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Modelling education equality through online platform adoption: Insights into the digital divide, fairness, perceived ease of use, and usefulness

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Abstract: Online education platforms are pivotal in achieving educational equity. This study employs grounded theory to examine the factors influencing the adoption of online education platforms by students and educators in Chinese higher education institutions. Data were collected through semi-structured interviews with 30 participants, including 15 students and 15 educators, to provide a detailed qualitative analysis. The findings identify critical factors affecting platform adoption, including digital accessibility and infrastructure, user experience and interface design, adoption and integration challenges, and the impact on educational outcomes and equity. Significant disparities in digital access, especially between urban and rural areas, underscore the need for enhanced digital infrastructure to ensure equitable access to online education. The usability of the platforms, facilitated by user-friendly interfaces and comprehensive training, emerged as essential for engaging students and educators effectively. The study also highlights technological challenges and a lack of digital literacy as significant barriers, necessitating targeted interventions like digital literacy programs and robust technical support.

Keywords: education equality; online platform adoption; Chinese higher education institution; grounded theory; digital divide; fairness in education; perceived ease of use; perceived ease of usefulness

1. Introduction

In the contemporary landscape of education, the advent of digital technologies has heralded a new era of learning opportunities, offering unprecedented access to information and educational resources [1]. This digital evolution is pivotal in advancing sustainable development goals (SDGs), particularly SDG4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all [2]. However, the persistence of the digital divide mars the promise of digital education—a multifaceted phenomenon characterised by unequal access to information and communication technologies (ICTs) and disparities in digital skills and literacy among different populations [3]. The digital divide exacerbates existing inequalities and poses a significant barrier to realising sustainable development through education [4].

Online education platforms for education equality are digital infrastructures designed to facilitate the delivery, management, and engagement of educational content and experiences [5]. These platforms leverage ICTs to provide accessible, flexible, and inclusive educational opportunities that cater to diverse learners,

irrespective of their geographical location or socioeconomic status [6]. Within education equality, online education platforms are instrumental in disseminating knowledge and fostering competencies that empower individuals to contribute to educational equality [7]. They promote personalised learning paths, real-time feedback, and peer-to-peer interaction, enhancing learner engagement and motivation. Moreover, these platforms serve as vital tools for continuous professional development, allowing individuals to update their knowledge and skills in response to evolving educational practices [8]. The digital nature of these platforms enables the incorporation of multidisciplinary approaches and perspectives, facilitating a holistic and integrated learning experience essential for addressing complex educational challenges [9].

In China, the digital divide is a significant issue, particularly in higher education [10]. The rapid digital transformation has brought to light the stark disparities in access to technology and digital resources among students from different socioeconomic backgrounds [11]. Three primary dimensions characterise the digital divide in the Chinese higher education system: the digital usage divide among learners, the digital design divide among educators, and the digital access divide within the educational environment [12]. Technological advancements are reshaping the educational landscape but highlight the existing inequalities in access to quality education resources [13].

The COVID-19 pandemic has further highlighted the disparities within China's education system, particularly as the shift to online learning underscored the challenges faced by students from rural areas and lower-income households who struggle with limited internet connectivity and a lack of digital devices [14]. Despite governmental and institutional efforts to distribute digital devices and enhance internet infrastructure, many students remain marginalised from digital learning environments due to insufficient digital literacy and inadequate support systems [15]. Recognising the urgency of addressing these disparities, the Chinese government and educational institutions have implemented initiatives such as providing internet hotspots, digital devices, and training programs for digital literacy to bridge the gap and promote educational equity [16]. However, achieving genuine educational equality necessitates a comprehensive understanding of the nuanced challenges faced by different student populations and the development of targeted strategies to address these issues effectively [17].

The current research landscape in digital education equity extensively explores various critical factors and contexts. Studies frequently investigate the extent of internet access, the availability of digital devices, and the disparities in digital skills among students from different socioeconomic backgrounds [18]. Many studies provide insights into the infrastructural and socioeconomic barriers to equitable digital education, underscoring the need for improved technological infrastructure and resources [19]. Additionally, substantial research focuses on the technical challenges and barriers to adopting online education platforms [20]. These studies address issues related to the usability and accessibility of digital tools and their effectiveness in enhancing learning outcomes [21]. They generally examine how educators integrate different digital solutions into the curriculum and their impact on teaching and learning processes [22], providing valuable insights into the

performance and deployment of educational technology in various settings [23]. This body of research contributes significantly to our understanding of optimising digital tools and platforms to support effective teaching and learning [24].

