Migration Letters

Volume: 21, No: S7 (2024), pp. 1345-1362
ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)
www.migrationletters.com

Development Model of Factors Influencing the Adoption of Online Education Platforms for Promoting Educational Equity in Chinese Higher Education Institutions

Zhu, H.[1], Pongtornkulpanich, A.[2], and Chankoson, T.[3]*

Abstract

This research explores the determinants influencing the utilization of online education platforms within Chinese Higher Education Institutions (CHEIs) and examines their role in advancing educational equity, in alignment with Sustainable Development Goal (SDG) 4. Utilizing a structural equation modeling approach, the study analyzes data from a range of CHEIs, with a focus on both the direct and mediated effects of the digital divide on aspects of educational equity. The results reveal significant direct impacts of the digital divide on crucial educational aspects, notably equitable resource allocation and fairness in educational processes. Additionally, the research uncovers substantial indirect effects, indicating a complex interplay between the digital divide and the adoption of online education platforms, mediated by various dimensions of educational equity. This study not only enhances the theoretical understanding of the role of digital education in fostering educational equity but also provides practical insights for policymakers, educators, and technology providers. The findings are contextualized within the broader academic discourse, underscoring the critical role of online education in diminishing educational disparities. Ultimately, this study underscores the importance of strategically adopting online platforms in CHEIs to enhance educational equity, highlighting how digital education can bridge socio-economic and geographical gaps in accessing quality education. The insights gained offer a strategic framework for leveraging technology to fulfill SDG4 objectives, thereby contributing to the creation of a more inclusive educational landscape in China and potentially in other similar contexts.

Keywords: *Educational equity in digital education, Structural equation modeling in higher education, Digital divide impact, Online education platform adoption, Sustainable development goal 4 (SDG4)*

1. Introduction

The quest for educational equity is a critical global endeavor, intricately tied to the Sustainable Development Goal (SDG) 4, which advocates for inclusive and equitable quality education and lifelong learning opportunities for all (Burbules et al., 2020). This goal underscores the importance of equal access to education across all levels and forms, including vocational and adult learning, and is integral to the achievement of other SDGs, such as poverty reduction, health and well-being, and gender equality (Jiang & Pu, 2022; Lal et al., 2021). Educational equity, rooted in social justice, ensures that every individual, irrespective of their background, has equitable opportunities to access quality education (Gümüş et al., 2021).

Despite the rapid growth and global proliferation of online education platforms, which hold the promise of democratizing education, the realization of educational equity remains elusive, particularly in Chinese Higher Education Institutions (CHEIs) (Santamaría & Jean-Marie, 2014). The advancement of technology and the emergence of online education platforms have transformed the educational landscape, offering accessible, flexible, and diverse learning opportunities (Alam, 2022). However, in China, the challenge of educational inequality is exacerbated by disparities in access to quality

1 Hao Zhu, Email: hao.zhu@rmutto.ac.th
2 Anan Pongtornkulpanichm, Email: anan_po@rmutto.ac.th
1,2 Chakrabongse Bhuvanarth International Institute for Interdisciplinary Studies (CBIS), Rajamangala University of Technology Tawan-OK, Thailand.
3* Thitinan Chankoson,Faculty of Business Administration for Society, Srinakharinwirot University, Thailand.
* Corresponding author: tchankoson@gmail.com

education, resources, and opportunities, particularly between urban and rural areas and among different socio-economic groups (Ma & Li, 2021; Mei & Symaco, 2021; Xiao & Zhang, 2022).

While there is a significant body of research on online education globally, there is a notable gap in comprehensive studies specifically addressing the Chinese context (Lim et al., 2020; Tonegawa, 2022). Existing research often focuses on the effectiveness and adoption rates of online platforms but lacks depth in exploring their impact on educational equity in CHEIs. Moreover, there is limited empirical understanding of the factors influencing the adoption of commercial online education platforms by students in China's top universities and how these platforms can be leveraged to enhance educational equity (Jiang & Pu, 2022; Pu & Jiang, 2021).

This study aims to fill this gap by exploring the following objectives: 1)To investigate the factors influencing the adoption of online education platforms for promoting educational equity in Chinese higher education institutions; 2)To examine and analyze these factors within the context of Chinese higher education; 3)To develop and validate a structural equation model of the factors influencing the adoption of online education platforms for promoting educational equity in Chinese higher education institutions. 4) To provide actionable insights and recommendations for stakeholders to effectively utilize online education platforms for enhancing educational equity in Chinese higher education institutions.

This research is structured to systematically address the identified objectives. The study begins with a comprehensive literature review, establishing the theoretical foundation and contextual background. It then delves into the methodology, detailing the research design, data collection, and analysis techniques. The findings are presented and discussed in relation to the existing literature, highlighting the key factors influencing the adoption of online education platforms in CHEIs and their implications for educational equity. The study concludes with a summary of the findings, implications for stakeholders, limitations, and recommendations for future research.

