

The Relationship Between Information Literacy and Teaching Competencies Among Instructors at Zhengzhou Technology and Business University in Henan Province, China

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Abstract: The research aims to investigate the current status and relationship between teachers' information literacy and teaching competencies among Instructors at Zhengzhou Technology and Business University. Taking the teachers of this university as the research subjects, this study adopted a quantitative research method and conducted a questionnaire survey using the Teacher Information Literacy Scale and the Teaching Competency Scale. This study adopted convenience sampling and questionnaire surveys with the assistance of mid-level administrators. A total of 290 questionnaires were distributed, and 290 valid questionnaires were returned, yielding an effective response rate of 100%. Data analysis was performed using descriptive statistics, independent sample t-tests, one-way ANOVA, and correlation analysis. All analyses yielded consistent findings matching the study hypotheses: significant differences in the two core variables were found for gender (information literacy only), educational background, teaching experience and professional title (all $p < 0.05$), while no significant differences were observed for academic discipline and department (all $p > 0.05$); furthermore, all dimensions of information literacy were significantly positively correlated with overall teaching competence (overall $r = 0.773$, $p < 0.01$). Reliability analysis showed that Cronbach's α coefficients for both pre-test and formal survey exceeded 0.80, indicating high internal consistency. Validity analysis confirmed strong construct validity, with model fit indices meeting standard thresholds. The KMO measure of sampling adequacy was 0.946, and Bartlett's test of sphericity was significant ($p < 0.001$), demonstrating that the scale was highly suitable for factor analysis. The results indicate that both teachers' information literacy and teaching competency are at a relatively high level. Difference analysis showed that gender differences were insignificant in teaching competence but significant in information literacy, with significant differences across teaching experience, professional titles, and educational background, but not across academic disciplines or departments. Correlation analysis shows a significant positive correlation between teachers' information literacy and teaching competency, with information cognition, information skills, and information affect all positively associated with various dimensions of teaching competency. The study concludes that enhancing training and incentive mechanisms is essential to promoting teachers' professional development and improving teaching quality.

Keywords: Teacher Information Literacy, Teaching Competencies, Teacher of Zhengzhou Technology and Business University.

1. INTRODUCTION

As higher education enters an era of digitalization, the teaching environment has undergone significant structural transformation, characterized by highly digitized resources, complex information sources, and increased reliance on data and information systems (Redecker, 2020). In this context, teachers' ability to access, evaluate, integrate, and apply information effectively has become essential to course design, classroom management, and student support, leading to the recognition of information literacy as a core component of teaching competence.

International frameworks, such as UNESCO's ICT Competency Framework for Teachers, emphasize that educators must critically assess and transform information into meaningful instructional practices (Trixa & Kaspar, 2024). Similarly, the European Commission's Digital Competence Framework highlights information and data literacy as foundational for high-quality teaching, assessment, and student learning support (European, 2022). With the rapid expansion of blended and online learning, challenges such as information overload and complex decision-making further underscore the importance of information literacy in shaping effective teaching competence.

Consequently, global higher education systems have increasingly integrated information literacy into teacher competency frameworks, shifting the focus from teaching methods alone to educators' ability to make informed instructional decisions in information-rich environments (Falloon, 2020).

China's higher education sector is rapidly advancing digital transformation alongside high-quality teacher development, making the relationship between teacher information literacy and pedagogical competence a central issue in contemporary educational governance. With the implementation of the Education Digitalization Strategy, university teaching environments have become increasingly characterized by resource digitization, platform-based instruction, and data-driven management. In this context, teachers are required to effectively engage with abundant digital resources and make informed instructional decisions, positioning information literacy as a foundational competence for teaching practice. The 2022 Teacher Digital Literacy standard further institutionalizes this by emphasizing digital awareness, resource application, and technology-enhanced teaching capabilities. Policy initiatives and institutional practices consistently highlight that teachers' information literacy directly influences teaching quality and reform outcomes. As a result, universities have integrated information literacy, digital resource development, and data analysis into teacher training programs to strengthen instructional capacity (Zhang & Liu, 2021). China's higher education system is shifting toward competency-oriented digital pedagogy, where the ability to evaluate, integrate, and apply information has become essential, reinforcing information literacy as a practical prerequisite for effective teaching competence.