Current research in this field predominantly adopts a quantitative approach, focusing on statistical analyses to understand the extent of the digital divide, disparities in digital skills, and the impact of these issues on educational outcomes [25]. However, there is a noticeable paucity of qualitative studies that delve into the nuanced experiences and perceptions of students and educators affected by these disparities [26].

This study seeks to address this gap by exploring these challenges and developing a conceptual model to understand and address the digital divide better, fairness in education, perceived ease of use and usefulness, and the adoption of online education platforms in China. By adopting a qualitative approach, this research aims to provide a richer, more detailed understanding of the factors influencing education equality in the digital age.

This study is structured to comprehensively examine the factors influencing the adoption and effectiveness of online education platforms in Chinese higher education, focusing on promoting educational equity. The literature review synthesises existing research on digital accessibility, user experience, adoption challenges, and the impact on educational outcomes. The methodology section details the qualitative approach, including data collection through semi-structured interviews and data analysis using grounded theory. The methodology is followed by presenting the essential findings and developing a conceptual framework. The discussion interprets these findings in the context of existing literature and educational policy, highlighting theoretical and practical implications. Finally, the conclusion summarises the contributions and suggests future research directions to further enhance the adoption and effectiveness of online education platforms in achieving educational equity.

2. Literature review and theoretical framework

2.1. Education equity and adoption of online education platform

Education equity refers to the principle that all students, regardless of their socioeconomic status, geographical location, or other potential barriers, should have equal access to high-quality education and the necessary support to achieve their full potential [27]. Equity in education encompasses equal access to educational resources, eliminating disparities in educational outcomes, and ensuring all students have the necessary support systems [28].

Online education platforms are digital infrastructures facilitating the delivery, management, and engagement of educational content and experiences. These platforms include learning management systems (LMS), open educational resources (OER), and interactive digital tools [29]. These platforms provide accessible, flexible, and inclusive learning opportunities for diverse learners. Key benefits include offering personalized learning paths, real-time feedback, and peer-to-peer interaction, enhancing student engagement and motivation [30].

The interplay between education equity and online platforms is crucial in

contemporary educational discourse. Online platforms possess significant potential to bridge educational access and quality gaps by delivering resources that may be unavailable locally [31]. For instance, these platforms can offer tailored educational experiences that meet the diverse needs of students, thus addressing and mitigating traditional barriers to equity. However, the successful adoption and effectiveness of online education platforms are contingent upon several factors, including digital literacy, reliable internet access, and the provision of necessary training for both educators and students [32]. These factors underscore the need for comprehensive strategies to ensure that online education platforms fulfil their potential in promoting education equity.

The current academic discourse on adopting online education platforms for educational equity emphasizes their transformative potential to democratize access to quality education [33]. Studies highlight that these platforms can effectively bridge geographical and socioeconomic disparities by providing flexible, inclusive, and personalized learning opportunities [34]. Research demonstrates that online education platforms can offer tailored educational experiences, addressing the diverse needs of students and mitigating traditional barriers to equity [35]. However, the literature also underscores significant challenges to their adoption, including issues of digital literacy, access to reliable internet, and the necessity for adequate training for educators and students [36]. These challenges highlight the importance of comprehensive strategies encompassing infrastructural improvements, policy support, and continuous professional development to fully leverage the potential of online education platforms in promoting educational equity [37]. Integrating these elements ensures that online education platforms can effectively contribute to a more equitable education system.

2.2. Digital divide, fairness, perceived ease of use and usefulness in education

The digital divide refers to the gap between individuals with access to modern information and communication technology (ICT) and those without it. This divide includes access to digital devices, internet connectivity, and the skills required to use these technologies effectively [38]. This disparity significantly impacts educational opportunities, as students lacking these resources face disadvantages in accessing and benefiting from online education platforms.

Research on the digital divide highlights various socioeconomic, geographical, and infrastructural disparities. In low-income urban communities, financial constraints severely limit access to essential technologies [39]. Community technology centres are crucial in providing ICT access in these areas. Additionally, underfunded schools face significant challenges in digital readiness, with cloud computing resources emerging as a potential solution [40]. Geographical disparities also play a crucial role, with rural areas often having less access to high-speed internet than urban regions. Limited digital access correlates with lower levels of happiness and satisfaction, further emphasizing the importance of bridging this divide.