2. Literature review and hypothesis

2.1 theoretical approach

Educational equity theory, developed in the 1960s and grounded in social justice principles (Gümüş et al., 2021), emphasizes fair resource distribution, equal educational opportunities, and equitable educational processes and outcomes (Zahra, 2021)(Zahra, 2021). It has evolved to focus on equity in both educational processes and outcomes, especially significant in online education post-pandemic. Key components include equitable resource allocation (Druege et al., 2019), ensuring equal access to quality education for students from diverse backgrounds (Reimers, 2022; Toquero, 2020), and fair teaching and evaluation methods (Blossfeld & Von Maurice, 2019). The goal is for all students to achieve satisfactory educational outcomes, irrespective of their background (Iglesias-Pradas et al., 2021; Singh & Thurman, 2019).

Digital divide theory, emerging in the 1990s, examines disparities in access to and use of information and communication technologies (ICT) across different populations and regions (Szymkowiak et al., 2021). It highlights how technological advancements might worsen social inequalities, particularly in education, where it aims to bridge technology gaps for educational equity (Van Dijk, 2020). Key components include hardware facilities, software resources, network connectivity, skill differences, and social support (Caena & Redecker, 2019). Recent research has explored the digital divide's impact on educational equity, strategies to bridge it, the role of online platforms, and policy implications (Reggi & Gil-Garcia, 2021). However, gaps remain in understanding the effects of emerging technologies, focusing on disadvantaged groups, and conducting

cross-cultural studies (Papadopoulos & Cleveland, 2023; Zhang et al., 2022). Future research should address these areas for a more comprehensive understanding of the digital divide's impact on education (Azubuike et al., 2021).

In conclusion, Educational Equity Theory and Digital Divide Theory provide a comprehensive framework for understanding and addressing the challenges in contemporary education. Educational Equity Theory, with its roots in social justice, emphasizes the necessity of fair resource distribution and equal opportunities in education, adapting to include online education in the post-pandemic era (Gümüş et al., 2021; Zahra, 2021). Meanwhile, Digital Divide Theory, emerging in the 1990s, sheds light on the disparities in ICT access and usage, underscoring the need for equitable technology integration in education (Szymkowiak et al., 2021; Van Dijk, 2020). Both theories highlight the ongoing need for research and policy development to address emerging technologies, focus on disadvantaged groups, and undertake cross-cultural studies to ensure educational equity in a rapidly evolving digital landscape (Azubuike et al., 2021; Papadopoulos & Cleveland, 2023; Reggi & Gil-Garcia, 2021; Zhang et al., 2022).

2.2 hypothesis development

The digital divide, a disparity in access to information and communication technologies (ICT) influenced by socioeconomic, geographical, and demographic factors, not only exacerbates existing inequalities but also underscores the need for equitable resource distribution (Badham et al., 2019). This divide prompts governments and organizations to focus on equitable resource allocation, particularly for marginalized groups like rural communities and low-income households (le Roux & Lesch, 2023). It emphasizes the significance of digital literacy and skills training in improving economic and social outcomes for disadvantaged groups. Public-private partnerships, formed to enhance ICT access, play a pivotal role in this equitable allocation by combining diverse resources and expertise (Chowdhury et al., 2023). These collaborations, involving the private sector's provision of affordable technology and the public sector's investment in infrastructure and educational initiatives, foster digital inclusion. Moreover, the digital divide raises awareness among the public, policymakers, and organizations about the necessity of equitable digital access, leading to informed policy-making and initiatives aimed at bridging this divide (Pérez-Castro et al., 2021). Thus, the following hypothesis is proposed:

H1. Digital divide negatively affects the adoption of AOEPEE

The digital divide, denoting disparities in access to information and communication technologies (ICTs), significantly impacts educational equality (Jamil, 2021). This divide disproportionately affects low-income and minority students, limiting their academic skill development (Belay, 2020), and leads to a 'second-level' divide in digital literacy among those with ICT access. Research suggests that bridging this divide can enhance educational equity, as seen in improved performance and motivation in underprivileged South African schools (Lythreatis et al., 2022). However, access alone is insufficient; addressing deeper socioeconomic and systemic inequalities is crucial (Su et al., 2023). While some studies highlight the divide's exacerbation of inequalities, others emphasize the role of comprehensive reforms in ensuring educational equity (Cheshmehzangi et al., 2023). Therefore, the following hypothesis is available:

H2. Digital divide negatively affects fair resource allocation.

