

Pathways to Enhance the Informative Teaching Ability of Teachers from Local Universities in the Digital and Intelligent Era

Hong YANG*, Lu TAN, Xiaofang ZOU

Yangtze University, Jingzhou 434023, China

Abstract The advent of digital and intelligent era has brought profound impacts to higher education in terms of teaching models, learning resources, teacher – student roles, and instructional management. Among them, local universities with relatively weak resources but large scale are particularly noteworthy. A questionnaire survey on the current situation of informative teaching among teachers from local universities found that their overall awareness of informative teaching is positive, but their ability structure is uneven, especially in data-driven teaching evaluation and human – machine collaborative design, where there are obvious shortcomings. Research has revealed that the development of teachers' informative teaching ability is influenced by internal factors such as intrinsic motivation and data literacy, as well as external factors such as training systems and school support. Based on this, a systematic improvement path of "concept guidance – precise empowerment – environmental support – institutional guarantee" four-in-one is proposed to provide practical reference for promoting the professional development of teachers from local universities and the digital transformation of higher education.

Key words Digital and intelligent era; Informative teaching; Improvement path

DOI 10.19547/j.issn2152 – 3940.2026.01.011

With the deep integration of technologies such as cloud computing, big data, and artificial intelligence, human society is moving from the "digital age" to the "digital and intelligent age". The core of this transformation lies in realizing the intelligent reshaping of business processes, service models, and decision-making methods in various fields of society through data-driven and intelligent technologies. In this context, the higher education ecosystem is facing profound changes, which have put forward unprecedented high-level requirements for teachers' informative teaching abilities.

However, compared with key universities with abundant resources, local universities have obvious shortcomings in infrastructure, teacher training, incentive mechanisms, and other aspects. The development of their teachers' informative teaching ability faces multiple challenges: some teachers remain at the shallow level of tool application, making it difficult to achieve deep integration of technology and curriculum; there is a gap in the ability structure of teachers, which cannot meet the requirements of "smart teachers"; the lack of targeted support system for teacher development exacerbates teachers' sense of frustration; the emphasis on hard resources over soft resources makes it difficult to form a healthy development ecosystem; the intervention of AI and other technologies in teaching brings new ethical challenges, and teachers are generally unprepared. These

issues make it an urgent problem to improve the data literacy and human – machine collaborative teaching ability of teachers from local universities.

This study explores the attitudes, abilities, and influencing factors of informative teaching among teachers from local universities through a questionnaire survey, and proposes development suggestions, aiming to provide reference for the digital and intelligent reform of higher education.

1 Impact of digital and intelligent era on university teaching

1.1 New characteristics of higher education in the digital and intelligent era

1.1.1 Subversion of teaching mode: from "standardized indoctrination" to "personalized learning". Traditional education is difficult to adjust teaching pace and content for each student. In the digital and intelligent era, by learning analytics technology and big data, it is possible to accurately depict student profiles, and identify their knowledge gaps, learning styles, and interests, thus achieving customized learning path recommendations, and truly implementing the teaching philosophy of "student-centered".

1.1.2 Reconstruction of learning resources: from "static textbooks" to "dynamic ecology". The teaching resources in the digital and intelligent era present ubiquitous and intelligent characteristics, covering various forms of resources such as MOOC, virtual simulation experiments, and generative AI learning materials. These resources can dynamically adjust their difficulty and form based on student learning feedback, forming a continuously opti-

Received: December 20, 2025 Accepted: January 22, 2026

Supported by the Yangtze University School-level Teaching Research Project (JY2024059, JY2021038, JY2022009).

* Corresponding author.

mized resource ecosystem.

1.1.3 Reshaping the roles of teachers and students: from "knowledge authority and receiver" to "learning partner and collaborator". Teachers have transformed from knowledge transmitters to learning guides, designers, and motivators, with a focus on learning experience design, collaborative exploration organization, and emotional support; students transit from passive receivers to active knowledge constructors, collaborators, and creators.

1.1.4 Evolution of teaching management: from "experience driven" to "data driven". School management and decision-making increasingly rely on data support, and academic warning is achieved by analyzing student behavior data. By analyzing course data, teaching evaluation and course optimization are achieved. The automation of administrative affairs has greatly improved management efficiency, freeing up manpower to engage in more creative work.

