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Exploring University Teachers' Perceptions of Metaverse Integration in Higher Education: A Quantitative Study from China

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***Abstract*—Understanding these perceptions is crucial for successful adoption and implementation, particularly in the context of higher education institutions in Jiangsu Province, China, as little is known about university teachers' perceptions of these technologies and their potential applications in educational settings. This study employed a quantitative research approach, collecting data through a questionnaire sent to 389 university teachers from institutions offering Bachelor's programs. The data were analyzed using SPSS 26, applying statistical techniques such as independent sample t-tests, Analysis of Variance (ANOVA), and factor analysis to examine the influence of demographic variables on teachers' perceptions. The analysis revealed that demographic factors, including teachers' age, academic qualifications, years of teaching experience, and attitudes toward new educational technologies, significantly influenced their perceptions of the application of Metaverse technologies in higher education. The findings contribute to the growing body of knowledge on technology acceptance in educational contexts and offer practical implications for policymakers and educators aiming to integrate innovative technologies into teaching and learning practices.**

Keywords*— *University teachers, Metaverse, Perception of Metaverse, Higher education

I. INTRODUCTION

Since 2021, Metaverse has become the focus of the global technology community, with major technology companies joining the Metaverse industry by establishing Research and Development departments, acquiring unicorn companies in Metaverse-related industries, and investing in Metaverse companies. At the same time, there has been a surge of academic research on Metaverse-related theories. The rapid development of network technology, human-computer interaction, and artificial intelligence has given birth to Metaverse and further promoted the digital transformation of all aspects of people's material lives [1].

Metaverse has been used for various purposes, including social networking, online gaming, education, and training. It can be used to create virtual worlds that mirror the real world, or it can be used to create entirely new and imaginary worlds. According to academics, one of the most important uses of Metaverse will be in education in the future [2], though Metaverse is still a new concept in the field of education. Metaverse in education can be thought of as an upgraded educational environment that combines components of the real and virtual educational environments with Metaverse-related technologies, which has enabled students to feel engaged as if they are in a real-world educational environment as a result. From this vantage point, it is clear that integrating Metaverse into education can open up a wide range of amazing learning opportunities for students [2]. This is because Metaverse can create a new educational environment [3] that combines elements of the virtual and physical educational environments. Thus, because of Metaverse, educational institutions will be able to provide students and staff with a 360-degree experience and, of course, will be much more flexible and adaptable to unforeseen circumstances [4].

Metaverse has not yet received widespread attention from educational researchers in China since June 2022; using China National Knowledge Infrastructure as the data source, a total of 372 papers with "Metaverse" as the keyword were retrieved, among which papers on the educational Metaverse accounted for approximately 10% [5]. How to integrate deeply into the educational teaching process remains an important proposition in educational research. An important prerequisite is the university teachers' perceptions of Metaverse as well as their acceptance of Metaverse and its related technologies used in their learning and teaching settings. This paper is intended to explore university teachers' perceptions of Metaverse and conduct a questionnaire survey on the current situation and development needs of Metaverse applied in higher education institutions taking teacher groups in Jiangsu, China, as the research sample. This study explores an important yet under-researched area by examining university teachers' perceptions of Metaverse technologies in higher education. By adopting a quantitative approach and focusing on Jiangsu Province, the research offers a unique perspective, particularly through its analysis of demographic factors influencing these perceptions. The findings contribute to the understanding of technology acceptance in educational settings and offer practical insights to support the integration of Metaverse technologies in higher education, both within China and internationally.

II. LITERATURE REVIEW

In 2021, Metaverse became an international buzzword and thus became known as the Year of Metaverse. In recent years, information technology has been fully applied in education, and the integration of technology and education has become increasingly close; however, problems such as insufficient

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interactivity and contextualization in online teaching, poor interaction between teachers and students in offline teaching, and incomplete recording of learning data have still not been effectively addressed. Metaverse is a comprehensive integration of information technology, depicting a panoramic view of the vision of the future information technology revolution. The emergence of Metaverse has naturally become a topic of lively discussion in the field of education. It is important to analyze academic research on Metaverse and to explore its application in the field of education to provide a reference for future reform and innovation in higher education.

The use of Metaverse in numerous fields is growing in popularity because of the potential advantages it offers. Teachers of different levels have shown interest in the application of Metaverse or its enabling technologies in their teaching activities. Mustafa found that teachers have a strong interest in Metaverse, though their knowledge of it is low, and that the majority of them are aware of the potential for using Metaverse in the classroom and for educational purposes [6]. According to Aydin, EFL (English as a Foreign Language) teachers primarily have favorable attitudes toward using Metaverse as a setting for teaching and studying foreign languages and that comparatively, to individuals with MA and Ph.D. degrees, BA holders were more optimistic about the value of Metaverse for comprehending ideas and expressing opinions [7].

For teachers, the knowledge, attitude, and awareness scores of male and female teachers on the concept of Metaverse do not differ significantly. Compared to teachers younger than 31 and older than 40, teachers between the ages of 31 and 40 expressed greater confidence in their ability to use Metaverse in their lesson plans to achieve specific learning objectives [8].

Researchers have also studied what factors have played mediating roles in the teachers' perceptions of the application of Metaverse in education.

- **Perceived Ease of Use (PEU)**. The degree to which people believe their productivity will increase and they will exert less effort when utilizing the technology in issue is referred to as perceived ease of use [8]. Teachers' attitudes about using AI technologies to help teaching are positively influenced by their PEU [9].
- **Perceived Usefulness (PU).** The extent to which users believe they will benefit and perform better as a result of using the technology in question is known as perceived usefulness [10]. According to [11], teachers' PU toward applying AI technologies to support teaching are positively affected by their perceived ease of use.
- **Self-Efficacy (SE)**. Self-efficacy is a term used to describe one's assessment of one's own technological proficiency [12]. According to [13], teachers' attitudes toward implementing particular technologies in the classroom are typically influenced indirectly by their SE. The SE of university teachers would improve their perceptions of usability and usefulness while incorporating AI technology into instruction was less of a concern for teachers who had greater SE [14].

Other variables that may influence the perception and application of Metaverse and its enabling technologies in education include effort expectancy, facilitating conditions [15], perceived enjoyment, and perceived cyber risks [16], perceived benefit, readiness [17], perceived complexity, perceived ubiquity, perceived value [18], and trialability, observability, compatibility, and users' satisfaction [19].