The digital divide, encompassing access, participation, and benefits, is a complex issue crucial for educational equity, extending beyond mere technology access to include knowledge, skills, and effective utilization (Malodia et al., 2021). This multifaceted divide, influenced by social, economic, and cultural factors, necessitates addressing both

material and mental access, along with usage and skills, to benefit students from diverse backgrounds. Research indicates that unequal technology access intensifies educational disparities, requiring comprehensive policies for technology access, digital literacy, and inclusive pedagogies (Chohan & Hu, 2022). In the United States, limited technology access correlates with lower academic performance and engagement. Conversely, in rural Indian schools, technology access led to improved learning outcomes and increased student confidence (Rafique et al., 2021), underscoring the digital divide's significant impact on education. Thus, the following hypothesis is proposed:

H3. Digital divide negatively affects equality of educational opportunities.
The digital divide, characterized by disparities in access, skills, and usage of digital technologies, significantly influences educational equity (Thomas et al., 2020). Factors like socioeconomic status, race, and educational attainment are crucial in determining digital literacy and internet usage, with the divide amplifying social inequalities and affecting educational outcomes (Tewathia et al., 2020). This divide is particularly acute in underprivileged areas, where limited access to technology impedes educational progress, perpetuating systemic educational inequalities. In online learning, the lack of digital access and skills among disadvantaged students exacerbates achievement gaps (Chiu, 2021). However, targeted interventions, such as providing digital resources and training to low-income students, have been shown to mitigate these disparities and enhance educational equity (Guo & Wan, 2022). Therefore, this study proposes the following hypothesis:

H4. Digital divide negatively affects fairness in the education process.
In the context of online education, fair resource allocation is crucial for achieving educational equality. The digital divide, significantly influenced by access to technology, is a key factor in this regard (Du Preez & Le Grange, 2020). Equitable distribution of resources, including essential tools like computers and broadband, is vital for enhancing student engagement in online learning (Onyema et al., 2019). Beyond mere availability, the quality and suitability of technological resources are critical for effective online education outcomes (Carrillo & Flores, 2020). Fair allocation allows educators to tailor online content to diverse learning needs, advancing educational equality. Additionally, the perception of fairness in resource distribution is essential for the acceptance and utilization of online platforms, fostering equity and broadening platform adoption across diverse learner demographics (Wang et al., 2020). Thus, the following hypothesis is available:

H5. Digital divide negatively affects equity in educational outcomes.
The advent of the digital era has significantly expanded access to educational resources. Online education platforms are increasingly recognized for their capacity to close educational gaps, offering affordable and quality content to a wide range of students (Singh et al., 2022). In regions marked by educational inequality, these platforms provide an equitable environment for learning. Equal access to digital learning opportunities, irrespective of socio-economic status, enhances student engagement on these platforms (Bekova et al., 2021). Furthermore, technology, especially online platforms, is instrumental in promoting educational equality, provided that learners have access to necessary resources and support (Vilchez et al., 2021). The integration of technology in education is a key factor in narrowing achievement gaps. Therefore, this study proposes the following hypothesis:

H6. Fair resource allocation positively affects AOEPEE.
Educational fairness, which includes accessibility, representation, inclusivity, and equity, is pivotal in the adoption of educational platforms. Users' perceptions of fairness increase their likelihood of adopting these platforms, as it enhances perceived value and engagement (Ruiz-Alba et al., 2022). Online education platforms provide an opportunity

to bridge traditional educational disparities by democratizing access and catering to a diverse learner base. However, fairness also entails the quality and relevance of educational content (Kizilcec & Lee, 2022). These platforms can offer customized learning experiences through analytics and adaptive learning, addressing individual needs. Additionally, the success of these platforms hinges on user trust, influenced by their perceived fairness and equitable opportunity provision (Rizki et al., 2022). Therefore, the widespread acceptance of online platforms depends on ensuring not just equal access but also delivering personalized and relevant content to foster trust and value among users. Therefore, the following hypothesis is available:

H7. Equality of educational opportunities positively affects AOEPEE.

Equity in educational outcomes, crucial for socioeconomic development and social cohesion, has gained prominence in the 21st century (Kamanzi et al., 2021). The integration of technology in education, particularly online platforms, is closely linked to educational equity (Ali, 2020). These platforms, when utilized effectively, address diverse learning needs and foster inclusivity (Haleem et al., 2022). Their flexibility and accessibility offer the potential to level the educational playing field across different socioeconomic groups (Dodd et al., 2021). However, technological availability alone does not ensure equity; its impact depends on how it is adopted and used. Online platforms that emphasize inclusivity and diverse representation are more effective in promoting educational equity (Zallio & Clarkson, 2022). Thus, this study proposes the following hypothesis:

H8. Fairness in the education process positively affects AOEPEE.