1.1.5 Reform of educational evaluation: from "single score" to "multidimensional evidence". The evaluation system should pay more attention to process evaluation. A "learning evidence chain" is formed by recording the entire learning process. Using technologies such as virtual simulation and electronic portfolio, high-level competencies such as practical ability and innovative thinking that are difficult to measure in traditional exams are evaluated.

1.2 Requirements of digital and intelligent era for the informative teaching ability of university teachers Based on the above analysis, the new educational features that have emerged in the digital and intelligent era have put forward comprehensive and profound reform requirements for the teaching ability of university teachers. Teachers cannot simply be transmitters of knowledge, but must transform into designers, guides, and enablers of the learning process^[1].

1.2.1 Numerical literacy and tool application ability: from "user" to "driver". This is the fundamental ability that university teachers should possess. It requires teachers to have the ability to interpret and analyze data, and achieve data-driven teaching decisions. At the same time, it is necessary to proficiently and critically use tools such as generative AI, intelligent teaching platforms, and virtual simulations to create immersive learning experiences.

1.2.2 Ability in informative teaching design: from "courseware maker" to "learning experience architect". This is the core ability to integrate technology into teaching. For example, it should possess the ability of human – computer collaborative teaching design, thus being able to construct an efficient interactive mode of "teacher – AI – student"; and the ability to design personalized learning paths based on student data, supporting students' self-directed and on-demand learning.

1.2.3 Teaching implementation and evaluation ability: from "lecturer" to "mentor". This ability requires teachers to be good at guiding discussions, stimulating critical thinking, using intelligent tools to obtain real-time learning feedback, and adjusting teaching strategies. Simultaneously, they can utilize techno-

logical means to achieve process oriented and diversified teaching evaluation.

1.2.4 Ethical reflection and continuous evolutionary ability: from "practitioner" to "reflective practitioner". Teachers need to have a digital ethics awareness and handle issues such as data privacy and AI academic integrity properly. At the same time, they should maintain continuous learning ability, critically evaluate the value of technology education, build professional learning communities, and achieve continuous evolution of abilities. On this basis, it is necessary to critically evaluate the educational value and potential risks of technological tools, ensuring the fundamental goal of technology serving for educating people, rather than blindly pursuing technology.

2 Investigation on the current situation of informative teaching ability of teachers from local universities

Based on the comprehensive reference of domestic and foreign literature on informative teaching ability survey scales, this study adopted a questionnaire survey method to conduct a sampling survey of 88 teachers from 11 local universities in Hubei Province.

2.1 Basic investigation information From the distribution of the survey sample, the gender ratio is about 4 : 6, and the distribution of teachers from the older, middle-aged, and younger generations is relatively even in terms of age: 31.8% are aged 31 – 40, 45.5% are aged 41 – 50, and 22.7% are aged 51 and above. The institutions involved are mainly local key colleges, local ordinary colleges, and ordinary higher vocational colleges. The teachers belong to a total of 11 disciplines, and the vast majority of the respondents have more than 5 years of teaching experience. 47.8% of them have a master's degree, and 44.3% have a doctoral degree. The survey results have good representativeness.

2.2 Survey results and data analysis The survey on the current situation of teaching ability of teachers from local universities is based on comprehensive reference to previous research results, using a five-level scale form, and setting 17 questions from four dimensions. The mean and standard deviation of the four dimensions are detailed in Table 1.

Table 1 Mean of four dimensions of informative teaching capability in local universities

Dimension	Mean points	Standard deviation points
Awareness and attitude of informative teaching	3.78	0.95
Ability to design informative teaching	3.68	0.83
Ability to implement informative teaching	3.76	0.88
Ability to evaluate informative teaching	3.60	0.88

Note: 1 point = very inconsistent; 2 points = not quite consistent; 3 points = general; 4 points = quite consistent; 5 points = very consistent.

