THE IMPACTS OF DIGITAL TRANSFORMATION ON COLLEGE TEACHERS' COMPETENCIES IN EDUCATIONAL TECHNOLOGY

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ABSTRACT

Introduction: This study attempts to analyze the problems of teachers' educational technology competence in Chinese higher education under igital transformation, and to provide theoretical support for the future development of university teachers as well as the digital transformation of universities. **objectives:** 1) to assess the competency level of university teachers in utilizing educational technology tools. (2) To identify the key factors affecting university teachers' ability to effectively integrate technology in their teaching. (3) To provide suggestions and strategies for improving the educational technology competence of university teachers. **Method:** This study used a questionnaire to survey college teachers in Sichuan Province, and 520 people were randomly selected as the survey sample. **Resultes:** Content Knowledge (CK) .108 .083.113 1.293 .016 Through regression analysis, it was found that Technological Pedagogical Content Knowledge (Technological Knowledge, Pedagogical Knowledge (Blended Learning, Gamification, Learning Analytics), and Content Knowledge) on the dependent variables: Educational Digital Transformation, Resulte Teaching Effectiveness, Student Learning Outcomes Conclusion: Strengthening top-level design and improving strategic planning for Education Digital Transformation at the national, university, and college teacher levels; Boosting the Educational Technology Capacity of College Teachers with a New Digital Ecological Environment; Promote the training of college teachers' educational The main objective of this project is to improve the quality of education and the quality of the teaching profession, and to improve Conclusion: the quality of the teaching profession by providing a better quality of teaching and learning; Strengthening their own subjective initiative and improving their self-learning and development ability.

Keywords: Digital Transformation in Education; TPACK Framework; Educational Technology Competence

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1. INTRODUCTION

Advances in digital technology are driving the transformation of higher education, (Kotorov, Krasylnykova, Mazzara, & Bobrov 2024,) changing the way students learn and the way colleges and universities deliver their programs. (Aithal, & Aithal, 2023) There is a growing demand for more flexible modes of learning, particularly online learning, driven by the need for distance learning and the ubiquity of mobile access to information.The popularity of COVID-19 has accelerated the use of digital technologies in higher education and the use of online learning is becoming more prevalent in colleges and universities around the world (Sutton & Douglas, 2022)

In China, the government has launched a number of initiatives to encourage the integration of digital technology into Educational Technology, (Bai, et al., 2022) including the program "Promoting the Development of World-Class Universities and World-Class Disciplines." This program provides substantial support for the development and adoption of online courses and other digital educational resources with the aim of improving the quality and accessibility of education in China.

Despite the potential benefits of digital technologies in higher education, (Ahong & Mahamud, 2022) significant challenges remain in successfully integrating them into traditional teaching and learning environments. In particular, some university faculty are reluctant to adopt digital technologies, either because they lack the Pedagogical knowledge and skills to teach with digital technologies or because they are resistant to change. (Almaiah, et al., 2022) Other faculty may not have adequate access to technology or support to implement digital technologies in their teaching. These barriers need to be addressed to ensure that digital transformation can be implemented effectively and the benefits of digital technology are realized in higher education (Zaoui & Souissi, 2020)

This paper will explore some of the key challenges faced by college and university teachers in adapting to the digital transformation and analyze some of the best practices and strategies to overcome these barriers. By exploring these issues, this paper seeks to contribute to the ongoing conversation about the role of Digital Transformation in Higher Education and the challenges faced by university faculty in adapting to this new educational environment.Research RationaleThe current study seeks to contribute to this area of research by examining the reform and innovation of college teachers' educational technology under the digital transformation of higher education context. By investigating the challenges and opportunities that teachers face when adopting and utilizing educational technology effectively,

The findings of this study will help advance knowledge about pedagogical approaches and strategies that can enhance university faculty's knowledge and skills in teaching with technology and improve teaching and learning in Chinese higher education. By identifying contextual factors that influence faculty adoption and use of educational technology, this study aims to provide practical recommendations and implications for policymakers, educators, and researchers interested in digital transformation and innovation in higher education.