The digital divide, characterized by unequal access to and use of digital technologies, poses a significant challenge to the equitable adoption of online education platforms (Chang et al., 2021). This divide, marked by disparities in internet access, devices, and digital literacy, impedes certain groups from fully benefiting from online education. However, merely addressing the digital divide is insufficient for ensuring educational equality. Fair resource allocation, crucial for providing equal access and tools for online education, is essential (Sukawati et al., 2020). Even with similar internet access levels, disparities in digital skills and usage remain, highlighting the need for more equitable resource distribution. Equitable provision of resources, including high-quality content, teacher training, and support services, is key to transforming access into meaningful engagement with online platforms (Saiyad et al., 2020). Such distribution can alleviate the negative impacts of the digital divide, fostering higher and more equitable adoption rates of online educational platforms. Therefore, the following hypothesis is available:

H9. Equity in educational outcomes positively affects AOEPEE.

The 'digital divide' is a critical topic in contemporary academic discourse, highlighting disparities in access to, usage of, and benefits from digital technologies, particularly in education (Mitsch et al., 2021). This divide, driven by socioeconomic, geographical, and infrastructural factors, exacerbates the educational achievement gap, as students lacking digital resources fall behind. Online education platforms, offering scalability and flexibility, propose a means to bridge this gap, theoretically enabling equal access to educational resources regardless of location or socioeconomic status. However, their effectiveness hinges on the equality of educational opportunities provided (Gomez et al., 2021). Without equitable educational opportunities, even advanced online platforms risk perpetuating the digital divide (Shin et al., 2021). Conversely, when these platforms prioritize educational equality—through diverse, accessible content and user support—they can serve as effective tools in bridging the digital divide and promoting equitable education. Thus, this study proposes the following hypothesis:

H10. Fair resource allocation mediates the relationship between the digital divide and AOEPEE.

The digital divide, defined as the disparity in access to information and communication technologies (ICTs), is a recognized factor exacerbating educational inequalities, especially highlighted during the shift to online education in the COVID-19 pandemic. This divide challenges the notion that technology-based educational solutions are inherently equitable (Bratton, 2022). Ensuring fairness in education, where all students have equal success opportunities regardless of background or resources, is crucial. However, access to technology alone doesn't ensure its effective use or improved learning outcomes (Turnbull et al., 2021). The relationship between the digital divide and online education adoption may hinge on perceived fairness. If learners view the educational process as unfair due to digital access disparities, their engagement with online platforms could be adversely affected. Additionally, the concept of "digital equity" extends beyond mere access, including the development of necessary skills and competencies. Schools and educators promoting fairness in digital pedagogy, through supportive environments, addressing diverse student needs, and inclusive curriculum designs, are key to enhancing the adoption and effective use of online education platforms (Warren & Khan, 2023). Therefore, the following hypothesis is proposed:

H11. Equality of educational opportunities mediates the relationship between the digital divide and AOEPEE.

The "digital divide," denoting disparities in access to digital resources, is a critical obstacle to educational equity, encompassing not just hardware access but also internet connectivity, digital literacy, and availability of appropriate educational content(Morgan et al., 2022). Educational institutions aim to provide equal opportunities for all students to reach their full potential. Online education platforms have been proposed as a means to mitigate educational disparities (Aditya, 2021). However, their effectiveness depends on addressing the existing digital divide. The nuance in this relationship lies in educational outcomes; if online education enables equitable outcomes for students from diverse backgrounds, it suggests that these platforms may be addressing the challenges of the digital divide (Tamah et al., 2020). This potential success indicates a significant step towards overcoming digital barriers in education. Therefore, the study proposes the following hypothesis:

H12. Fairness in the education process mediates the relationship between the digital divide and AOEPEE.

H13. Equity in educational outcomes mediates the relationship between the digital divide and AOEPEE.

3. Methodology

This study adheres to a quantitative research methodology. A purposive sampling strategy was employed to select 609 participants, who have experience in consuming and using online education platforms within the online questionnaire. In addition, the population of this survey is mainly students from Tsinghua University, Peking University, Fudan University, Nanjing University and Southwest Jiaotong University. And then, we use the 5point Likert scale to measure the variables.