2.2.1 Awareness and attitude of informative teaching. The average score for awareness and attitude of informative teaching among

teachers from local universities is 3.78, which is the highest among all dimensions, indicating that teachers have a strong awareness of informative teaching and a significantly positive attitude. However, it is worth noting that the standard deviation of this dimension is 0.95, which is also the largest among all dimensions, indicating that there are still significant differences among teachers. Cross analysis shows that as teachers age, their awareness and attitude towards informative teaching become more negative. Older teachers aged 50 and above have the lowest average score in this dimension compared to other groups, while teachers aged 31–40 score the highest. This reflects that senior teachers have a relatively conservative attitude towards the wave of informative teaching, and the transformation of teaching awareness is relatively lagging behind. Especially in the question of "I am familiar with the application scenarios and functional characteristics of artificial intelligence technology", the score difference is most significant.

2.2.2 Ability to design informative teaching. The standard deviation of scores in this dimension is the smallest among the four dimensions, indicating that the differences in teachers' abilities in informative teaching design are relatively small. From the four issues involved in this dimension, the best performance is that teachers are generally able to choose appropriate teaching methods based on teaching objectives and technical conditions, while the poor performance is the ability to reasonably select informative teaching resources based on teaching needs.

2.2.3 Ability to implement informative teaching. The overall performance in this dimension is good, with an average score of 3.76. Teachers are generally proficient in using communication platforms such as Learning Pass, Rain Classroom, and DingTalk to conduct synchronous or asynchronous online teaching and achieve high-quality teacher–student interaction. However, it seems that the integration and application of technical knowledge, teaching method knowledge, and subject knowledge content is not yet proficient enough.

2.2.4 Ability to evaluate informative teaching. The average score of this dimension is the lowest among the four dimensions. It can be seen that how to use information technology tools to develop a diversified (self-evaluation–peer evaluation–teacher evaluation) teaching evaluation system, establish student learning electronic files, and provide comprehensive quality evaluation for students is still a weak point in current informative teaching, which needs to be improved and strengthened.

3 Influencing factors of informative teaching ability of university teachers

The most representative theoretical model for the development of university teachers is the conceptual comprehensive model proposed by Bergquist and Phillips from America in 1975. They believe that the development of university teachers should be carried out from three levels: attitude (personal development), process (teaching development), and structure (organizational develop-

ment)^[2]. This also reminds us that the development of informative teaching ability of university teachers is not only influenced by their own factors such as development awareness and technical ability, but also by external environments such as school organizational development and the overall institutional environment.

3.1 Internal factors Internal factors are the endogenous driving force for the development of teachers' abilities, determining whether they "want to" and "dare not" engage in informative teaching practices.

3.1.1 Awareness and attitude of informative teaching. Data analysis shows that consciousness and attitude are the strongest predictor variables for ability development. Teachers who score high in "importance cognition" typically exhibit higher levels in various dimensions of ability (design, implementation, evaluation). This indicates that intrinsic value identification is the fundamental driving force for teachers to overcome difficulties and actively explore. On the contrary, if teachers believe that informative teaching is a "burden" or a "facade", then even if the school provides good external conditions, their ability development will stagnate.

3.1.2 Self-efficacy. Self-efficacy is directly related to a teacher's resilience and innovative courage. Regression analysis found that teachers with high self-efficacy scores also have stronger "informative teaching implementation ability" and "teaching design ability". Because they are more willing to try risky and highly innovative teaching activities in the classroom, rather than fearing possible failures. Teachers with low efficacy tend to use the most basic and secure technologies, and their ability improvement is slow.

3.1.3 Data literacy and cognition. This is a crucial internal factor in the digital and intelligent era. The survey results show that this is the lowest scoring weakness among all internal factors. Teachers generally feel unfamiliar and confused about data, which directly leads to their weak ability to evaluate informative teaching. They don't know how to read the learning situation from data, so naturally they cannot achieve data-driven teaching optimization. Therefore, the lack of data literacy is a key internal bottleneck that hinders teachers from transitioning from being "experiential" to "intelligent".

3.2 External factors External factors are the external conditions for the development of teachers' abilities, which determine whether teachers can easily put informative teaching into practice.

3.2.1 Pertinence and effectiveness of training system. As the most critical external factor, the survey results show that nearly 80% of teachers have participated in training on informative teaching. But for the problems that exist in the training, the top three most prominent ones are: too much theory and too little practice; lack of follow-up guidance and single training format. If training always teaches hollow theories or software unrelated to the subject, teachers will think that "learning is useless", with low participa-

tion and inability to improve abilities. However, the lack of follow-up guidance indicates that the training effect cannot be sustained, and the problems encountered by teachers in practice cannot be solved, which dampens their enthusiasm. The single training format of pure lecture style cannot provide necessary practical experience, resulting in teachers' understanding but inability to do, leading to a gap between theory and practice.

