseminate teaching notifications, distribute instructional materials, and assign learning tasks that facilitate student preparation ahead of time while establishing a foundation for classroom engagement. During instruction, college teachers utilize these applications for routine activities including screen projection, interactive discussions, group work facilitation, quick responses to queries, practice exercises with grading features—all aimed at transforming teaching resources into visualized dynamic content that caters to diverse learning needs. Following lessons, educators can innovate homework methodologies by curating question banks that allow students to select modules aligned with their interests for practice; this approach fosters greater enthusiasm towards homework completion while enabling timely review of knowledge points through error correction strategies. For extracurricular enrichment purposes, these applications encompass an extensive array of periodicals, books, newspapers among other vast resources which teachers can directly recommend to students—thereby cultivating a habit of mobile reading during fragmented time.

2.2 Intelligent Teaching Environment

As the adage goes, 'Educate individuals through culture and refinement.' Among various methods, 'environmental conditioning' plays a pivotal role in education. In promoting cultural education, universities subtly cultivate and inspire individuals by fostering an enriching cultural environment, thereby achieving the effect of 'lingering in the room of Zhilan for an extended period leads to becoming fragrant' [3]. The teaching environment constitutes the external framework for educating individuals. With the implementation of Education Informationization 2.0 initiatives, higher education institutions are advancing the 'three links and two platforms,' facilitating widespread access to and application of 'broadband network connectivity for schools,' 'quality resource class connections,' and 'network learning spaces accessible to all.' This endeavor aims to enhance intelligence while improving quality and efficiency.

For college educators, today's teaching landscape has evolved from traditional blackboards and whiteboards to integrated smart blackboard systems—particularly with tools like Seewo Smart Blackboard. This transition transforms educational resources from a two-dimensional plane into a three-dimensional experience, making audiovisual materials such as images, audio clips, and videos more tangible, vivid, and engaging. The intelligence embedded within the teaching environment is centered around pedagogy itself; thus it necessitates heightened information literacy among college instructors. Consequently, educators should align closely with course content during curriculum design while innovating classroom management strategies and interactive formats. By leveraging intelligent teaching environments effectively, they can facilitate students' profound comprehension of learning material, which promoting deep learning that transitions from external engagement to internal understanding.

2.3 Teaching Evaluation Intelligence

Classroom teaching evaluation constitutes a crucial component of the educational process, and effectively harnessing its inherent functions is vital for enhancing overall educational quality, fostering student development, and promoting teachers' professional growth. Currently, the intelligence of teaching evaluations is manifested in the distinctive features of various learning applications. For instance, Super Star Learning Pass employs big data technology to statistically analyze and present all online learning and teaching activities while generating technical support reports. Furthermore, capabilities such as automatic chart generation, paperless assessments, curve visualization, and scientific dynamic evaluations exemplify the intelligent nature of these evaluations.

When assessing students, college educators can utilize the technical support report from Learning Pass as an objective reference to enrich formative assessments during regular instruction while complementing them with summative evaluations. This approach ensures that student assessments retain their humanistic qualities

without sacrificing rigor or objectivity. Additionally, the intelligence embedded in teaching evaluations facilitates self-assessment for both teachers and students; educators can identify their pedagogical strengths and weaknesses through 'learning reports,' fostering mutual improvement. Students can track their academic progress via 'learning reports,' thereby increasing their motivation to learn while identifying areas needing attention. Consequently, the level of informatization among college instructors significantly influences the scientific rigor, humanity, and objectivity of teaching evaluations—ultimately impacting student learning outcomes.

3. The Present State of Training College Educators in Information Technology Competencies

In November 2022, the Ministry of Education issued a notice regarding the educational industry standard "Digital Literacy for Teachers," emphasizing that educators should effectively leverage digital technology to acquire, process, utilize, manage, and evaluate digital information and resources. They are also expected to identify, analyze, and resolve educational challenges while optimizing, innovating, and transforming teaching practices. Furthermore, they must possess the awareness, skills, and responsibilities associated with these tasks [5]. As institutions primarily responsible for training specialized talent, advancing scientific knowledge, and serving societal needs, colleges and universities must respond to contemporary demands by attuning themselves to current trends and actively listening to student feedback. Consequently, in the context of intelligent education where college instructors serve as its primary implementers, their proficiency in information-based teaching significantly influences the effectiveness of such education; likewise, students' satisfaction and sense of achievement remain pivotal concerns within this humanistic framework [6]. Therefore, it is both urgent and essential to enhance college teachers' capabilities in instructional informatization.