The digital divide, a multifaceted issue, is commonly understood as the gap in access to and skills in using Information and Communication Technology (ICT) (Gupta & Yadav, 2022). Gran et al. (2020) provide a comprehensive framework for analyzing this divide, encompassing technical means (access to hardware, software, and internet connections), autonomy of use (freedom in technology usage), skills (effective use of digital technologies), social support (assistance from social networks), and purpose of use (diversity in technology application).In exploring fair resource allocation, the Organizational Justice Scale by Cugueró-Escofet et al. (2019) is instrumental. It assesses distributive justice (outcome fairness), procedural justice (process fairness), and

interactional justice (fairness in interpersonal interactions during outcome implementation). For measuring fairness in the education process, Baydas and Cicek (2019) developed the Education Process scale, which evaluates aspects like equal opportunities, fair grading, accessibility to resources, impartial treatment by teachers, support for special needs, non-discriminatory admissions, and promotion of diversity and inclusivity. Furthermore, the Educational Opportunities scale assesses equity in educational outcomes, focusing on equal opportunities for academic success, access to high-quality education, addressing achievement gaps, higher education chances for marginalized groups, equitable resource distribution, and policies to reduce educational disparities. Lastly, the Adoption of Online Education Platform for Education Equality scale measures factors crucial for online education platforms in promoting educational equity. These include access and availability, digital literacy and support, personalization and flexibility, inclusivity and diversity, equity and affordability, and empowerment and engagement. This comprehensive approach to measurement variables provides a robust framework for analyzing the digital divide, fair resource allocation, and the effectiveness of online education platforms in fostering educational equity.

The methodology for data analysis in this research incorporates a comprehensive approach, beginning with descriptive statistical analysis to examine demographic information and other pertinent data of the surveyed sample (Sulistyawati et al., 2021). This includes key indicators such as age, income, education, and cities. The study further employs a reliability and validity test, utilizing Cronbach's alpha to assess the consistency and reliability of the measurement scale, with a value closer to 1 indicating higher reliability (Vaske et al., 2017). Validity analysis ensures the internal consistency of questionnaire data, evaluated through criteria such as KMO and cumulative variance interpretation rate (Song et al., 2020). The research also involves confirmatory factor analysis (CFA) to test the fit between the theoretical model and observed data, identifying underlying latent variables (Mueller & Hancock, 2018). This process includes model fitting, comparing the observed data with the theoretical model using maximum likelihood estimation and goodness-of-fit statistics like RMSEA and CFI (Gates et al., 2020; Lospinoso & Snijders, 2019). Model modification may be necessary to achieve an acceptable fit. Additionally, path analysis is conducted to investigate relationships between variables in the theoretical model, focusing on direct and indirect effects and assessing the model's goodness-of-fit (Mueller & Hancock, 2018). This technique is crucial for testing hypotheses about variable relationships and determining their effects on each other. Overall, this multi-faceted methodological approach, encompassing descriptive statistics, reliability and validity testing, CFA, model fitting, and path analysis, provides a robust framework for analyzing the data and extracting meaningful insights relevant to the study's objectives.

4. Results

4.1 Descriptive analysis

Table 1 in the study provides a comprehensive demographic and experiential profile of the participants involved in the research. The table categorizes the participants based on several key variables: gender, age, experience with online education platforms, platform experience, geographical area, university affiliation, family income per year, and education level. The gender distribution shows a higher representation of females (57.5%) compared to males (42.5%). Age-wise, the participants are predominantly young adults, with the largest age group being 22-25 years (43.5%), followed by 20-22 years (23.2%). This suggests that the study primarily involves younger individuals who are likely to be more familiar with digital technologies.

The experience with online education platforms is varied, with the majority having 2-3 years of experience (44.3%), indicating a moderately experienced user base. The participants have used a range of online platforms, with no single platform showing a

dominant usage, which points to a diverse exposure to different online educational environments. Geographically, a significant majority of the participants come from rural areas (67.7%), which could reflect on the reach of online education in non-urban settings.

Regarding university affiliation, the participants are associated with some of China's top universities, such as Tsinghua and Peking University, suggesting a high educational background among the sample. The family income data shows a wide range, with the largest group earning between 100,000 to 200,000￥ annually, indicating a middle-income demographic. In terms of education level, the majority hold a Bachelor's degree (51.2%), followed by Master's (35.3%) and Doctorate degrees (13.5%).

Overall, Table 1 presents a detailed breakdown of the participant demographics and backgrounds, offering insights into the diversity of the sample in terms of age, gender, educational and economic background, and experience with online education platforms. This diversity is crucial for understanding the generalizability and applicability of the study's findings across different segments of the population.

Table 1. Information of the participants

		Frequency	Percent
Gender	Male	259	42.5
	Female	350	57.5
Age	<20	64	10.5
	20-22	141	23.2
	22-25	265	43.5
	>25	139	22.8
Experience in using an online education platform	Less than 1 year	64	10.5
	1-2 Years	146	24.0
	2-3 Years	270	44.3
	More than 3 years	129	21.2
Platforms experience	New Oriental	63	10.3
	Gaotu	59	9.7
	Offcn	60	9.9
	Huatu Online	63	10.3
	Hujiang	74	12.2
	Fenbi	59	9.7
	Youdao Quality Course	63	10.3
	NetEase Cloud Classroom	47	7.7
	Tencent Classroom	62	10.2
	Open University of China	59	9.7
Area	Urban area	197	32.3
	Rural area	412	67.7
Affiliation	Tsinghua University	128	21.0
	Peking University	120	19.7
	Fudan University	120	19.7
	Nanjin university	124	20.4
	SouthWest JiaoTong University	117	19.2
Family income/ year	＜100000￥	146	24.0
	100000￥-200000￥	203	33.3
	200000￥-250000￥	182	29.9
	250000￥-300000￥	48	7.9
	>300000￥	30	4.9
Education level	Bachelor	312	51.2
	Master	215	35.3
	Doctor	82	13.5