3.2.2 School information environment and resource support. This is the "soil" for the development of teachers' abilities. The survey results show that teachers with low satisfaction with the school's informative teaching atmosphere and hardware facilities also have significantly lower scores in their "informative teaching implementation ability". If the operation of teaching platform is complex and unstable, the willingness of teachers to use it will sharply decrease. If timely technical support is not provided when encountering problems, it will greatly amplify teachers' sense of frustration and reinforce their negative perception that "new technologies are troublesome", thereby hindering their in-depth use. The richness of relevant teaching resource library also significantly affects the teaching efficiency of teachers. When teachers have to invest too much time and effort in producing their own resources, the development of their informative teaching ability will also be hindered.

3.2.3 Incentive and evaluation mechanism. This is the "baton" of ability development. If the leaders of the school do not attach enough importance to informative teaching, and the evaluation system still focuses on scientific research and neglects teaching, and do not recognize the investment and innovation of informative teaching in teaching evaluation, then the internal motivation of teachers in related colleges to invest in informative teaching will be seriously weakened.

4 Ways to improve the informative teaching ability of teachers from local universities

Based on the in-depth analysis of internal and external factors mentioned above, the improvement of informative teaching ability of teachers from local universities cannot rely on fragmented training, but a systematic improvement path of "concept guidance – precise empowerment – environmental support – institutional guarantee" four-in-one must be built.

4.1 Activating endogenous motivation: achieving the transition from the concept of "requiring me to use" to "I want to use"

4.1.1 Concept guidance and value clarification. To solve the problems of teachers' "conceptual cognitive gap" and "insufficient intrinsic motivation", it can regularly hold high-end forums such as "education reform in the digital and intelligent era" and excellent teaching case sharing sessions, inviting leading figures in the field of educational informatization and frontline teaching masters

(especially those from the school) to share. The focus is on demonstrating how informative teaching can effectively reduce workload, improve teaching effectiveness, and achieve student growth, rather than increasing burden. It inspires resonance and recognition among teachers through people and events around them, helping them understand that informative teaching is the "second curve" of their professional development, rather than an additional task.

4.1.2 Cultivating teachers' identity as "designers". In promotion and training, efforts should be made to emphasize the core value of teachers as "learning experience architects", weaken their old role as "knowledge transmitters", strengthen their new role as "activity designers and learning guides", and give them a sense of professional dignity and mission.

4.2 Reshaping the training system: achieving a mode change from "theoretical instilling" to "practical empowerment"

4.2.1 Promoting "precision drip irrigation" workshop. While abandoning traditional large-scale lectures, small class, specialized, and workshop style training should be offered for teachers from different disciplines and skill levels, such as "critical applications of generative AI in liberal arts courses", "design and development of virtual simulation experiments in science and engineering", "workshop on learning diagnosis based on learning data analysis", etc. The training content should closely follow the teaching scenario of the teacher, ensuring that "using immediately after learning and using it effectively"^[3].

4.2.2 Establishing a "school-based micro certification" mechanism. By submitting teaching design plans, classroom records, student data reports, and other evidence materials, teachers can obtain a series of school-based informative teaching micro competency certifications, such as "blended curriculum design certification", "AI teaching assistant application certification", and "data-driven teaching evaluation certification". In this way, the grand goal of "ability enhancement" is broken down into specific and achievable "micro skill" certifications, providing teachers with immediate positive feedback and greatly enhancing their self-efficacy.

4.2.3 Building a "peer coach" model. A group of "informative teaching leaders" are selected and cultivated on campus, to pair up with ordinary teachers, and provide "one-on-one" classroom diagnosis, teaching design guidance, and long-term accompanying growth support. In this way, the problem of lack of support after training can be solved, forming a sustainable and trust based campus support network.