Scholars also conducted quantitative and qualitative research to explore the relations between variables of university teachers' understanding of using Metaverse or Metaverse-related technologies in higher education. Teo noted that ATU (Attitude towards AI) was influenced by the interplay of PU (Perceived Usefulness), PEU (Perceived Ease of Use), and subjective norms, which in turn encouraged teachers to use technology [20].

The effectiveness of using Metaverse in education depends on teachers' attitudes and perspectives as well as their knowledge of it. As they have become increasingly aware that it is helpful to apply Metaverse to education, this research is designed to make a quantitative study of how university teachers perceive Metaverse and its application in higher education based on literature.

A. Significance of the Study

Metaverse has now gained great attention since 2021 and has been applied in various fields. Scholars started to conduct research on the application of this technology in higher education. Much of the research has focused on opportunities, challenges, possible risks, and limitations of Metaverse in higher education [21-24]. They also focused on factors affecting the application of Metaverse in universities and colleges and the specific application of Metaverse in certain disciplines, including social science, medical science, and Engineering [25-28]. A greater number of research has been done concerning the United States [29, 30], the United Kingdom [31], Japan [32-34], South Korea [35, 36], Brazil [37], Spain [38], and China [39]. In terms of research objects, researchers have conducted research concerning university teachers' readiness for Metaverse, and sustainable learning of teachers. The research objects of this research are university teachers who had experiences with Metaverse-related technologies applied in their teaching and learning in Nanjing, Jiangsu Province, where new technologies in higher education have been attached great importance to and are supported by students and teachers, as well as administrations.

B. Research Limitations

This research has contributed to understanding Metaverse applied in higher education in China's context, but it still has several limitations. The specific target populations of this study are full-time teachers teaching undergraduate students in only a province in China instead of nationwide. The sample size for this research, 389 teacher respondents out of 120,236 full-time teachers, is adequate rather than large enough, which fails to provide enough statistical power to detect meaningful differences. Besides, this study has adopted a questionnaire concerning university teachers without integrating qualitative data; therefore, essential questions ---- the WHY questions or HOW questions, for example ---- may remain unanswered or unexplored.

III. Research Methods

This paper will use quantitative research methods. Quantitative research uses sampling techniques to gather statistically meaningful data from current and future clients [40].

A. Determination of Sample Size

A substantial sample size that accurately represents the target market is used when conducting quantitative research. The specific target populations of this study are full-time teachers teaching undergraduate students in Jiangsu Province. According to the statistics from the Jiangsu Bureau of Statistics (2023), there were 116,615 full-time teachers in 2021 and 123,856 full-time teachers in 2022 in Jiangsu Province, as shown in Table I. An average number of the two years was used to calculate the sample size.

Table I. Numbers Of Undergraduate Students And Teachers In Jiangsu Province In 2021 And 2022 (Jiangsu Bureau Of Statistics (2023))

Year	Full-time Teachers
2021	116,615
2022	123,856
Average	120,236

To determine the sample size for the large population proportion, Cochran created equation (1) [41]. Large populations are best suited for the Cochran formula, which determines the critical sample size for the necessary degree of precision, confidence level, and estimated fraction of the attribute present in the population [42].

$$n_0 = \frac{z^2 \cdot p \cdot (1-p)}{e^2} \quad (1)$$

Where e = Margin of error (percentage in decimal form); p = population proportion (assumed as 50% or 0.5); and z = z-score.

$$n = \frac{n_0}{1+\frac{n_0-1}{N}} \quad (2)$$

Where n_0 = sample size computed using the formula for ideal sample size, and N = the size of the population.

The sample size for the teachers' scale is 384 when z = 1.96, p = 0.5, e = 0.05, and N = 120,236. This research found that 389 questionnaires for the teachers' scale were usable. The completed forms were transcribed into the Statistical Package of Social Science 26 (SPSS).

The results of this study are most applicable to regions with similar technological and institutional contexts with Jiangsu Province, a leader in economic and educational development, but may not fully capture the diversity of experiences and attitudes across China or in other countries.

B. Data Collection

Another critical component of quantitative research is using closed-ended questions that are especially created to support the study's goals. In research, a questionnaire is a formal collection of inquiries intended to elicit participant data. It is employed to gather quantitative or qualitative information about participants' beliefs, actions, or traits [40]. The questionnaire designed in this research, "A Study on the Perception of College Teachers regarding the Application of Metaverse in Education", consists of 49 questions, focusing on investigating college teachers' understanding of the application of Metaverse in higher education and their utilization of Metaverse technology in teaching. The questionnaire was structured to integrate original and literature-based questions seamlessly. 12 original questions were designed to capture specific aspects of the research that were not addressed in existing literature. To ensure the reliability and comparability of the data, the other questions were adapted from validated scales found in the literature. For example, questions 16 and 41 were taken from [43].

The questionnaire includes two sections. Section 1 concerns demographic variables for the respondents' backgrounds; Section 2 was designed with 49 closed-ended questions on a 5-point Likert scale, anchored from 1 (strongly disagree) to 5 (strongly agree).

To distribute the data collection instruments via the Internet, invitations were sent to potential participants via email through Wenjuanxing (www.wjx.cn), an online survey tool that allows users to create, publish, and analyze surveys in China.

IV. Results And Findings

A. Analysis of Descriptive Statistics

Description statistics offer concise descriptions of the sample and the observations that have been recorded. These summaries could be sufficient for a specific investigation or serve as the foundation for the initial data description in a more thorough statistical analysis [44].

Table II, Table III, and Table IV show teacher respondents' statistics. As is shown in Table IV.1, the sample showed a more significant number of female (240) than male (149) respondents, representing a ratio of 61.70% and 38.30%, respectively. This gender imbalance reflects the broader teaching workforce in Jiangsu Province. The majority of respondents (54.8%) were aged 40-49 years, 21.60% were aged between 30-39 years old, accounting for the majority of the sample, while 15.40% of the respondents were over 50 years old, and only 8.20% were under 29 years old.

Table II. Frequency Of Teachers' Gender And Age (N=389)

Category	n	%
Gender		
Male	149	38.30%
Female	240	61.70%
Age		
under 29 years old	32	8.20%
30-39 years old	84	21.60%
40-49 years old	213	54.80%
Over 50 years old	60	15.40%

According to Table III, Most respondents hold the title of Lecturer (35.0%) or Associate Professor (29.0%), indicating a balanced representation of mid-level academic staff. A slight majority of respondents (54.8%) hold a Master's degree, while

45.2% have a Doctorate, suggesting a highly educated sample. Over half of the respondents (51.9%) work in regular colleges or universities, while fewer are affiliated with prestigious ‘Double First-Class’ institutions (15.4%).