4.2 Reliability and validity analysis

Table 2 and Table3 in the study are instrumental in assessing the psychometric properties of the survey instrument used for data collection. Table 2 presents the reliability statistics, specifically the Cronbach's Alpha coefficient, for the scale comprising 43 items. The Cronbach's Alpha value of .938 is significantly high, indicating a very strong internal consistency among the items in the scale. This high level of reliability suggests that the items are well-correlated and collectively contribute to a consistent measurement of the underlying construct. Such a high alpha value is indicative of the scale's robustness and reliability,

ensuring that the responses are not only consistent across items but also reliable over repeated administrations.

Table3 details the results of the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity, both of which are critical in validating the appropriateness of conducting a factor analysis on the dataset. The KMO measure of .956 is exceptionally high, far exceeding the commonly accepted threshold of .6, which indicates that the sample size is adequate and the data patterns are suitable for factor analysis. This high KMO value suggests that the partial correlations among variables are not negligible, thus justifying the factorability of the correlation matrix. Bartlett's Test of Sphericity further supports this by showing a significant chi-square value of 13079.921 with 903 degrees of freedom and a significance level of .000. This indicates that the correlation matrix is not an identity matrix and that the variables are sufficiently correlated to provide a meaningful structure in factor analysis. Together, these tables provide strong evidence of the reliability and validity of the survey instrument. The high reliability, as indicated by Cronbach's Alpha, ensures consistent responses, while the KMO measure and Bartlett's Test confirm the suitability of the data for uncovering underlying factor structures, crucial for any substantive analysis involving latent constructs.

Table 2. Reliability Statistics

Cronbach's Alpha	N of Items
.938	43

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.956
Bartlett's Test of Sphericity	Approx. Chi-Square	13079.921
	df	903
	Sig.	.000

4.3 Confirmatory factor analysis

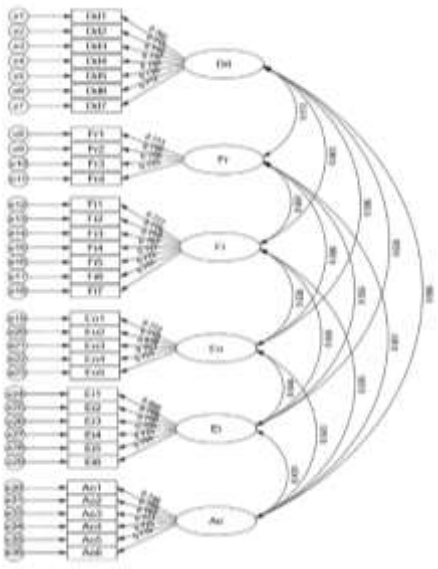

Figure 1. Measurement model analysis

Tables 4, 5, and 6 in the study provide a detailed analysis of the confirmatory factor model fit metrics, convergence validity, and discriminant validity of the latent variables under investigation. Table 4 presents the confirmatory factor model fit metrics, which are essential for evaluating how well the proposed theoretical model fits the observed data. The fit indices include Chi-square/df, RMSEA (Root Mean Square Error of Approximation), GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), NFI (Normed Fit Index), TLI (Tucker-Lewis Index), and CFI (Comparative Fit Index). The reference standards for these indices

suggest acceptable thresholds for a good model fit: Chi-square/df < 3, RMSEA < 0.08, and all others > 0.9. The results indicate a good model fit with all indices meeting or exceeding the reference standards, suggesting that the theoretical model is a good representation of the observed data.

Table Error! No text of specified style in document.**. Confirmatory factor model fit metrics**

Fit index	χ2/df	RMSEA	GFI	AGFI	NFI	TLI	CFI
Reference standards	<3	<0.08	>0.9	>0.85	>0.9	>0.9	>0.9
Result	1.528	0.029	0.930	0.919	0.935	0.974	0.977

Table 5 focuses on the convergence validity of the latent variables, which assesses whether the set of items or observation indicators that are supposed to measure the same construct are indeed doing so. The table lists latent variables such as Digital Divide, Fair Resource Allocation, Fairness in the Education Process, Equality of Educational Opportunities, Equity in Educational Outcomes, and Adoption of Online Education Platform for Education Equality. For each latent variable, factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE) are provided. The factor loadings are all substantial, indicating strong relationships with their respective latent variables. The CR values are all above the acceptable threshold of 0.7, and the AVE values are above 0.5, suggesting good convergence validity.