Henan Province is experiencing rapid digital transformation, particularly in applied undergraduate institutions where teaching increasingly relies on information systems and digital resources. With the advancement of the Digital Henan strategy and Zhengzhou's development as a national central city, university teaching environments have shifted toward platform-based instruction, smart classrooms, and data-driven governance, making information literacy a practical prerequisite for effective teaching competence. Provincial policies, such as the Digital

Education Development Action Plan (2021–2025), further emphasize the integration of information skills into teaching, requiring educators to strengthen their abilities in information retrieval, digital resource application, and instructional platform use. Although universities in Zhengzhou have made progress in adopting online platforms and data systems, disparities remain in teachers' abilities to integrate and utilize information, which directly affects teaching quality and outcomes. In the context of applied talent cultivation and industry-education integration, teachers must also effectively transform diverse information and industry resources into instructional practice, further highlighting the importance of information literacy. Therefore, within Henan's higher education system teacher information literacy has become a foundational factor influencing teaching competence, and examining their relationship holds important practical significance for improving teacher development and educational quality at Zhengzhou Technology and Business University.

Existing research has inadequately explored the contextual relationship between university teachers' information literacy and their teaching competence, especially within regional applied undergraduate institutions such as those in Zhengzhou and Henan Province. First, prior studies fail to clarify how different dimensions of teachers' information literacy specifically shape the practical manifestations of their teaching competence in information-enabled teaching environments. Second, few investigations have targeted the real-world teaching challenges of applied universities, including teachers' uneven information processing capacities, superficial application of digital tools, and difficulties in integrating industry-relevant information and practical cases into instruction. Third, there is insufficient analysis of how disparities in information literacy led to inconsistent classroom teaching quality and hinder teachers from meeting the high requirements of practice-oriented.

This study filled the above gaps by systematically examining the linkage between teachers' information literacy and teaching competence based on actual teaching practices at Zhengzhou Technology and Business University. It addressed practical capacity-related problems among teachers in digital teaching settings, identified specific

impacts of information literacy dimensions on teaching performance, and provided objective evidence for improving classroom teaching quality and supporting teachers' professional development tailored to regional applied undergraduate contexts.

RESEARCH OBJECTIVES

1) To understand the current status of information literacy among teachers at Zhengzhou Technology and Business University.

2) To understand the current status of teaching competencies among teachers at Zhengzhou Technology and Business University.

3) To analyze differences in information literacy among Zhengzhou Technology and Business University teachers based on various demographic variables (gender, years of teaching experience, professional title, educational background, academic discipline, and department affiliation).

4) To analyze variations in teaching competencies among Zhengzhou Technology and Business University teachers across different demographic variables (gender, years of teaching experience, professional title, educational background, academic discipline, and department affiliation).

5) To explore the correlation between information literacy and teaching competencies among teachers at Zhengzhou Technology and Business University.

RESEARCH HYPOTHESES

Based on the research questions and objectives outlined above, and in reference to this study's research framework, the following hypotheses are proposed:

H1: There are significant differences in the information literacy of Zhengzhou Technology and Business University teachers across different background variables.

H1-1: There are significant differences in information literacy among teachers of Zhengzhou Technology and Business University based on gender.

H1-2: There are significant differences in information literacy among Zhengzhou Technology and Business University teachers with years of teaching experience.

H1-3: There are significant differences in information literacy among Zhengzhou Technology and Business University teachers

of different professional title.

H1-4: There are significant differences in information literacy among Zhengzhou Technology and Business University teachers with educational backgrounds.

H1-5: There are significant differences in information literacy among Zhengzhou Technology and Business University teachers with different academic discipline.

H1-6: There are significant differences in information literacy among Zhengzhou Technology and Business University teachers across different academic departments.

H2: There are significant differences in Teaching Competencies Among Zhengzhou Technology and Business University teacher across various background variables.

H2-1: There are significant differences in teaching competencies among Zhengzhou Technology and Business University teachers of different genders.