Equity in education refers to the principle that all students should have equal

opportunities to succeed, irrespective of their socioeconomic status, geographical location, or other barriers. This concept includes distributive justice, which focuses on the fair allocation of educational resources, and procedural justice, emphasizing fairness in educational processes like assessments and admissions [41].

The current academic landscape on educational equity delves into various dimensions of fairness and justice in education, with significant concerns about geographic disparities in access to educational technologies. Research suggests that educational recommender systems frequently perpetuate and amplify existing inequalities, thereby disadvantaging students in under-resourced areas by providing them with fewer and lower-quality recommendations [42]. Furthermore, ensuring fairness in classroom assessments is paramount. Studies by Chen et al. [21] underscore the necessity for transparent, consistent, and unbiased assessment practices to guarantee equitable evaluation for all students, considering their diverse needs and contexts. Implementing strategies tackling structural and procedural issues is crucial for comprehensively addressing educational equity. This includes enhancing access to educational resources, instituting fair assessment practices, and fostering inclusive educational environments. Policies designed to reduce geographic and socioeconomic disparities, improve teacher training, and integrate technology equitably are vital for promoting fairness in education [43]. Moreover, involving students and communities in decision-making helps ensure that they perceive educational practices and policies as fair and just, thereby contributing to a more equitable education system.

Perceived ease of use (PEOU) refers to an individual's belief that using a particular system will require minimal effort [44]. On the other hand, an individual defines perceived usefulness (PU) as the extent to which they believe using a particular system will enhance their performance [45]. These concepts are integral to the Technology Acceptance Model (TAM), which posits that PEOU and PU significantly influence users' acceptance and use of technology [46].

Studies in this field have extensively validated the significance of PEOU and PU in adopting educational technologies. For instance, a study on social media for e-learning in Libyan higher education found that PEOU positively impacts PU and overall acceptance [47]. Similarly, research on university students' internet use for learning highlighted that user interface design and technical support significantly affect PEOU [48]. During the COVID-19 pandemic, studies on platforms like Microsoft Teams and NUADU demonstrated that PEOU and PU are crucial for user acceptance and sustained use [49]. Additionally, as assessed through instruments like the System Usability Scale (SUS), perceived usability correlates with higher PEOU and PU, enhancing overall acceptance [50].

To summarize the insights from previous studies, current studies provide a theoretical foundation for understanding educational equity, digital divide, fairness, and technology acceptance. However, they often address these factors in isolation rather than synthesizing them into a comprehensive framework. This study aims to bridge this gap by integrating insights from existing research to develop a holistic understanding of how these factors interact to influence the adoption of online education platforms in promoting educational equity.

3. Methodology

This study adopts a qualitative approach, utilizing grounded theory to investigate the perceptions of Chinese students and educators in higher education institutions regarding adopting online education platforms. We chose grounded theory for its robust framework in systematically generating theory from data gathered and analysed throughout the research process [51]. This study aims to develop a conceptual model that elucidates these factors, and grounded theory provides the ideal tool for this purpose by enabling the researcher to derive a theoretical framework grounded in the empirical data. This approach ensures that the resulting model is closely aligned with the lived experiences and perspectives of the participants, thereby enhancing its relevance and applicability in the educational setting.

Researchers will collect data for this study through semi-structured interviews with 30 participants., comprising 15 students and 15 educators from Chinese higher education institutions. Purposive sampling is adopted to identify the most knowledgeable individuals who can provide rich, detailed information about their experiences with online education platforms. Thus, this study utilizes the purposive sampling method. Each participant must meet specific inclusion criteria to ensure the relevance and quality of the data. The criteria for students include current enrolment in a higher education institution, regular use of online education platforms, and a willingness to share their experiences and perceptions. **Table 1** details the basic information of participants.

For this study, researchers have structurally organized the interviews to address the critical factors of the digital divide, fairness in education, perceived ease of use, and perceived usefulness. Researchers have designed each interview to be comprehensive yet flexible, generally lasting around 45 min to ensure an in-depth exploration of participants' experiences and perspectives. This structured approach facilitates consistency across interviews while allowing participants to elaborate on their unique viewpoints, enriching the collected data's quality and depth.