TABLE III. BACKGROUND INFORMATION OF THE TEACHER RESPONDENTS (N=389)

Category	n	%
Professional Rank and Title		
Professor	78	19.5%
Associate Professor	113	29.0%
Assistant Professor	44	11.3%
Lecturer	136	35.0%
Highest Academic Qualification		
Doctor	176	45.2%
Master	213	54.8%
Higher Educational Institutions They Work with		
‘Double First-Class’ Educational Institutions	60	15.4%
Educational Institutions with ‘Double First-Class’ Disciplines	127	32.6%
Normal Colleges or Universities	202	51.9%
Years of Teaching		
0-5 years	42	10.8%
6-10 years	39	10.0%
11-15 years	87	22.4%
16-20 years	138	35.5%
Over 21 years	83	21.3%
0-5 years	42	10.8%

Note. ‘Double First-Class’ educational institutions refer to universities or colleges in China that are part of the *Double First-Class Initiative*, a national strategy launched by the Chinese government in 2015. The initiative aims to develop a group of world-class universities and disciplines by improving the quality of higher education and research in China (Minister of Education).

Table IV shows how teacher respondents were familiar with Metaverse-related technologies. Teachers are most familiar with Virtual Reality (55.3%), followed by Artificial Intelligence (47.8%) and the Internet of Things (47.6%). Familiarity with Metaverse technology is relatively low (36.5%), indicating that while some teachers are aware of the concept, it is not yet widely understood or adopted. Emerging technologies like Blockchain (15.9%) and GameFi (14.7%) have the lowest familiarity, suggesting a need for further training.

TABLE IV. TEACHERS’ FAMILIARITY WITH METAVERSE-RELATED TECHNOLOGIES

Technology	Very Familiar + Familiar (n=389)
VR (Virtual Reality)	215 (55.3%)
AI (Artificial Intelligence)	186 (47.8%)
IoT (Internet of Things)	185 (47.6%)
Metaverse	142 (36.5%）
AR (Augmented Reality)	98 (25.2%)
Digital Twins	80 (20.6%)
Cloud computing	74 (19.0%)
High-performance computing	70 (18.0%)
Blockchain technology	62 (15.9%)
Gamefi	57 (14.7%)

B. Exploratory Factor Analysis (EFA)

The researcher intends to determine the number of factors of university teachers’ perception of Metaverse. The main objectives of EFA include reducing the number of variables, examining the structure or relationship between variables, detecting and assessing the unidimensionality of a theoretical construct, and evaluating the construct validity of a scale, test, or instrument [45]. The suitability of the respondent data for factor analysis should be evaluated using several tests before the factors are extracted. Bartlett’s Test of Sphericity [46] and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy [47] are two examples of these tests. When the cases-to-variable ratio is smaller than 1:5, the KMO index, in particular, is advised. The KMO index ranges from 0 to 1, with a value of 0.50 being appropriate for factor analysis. To be appropriate, factor analysis requires a substantial ($p<0.05$) Bartlett’s Test of Sphericity [48, 49]. Factor analysis helped the researchers identify the main constructs (e.g., benefits, effectiveness, challenges) that define teachers’ perceptions. This analysis provided a deeper understanding of how teachers conceptualize Metaverse technologies and their applications in higher education, aligning with the study’s goal of exploring perceptions in a systematic and data-driven manner.

The KMO Measure of the Sampling Adequacy coefficient is .97, the sample size is good enough for factor analysis, and Bartlett’s Test of Sphericity is significant (Chi-square = 16689.64, $p = .00 < .05$) confirmed that the data has patterned relationships. Ten questions were eliminated from the study as factor loadings and eigenvalues were used as the relationship between the factors and the research questions is very weak, and the factors cannot effectively extract information from them. Then, a Varimax rotation was applied to achieve a simpler and more interpretable factor structure, assuming that the factors are uncorrelated. The Varimax rotation model was fit to three factors as after rotation, the factor loadings revealed a clear structure, with each item loading strongly on a single factor and minimal cross-loadings. Three factors have been extracted, and 45.26% of the item variance was accounted for by factor 1, 15.73% by factor 2, and 9.45% by factor 3. 3 variables together account for 70.44% of the variation.

The removed questions are 7 (Metaverse educational platforms provide sufficient safety measures that make me feel at ease while using them for educational purposes.), 8 (I have no concerns that Metaverse educational platforms will distribute my data without my permission.), 17 (I appreciate the realism of the virtual environment (avatars and scenery) on Metaverse.), 19 (Access to Metaverse platforms can be expensive.), 33 (Metaverse educational platforms enhance the quality of my student’s learning.), 36 (Using Metaverse in education makes my students’ learning easier.), 38 (When Metaverse platforms used, my students feel fully engaged in the learning process and can experience it with all their senses.), 43 (Metaverse educational environments increase my students’ motivation to learn.), 44 (I believe that my students are ready for Metaverse in education.), 45 (I believe that my school is ready for Metaverse in education.), and 47 (My students can benefit more from Metaverse education than traditional education because the former is more flexible for them.).

The results of factor analysis on teachers’ perception of Metaverse in education are presented in Table V.

A measurement’s consistency is evaluated by reliability. A measurement instrument’s internal consistency and credibility can be evaluated using a variety of metrics. Cronbach’s alpha [50] was utilized to assess each factor’s reliability. If a factor’s

Cronbach alpha is at least 0.70, it is regarded as dependable. The scale of Cronbach's alpha for Teachers' Perception of the Metaverse in the Education dimension is 0.97, both indicating a high reliability.