H2-2: There are significant differences in the teaching competencies of Zhengzhou Technology and Business University teachers based on years of teaching experience.

H2-3: There are significant differences in teaching competencies among Zhengzhou Technology and Business University teachers with different professional titles.

H2-4: There are significant differences in teaching competencies among Zhengzhou Technology and Business University teachers with varying educational backgrounds.

H2-5: There are significant differences in teaching competencies among Zhengzhou Technology and Business University teachers with different academic discipline.

H2-6: There are significant differences in teaching competencies among Zhengzhou Technology and Business University teachers across different academic departments.

H3: There is a significant positive correlation between information literacy and teaching competencies in Zhengzhou Technology and Business University.

LITERATURE REVIEW

Technology Acceptance Model

The Technology Acceptance Model (TAM) provides an important theoretical lens for understanding how teachers' information literacy influences pedagogical competence in digital learning environments. The model emphasizes perceived usefulness and perceived ease of use as key determinants of technology

adoption, which in turn shape teaching attitudes and behaviors (Venkatesh et al., 2016). In educational contexts, teachers with higher information literacy are more likely to perceive technology as useful and manageable, thereby enhancing their teaching effectiveness and integration of digital tools (Zhou, 2022; Wang & Wang, 2020). However, as teaching environments become more complex, extended frameworks such as the Unified Theory of Acceptance and Use of Technology (UTAUT) offer a more comprehensive explanation by incorporating factors like performance expectancy, effort expectancy, and social influence (Venkatesh et al., 2016). Empirical studies show that these factors not only promote teachers' technology use but also strengthen their professional competence and instructional innovation (Teo & Zhou, 2021; Zhang & Liu, 2022). Additionally, differences across career stages suggest that novice teachers rely more on ease of use, while experienced teachers prioritize perceived usefulness for improving teaching outcomes (Li et al., 2021).

Constructivist Learning Theory

Constructivist Learning Theory, grounded in the work of Jean Piaget and Lev Vygotsky, emphasizes that knowledge is actively constructed through individual experience and social interaction rather than passively received. In digital teaching environments, this theory highlights that teachers must design authentic learning contexts, support collaboration, and guide inquiry-based learning, all of which rely heavily on their information literacy (Driscoll, 2018; Jonassen et al., 2020). Teachers with strong information literacy are better able to integrate technology, facilitate student-centered learning, and apply formative assessment strategies, thereby enhancing pedagogical competence (Ertmer & Ottenbreit-Leftwich, 2020; Harris & Hofer, 2021). Frameworks such as TPACK framework further illustrate that effective teaching requires the integration of technological, pedagogical, and content knowledge. Constructivist theory provides a comprehensive lens for understanding how teachers' information literacy shapes their ability to implement student-centered, technology-supported instruction and continuously develop professionally.

Teacher Information Literacy

Teacher information literacy refers to educators' comprehensive ability to acquire, evaluate, integrate, and apply information within digital teaching environments, and has evolved from basic technical skills to a multidimensional structure encompassing cognition, skills, and affect (Leu et al., 2022; Koltay, 2011). It includes information cognition, information skills, and information affection, aligning with international frameworks such as UNESCO digital competence models. Existing research focuses on influencing factors, development pathways, and educational outcomes, indicating that individual characteristics, institutional support, and disciplinary contexts significantly shape teachers' information literacy, while experiential learning and practice-based training are key to its development (Scherer et al., 2021; Harris & Hofer, 2021). Empirical studies further confirm that teacher information literacy positively affects teaching quality, instructional design, and student learning outcomes (Zhang & Liu, 2022). In terms of measurement, frameworks such as TPACK framework and European digital competence tools assess teachers' ability to integrate technology, pedagogy, and content knowledge, with increasing emphasis on performance-based evaluation and emerging dimensions like data and ethical literacy (Mishra & Koehler, 2021; Tondeur et al., 2022).