Data analysis in this study is conducted systematically involving three key steps: open coding, axial coding, and selective coding. In the open coding phase, the interview data are segmented into discrete parts, closely examined, and compared for similarities and differences to identify key concepts and categories directly from the data. Finally, selective coding integrates and refines the categories into a cohesive theoretical framework, focusing on core categories that encapsulate the central phenomena under investigation. This step ensures that the theory developed is deeply rooted in the data and accurately reflects the complexities of participants' experiences with online education platforms. This structured analytical approach facilitates a thorough and rigorous analysis, leading to the developing of a robust conceptual model that explains the factors influencing the adoption and effectiveness of online education platforms in Chinese higher education institutions.

Table 1. Basic information of participants.

| Participant ID. | Role | Gender | Age Arrange | Discipline | Experience with online education platforms | Institution type |
|-----------------|----------|--------|-------------|------------------|--|--------------------|
| 1 | Student | Male | 18–22 | Engineering | 4 | Public University |
| 2 | Student | Female | 18–22 | Social Sciences | 3 | Public University |
| 3 | Student | Female | 23–27 | Medicine | 5 | Public University |
| 4 | Student | Male | 18–22 | Humanities | 4 | Private University |
| 5 | Student | Female | 23–27 | Business | 5 | Public University |
| 6 | Student | Male | 18–22 | Computer Science | 4 | Public University |
| 7 | Student | Male | 18–22 | Law | 4 | Public University |
| 8 | Student | Male | 18–22 | Education | 4 | Private University |
| 9 | Student | Female | 23–27 | Social Sciences | 6 | Public University |
| 10 | Student | Male | 18–22 | Art | 3 | Public University |
| 11 | Student | Male | 23–27 | Economics | 5 | Public University |
| 12 | Student | Female | 18–22 | Social Sciences | 4 | Public University |
| 13 | Student | Male | 18–22 | Management | 4 | Public University |
| 14 | Student | Male | 23–27 | Humanities | 8 | Public University |
| 15 | Student | Female | 23–27 | Management | 8 | Public University |
| 16 | Educator | Female | 30–40 | Art | 7 | Public University |
| 17 | Educator | Male | 51–60 | Computer Science | 6 | Public University |
| 18 | Educator | Male | 30–40 | Medicine | 8 | Public University |
| 18 | Educator | Female | 41–50 | Social Sciences | 7 | Public University |
| 20 | Educator | Female | 30–40 | Management | 11 | Private University |
| 21 | Educator | Male | 30–40 | Business | 6 | Public University |
| 22 | Educator | Female | 30–40 | Computer Science | 6 | Public University |
| 23 | Educator | Male | 41–50 | Economics | 12 | Public University |
| 24 | Educator | Female | 51–60 | Law | 5 | Public University |
| 25 | Educator | Male | 30–40 | Engineering | 11 | Private University |
| 26 | Educator | Male | 30–40 | Social Sciences | 7 | Public University |
| 27 | Educator | Female | 30–40 | Law | 10 | Private University |
| 28 | Educator | Male | 41–50 | Engineering | 5 | Public University |
| 29 | Educator | Male | 30–40 | Art | 12 | Public University |
| 30 | Educator | Female | 41–50 | Education | 9 | Public University |

4. Findings

The researchers meticulously organized the findings section to address the core themes identified through data analysis systematically. Each subsection begins with a summary of the key insights, followed by a detailed analysis supported by direct interview quotes. This part comprises three sections, namely perceptions from

students, perceptions from educators, and the development of the conceptual model, and launches with perceptions from students.

4.1. Perception from students

This section employs the results of axial codes derived from student interviews to provide a structured and comprehensive analysis of their perceptions of online education platforms. Initial open coding identified detailed themes such as digital access, internet reliability, and equity in educational resources [52]. Axial coding organizes these specific themes into broader, more abstract categories, facilitating a deeper understanding of underlying patterns and relationships within the data [53]. This approach ensures a systematic and grounded analysis, identifying key factors influencing the adoption and effectiveness of online education platforms in Chinese higher education.

The researchers organized the analysis of student perceptions regarding online education platforms into seven axial codes: access and availability, equity and fairness, usability and interface, perceived usefulness, usage patterns, motivation and barriers, and impact on learning. The researchers systematically derived these axial codes from detailed open coding, which included themes such as Digital Access, Internet Reliability, Perception of Equity, Ease of Use, and Goal Achievement. **Table 2** details the results of axial codes from students.