TABLE V. FACTOR ANALYSIS RESULTS

Variables and Measurement Items	*Factor Loading*	*Cronbach's Alpha*
Benefits of Metaverse		0.98
BOM 1	0.764	
BOM 2	0.739	
BOM 3	0.712	
BOM 4	0.764	
BOM 5	0.791	
BOM 6	0.770	
BOM 7	0.807	
BOM 8	0.793	
BOM 9	0.634	
BOM 10	0.777	
BOM 11	0.638	
BOM 12	0.630	
BOM 13	0.653	
BOM 14	0.711	
BOM 15	0.712	
BOM 16	0.728	
BOM 17	0.716	
BOM 18	0.641	
BOM 19	0.664	
BOM 20	0.684	
BOM 21	0.714	
BOM 22	0.611	
BOM 23	0.633	
BOM 24	0.384	
BOM 25	0.782	
BOM 26	0.782	
BOM 27	0.753	
BOM 28	0.777	
Variables and Measurement Items	*Factor Loading*	*Cronbach's Alpha*
BOM 29	0.785	
Effectiveness of Metaverse		0.87
EOM 1	0.767	
EOM 2	0.792	
EOM 3	0.718	
EOM 4	0.550	
EOM 5	0.520	
Challenges of Metaverse		0.85
COM 1	0.783	
COM 2	0.793	
COM 3	0.674	
COM 4	0.620	

C. Comparative Analysis

The independent sample t-test compares the means of two samples from unrelated populations. This suggests that different samples are adding points to each group. By using t-tests, the researchers were able to assess whether specific groups (e.g., male vs. female teachers or Master's vs. Doctorate holders) differ significantly in their perceptions.

An independent sample t-test was run to see if gender plays a statistically significant role in teacher's understanding of Metaverse, and the results show that males and females are significantly different in their understanding of five items of the scale (Table VI). Statistics showed that female teachers (M=2.78, SD=0.83) found joining a Metaverse educational platform easier than male teachers (M=2.60, SD=0.89). It was statistically easier for female teachers (M=2.88, SD=0.94) to become skilled at using a Metaverse educational platform than male teachers (M=2.65, SD=0.94). More female teachers (M=2.40, SD=0.83) than male teachers (M=2.15, SD=0.89) assume that they will use Metaverse educational platforms. Compared with female teachers (M=3.46, SD=0.99), male teachers (M=3.74, SD=1.03) cannot distinguish the virtual world on Metaverse from the real world. Female teachers (M=2.46, SD=0.91) feel more than male teachers (M=2.22, SD=0.94) that their students could become addicted to the digital games on Metaverse. Female teachers found it easier to join and become skilled at using Metaverse educational platforms compared to male teachers. Female teachers were more likely to assume they would use Metaverse platforms in their teaching. Male teachers, however, found it harder to distinguish between the virtual and real worlds in Metaverse. Female teachers expressed more concern about students potentially becoming addicted to digital games on Metaverse.

TABLE VI. INDEPENDENT SAMPLES T-TESTS ON GENDER VS FIVE ITEMS IN THE SCALE

Item	Gender	*n*	*M*	*SD*	t-test		
					t	*df*	*p*
1	Male	149	2.60	0.89	-2.10	387	0.037
	Female	240	2.78	0.83			
2	Male	149	2.65	0.94	-2.37	387	0.018
	Female	240	2.88	0.94			
9	Male	149	2.15	0.89	-2.84	387	0.005
	Female	240	2.40	0.83			
18	Male	149	3.74	1.03	2.73	387	0.007
	Female	240	3.46	0.99			
41	Male	149	2.22	0.94	-2.48	387	0.014
	Female	240	2.46	0.91			

An independent sample t-test was run to see if the teachers' academic qualifications make a statistically significant difference. As is shown in Table VI, there are statistically significant differences for the 26 items as the p-values are less than 0.05. For items 41 and 42, teachers with a Doctor's Degree had higher mean scores than teachers with a Master's Degree. For the other 24 items, teachers with a Master's Degree had higher mean scores than teachers with a Doctor's Degree.

TABLE VII. INDEPENDENT SAMPLE T-TESTS ON ACADEMIC QUALIFICATIONS VS. 26 ITEMS IN THE SCALE

Item	Academic qualification	*n*	*M*	*SD*	t-test		
					t	*df*	*p*
4	Doctor	176	2.16	0.98	-5.897	387	0.000
	Master	213	2.74	0.95			
5	Doctor	176	2.17	1.00.	-5.985	387	0.000
	Master	213	2.77	0.99			
6	Doctor	176	2.46	0.96	-7.092	387	0.000
	Master	213	3.14	0.93			
9	Doctor	176	1.99	0.88	-6.959	387	0.000
	Master	213	2.56	0.75			
10	Doctor	176	2.12	0.95	-6.333	387	0.000
	Master	213	2.72	0.91			
11	Doctor	176	2.13	0.92	-4.805	387	0.000
	Master	213	2.56	0.86			
12	Doctor	176	1.98	0.89	-5.635	387	0.000
	Master	213	2.48	0.87			
16	Doctor	176	2.95	1.00	-2.180	387	0.030
	Master	213	3.17	0.99			
20	Doctor	176	2.06	0.87	-5.697	387	0.000
	Master	213	2.55	0.84			
21	Doctor	176	2.32	0.81	-6.471	387	0.000
	Master	213	2.86	0.84			
22	Doctor	176	2.38	0.85	-6.926	387	0.000

Item	Academic qualification	n	M	SD	t-test		
					t	df	p
	Master	213	2.99	0.88			
23	Doctor	176	2.51	0.93	-5.781	387	0.000
	Master	213	3.07	0.99			
24	Doctor	176	2.15	0.98	-6.793	387	0.000
	Master	213	2.84	1.01			
25	Doctor	176	2.15	0.95	-7.171	387	0.000
	Master	213	2.87	1.03			
26	Doctor	176	2.14	0.98	-7.052	387	0.000
	Master	213	2.87	1.04			
27	Doctor	176	2.18	1.00	-6.438	387	0.000
	Master	213	2.85	1.06			
28	Doctor	176	2.22	0.97	-6.549	387	0.000
	Master	213	2.89	1.03			
31	Doctor	176	2.32	0.81	-5.736	387	0.000
	Master	213	2.81	0.88			
34	Doctor	176	2.49	1.01	-5.354	387	0.000
	Master	213	3.05	1.04			
35	Doctor	176	2.67	1.07	-5.024	387	0.000
	Master	213	3.20	1.02			
37	Doctor	176	2.60	0.98	-5.846	387	0.000
	Master	213	3.19	1.02			
41	Doctor	176	2.48	0.90	2.140	387	0.033
	Master	213	2.28	0.93			
42	Doctor	176	2.94	0.90	3.538	387	0.000
	Master	213	2.61	0.92			
46	Doctor	176	2.42	0.94	-6.510	387	0.000
	Master	213	3.06	1.00			
48	Doctor	176	2.24	0.89	-4.425	387	0.000
	Master	213	2.63	0.87			
49	Doctor	176	2.24	0.93	-5.636	387	0.000
	Master	213	2.79	0.97			

Independent sample t-tests were run with respect to each factor of the teachers' scale. In Table VIII, Levene's test shows that p-values for all 3 Factors are greater than 0.05, and group variances are equal. There is a statistically significant difference in Doctor teachers' and Master Teachers' perception of the Benefits of Metaverse, Effectiveness of Metaverse, and Challenges of Metaverse. Master teachers have better perceptions than Doctor teachers of the Benefits and Effectiveness of the Metaverse; Doctor teachers know the Challenges of the Metaverse statistically better than Master teachers. Teachers with Master's degrees perceived more benefits and effectiveness of Metaverse, while those with Doctoral degrees were more attuned to its challenges.