Currently，based on existing literature reviews，classroom observations， teaching supervision reports， and other relevant data, several issues have been identified concerning college teachers' informatization competencies: superficial pedagogical understanding, inconsistent teaching methodologies, formulaic application of instructional strategies and simplistic evaluation approaches.

3.1 Superficial Understanding of College Teachers' Information-based Teaching

With the advancement of information technology, the interest in teachers' information-based teaching is growing exponentially. Consequently, there are varying interpretations regarding the essence of information-based teaching. Guided by this concept, educators leverage information technology, big data analytics, and digital teaching resources to enhance the optimization of instructional processes, address key challenges within these processes, and facilitate effective implementation of educational activities which ultimately aiming to improve teaching outcomes and foster deeper understanding, construction, and creation of knowledge [7].

Through classroom observations and teacher interviews, it has been observed that college instructors possess a superficial and narrow understanding of their capabilities in information-based teaching. Some educators mistakenly equate the use of presentation tools such as slides (PPT), audio-visual materials during instruction with true information-based pedagogy; thus conflating multimedia usage with comprehensive informational instruction. As a result, their approach to information-based teaching becomes restricted to mere utilization of technological means [8]. Additionally, some middle-aged faculty members exhibit a lackluster enthusiasm for integrating information technology into their practice; this is evident in their limited initiative to engage with digital resources for educational innovation or exploration while remaining complacent with existing pedagogical practices.

3.2 Hierarchical Informatization Teaching Skills of College Teachers

In the era of information-based education, a collaborative relationship exists between educators and information technology. College instructors should not only comprehend the principles and methodologies for selecting digital tools, software, and platforms in educational contexts but also adeptly operate these resources to address common challenges. The information literacy skills of novice

teachers can be categorized into three tiers: primary, intermediate, and advanced levels. Specifically, perception, preparation, imitation, and experimentation fall under first-order skills; habitual application and proactive utilization across diverse scenarios represent intermediate skills. Advanced skills encompass both adaptive application and innovative practices tailored to situational demands.

Classroom observations and reports from teaching supervisors indicate that the proficiency in informatized teaching among college educators exhibits a stratified trend with pronounced differentiation. Most college instructors possess foundational skill sets enabling them to utilize digital tools and software effectively for instruction; some younger faculty leverage informational resources to innovate pedagogical approaches by integrating contemporary teaching concepts alongside various technological means or software tools to enhance knowledge transfer efficiency. However, the majority of educators maintain their informatization teaching competencies at an intermediate level where they routinely employ information-based platforms to resolve typical instructional issues.

3.3 The Application Model of Informatization Teaching For College Teachers

The foundation and assurance for effective teaching application lie in the integration of pedagogical cognition and instructional skills. Teaching application is pivotal for enhancing educational outcomes, encompassing both instructional design and execution. Recent studies have examined the current state of informatization teaching capabilities among college educators in the intelligent era, revealing a deficiency in their ability to integrate technical knowledge with subject matter expertise during instruction, as well as a lack of adaptability [10]. Observations from classroom assessments and supervisory reports indicate that some college instructors do not employ diverse teaching methodologies; they often rely heavily on slides without fostering critical thinking or utilizing visual aids effectively—resulting in an over-reliance on textual content at the expense of graphical representations. Furthermore, there is inadequate proficiency in equipment usage and troubleshooting during implementation, leading to frequent interruptions due to courseware adjustments. The utilization of applications such as LearningPass for displaying instructional activities remains minimal; similarly, few classrooms leverage insights gained from developing exemplary undergraduate curricula. In summary, it has been identified that college educators exhibit limited flexibility and innovation within information-based teaching practices, alongside a tendency towards conventional pedagogical approaches.

3.4 The Evaluation of University Teachers' Information-Based Teaching Is Standardized

According to the survey, the majority of online teaching evaluations conducted by educational institutions at all levels still rely on traditional assessment methods. These include teaching supervision evaluations, peer assessments, student feedback, and teacher self-evaluations. Such manual evaluation techniques struggle to fulfill the requirements for dynamic quality monitoring and continuous assessment of teaching effectiveness; they also fall short in supporting data-driven precision instruction and pedagogical enhancement [11]. In higher education contexts, existing evaluation methodologies are marked by a lack of objectivity, pronounced subjectivity, and challenges in dynamically monitoring teaching quality through mid-term and final assessments [12]. However, it is essential to recognize that teaching constitutes a dynamic bilateral interaction between educators and learners characterized by continual evolution. For instance, Dewey posits that 'the process of education is one of constant reorganization, transformation, and change' [13]. In summary, current teaching evaluation methods inadequately address the needs arising from students' dynamic development and have yet to achieve a truly information-based approach to educational assessment.