Table 2. Results of Axial codes from students.

| Axial codes | Open codes associated |
|---|--|
| Access and Availability | Digital Access, Internet Reliability, Device Ownership, Connectivity Challenges, Impact of Resource Availability, Learning Continuity, Resource Accessibility |
| Equity and Fairness in Digital Education | Perception of Equity, Resource Distribution, Inclusion and Exclusion Instances of Improved Fairness, Instances of Hindered Fairness, Comparative Experiences, Suggestions for Improvement, Policy Recommendations, Technological Enhancements |
| Usability and Interface Design | Ease of Use, User Interface, Navigation Simplicity, Technical Support, User-Friendly Features, Intuitive Design, Interactive Tools, Accessibility Features, Difficult Features, Cumbersome Aspects, Usability Issues, Technical Difficulties |
| Perceived Effectiveness and Utility | Perceived Usefulness, Goal Achievement, Academic Support, Resource Availability, Enhanced Learning Experiences, Engagement Tools, Interactive Learning, Peer Collaboration |
| Patterns and Frequency of Usage | Duration of Use, Initial Adoption, Frequency of Use, Regular Usage Patterns, Sporadic Use, Course Integration |
| Motivational Drivers and Barriers to Adoption | Motivations for Use, Academic Requirements, Convenience, Learning Benefits, Barriers to Use, Technological Limitations, Access Issues, User Resistance |
| Impact on Learning Outcomes and Methods | Impact on Learning Methods, Study Habits, Academic Performance |

Access and availability: this axial code captures themes related to digital access, internet reliability, device ownership, connectivity challenges, and the impact of resource availability on learning continuity and accessibility [54]. Students highlighted various issues, such as unstable internet connections and limited availability of personal devices, which affect their ability to participate fully in online education. For instance, P1 stated, “I often struggle with unstable internet connections at my dorm, which makes it difficult to attend live classes. Sometimes, I miss important lectures because of this.” Similarly, P5 pointed out, “The university

provided tablets to some students, but not everyone received them. This inconsistency affects our ability to participate equally. For example, I had to borrow a tablet from a friend to submit an assignment on time.”

Equity and fairness address the perceived equality in resource distribution and inclusion in online education [55]. Students expressed concerns about how online platforms cater to students from diverse backgrounds, particularly those from less privileged or rural areas. P3 mentioned, “I feel that online platforms do not equally cater to all students, especially those from less privileged backgrounds. For instance, students from rural areas often complain about not having the same resources.” Additionally, suggestions for improvement were provided, such as better internet access and device provision to enhance equity. P14 suggested, “Universities should ensure all students have access to the necessary devices. They could have a program to lend or subsidize technology for those in need.”

Usability and interface involve ease of use, user interface design, navigation simplicity, and technical support [56]. Students generally found the platforms user-friendly but pointed out several areas needing improvement. For example, P2 said, “The platform is generally user-friendly but could be more intuitive. Sometimes, I must click through several menus to find what I need.” Positive feedback highlighted features like interactive quizzes and discussion forums that enhance engagement, while negative feedback focused on cluttered interfaces and buried features. P13 noted, “The interface is cluttered, making it hard to find what I need. For example, several tabs bury the assignment submission link.”

Perceived usefulness: this axial code includes students’ perceptions of how helpful online education platforms are in achieving their educational goals. Themes include goal achievement, academic support, and enhanced learning experiences. Many students appreciated the platform’s ability to help them keep track of assignments and deadlines efficiently. P3 mentioned, “The platform helps me keep track of my assignments and deadlines efficiently. I especially like the calendar feature that syncs with my schedule.” The usefulness of video lectures for revising complex topics and the ease of resource sharing for group projects were also frequently mentioned.

Usage patterns cover the duration, initial adoption, frequency of use, and integration into course structures [57]. Students reported varying use patterns, from daily engagement for accessing course materials to sporadic use during exam periods. P5 stated, “I use the platform daily for accessing course materials and submitting assignments. It has become an essential part of my study routine.” Integrating the platform into all courses facilitated a smoother transition to online learning for many students.

Motivational drivers and barriers to adopting online education platforms include factors such as academic requirements, convenience, learning benefits, technological limitations, and user resistance [58]. Students cited the convenience of having all study materials in one place and the interactive features as critical motivators. P4 shared, “The convenience of accessing all my study materials in one place motivates me to use the platform. I do not have to carry heavy books around anymore.” However, they also mentioned significant barriers like technical issues and lack of reliable internet access. P2 remarked, “Technical issues and lack of reliable internet

access are major barriers. Sometimes, I cannot log in during peak hours.”