TABLE VIII. INDEPENDENT SAMPLE T-TESTS ON HIGHEST ACADEMIC QUALIFICATION VS. 3 FACTORS IN THE TEACHERS' SCALE

Factor	Academic Qualification	n	M	SD	t-test		
					t	df	p
BOM	Doctor	176	2.25	0.75	-7.363	387	0.000
	Master	213	2.82	0.76			
EOM	Doctor	176	2.84	0.81	-5.008	387	0.000
	Master	213	3.25	0.82			
COM	Doctor	176	2.65	0.69	2.228	387	0.026
	Master	213	2.49	0.73			

The study aims to explore how different demographic variables, such as age and teaching experience, influence teachers' perceptions of Metaverse. ANOVA allowed the researchers to determine whether teachers with varying levels of experience or from different age groups had significantly different perceptions of the benefits, effectiveness, and challenges of Metaverse. A one-way ANOVA test was run to see if different years of teaching play a statistically significant role in teachers' perception of Metaverse and their application of Metaverse in education. In Table IX, teachers with more years of teaching experience had a statistically better understanding of Metaverse and were more adept at applying it in their teaching. This suggests that experienced teachers may have a broader perspective on the potential benefits and challenges of Metaverse technologies.

TABLE IX. ONE-WAY ANOVA RESULTS BASED ON TEACHERS' YEARS OF TEACHING

	Years of Teaching (Years) M (SD)					F	Post hoc Analysis
	(1) 0-5 (n=42)	(2) 6-10 (n=39)	(3) 11-15 (n=87)	(4) 16-20 (n=138)	(5) Over 21 (n=83)		
3	2.86 (0.95)	3.00 (0.92)	3.02 (1.01)	2.95 (0.98)	3.51 (0.76)	5.718*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
4	2.33 (1.07)	2.46 (0.88)	2.38 (0.93)	2.25 (0.89)	3.06 (1.06)	10.171*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
5	2.33 (1.07)	2.54 (0.91)	2.45 (0.99)	2.21 (0.94)	3.11 (1.04)	11.313*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
6	2.67 (0.98)	2.72 (0.92)	2.86 (0.99)	2.56 (0.94)	3.40 (0.94)	10.616*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
9	2.07 (0.84)	2.38 (0.85)	2.23 (0.76)	2.08 (0.86)	2.83 (0.76)	12.522*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
10	2.40 (1.01)	2.56 (0.91)	2.36 (0.88)	2.16 (0.94)	2.99 (0.93)	10.734*	(1)<(5) (3)<(5) (4)<(5)
11	2.19 (1.04)	2.21 (0.86)	2.39 (0.84)	2.15 (0.81)	2.84 (0.93)	8.995*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
15	2.43 (1.09)	2.54 (0.88)	2.30 (0.92)	2.14 (0.90)	2.95 (1.11)	9.449*	(1)<(5) (3)<(5) (4)<(5)
20	2.31 (0.95)	2.41 (0.79)	2.23 (0.77)	2.07 (0.87)	2.84 (0.86)	11.404*	(1)<(5) (3)<(5) (4)<(5)
21	2.50 (0.99)	2.56 (0.91)	2.59 (0.79)	2.43 (0.78)	3.05 (0.88)	7.444*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
22	2.62 (1.01)	2.69 (0.92)	2.59 (0.87)	2.52 (0.87)	3.20 (0.84)	8.631*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
23	2.79 (1.07)	2.87 (0.89)	2.67 (0.94)	2.60 (0.92)	3.31 (1.05)	7.776*	(1)<(5) (3)<(5) (4)<(5)
24	2.52 (1.09)	2.54 (1.10)	2.37 (0.97)	2.27 (0.90)	3.13 (1.10)	10.445*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
25	2.31 (1.14)	2.36 (1.01)	2.46 (1.09)	2.35 (0.92)	3.17 (1.00)	10.315*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
26	2.40 (1.11)	2.36 (1.04)	2.49 (1.01)	2.28 (0.98)	3.18 (1.05)	11.014*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
27	2.45 (1.09)	2.51 (1.17)	2.46 (1.05)	2.25 (0.94)	3.20 (1.06)	11.615*	(1)<(5) (2)<(5) (3)<(5)

	Years of Teaching (Years) M (SD) (1) 0-5 (n=42)	(2) 6-10 (n=39)	(3) 11-15 (n=87)	(4) 16-20 (n=138)	(5) Over 21 (n=83)	F	Post hoc Analysis
							(4)<(5)
31	2.55 (0.92)	2.56 (0.91)	2.55 (0.85)	2.38 (0.81)	3.01 (0.86)	7.326*	(1)<(5) (3)<(5) (4)<(5)
32	2.50 (0.94)	2.44 (0.97)	2.48 (0.83)	2.28 (0.76)	2.95 (0.90)	8.339*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
37	2.93 (1.16)	2.97 (0.90)	2.84 (1.00)	2.68 (0.98)	3.39 (1.06)	6.449*	(3)<(5) (4)<(5)
41	2.19 (0.89)	2.41 (0.94)	2.28 (0.90)	2.62 (0.87)	2.12 (0.96)	4.789*	(3)<(4) (5)<(4)
46	2.81 (1.15)	2.79 (0.92)	2.68 (0.98)	2.50 (0.95)	3.29 (0.96)	8.689*	(3)<(5) (4)<(5)
48	2.48 (0.97)	2.49 (0.94)	2.32 (0.91)	2.28 (0.81)	2.86 (0.86)	6.219*	(3)<(5) (4)<(5)
49	2.55 (1.06)	2.62 (0.82)	2.45 (1.01)	2.31 (0.93)	2.99 (0.96)	6.771*	(3)<(5) (4)<(5)

*p < 0.05.