Teaching Competencies

Teaching competence refers to the integrated set of knowledge, skills, attitudes, and values that enable teachers to effectively design, implement, and evaluate instruction in diverse educational contexts (Koehler & Mishra, 2021; Berkvens et al., 2022). It is commonly conceptualized across four dimensions: instructional and assessment competence, knowledge–ethics–preparation, professional competence, and behavior and technology use (Voogt et al., 2023). In the context of digital transformation, teaching competence has expanded from a focus on content delivery to include the effective integration of technology, where teachers' information cognition, skills, and attitudes jointly shape their instructional decision-making and professional development (Ertmer & Ottenbreit-Leftwich, 2020). Existing research highlights that teaching competence is influenced by individual factors, organizational

support, and cultural contexts, while its development is promoted through reflective practice, collaboration, and evidence-based teaching (Borko et al., 2022). Empirical studies confirm that higher teaching competence significantly improves student learning outcomes and teaching quality, particularly in blended learning environments (Teo et al., 2023). In terms of measurement, multidimensional approaches such as teaching competency scales, teaching portfolios, classroom observation, and student outcome evaluation are widely used to capture both the complexity and contextual nature of teaching competence, with increasing emphasis on assessing technology integration and instructional innovation in digital settings (Voogt et al., 2023; European, 2022).

Relationship Between Information Literacy and Teaching Competence

Existing research shows that teacher information literacy and teaching competence exhibit a significant positive and multidimensional relationship, particularly in digitally enriched and blended learning environments (Ertmer & Ottenbreit-Leftwich, 2020). The TPACK framework explains this connection by emphasizing that effective teaching depends on the integration of technological, pedagogical, and content knowledge, rather than isolated technical skills (Mishra & Koehler, 2021). Teachers' information literacy enhances their ability to design instruction, integrate technology, and make informed teaching decisions, though the strength of this relationship is influenced by contextual factors such as institutional support, disciplinary culture, and resource availability (Teo et al., 2023; Wang et al., 2022).

In Henan Province, studies indicate that university teachers generally demonstrate moderate levels of information literacy and solid basic teaching competence, but show limitations in information cognition, ethical awareness, and innovative technology application. Differences in age, discipline, and teaching experience significantly affect both information literacy and teaching competence, while institutional policies and regional development conditions further shape their growth. Although local universities have explored diverse development pathways there remains a lack of systematic, region-specific explanatory models. This highlights the need for more contextually grounded research to

better understand and strengthen the relationship between teacher information literacy and teaching competence in Henan's higher education system.

2. MATERIALS AND METHODS

This study took the full-time teachers of Zhengzhou Technology and Business University as the research object. Based on literature analysis, a quantitative research approach was adopted. Using stratified convenience sampling, the study selected 1,229 full-time teachers from ten teaching units as the population and determined a sample size of 290 according to the method proposed by Krejcie and Morgan (1970). With the support of mid-level administrators, questionnaires were distributed proportionally across all units via a shared link. Clear instructions were provided to ensure accurate and timely completion, and 290 valid questionnaires were recovered, yielding a 100% effective response rate. The research instrument was developed based on the Teacher Information Literacy Scale and the Teaching Competency Scale, covering dimensions of information cognition, information skills, information affection, and multiple aspects of teaching competence, all measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with corresponding interpretation levels from very low to very high.

Cronbach's α coefficients derived from a pre-test of 50 faculty members and formal survey data demonstrate that all overall and dimensional values of the Information Literacy Scale and Teaching Competency Scale exceed 0.80, indicating strong internal consistency and stability. In terms of validity, structural equation modeling reveals satisfactory model fit, convergent validity, predictive validity and structural validity for the Information Literacy Scale based on fit indices and item-total correlations above 0.7; meanwhile, the Teaching Competency Scale achieves an excellent KMO value and significant Bartlett's sphericity test result, collectively verifying the sound reliability and validity of both measurement tools.