Impact on learning: this axial code covers the impact of online education platforms on learning methods, outcomes, study habits, and academic performance. Students reported that the platforms encouraged more digital study methods and improved organization and time management, leading to better academic outcomes. P6 mentioned, “The platform has encouraged me to adopt more digital study methods, such as e-books and online quizzes. It is more interactive than traditional methods.” The analytics provided by the platforms helped track progress and identify areas for improvement. As noted by P7, “The platform’s analytics help me track my progress and identify areas where I need to improve.”

These axial codes provide a robust framework for analysing and presenting the extensive range of student experiences and perceptions of online education platforms. By systematically organizing the data, this study effectively identifies critical factors influencing the adoption and effectiveness of these platforms within the context of Chinese higher education. This structured approach ensures a comprehensive understanding of how digital access, usability, perceived usefulness, equity, and other vital elements impact student engagement and educational outcomes, offering valuable insights for improving online education strategies [59].

4.2. Perception from educators

Seven axial codes emerged after analysing and categorizing data from interviews with 15 educators, providing a comprehensive understanding of the factors influencing educators’ engagement with online education platforms. **Table 3** details the results of axial codes from educators.

Table 3. Axial codes from educators.

| Axial codes | Open codes associated |
|---------------------------------|---|
| Access and Availability | Availability of Digital Resources, Internet Connectivity, Access to Devices, Technical Support Needs |
| Equity and Fairness | Perceptions of Equity, Resource Distribution, Inclusivity in Online Education, Barriers to Fair Access |
| Usability and Interface | Ease of Use, User Interface Design, Navigation, Technical Issues, User-Friendly Features |
| Perceived Usefulness | Perceived Benefits, Enhancements to Teaching, Student Engagement, Academic Support |
| Usage Patterns | Frequency of Use, Initial Adoption Challenges, Integration into Curriculum, Consistency in Use |
| Motivation and Barriers | Motivational Factors, Convenience, Pedagogical Benefits, Resistance to Adoption, Technological Challenges |
| Impact on Teaching and Learning | Changes in Teaching Methods, Impact on Student Learning, Professional Development, Assessment Practices |

Educators frequently mentioned the challenges associated with digital resource availability and internet connectivity. For instance, P1 highlighted, “Access to high-speed internet is still challenging for many students, especially those in rural areas.” Similarly, P5 emphasized the importance of technical support, stating, “Technical support is essential. Without prompt support, many students struggle to keep up.”

Issues of equity and fairness were prominent, with educators noting disparities in resource distribution. P3 observed, “There is a noticeable gap between students from urban and rural areas in terms of access to digital resources.” P10 stressed the need for inclusivity, saying that inclusivity must be a priority. All students should

have equal access to learning materials regardless of background.”

Users gave mixed feedback on the platform’s ease of use and interface design. While P2 mentioned, “The platform is user-friendly, but navigation could be simplified further,” P11 pointed out, “Frequent updates sometimes disrupt the workflow, causing confusion among students.”

Educators noted the benefits of online platforms in enhancing teaching and student engagement. P4 stated, “The platform has significantly enhanced my ability to engage students in interactive activities,” P8 noted, “It offers great tools for academic support, but users need more training for effective use.”

The patterns of platform use varied, with initial adoption challenges noted by many. P6 mentioned, “Integrating the platform into the curriculum took time, but now it is used consistently across courses.” P9 reflected on the initial resistance: “Initial adoption was challenging due to resistance from both students and educators.”

Participants frequently discussed motivational factors and barriers to adoption, with Participant 7 highlighting the convenience factor. “The convenience of accessing all teaching materials in one place is a major motivator.” However, P13 noted resistance due to a “lack of digital literacy among some educators.”

The platforms’ impact on teaching methods and student learning was significant. P12 observed, “The platform has changed my teaching methods, making them more interactive and student-cantered.” P14 added, “There is a noticeable improvement in student engagement and learning outcomes.”

This structured approach effectively identifies critical factors influencing the adoption and effectiveness of online education platforms within Chinese higher education, offering valuable insights for enhancing online education strategies.

4.3. Development of a conceptual model for online education platform adoption

The development of a conceptual model for adopting online education platforms in Chinese higher education is informed by the selective codes derived from student and educator perspectives. This model integrates key factors identified through a systematic analysis of axial codes, offering a comprehensive framework that addresses the multifaceted nature of online education adoption.

Digital accessibility and infrastructure emerged as critical components influencing the effectiveness of online education platforms. Both students and educators highlighted the importance of reliable internet connectivity, the availability of digital devices, and adequate technical support. Ensuring that all students and educators have consistent access to these resources is essential for promoting equitable participation in online education [50]. The emphasis on infrastructure aligns with findings from previous research indicating that digital divides, particularly in rural areas, significantly impact educational outcomes [12].