A one-way ANOVA test was run to see if teachers' different attitudes towards new technology play a statistically significant role in their perception of Metaverse and their application of Metaverse in education. In Table X, Levene's test of homogeneity of variances shows that the group variances are equal. Generally, teachers who like new technologies have a statistically worse understanding of Metaverse than those who are hesitant to use new technology and are not interested in new technologies in education.

TABLE X. ONE-WAY ANOVA RESULTS BASED ON TEACHERS' ATTITUDES TOWARD NEW TECHNOLOGIES

	Attitudes towards New Technology M (SD) *A (n=165)*	*B (n=131)*	*C (n=93)*	F	Post hoc Analysis
1	2.25 (0.77)	2.85 (0.73)	3.33 (0.70)	68.127*	A<B<C
2	2.25 (0.81)	3.02 (0.84)	3.44 (0.76)	71.432*	A<B<C
5	1.88 (0.80)	2.57 (0.82)	3.49 (0.86)	115.100*	A<B<C
6	2.30 (0.82)	2.89 (0.78)	3.71 (0.92)	85.590*	A<B<C
23	2.30 (0.70)	2.79 (0.91)	3.82 (0.81)	106.197*	A<B<C
35	2.42 (0.77)	2.98 (1.00)	3.89 (0.97)	78.298*	A<B<C
37	2.44 (0.76)	2.90 (0.98)	3.82 (0.99)	71.081*	A<B<C
41	2.73 (0.84)	2.38 (0.82)	1.71 (0.84)	44.248*	C<B<A
42	3.05 (0.87)	2.77 (0.86)	2.23 (0.87)	26.903*	C<B<A
46	2.22 (0.78)	2.76 (0.88)	3.75 (0.83)	102.488*	A<B<C

*p < 0.05.

Note. A. I like new technologies so I would look for ways to experiment with them.
B. I am hesitant to try out new technologies, but I will try them.
C. I am not interested in new technologies and only work on them as required.

Statistics in Table XI show that teachers' age has a statistically significant influence on their perceptions of the Benefits of the Metaverse (Factor 1), their perceptions of the Effectiveness of the Metaverse (Factor 2), and the Challenge of the Metaverse (Factor 3). For Benefits of Metaverse, teachers over 50 years old have a better perception than teachers from other age groups. For the Effectiveness of Metaverse, teachers over 50 years old have a better perception than teachers aged between 30 and 39 and teachers between 40 and 49. Teachers between 30 and 49 have a statistically better understanding than older teachers concerning the Challenges of Metaverse. Older teachers (over 50) are more optimistic about the benefits and effectiveness of Metaverse, possibly due to their broader experience and less direct engagement with its challenges. Teachers aged 30-49 are more critical, likely due to their active involvement in integrating technology into teaching and encountering practical challenges.

TABLE XI. ONE-WAY ANOVA RESULTS OF 3 FACTORS BASED ON TEACHERS' AGE

	Age (Years old) M (SD) A < 29 (n=32)	B 30-39 (n=84)	C 40-49 (n=213)	D >50 (n=60)	F	Post hoc Analysis
BOM	2.54 (0.92)	2.50 (0.80)	2.38 (0.67)	3.25 (0.81)	21.551*	A<D B<D C<D
EOM	3.34 (0.96)	3.09 (0.88)	2.85 (0.66)	3.64 (0.97)	17.068*	C<A B<D C<D
COM	2.48 (0.05)	2.51 (0.76)	2.71 (0.66)	2.18 (0.71)	9.771*	D<B D<C

*p < 0.05.

A one-way ANOVA test was run to see if different years of teaching play a statistically significant role in teachers' perception of Metaverse and their application of Metaverse in education. The results show that different years of teaching have played a significantly important role concerning 23 items in the scale, as shown in Table XII. Generally, teachers who teach for a longer time in college or university have a statistically better understanding of Metaverse and are better at applying Metaverse in their teaching.

TABLE XII. TUKEY POST-HOC TEST RESULTS OF DIFFERENTIATED QUESTIONS BASED ON TEACHERS' YEARS OF TEACHING

	Years of Teaching (Years) M (SD) *(1) 0-5 (n=42)*	*(2) 6-10 (n=39)*	*(3) 11-15 (n=87)*	*(4) 16-20 (n=138)*	*(5) Over 21 (n=83)*	F	Post hoc Analysis
3	2.86 (0.95)	3.00 (0.92)	3.02 (1.01)	2.95 (0.98)	3.51 (0.76)	5.718*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
4	2.33 (1.07)	2.46 (0.88)	2.38 (0.93)	2.25 (0.89)	3.06 (1.06)	10.171*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
5	2.33 (1.07)	2.54 (0.91)	2.45 (0.99)	2.21 (0.94)	3.11 (1.04)	11.313*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
6	2.67 (0.98)	2.72 (0.92)	2.86 (0.99)	2.56 (0.94)	3.40 (0.94)	10.616*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
9	2.07 (0.84)	2.38 (0.85)	2.23 (0.76)	2.08 (0.86)	2.83 (0.76)	12.522*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)