2. OBJECTIVES

1. To assess the competency level of university teachers in utilizing educational technology tools.

2. To identify the key factors affecting university teachers' ability to effectively integrate technology in their teaching.

3. To provide suggestions and strategies for improving the educational technology competence of university teachers

3. METHODOLOGY

the factors influencing the digital transformation on the educational technology competence of higher education teachers. And, based on the collected results, actionable recommendations were made. The online questionnaires included a report of the reliability/validity testing process and path analysis as specified using SPSS/AMOS. The time period for collecting research data 14-4-2024 to 1-9-2025 month and year population and sample The respondents and samples of this study mainly centered on teachers in colleges and universities in Sichuan Province, China. The survey involves teachers of various majors in colleges and universities in Sichuan Province. A sample of 520 teachers from the teachers of universities in Sichuan Province were selected for the questionnaire survey data collection

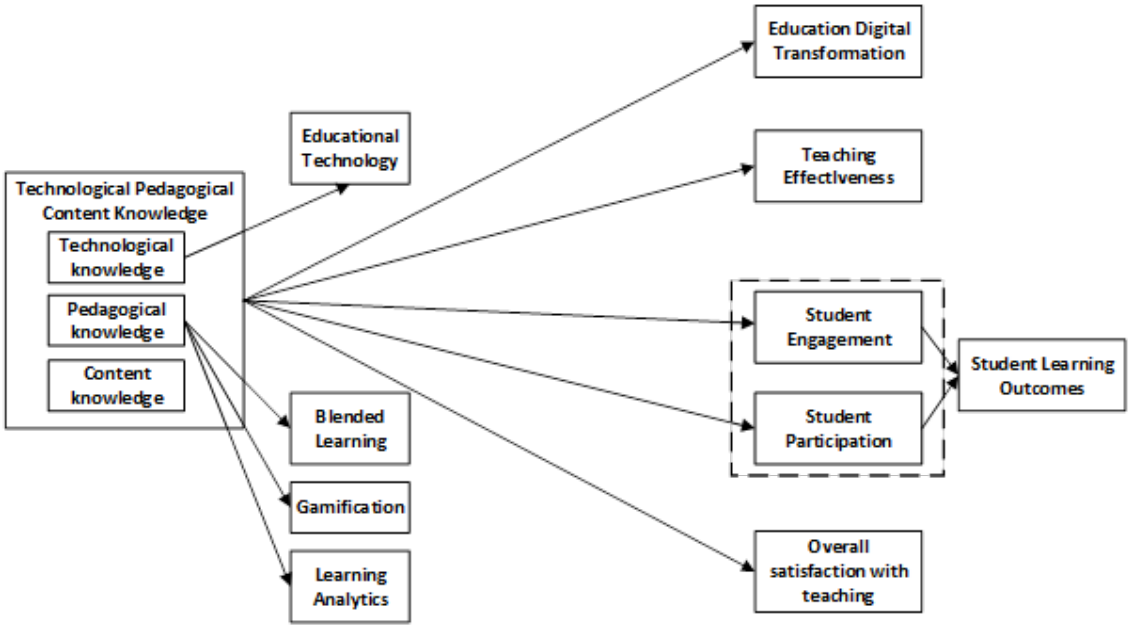
The data collection for this study utilized the Questionnaire Star platform to distribute questionnaires to the teachers, which were distributed and recovered in order to obtain the appropriate data. A total of 520 questionnaires were distributed and 520 were recovered. Among them, 507 questionnaires were valid, with a validity rate of 97.5%.

The questionnaire was referred to the Questionnaire on Teachers' Knowledge of Subject Teaching by Integrating Intelligent Technology (2022) prepared by Yang. The questionnaire was divided into two parts. First, the basic and professional information of the respondents was collected, including gender, age, years of teaching in higher education, and education level. Second, a five-point scale was used to rate the influencing factors affecting teachers' educational technology competence.