3. RESULTS AND DISCUSSION

Demographic Analysis of the Respondents

A descriptive statistical analysis of 290 teachers at Zhengzhou Technology and Business University indicates a relatively

balanced demographic structure (See Table 1 for details). Female teachers (55.17%) slightly outnumber male teachers (44.83%). In terms of teaching experience, the largest group consists of teachers with 7–9 years of experience (28.62%), followed by those with 10 years or more (25.86%), 4–6 years (23.10%), and 3 years or less (22.41%), suggesting a reasonably distributed experience structure. Regarding professional titles, junior (34.14%), intermediate (32.76%), and senior (33.10%) levels are nearly evenly represented. In terms of educational background, teachers with a master's degree or higher account for 54.50%, slightly exceeding those with a bachelor's degree or below (45.50%). Disciplinary distribution is also balanced, with science and engineering teachers comprising 38.62%, humanities and social sciences 33.10%, and other disciplines 28.28%, reflecting a diverse and well-structured academic composition.

Table. 1: Demographic Information of the Participants

Background	Category	N	%
Gender	Male	130	44.83
	Female	160	55.17
Teaching Experience	3 years or less	65	22.41
	4–6 years	67	23.10
	7–9 years	83	28.62
	10 years and above	75	25.86
Professional Title	Junior	99	34.14
	Intermediate	95	32.76
	Advanced	96	33.10
Education Level	Bachelor's degree or below	132	45.50
	Master's degree and above	158	54.50
Academic Discipline	Humanities and Social Sciences	96	33.10
	Science and Engineering	112	38.62
	Other	82	28.28
Department	School of Engineering	27	9.31
	School of Information Engineering	26	8.97
	School of Business	43	14.83
	School of Finance and Taxation	26	8.97
	School of Humanities and Law	41	14.14
	School of Arts	51	17.59
	School of Physical Education	41	14.14
	School of Marxism	22	7.59
	Basic Education Department	11	3.79

	Mental Health Center	2	0.69
Total		290	100.00

Hypothesis Testing

1. Current status of teachers' information literacy

The overall mean score of information literacy among teachers at Zhengzhou Technology and Business University is 4.16 (SD = 0.316). Among its three dimensions, information affection scores the highest (M = 4.17, SD = 0.423), followed by information skills (M = 4.16, SD = 0.440), while information cognition is relatively lower (M = 4.15, SD = 0.394), indicating a relatively high overall level of teachers' information literacy.

2. Current status of teachers' teaching competencies

Teachers demonstrate a relatively high level of teaching competence with an overall mean score of 4.32 (SD = 0.300). Professional competence ranks highest (M = 4.33, SD = 0.366), followed by instruction and evaluation, knowledge, ethics and preparation (both M = 4.32), and behavior and technology use (M = 4.31).

3. Demographic differences in information literacy

Significant differences in teachers' information literacy are found across gender ($t = -2.104$, $p = 0.036$), years of teaching experience ($F = 56.756$, $p < 0.001$), professional titles ($F = 45.540$, $p < 0.001$), and educational background ($t = -4.656$, $p < 0.001$). However, no significant variations exist across academic disciplines ($F = 0.522$, $p = 0.594$) or departments ($F = 1.453$, $p = 0.165$).

4. Demographic differences in teaching competencies

Teaching competence shows no significant gender differences ($t = -1.496$, $p = 0.136$). Significant disparities are identified in terms of years of teaching experience ($F = 115.090$, $p < 0.001$), professional titles ($F = 69.433$, $p < 0.001$), and educational background ($t = -3.671$, $p < 0.001$). In contrast, academic disciplines ($F = 0.311$, $p = 0.733$) and departments ($F = 1.554$, $p = 0.129$) do not lead to significant differences in teaching competencies.

5. Correlation between information literacy and teaching competencies

Correlation analysis confirms a significant positive relationship between overall information literacy and teaching

competencies ($r = 0.773$, $p < 0.01$). The three dimensions of information literacy (information cognition, information skills, information affection) are significantly positively correlated with overall teaching competence ($r = 0.553$, 0.561 , 0.636 respectively, $p < 0.01$). Dimensions of information literacy show moderate mutual correlations ($r = 0.341$ – 0.365) and high correlations with overall information literacy ($r = 0.731$ – 0.773). All dimensions of teaching competence are strongly correlated with overall teaching competence (instruction and evaluation: $r = 0.930$; knowledge, ethics and preparation: $r = 0.895$; professional competence: $r = 0.827$; behavior and technology use: $r = 0.764$, all $p < 0.01$).