Table 5. Convergence Validity

Latent variables	Observation indicators	Factor loading	CR	AVE
Dd	Dd1	0.765	0.890	0.535
	Dd2	0.715		
	Dd3	0.742		
	Dd4	0.747		
	Dd5	0.708		
	Dd6	0.730		
	Dd7	0.712		
Fr	Fr1	0.731	0.829	0.548
	Fr2	0.750		
	Fr3	0.756		
	Fr4	0.723		
Fi	Fi1	0.777	0.905	0.578
	Fi2	0.775		
	Fi3	0.759		
	Fi4	0.767		
	Fi5	0.727		
	Fi6	0.772		
	Fi7	0.741		
Eo	Eo1	0.772	0.873	0.581
	Eo2	0.718		
	Eo3	0.830		
	Eo4	0.763		
	Eo5	0.721		
Ei	Ei1	0.808	0.909	0.624
	Ei2	0.786		
	Ei3	0.790		
	Ei4	0.786		
	Ei5	0.775		
	Ei6	0.794		
Ao	Ao1	0.748	0.890	0.575

Ao2	0.785
Ao3	0.765
Ao4	0.771
Ao5	0.770
Ao6	0.710

Note: Dd: Digital Divide; Fr: Fair resource allocation; Fi: Fairness in the education process; Eo: Equality of educational opportunities; Ei: Equity in educational outcomes; Ao: Adoption of online education platform for education equality

Table 6 tests the discriminant validity, which examines whether the latent variables are distinct from each other. The diagonal elements represent the square root of AVE for each latent variable, and these should be greater than the off-diagonal elements in their respective rows and columns. The table shows that this condition is met for all latent variables, indicating good discriminant validity.

Table 4-6. Discriminant validity test

Latent variables	1	2	3	4	5	6
Dd	0.731					
Fr	0.572	0.740				
Fi	0.663	0.697	0.760			
Eo	0.596	0.598	0.639	0.762		
Ei	0.634	0.556	0.559	0.644	0.790	
Ao	0.696	0.651	0.676	0.643	0.631	0.758

Note: The diagonal is the square root of the corresponding dimension AVE
Dd: Digital Divide; Fr: Fair resource allocation; Fi: Fairness in the education process; Eo: Equality of educational opportunities; Ei: Equity in educational outcomes; Ao: Adoption of online education platform for education equality

In summary, these tables collectively demonstrate that the measurement model used in the study is statistically robust, with strong evidence of model fit, convergence validity, and discriminant validity. This robustness is crucial for ensuring the reliability and validity of the findings derived from the model.

4.4 Structural equation model

Table 7 in the study presents the model fit metrics for the structural equation model (SEM), a crucial aspect in assessing the adequacy and appropriateness of the model in representing the observed data. The table lists several fit indices, including Chi-square/df, RMSEA (Root Mean Square Error of Approximation), GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), NFI (Normed Fit Index), TLI (Tucker-Lewis Index), and CFI (Comparative Fit Index), alongside their respective reference standards for an acceptable model fit. The results indicate a Chi-square/df ratio of 1.943, which is well below the recommended threshold of 3, suggesting a good fit. The RMSEA value of 0.039 is significantly lower than the standard of 0.08, further confirming the model's adequacy. The GFI, AGFI, NFI, TLI, and CFI indices all exceed their respective reference values (0.9 for GFI, NFI, TLI, CFI and 0.85 for AGFI), indicating a strong and satisfactory fit between the theoretical model and the observed data. These metrics collectively demonstrate that the SEM is robust and effectively captures the relationships and constructs proposed in the study, providing a reliable foundation for subsequent analyses and interpretations.

Table 7. Model fit metrics for structural equation model

Fit index	$\chi 2$/df	RMSEA	GFI	AGFI	NFI	TLI	CFI
Reference standards	<3	<0.08	>0.9	>0.85	>0.9	>0.9	>0.9
Result	1.943	0.039	0.907	0.894	0.917	0.954	0.958

Table 8 in the research delineates the outcomes of the path analysis within the structural equation model (SEM), a key component in assessing the proposed relationships among

various constructs related to the digital divide and the adoption of online education platforms. The table outlines nine hypotheses (H1-H9), each examining a specific path within the model. The paths are defined by the relationships between constructs such as Digital Divide (Dd), Fair Resource Allocation (Fr), Fairness in the Education Process (Fi), Equality of Educational Opportunities (Eo), Equity in Educational Outcomes (Ei), and Adoption of Online Education Platform for Education Equality (Ao).