4. CONCEPTUAL FRAMEWORK

Figure 1

Conceptual Framework



5. HYPOTHESE

The digital transformation of Chinese higher education has brought significant challenges and opportunities for college teachers in adopting and utilizing educational technology. The following hypotheses have been formulated based on the literature review and analysis of the data collected through interviews and surveys.

6. METHODOLOGY

1. data analysisIn

order to carry out the research on the reform and innovation of educational technology for college teachers in the context of digital transformation of higher education, the reliability and validity of the questionnaire data, descriptive statistical analysis, and path analysis were carried out in conjunction with SPSS and AMOS software as a means of analyzing the reliability and validity of the data, as well as the interpretive significance of the data presented.

2. scope of the study

Based on the regional limitation of the research topic, the scope of the study was strictly limited and the sample area was distributed. Based on the authors' own ability and the social resources that can be allocated within the scope, the sample collection was limited to universities in Sichuan Province.

7. RESULTS

There are findings from research as follows.

1) Demographic information of the respondents is shown in Table 1

Table 1

Respondents' demographic information

Items	clusters	Number of cases/N	Composition ratio/%
Gender	Male	241	47.5
	Female	266	52.5
Age	Below 35 years old	53	10.5
	35-45 years old	205	40.4
	Above 45 years old	249	49.1
Academic rank	College or below	69	13.6
	Bachelor's degree	109	21.5
	Master's degree	184	36.3
	Doctor's degree	145	28.6
Job Title	Assistant Professor	45	8.9
	Lecturer	126	24.9
	Associate Professor	220	43.4
	Professor	116	22.9
Number of	1-3 years	22	4.3
years teaching	4-5 years	116	22.9
in higher	6-10 years	176	34.7
education	More than 10 years	193	38.1

Table 1 reveals that among all the respondents, the percentage of males among the 507 university teachers was 47.7%, and the percentage of females was 52.3%, with the highest number of people aged 45 years old and above, 249, or 49.1%. In terms of education, master's degree accounted for the highest proportion of 36.3%, followed by doctoral degree at 28.9%, bachelor's degree at 21.5%, and junior college and below at 13.6%. In terms of titles, associate professors accounted for the highest percentage of 43.4%, followed by lecturers with 24.9%, professors with 22.9%, and assistant professors with 8.9%. In terms of the length of time teaching, 10 years or more accounted for the highest percentage of 38.1%, followed by 6-10 years with 34.7%, 4-5 years with 22.9%, and 1-3 years with 4.3%. See the table below for details.

Current Factors Affecting the Educational Technology Competence of College Teachers

The impact of digital transformation on educational technology in higher education has been immense and far-reaching. It has changed the way students learn and teachers teach, leading to a more engaging and immersive learning experience. In order to keep pace with digital transformation, higher education teachers need to adopt new technologies and innovative approaches to educational technology to ensure that students receive a high quality education and are prepared to meet the challenges of the digital age. This study analyzes the current factors affecting the educational technology competence of college teachers through literature research and questionnaire survey methods. It was found that the main factors affecting the educational technology competence of college teachers are technology knowledge, pedagogical knowledge, and content knowledge.

Table 2

Total score of questionnaire results and scores of each dimension ($\bar{x} \pm s$)

Items	Number of entries	Score range	Total score	Average score of entries	Sort by
Total Questionnaire Score	52	52-225	135.296±35.883		
Technological Pedagogical Content Knowledge (TPACK)	4	4-20	10.667±4.006	2.667±1.001	3
Technological knowledge (TK)	4	4-20	9.639±4.110	2.410±1.027	12
Pedagogical knowledge (PK)	4	4-20	11.525±3.757	2.881±0.939	1
Content Knowledge (CK)	4	4-20	10.529±3.757	2.632±0.991	4
Blended Learning (BL)	4	4-20	10.225±4.087	2.556±1.022	8
Gamification (GA)	4	4-20	10.308±4.207	2.577±1.052	7
Learning Analytics (LA)	4	4-20	11.371±4.273	2.843±1.068	2
Education Digital Transformation (EDT)	4	4-20	10.402±4.062	2.601±1.016	5
Teaching Effectiveness (TE)	4	4-20	10.389±4.129	2.597±1.032	6
Student Learning Outcomes (SLO)	4	4-20	9.641±3.937	2.410±0.984	13
Student Engagement (SE)	4	4-20	10.179±3.763	2.545±0.941	9
Student Participation (SP)	4	4-20	10.103±3.768	2.526±0.942	10
Overall satisfaction with teaching (OST)	4	4-20	9.842±3.885	2.461±0.971	11