Discussion

This study's empirical findings closely link to its conceptual framework by verifying how demographic variables (gender, teaching experience, professional title, educational background, discipline and department) shape the three-dimensional construct of information literacy (information cognition, information skills, information affection), which in turn significantly positively predicts the four-component structure of teaching competence (instruction and evaluation, knowledge ethics and preparation, professional competence, behavior and technology use); consistent with prior relevant theories and scholarship, the results validate the rationality of the proposed framework by confirming significant demographic disparities in core competency dimensions and strong inter-dimension correlations between information literacy and teaching competence.

Teachers at Zhengzhou Technology and Business University generally demonstrate high levels of both information literacy and teaching competencies, indicating that they are well-prepared to meet the demands of educational digitalization. Information literacy has been effectively transformed into teaching practice, supporting instructional design, classroom implementation, and professional development. This finding is consistent with Harris & Hofer (2021), who emphasized that the integration of information skills into curriculum design enhances teaching effectiveness, and also aligns with Tondeur et al. (2022), who highlighted information literacy as a fundamental basis for the development of teaching competence.

The analysis of demographic variables shows that teaching experience, professional title, and educational background significantly influence teachers' information literacy and teaching competencies, while gender, discipline, and department have limited impact. Teachers with longer teaching experience, higher professional titles, and higher academic qualifications demonstrate stronger capabilities in both information application and teaching practice. This is in line with Voogt et al. (2023), who argued that accumulated professional experience enhances teachers' practical and innovative abilities, and Zhang & Liu (2022), who confirmed the important role of professional title in promoting teachers' instructional innovation and professional development.

The findings also confirm a significant positive relationship between information literacy and teaching competence. The various dimensions of information literacy jointly contribute to teaching competence, with teachers' attitudes and engagement toward information playing a particularly important role. This is consistent with Wang et al. (2022), who found strong interconnections among dimensions of information literacy, and Zhou & Li (2023), who emphasized that teaching competence is a multidimensional construct requiring integrated development. Furthermore, this result supports Borko et al. (2022), who highlighted the critical role of teachers' beliefs and attitudes in facilitating the integration of information skills and promoting pedagogical innovation.

4. CONCLUSION

This study confirms that teachers demonstrate relatively high levels of both information literacy and teaching competence, indicating a strong capacity to respond to the ongoing process of educational digitalization. Teachers are generally able to integrate information-related knowledge, skills, and attitudes into teaching practice, thereby supporting instructional design, classroom delivery, and continuous professional growth.

The findings further reveal that teaching experience, professional title, and educational background are key factors influencing both information literacy and teaching competence. Teachers with more experience, higher academic qualifications, and advanced professional titles tend to exhibit stronger

capabilities in information application and pedagogical practice. In contrast, gender, academic discipline, and departmental affiliation show no significant differences, suggesting that these competencies are relatively consistent across different subject areas and organizational contexts. The study identifies a strong positive relationship between information literacy and teaching competence. The various dimensions of information literacy jointly contribute to the development of teaching competence, with teachers' attitudes and engagement toward information playing a particularly important role. This highlights that information literacy is not only a technical skill set but also a comprehensive construct that underpins effective teaching.

5. RECOMMENDATIONS

1. Higher Education Institutions Should Establish a Systematic Information Literacy Training System.
2. Universities Should Refine Incentive Mechanisms for Promotion and Academic Advancement
3. Universities Should Promote Interdisciplinary Collaboration and Teaching Innovation Practices
4. Higher Education Institutions Should Strengthen the Development and Application Support of Digital Teaching Resources

6. STUDY IN FUTURE

Future research can expand the sampling scope beyond Zhengzhou Technology and Business University to include multiple types of higher-education institutions and regions, adopt longitudinal research designs to track dynamic changes in teachers' information literacy and teaching competence over time, and further explore potential mediating or moderating factors such as institutional support and digital training quality, so as to deepen understanding of the internal mechanisms linking information literacy to teaching competence and provide more targeted strategies for improving university teachers' professional development in the digital era.

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