10	2.40 (1.01)	2.56 (0.91)	2.36 (0.88)	2.16 (0.94)	2.99 (0.93)	10.734*	(1)<(5) (3)<(5) (4)<(5)
11	2.19 (1.04)	2.21 (0.86)	2.39 (0.84)	2.15 (0.81)	2.84 (0.93)	8.995*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
15	2.43 (1.09)	2.54 (0.88)	2.30 (0.92)	2.14 (0.90)	2.95 (1.11)	9.449*	(1)<(5) (3)<(5) (4)<(5)
20	2.31 (0.95)	2.41 (0.79)	2.23 (0.77)	2.07 (0.87)	2.84 (0.86)	11.404*	(1)<(5) (3)<(5) (4)<(5)
21	2.50 (0.99)	2.56 (0.91)	2.59 (0.79)	2.43 (0.78)	3.05 (0.88)	7.444*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
22	2.62 (1.01)	2.69 (0.92)	2.59 (0.87)	2.52 (0.87)	3.20 (0.84)	8.631*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
23	2.79 (1.07)	2.87 (0.89)	2.67 (0.94)	2.60 (0.92)	3.31 (1.05)	7.776*	(1)<(5) (3)<(5) (4)<(5)
24	2.52 (1.09)	2.54 (1.10)	2.37 (0.97)	2.27 (0.90)	3.13 (1.10)	10.445*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
25	2.31 (1.14)	2.36 (1.01)	2.46 (1.09)	2.35 (0.92)	3.17 (1.00)	10.315*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
26	2.40 (1.11)	2.36 (1.04)	2.49 (1.01)	2.28 (0.98)	3.18 (1.05)	11.014*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
27	2.45 (1.09)	2.51 (1.17)	2.46 (1.05)	2.25 (0.94)	3.20 (1.06)	11.615*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
31	2.55 (0.92)	2.56 (0.91)	2.55 (0.85)	2.38 (0.81)	3.01 (0.86)	7.326*	(1)<(5) (3)<(5) (4)<(5)
32	2.50 (0.94)	2.44 (0.97)	2.48 (0.83)	2.28 (0.76)	2.95 (0.90)	8.339*	(1)<(5) (2)<(5) (3)<(5) (4)<(5)
37	2.93 (1.16)	2.97 (0.90)	2.84 (1.00)	2.68 (0.98)	3.39 (1.06)	6.449*	(3)<(5) (4)<(5)
41	2.19 (0.89)	2.41 (0.94)	2.28 (0.90)	2.62 (0.87)	2.12 (0.96)	4.789*	(3)<(4) (5)<(4)
46	2.81 (1.15)	2.79 (0.92)	2.68 (0.98)	2.50 (0.95)	3.29 (0.96)	8.689*	(3)<(5) (4)<(5)
48	2.48 (0.97)	2.49 (0.94)	2.32 (0.91)	2.28 (0.81)	2.86 (0.86)	6.219*	(3)<(5) (4)<(5)
49	2.55 (1.06)	2.62 (0.82)	2.45 (1.01)	2.31 (0.93)	2.99 (0.96)	6.771*	(3)<(5) (4)<(5)

*p < 0.05.

As shown in Table XIII, teachers' years of teaching have a statistically significant influence on their perception of all three Factors. Teachers with more than 21 years of teaching have a better perception of the benefits of Metaverse (Factor 1) than teachers with fewer years of teaching. Teachers with over 21 years of teaching experience have a statistically better understanding of Metaverse concerning its challenges (Factor 2) than teachers with only 0-5 years of teaching experience and teachers with 11-15 years of teaching. For Challenges of Metaverse (Factor 3), teachers with 16-20 years of teachers have a statistically better perception than Teachers with over 21 years of teaching experience.

TABLE XIII. ONE-WAY ANOVA RESULTS OF 3 FACTORS BASED ON TEACHERS' YEARS OF TEACHING

	Years of Teaching (Years) M (SD)					F	Post hoc Analysis
	***A* 0-5 (n=42)**	***B* 6-10 (n=39)**	***C* 11-15 (n=87)**	***D* 16-20 (n=138)**	***E* Over 21 (n=83)**		
BOM	2.46 (0.89)	2.51 (0.74)	2.49 (0.73)	2.32 (0.70)	3.07 (0.80)	13.258*	A<E B<E C<E D<E
EOM	3.12 (1.00)	3.14 (0.72)	2.91 (0.84)	2.91 (0.84)	3.43 (0.91)	6.528*	C<E D<E
COM	2.43 (0.68)	2.60 (0.73)	2.49 (0.70)	2.73 (0.68)	2.41 (0.76)	3.299*	D>E

*p < 0.05.

Teachers' attitudes towards education-related new technologies have a statistically significant influence on their perception of the Benefits of the Metaverse (Factor 1), the Effectiveness of the Metaverse (Factor 2), and the Challenges of the Metaverse (Factor 3), as shown in Table XIV. As for the benefits of Metaverse and the Effectiveness of Metaverse, teachers who use new technology only upon request have greater means than teachers who are hesitant to use new technologies and teachers who like new technologies. In terms of the Challenges of Metaverse, teachers who like new technologies have better perceptions than teachers who use new technology only upon request, while teachers who are hesitant to use new technologies have the least understanding. Teachers hesitant to adopt new technologies had a better understanding of Metaverse's benefits, while tech-savvy teachers focused more on its challenges.

TABLE XIV. ONE-WAY ANOVA RESULTS OF 3 FACTORS BASED ON TEACHERS' ATTITUDES TOWARD NEW TECHNOLOGIES

	Attitudes Towards New Technologies M (SD)			F	Post hoc Analysis
	***A* (n=165)**	***B* (n=131)**	***C* (n=93)**		
BOM	2.05 (0.58)	2.59 (0.65)	3.40 (0.60)	146.269*	A<B<C
EOM	2.67 (0.57)	3.02 (0.78)	3.83 (0.79)	81.056*	A<B<C
COM	2.83 (0.68)	2.60 (0.62)	2.04 (0.62)	44.555*	A>B>C

*p < 0.05.

Note. A. I like new technologies so I would look for ways to experiment with them.
B. I am hesitant to try out new technologies, but I will try them.
C. I am not interested in new technologies and only work on them as required.

V. DISCUSSION

This research is designed to find out how university teachers in China perceive Metaverse-related technologies and their application in higher educational institutions. Data collected through two questionnaires from 389 university teachers in Jiangsu Province, China, have been thoroughly analyzed quantitatively. Based on statistical analyses, several findings have been discovered.

The results show that male and female teachers have no statistically different perceptions of the Benefits of Metaverse and the Effectiveness of Metaverse. This differs from the findings in [50] when they conclude that male teachers know more about Metaverse and have more application of Metaverse than their female counterparts. According to [7], female teachers appeared to have a more positive perception of Metaverse's potential benefits for education. Gender makes no statistical difference in teachers' understanding of the Challenges of the Metaverse, which echoes the conclusion of [52] that there is no statistical difference between male and female teachers concerning what they know about and how they perceive Metaverse as well as their awareness scores. The lack of gender-based differences in this study suggests a shift in how both male and female teachers engage with emerging technologies like Metaverse. This could indicate that gender is becoming less of a determinant in technology adoption, possibly due to increased access to training and resources for both genders.

The results show that Master teachers have statistically better perceptions of the Benefits of Metaverse and the Effectiveness of Metaverse while Doctor teachers have statistically better perceptions of the Challenges of Metaverse. Reference [7] points out in his research that Ph.D. graduates feel more comfortable choosing Metaverse environments to fit their students' work. In contrast, MA graduates are more optimistic about Metaverse's utility for conceptual understanding and thought expression. This finding suggests that master's degree holders may focus more on the practical and immediate benefits of Metaverse, while Ph.D. holders, with their deeper engagement in research, maybe more attuned to the challenges and limitations. This highlights the need for tailored professional development programs that address the specific needs and perspectives of teachers based on their academic qualifications.