Table 2 reveals that all the factors have little effect on teachers' competence in educational technology.

In this study, SPSS software was used to analyze the independent variables: Technological Pedagogical Content Knowledge (TPACK) (Technological Knowledge (TK), Pedagogical Knowledge (PK) (Blended Learning (BL), Gamification (GA), Learning Analytics (LA)), and Content Knowledge (CK)); and the dependent variables: Educational Digital Transformation (EDT), Teaching Effectiveness (TE), Student Learning Outcomes (SLO)), Student Engagement (SE), Student Participation (SP), and Overall satisfaction with teaching (OST) were analyzed by regression.

8. DISCUSSION

Education Digital Transformation in Higher Education to be Improved. The digital transformation of higher education teaching is not only reflected in the teaching itself, but will also challenge the physical form of the existing universities as well as the mode of operation. From the physical form, the future boundaries between universities will be completely broken, the traditional walls will no longer exist; from the operational model, schools and schools, schools and the whole elements of society are interconnected with each other, to achieve the sharing of resources in terms of faculty, curriculum, facilities, services and other aspects of the utilization of social resources to the greatest extent possible. Information technology for education and teaching reform still sticks to the existing education system, and optimization is still done within the original framework of schools, professions, courses and teaching; on the other hand, the "technology theory" has dominated education informatization for a long time, and the lack of corresponding capacity building and management system updating of the new technology has led to poor application results, and the effectiveness of the return on investment has been questioned, making it difficult to On the other hand, "technology theory" has dominated education informatization for a long time. How to smoothly realize digital transformation based on the existing higher education teaching system has undoubtedly become a major challenge. Higher education policymakers, managers of educational institutions, researchers and practitioners should jump out of the limitations of the thinking that "technology empowers education and teaching in the industrial society" and "the digital transformation of education is only limited to the perspective of education", and they need to look at education from outside of education, and have a deep understanding of the transformation of the higher education system from the industrial era to the digital transformation of the education system. They need to look at education from a different perspective, deeply understand the nature of the transformation of the higher education system from the industrial era to the digital era, understand the relationship between higher education and other systems such as society, economy, politics and technology, and work together to formulate a vision and path for the digital transformation of higher education reflecting the concerns of all parties, and to integrate the resources and services of other areas of society based on cyberspace to promote systemic changes in higher education.

9. RESEARCH RECOMMENDATIONS

Teaching and learning in the digital age require innovations in educational approaches. Educational technologies have the potential to enhance teaching and learning, but their successful implementation depends largely on the role of teachers. Teachers are the primary enablers of educational technology and their role is critical to the successful adoption and integration of technology in the classroom. As higher education is undergoing a digital transformation, the use of educational technology has become an integral part of the modern classroom. In order to effectively integrate technology into the teaching and learning process, teachers must adapt to new methods and tools. In order to support the implementation of educational technology, colleges and universities must implement reform strategies to optimize their use of technology in the classroom. However, the process of digital transformation has yet to be perfected in higher education; the lack of adoption and utilization of educational technology competencies by higher education teachers has also led to problems such as poor student learning and low motivation to participate in the classroom, making the digital transformation of colleges and universities face obstacles. Based on this, this paper proposes these strategies to seek better solutions to meet the needs of college teachers to improve their educational technology competence, and to improve students' learning.

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