4. The Training Path of College Teachers' Teaching Informatization Ability

Education serves as the cornerstone of a century-long vision, with teachers being the bedrock of this educational framework and the primary source of knowledge. They carry significant responsibilities in both education and pedagogy. In the context of implementing information technology in education, it is essential for educators to comprehend digital technologies and acquire relevant skills

applicable to their daily teaching practices. This encompasses an understanding of fundamental digital concepts, core principles, selection strategies, and methodologies for utilizing digital resources effectively. Given the current state of training, there is an urgent need to expand pathways for enhancing college instructors' capabilities in educational informatization while actively promoting collaborative mechanisms for informatized education. A comprehensive approach should be adopted regarding college teachers' professional development before, during, and after instruction to strive towards creating exemplary 'golden courses' through cultivation across four key dimensions.

4.1 Improve College Curriculum System and Improve College Students' Information Literacy

As the initial stage for college educators to pursue advanced education, higher education plays a crucial role in cultivating specialized talents, enhancing scientific knowledge, and serving societal needs. Prior to their entry into colleges and universities, prospective college teachers have the opportunity to systematically acquire information literacy pertinent to their field during their undergraduate studies. Taking English education as an illustrative example, students majoring in this discipline must possess robust information literacy skills to effectively navigate the increasingly diverse multi-modal approaches in English teaching. This proficiency enables educators to utilize online interactive platforms, electronic teaching aids, and multimedia resources effectively, thereby facilitating a profound integration of information technology with humanistic theories. Institutions of higher learning should engage in comprehensive research and reform initiatives within new liberal arts frameworks, promote the digital transformation of foreign language instruction, and establish targeted courses focused on English teaching methodologies.

Consequently, higher education institutions must adhere to the fundamental principles of 'who to train, how to train, and for whom to train,' while enhancing the curriculum framework and fostering the information literacy skills of college students. In the talent development process, universities should prioritize integrating information literacy into their disciplinary curricula or establishing relevant service platforms. This can be achieved by reinforcing instruction in conceptual, procedural, and metacognitive knowledge, thereby creating a pathway for embedded teaching that promotes deep learning and literacy advancement [17]. Based on institutional contexts and student learning conditions, it is essential to explore the construction of diverse curricular systems across various majors aimed at improving college students' information literacy capabilities with an emphasis on practical application, reuse, and development of these skills rather than merely superficial information retrieval.

4.2 Attach Importance to Pre-Job Training In Colleges and Universities to Enhance Information-Based Teaching Experience

The modernization of pre-employment training programs for college educators is a historical imperative for the advancement of higher education in our country and serves as a crucial avenue for many instructors to enhance their proficiency in information-based teaching methodologies. Currently, some scholars have conducted investigations into the informatization literacy levels among college teachers, revealing significant disparities across various domains such as informatization teaching skills, research and development of informatization teaching outcomes, and the implementation of informatized classrooms [18].

It has been noted that upon entering colleges and universities, educators are required to complete both pre-employment training and online courses to fulfill the study hour requirements necessary for obtaining college teacher certification. However, due to constraints such as limited training time, heavy instructional workloads, and a slow pace in collegiate pedagogy, many teachers tend to treat these sessions merely as formalities—overlooking the critical role that pre-employment training plays in enhancing their capabilities in information-based instruction. Consequently, institutions should leverage the induction training process for new faculty members as an opportunity to elevate their educational technology competencies. This will enable them to effectively master emerging pedagogical approaches including online education, interactive learning environments, and flipped classrooms while also improving their abilities in resource development and classroom management. Furthermore, colleges should

implement more comprehensive offline pre-employment training initiatives by establishing practical courses focused on enhancing informatization skills; fostering an understanding of intelligent course design within pre-employment frameworks; refining systems related to intelligent course delivery; optimizing physical environments conducive to effective learning; and instituting robust evaluation mechanisms for these intelligent courses [19].