Teachers of different ages have statistically different understandings of the Benefits of Metaverse, Effectiveness of Metaverse, and Challenges of Metaverse. Teachers of 50 years and older have a better perception of the Benefits of the Metaverse than teachers of any other age; teachers between 40 and 49 years of age have the slightest understanding of the Effectiveness of Metaverse. Teachers between 30 and 49 have a statistically better understanding than older teachers concerning the Challenges of Metaverse. This contradicts [51], which concluded that age has a significant influence on the acceptance of Metaverse because younger people accept Metaverse more frequently and expect it to be implemented in schools sooner. The positive perception of older teachers toward the benefits of Metaverse may reflect their broader teaching experience and ability to see the potential long-term value of new technologies. Conversely, younger teachers' focus on challenges could stem from their familiarity with the practical limitations of emerging technologies. This divergence underscores the importance of addressing age-specific concerns and expectations when designing training and support programs for Metaverse adoption.

Teachers with more than 21 years of teaching have a better perception of the benefits of Metaverse (Factor 1) than teachers with fewer years of teaching. Teachers with over 21 years of teaching experience have a statistically better understanding of Metaverse concerning its Challenges (Factor 2) than teachers with only 0-5 years of teaching experience and teachers with 11-15 years of teaching. For Challenges of Metaverse (Factor 3), teachers with 16 – 20 years of teaching have statistically better perceptions than teachers with over 21 years of teaching experience.

The results show that teachers with different years of teaching have statistically different perceptions of the Benefits of Metaverse, the Effectiveness of Metaverse, and the Challenges of Metaverse. Basically, the more years of teaching teachers have, the better is their perception of Metaverse. Teachers who like new technologies and teachers who use new technology only upon request have a better understanding of Metaverse. Experienced teachers may have a broader perspective on how to integrate new technologies effectively, while mid-career teachers may be more critical of specific challenges due to their active engagement with evolving pedagogical practices. This highlights the need for differentiated training programs that leverage the strengths of experienced teachers while addressing the concerns of mid-career educators.

The results show that teachers who are hesitant to use new technologies have a better understanding of the Benefits and Effectiveness of Metaverse, while teachers who like new technologies have the best understanding of the Challenges of Metaverse.

In conclusion, demographic variables, attitudes, and institutional factors all play a critical role in shaping these perceptions. Addressing these factors through targeted interventions and further research will be essential for the successful integration of Metaverse technologies in higher education.

VI. Conclusion

The study has examined how university teachers in China perceive Metaverse and related technologies applied in higher educational institutions in China. By quantitative analyses of data collected through a questionnaire among university teachers in Jiangsu Province in China, this research answers the following questions: the impact of demographic variables on the impact of demographic variables on university teachers' perception of Metaverse used in Education, with the conclusion that teachers of different gender, academic qualifications, age, years of teaching, and attitudes towards education-related technologies have different perceptions of Metaverse.

A. Practical Implications

In recent years, Metaverse, as a potential platform to enhance teaching and learning experiences in higher educational settings, has gained great popularity. By employing quantitative research methods, researchers can gather empirical data to evaluate the effectiveness of Metaverse in higher education and identify areas for improvement.

University teachers can benefit from the study by learning more about how students view and use Metaverse technologies in higher education. This knowledge can help teachers modify their lesson plans and curriculum to better suit their students' requirements and preferences by offering engaging activities, real-world simulations, and hands-on learning experiences through integrating Metaverse tools and resources into their courses. On the other hand, the study's findings can help university instructors improve their professional development chances and increase their understanding of using Metaverse technology in their classrooms. Personalized student support, collaborative learning, and the successful integration of Metaverse tools into classes are all areas in which teachers can be trained. They can also promote peer-to-peer interactions, group projects, and conversations to strengthen learning outcomes.

In or to overcome barriers to Metaverse adoption, teachers can attend workshops and training sessions focused on Metaverse technologies to improve their technical skills and understanding of how to integrate these tools into their teaching practices. They can also engage in peer-to-peer learning and knowledge-sharing sessions. They may also learn how to integrate Metaverse tools with their teaching objectives, ensuring that the technology enhances learning outcomes rather than being used for novelty.

B. Implication for Future Research

Larger-scale studies can be conducted to explore further the perceptions of university teachers towards Metaverse in higher education in bigger areas in China, including a more diverse sample of participants from different regions and institutions. Qualitative research can also be made concerning how Metaverse potentially influences teaching and learning outcomes, such as student engagement, motivation, and academic performance. Even though Metaverse education is still in its infancy, it has a very bright future ahead of it since, in terms of resources, environment, and manner of instruction, it has significantly overcome the constraints of traditional blended learning and online education [30].

Future studies could concentrate on how Metaverse enables university teachers to shift from a single-teacher to a dual-teacher or even multi-teacher teaching model, as well as how Metaverse makes learning more convenient for students by offering a widely accepted and credible paradigm of wisdom learning in addition to a rich, immersive experiential learning process.

Solving the challenges and barriers university teachers face is another potential topic for future researchers in integrating Metaverse into their teaching and learning practices, and strategies to overcome these obstacles can be identified. The potential ethical and privacy concerns associated with using Metaverse in higher education can be explored, and related guidelines and best practices for ensuring the responsible and ethical use of this technology can be developed. The role of institutional support and resources in facilitating the adoption and implementation of Metaverse in higher education in China can be examined.

Before the concept of the education Metaverse became popular, the Chinese government had already provided strong support for applying core enabling technologies such as AI, VR, and AR in education. However, due to the futuristic nature of the educational Metaverse vision and the immaturity of existing related technologies, as well as the relatively simplistic nature of research and design in the educational application of core enabling technologies, the current conclusions of research in terms of validity, generalizability, etc., are limited. There is still a long way to go for the journey from theory to realizing the educational Metaverse.

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AUTHORS` CONTRIBUTIONS

All authors have participated in drafting the manuscript. All authors read and approved the final version of the manuscript.

CONFLICT OF INTEREST

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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DATA AVAILABILITY

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

ETHICAL STATEMENT

In this article, the principles of scientific research and publication ethics were followed. This study did not involve human or animal subjects and did not require additional ethics committee approval.

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