User experience and interface design play a pivotal role in the adoption and sustained use of online education platforms. Both students and educators frequently mentioned the platforms’ usability, ease of navigation, and user-friendly features. Enhancements in these areas can significantly improve engagement and reduce

barriers to use. Additionally, ongoing training and support for users are crucial to ensure that both students and educators can effectively utilize the platforms [60].

The variability in usage patterns and the challenges associated with initial adoption highlight the need for strategies that address motivational factors and technological barriers [61]. Educators noted that while online platforms' convenience and pedagogical benefits are significant motivators, resistance to adoption often stems from a lack of digital literacy and technological challenges [62]. Addressing these barriers through targeted interventions, such as digital literacy programs and robust technical support, can facilitate smoother integration of online platforms into educational practices [63].

The impact of online education platforms on teaching methods, student engagement, and academic performance underscores their potential to enhance educational outcomes and promote equity. Both students and educators reported improved learning methods and outcomes, with platforms facilitating more interactive and student-centred teaching approaches. Ensuring equitable access to these benefits is crucial for addressing socioeconomic disparities and promoting fairness in education. This approach aligns with research highlighting the transformative potential of digital tools in creating more engaging and effective learning environments while promoting educational equity [64].

The core code of Enhancing Educational Equity through Adoption of Online Education Platforms highlights the need to address digital accessibility, improve user experience, overcome adoption challenges, and ensure positive educational outcomes to promote equity.

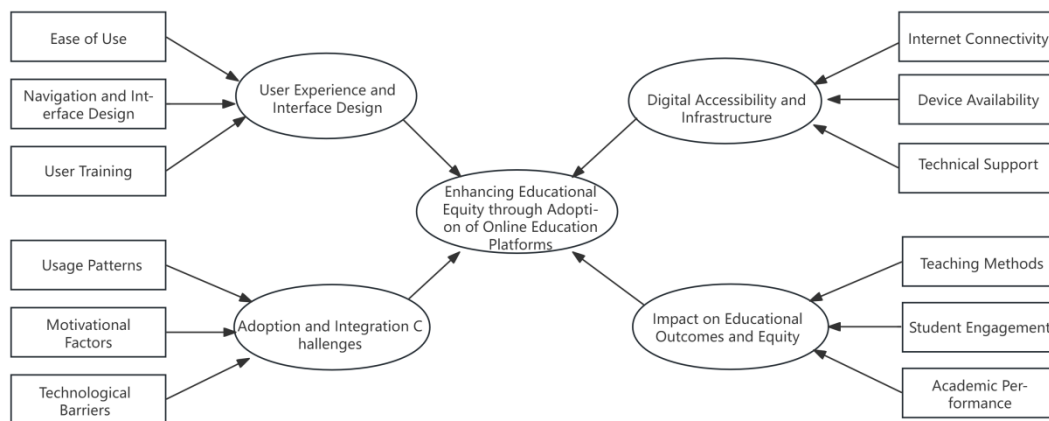


Figure 1. The conceptual framework of this study.

This conceptual framework, presented in **Figure 1**, illustrates how the identified components interact and influence the overall effectiveness of online education platforms, providing a structured approach to addressing the challenges and leveraging the benefits identified in this study. By focusing on these interconnected domains, the model offers valuable insights for policymakers, educators, and institutions aiming to enhance the digital learning experience and promote educational equity. This comprehensive framework for understanding and improving the adoption and effectiveness of online education platforms in Chinese higher

education provides actionable insights guiding efforts to enhance the digital learning experience and promote educational equity. This structured approach addresses the immediate challenges and leverages the potential benefits of online education to create a more inclusive and equitable educational landscape.

5. Discussion and conclusion

This study reveals several critical factors influencing the adoption of online education platforms in Chinese higher education, mainly promoting educational equity. The four selective codes encapsulate these factors: digital accessibility and infrastructure, user experience and interface design, adoption and integration challenges, and impact on educational outcomes and equity.