4.3 Jointly Build and Share University Resources to Promote the Construction of Education Informatization

The informatization construction of colleges and universities represents an inevitable trend in the evolution of the information age. With the backing of various intelligent digital, it is essential to implement effective top-level design to facilitate the advancement of informatization initiatives within higher education institutions. This includes fostering collaborative educational resource networks, ultimately achieving successful implementation and stability in educational informatization.

For instance, consider the Virtual Teaching and Research Office. In 2021, the Ministry of Education along with six other departments jointly issued guiding opinions aimed at promoting new educational infrastructure development and establishing a high-quality support system for education. As a crucial vehicle for digital transformation, the Virtual Teaching and Research Office must comprehensively address all relevant aspects. Serving as a vital component of higher education pedagogy, this virtual office exemplifies innovative grassroots teaching organization models suited for the information age while also acting as a key link through which colleges can integrate information technology to enhance teaching research innovation, adapt future pedagogical practices, and drive digital transformation across higher education. This initiative significantly mitigates issues related to "information islands" within educational resources by facilitating mutual construction among academic institutions' teaching resources. Furthermore, it promotes deep integration between digital technology and pedagogical processes while enhancing educators' instructional capabilities. Additionally, advancing university-level educational informatization extends beyond mere teaching research; it encompasses sharing high-quality educational resources collaboratively—such as Hunan Province's EEID service platform for education informatization; virtual simulation teaching-sharing platforms; provincial networked large classrooms; inter-school collaborations at various levels; alongside students' e-learning portfolios—to maximize data efficiency.

4.4 Construct College Teaching and Teaching, And Strictly Control Information Teaching

Young educators in colleges and universities are increasingly becoming the primary force in higher education instruction [22]. They often find themselves stepping into teaching roles immediately after graduation, facing challenges such as a lack of experience in information-based pedagogy. Although institutions provide pre-employment training, its effectiveness is limited. In the realm of technology-enhanced teaching, young educators frequently conflate digital literacy with pedagogical competence, overly relying on literacy development while neglecting the cultivation of teaching skills. Additionally, there is a tendency to pursue new technologies blindly or to depend excessively on them, overlooking the importance of developing effective teaching models [23]. Consequently, mentorship from experienced teachers serves as a crucial strategy for enhancing the innovative capabilities and competencies of novice educators in higher education settings [24].

Regarding mentorship within colleges and universities, we can implement a structured tutorial system for young teachers. For instance, seasoned mentors can guide novice instructors in familiarizing themselves with information-based instructional tools, pedagogical approaches, and assessment methods through practical activities such as lesson planning, direct instruction, tutoring sessions, homework evaluation, guiding hands-on practice and experiments. This support will enable young teachers to master diverse instructional strategies and modern educational technologies effectively. Simultaneously, collaborative brainstorming sessions between mentors and novice educators can foster dynamic exchanges of ideas—bridging 'new' perspectives with 'traditional' ones—to facilitate the reconstruction and redesign of pedagogical frameworks that leverage technology-enhanced learning as their foundation for reforming

educational practices. Furthermore, this mentoring model significantly contributes to updating content related to information-based instruction while enhancing resource availability and optimizing technological systems used in teaching [25]. Throughout this process both veteran and junior faculty members will benefit from experiencing the advantages inherent in technology-driven pedagogy while simultaneously improving their own proficiency levels.

5. Conclusions

Information-based teaching represents an inevitable trend in the era of intelligent education. In response to the evolving landscape of teaching resources, environments, and evaluation methods, college educators must enhance their information-based teaching competencies to adapt to contemporary changes. Currently, several challenges exist in cultivating the informatization skills of college instructors, including superficial pedagogical understanding, tiered instructional techniques, modular application of teaching strategies, and a singular approach to assessment. To address these issues, this paper explores four dimensions aimed at establishing a 'golden course' for information-centric instruction: enhancing university curriculum systems and improving students' information literacy; prioritizing pre-service training for educators to enrich their experience with information-based pedagogy; fostering collaborative sharing of university resources to advance educational informatization; and implementing rigorous standards for information-driven instruction within colleges. Through concerted efforts in curriculum development, training initiatives, resource allocation, and instructional practices, the level of informatized teaching among college faculty has been significantly elevated. By adopting an informatized teaching model as a foundation, we have constructed a pedagogical framework that aligns with contemporary developmental trends.

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