4.3 Optimizing support environment: achieving ecological restructuring from "hardware stacking" to "smart services"

4.3.1 Building a "one-stop" smart teaching service platform. It should integrate or upgrade the teaching platform, making it user-friendly, easy to operate, stable and reliable. Its core is to break

through data silos, allowing teachers to complete course construction, teaching interaction, learning data viewing, learning warning, and teaching evaluation on one platform. This can lower the threshold for technology usage, allowing teachers to focus on teaching itself rather than technical operations.

4.3.2 Building a "localized and generative" digital resource library. On the one hand, led by the school, high-quality resources are systematically procured and introduced according to disciplines. On the other hand, it should encourage teachers in the school to jointly build and share, and upload excellent micro lessons, cases, and exercise libraries, forming a "living" resource library with the school's characteristics. Intellectual property recognition and rewards should be provided to contributors. In this way, it can effectively solve the dilemma of teachers' inability to cook without rice and reduce their repetitive labor.

4.3.3 Providing technical and pedagogical support for "instant response". By establishing an "informative teaching support center", it can provide teachers with hotline, online and offline timely support. The support team should include both technical personnel and instructional designers, who can solve technical problems and provide teaching method consulting, thus providing a "safety net" for practice innovation of teachers, and allowing them to dare to try and have no worries.

4.4 Innovating incentive mechanism: achieving institutional traction from "soft requirements" to "hard indicators"

4.4.1 Incorporating the ability and effectiveness of informative teaching into the core evaluation system. Local colleges and universities should clearly establish evaluation indicators and weights for informative teaching in teacher title evaluation, job appointment, performance assessment, and excellence evaluation. For example, it makes "successfully offering a blended learning course" or "obtaining a certain micro certification" a necessary condition or important bonus for promotion. By leveraging the role of evaluation as a "baton", it can affirm the investment of teach-

ers from an institutional perspective and make teaching innovation "rewarding".

4.4.2 Establishing special funds and honors. By establishing the "innovation award for informative teaching" and the "golden course construction fund", material rewards and grand commendations could be given to teachers and teams who have achieved outstanding results in informative teaching, and their achievements should be widely promoted on campus as typical examples. Furthermore, it creates a campus atmosphere that "advocates teaching innovation" and stimulates teachers' sense of honor and competitiveness.

It is a complex systematic project by improving the informative teaching ability of teachers from local universities. It requires school administrators to transform from "managers" to "service providers and designers". Among the four paths mentioned above, the activation of ideas is a prerequisite, solving the problem of willingness; accurate empowerment is the core, solving the problem of methods; environmental support is the foundation, solving the problem of conditions; institutional incentive is a guarantee, solving the problem of motivation. Only by working together with the four measures can it break through the existing difficulties, help teachers from local universities successfully transform in the wave of the digital and intelligent era, and ultimately achieve an overall leap in the quality of higher education.

References

- [1] HUANG FM, ZHOU ZH, XIONG W. Innovation and practice of medical teaching development in the digital intelligence era[J]. *Basic and Clinical Medicine*, 2025, 45(11): 1536 – 1540.
- [2] HUANG L. Development of informative teaching ability for young teachers at Lanzhou University[D]. Lanzhou: Lanzhou University, 2015.
- [3] XU G, DAN HB. Exploration on methods to improve information-based teaching ability under the background of "Internet + education"[J]. *Education and Teaching Forum*, 2023(22): 37 – 40.
- [5] Yulin Normal University. College of Smart Agriculture holds school-enterprise cooperation signing ceremony and alumni forum [EB/OL]. (2025 – 11 – 09) [2026 – 01 – 16]. <https://www.ylu.edu.cn/info/1017/56858.htm>.
- [6] HUANG W. Thoughts on the cultivation of compound and outstanding agricultural and forestry talents based on school – enterprise cooperation [J]. *Scenic Spots*, 2019(4): 214.

(From page 54)

- [3] Nanning Municipal Bureau of Agriculture and Rural Affairs. Reply to the Proposal No. DH280 of the 6th Session of the 15th Municipal People's Congress[EB/OL]. (2025 – 08 – 15) [2026 – 01 – 16]. <https://www.nanning.gov.cn/zwgk/fdzdgnr/jytajg/rdjy/t6392374.html>.
- [4] College of Smart Agriculture, Yulin Normal University. College profile [EB/OL]. (2025 – 12 – 31) [2026 – 01 – 16]. <https://nxy.ylu.edu.cn/xygk/xyjj.htm>.