The findings of this study highlight significant disparities in digital access among students and educators, particularly between urban and rural areas. These disparities align with previous research indicating that students in rural areas face greater challenges in accessing reliable internet and digital devices, thereby exacerbating the digital divide [12]. While this study primarily focuses on the adoption and effectiveness of online education platforms, it is essential to recognize that the deficiency in connectivity represents a critical barrier to achieving educational equity. This issue, which lies beyond the immediate scope of platform design and implementation, underscores the urgent need for improved digital infrastructure. Enhancing connectivity is vital to ensure that all students and educators can participate effectively in online education, regardless of their geographical location. To fully realize the potential of online education platforms in promoting equity, coordinated efforts among educational institutions, government bodies, and technology providers are necessary to address these foundational connectivity challenges.

In addressing fairness in education, the study underscores the importance of equitable resource distribution and inclusive practices. The disparities in digital access highlight the need for targeted interventions to bridge the gap between urban and rural students [65]. Ensuring that all students have equal access to educational resources regardless of socioeconomic background is crucial for promoting educational equity. This approach aligns with research emphasizing inclusive practices to address socioeconomic disparities and ensure fairness in education [66].

The usability of online education platforms emerged as a critical factor influencing their adoption and sustained use. Both students and educators emphasized the importance of user-friendly interfaces and comprehensive user training. Design and navigation enhancement could significantly improve user experience, which aligns with existing studies that stress the importance of intuitive design and ongoing support to promote engagement and reduce user [67].

Furthermore, the study identified several barriers to adopting and integrating online education platforms, including technological challenges and a lack of digital literacy. Resistance to adoption often stems from unfamiliarity with new technologies. Overcoming these barriers through targeted interventions, such as digital literacy programs and robust technical support, is essential for facilitating smoother integration of these platforms into educational practices [68].

Lastly, the findings underscore the positive impact of online education platforms on teaching methods, student engagement, and academic performance. Improvements in learning methods and outcomes, facilitated by more interactive and student-centred teaching approaches, highlight the transformative potential of digital tools. Ensuring that these benefits are accessible to all students is crucial for promoting educational equity, as advocated in research emphasizing inclusive practices to address socioeconomic disparities.

This study offers practical implications and recommendations for enhancing the adoption and effectiveness of online education platforms in Chinese higher education by addressing key factors such as digital accessibility, user experience, adoption challenges, and educational equity. Policymakers and educational institutions are encouraged to invest in improving digital infrastructure, particularly in under-served regions, to bridge the digital divide. Additionally, the design of user-friendly interfaces and the provision of comprehensive training programs are crucial for increasing platform adoption and engagement. Overcoming technological barriers through targeted interventions, such as digital literacy programs and robust technical support, is essential for smoother integration of online platforms into educational practices. Furthermore, ensuring fairness and equity in education through these platforms is vital for mitigating socio-economic disparities. Continuous assessment and adaptation of online platforms, alongside professional development for educators, will help maintain effective and inclusive digital learning environments. This study's comprehensive framework provides valuable insights that can guide efforts to create a more inclusive and equitable educational landscape in Chinese higher education.

This study makes a significant practical contribution by providing a comprehensive framework for understanding and enhancing the adoption and effectiveness of online education platforms in Chinese higher education. By systematically addressing key factors such as digital accessibility, user experience, adoption challenges, and educational outcomes, the study offers actionable insights for policymakers, educators, and institutions. These insights can guide the development of targeted strategies to improve digital infrastructure, design user-friendly interfaces, provide adequate training, and overcome technological barriers. Consequently, the study aims to enhance the digital learning experience and promote educational equity, ensuring that all students, regardless of their socioeconomic background, have equal access to high-quality online education. This framework can serve as a model for other educational systems seeking to integrate digital learning solutions effectively, thereby contributing to the broader goal of inclusive and equitable education on a global scale.

Despite offering valuable insights into the adoption and effectiveness of online education platforms in Chinese higher education, this study has several limitations. Firstly, the reliance on a qualitative approach, although rich in detailed perspectives, limits the generalisability of the findings. Future research could benefit from incorporating quantitative methods to validate and extend these insights across a broader population. Additionally, the study's focus on higher education institutions in China may not fully capture the nuances of online education adoption in other cultural or educational contexts. Comparative studies across different countries or

educational systems could provide a more comprehensive understanding of online education's global challenges and opportunities. Moreover, the rapidly evolving nature of technology suggests that the platforms and tools examined may soon become outdated, necessitating continuous research to stay abreast of technological advancements and their implications for education. Finally, while this study highlights critical factors such as digital accessibility and user experience, future research should delve deeper into the specific pedagogical practices that maximise the effectiveness of online education platforms, ensuring they meet diverse learner needs and promote educational equity on a broader scale.

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