Each hypothesis is assessed through several statistical measures: path estimate, standardized coefficient (β), standard error (S.E.), critical ratio (C.R.), and significance level (P). The results indicate that all hypotheses are supported, with significant path coefficients ($p<0.001$). Notably, the paths from Digital Divide to other constructs (H1-H5) show strong relationships, with high β values and significant C.R. scores, suggesting that the Digital Divide has a substantial impact on factors like fair resource allocation, educational process fairness, and educational opportunity equality. Similarly, the paths from these factors to the Adoption of Online Education Platforms (H6-H9) are also significant, indicating that these elements play a crucial role in the adoption of online education platforms.The findings from this table are critical as they provide empirical evidence supporting the theoretical framework of the study. The significant path coefficients demonstrate the interconnectedness of these constructs and their collective influence on the adoption of online education platforms, highlighting the importance of addressing the digital divide and promoting fairness and equity in education to enhance the effectiveness of online education platforms.

Table 8. Structural equation model path test

Hypothesis	Path	Estimate	β	S.E.	C.R.	P	Results
H1	Dd→Ao	0.267	0.292	0.080	3.356	***	Supported
H2	Dd→Fr	0.619	0.656	0.048	12.795	***	Supported
H3	Dd→Eo	0.624	0.676	0.045	13.856	***	Supported
H4	Dd→Fi	0.695	0.728	0.046	15.047	***	Supported
H5	Dd→Ei	0.704	0.690	0.048	14.773	***	Supported
H6	Fr→Ao	0.176	0.181	0.047	3.748	***	Supported
H7	Eo→Ao	0.146	0.147	0.047	3.113	0.002	Supported
H8	Fi→Ao	0.176	0.184	0.049	3.589	***	Supported
H9	Ei→Ao	0.137	0.152	0.042	3.221	0.001	Supported

Note: Dd: Digital Divide; Fr: Fair resource allocation; Fi: Fairness in the education process; Eo: Equality of educational opportunities; Ei: Equity in educational outcomes; Ao: Adoption of online education platform for education equality.

***: $p<0.001$

Table 9 provides an academic analysis of the mediation effects within the structural equation model (SEM), utilizing a bootstrap test to evaluate the indirect relationships between the constructs. The table examines four hypotheses (H10-H13), each focusing on a different mediation path involving the Digital Divide (Dd) and its impact on the Adoption of Online Education Platforms (Ao) through various mediating variables: Fair Resource Allocation (Fr), Equality of Educational Opportunities (Eo), Fairness in the Education Process (Fi), and Equity in Educational Outcomes (Ei). Each hypothesis is assessed based on the mediation path's effect size, standard error (SE), and the bias-corrected 95% confidence interval (CI). The results indicate that all four hypotheses are supported. Specifically, the mediation effect of Fair Resource Allocation (H10) shows an effect size of 0.109, with a confidence interval ranging from 0.014 to 0.202. Similarly, the mediation effects of Equality of Educational Opportunities (H11), Fairness in the Education Process (H12), and Equity in Educational Outcomes (H13) demonstrate significant indirect impacts with effect sizes of 0.091, 0.123, and 0.096, respectively, and corresponding confidence intervals that do not include zero.

These findings are crucial as they highlight the significant role of these mediating variables in the relationship between the Digital Divide and the Adoption of Online Education Platforms. The supported mediation paths suggest that the impact of the Digital Divide on the adoption of online education platforms is not direct but is significantly influenced by factors like resource allocation fairness, educational opportunity equality, process fairness, and outcome equity. This nuanced understanding underscores the importance of addressing these

intermediary factors to effectively mitigate the effects of the Digital Divide on educational technology adoption.

Table 9. Mediation effect bootstrap test

Hypothesis	Mediation path	Effect size	SE	Bias-Corrected 95%CI		Results
H10	Dd→Fr→Ao	0.109	0.049	0.014	0.202	Supported
H11	Dd→Eo→Ao	0.091	0.047	0.004	0.178	Supported
H12	Dd→Fi→Ao	0.123	0.061	0.002	0.243	Supported
H13	Dd→Ei→Ao	0.096	0.048	0.004	0.202	Supported

Note: Dd: Digital Divide; Fr: Fair resource allocation; Fi: Fairness in the education process; Eo: Equality of educational opportunities; Ei: Equity in educational outcomes; Ao: Adoption of online education platform for education equality

Figure 2 uncovers the structural equation model diagram and explains the relationship among Digital Divide, Fair Resource Allocation, Equality of Educational Opportunities, Fairness in the Education Process, Equity in Educational Outcomes and the behavior of purchasing online exercise courses. By this way, this model identifies the mediation roles of Fair Resource Allocation, Equality of Educational Opportunities, Fairness in the Education Process, and Equity in Educational Outcomes.

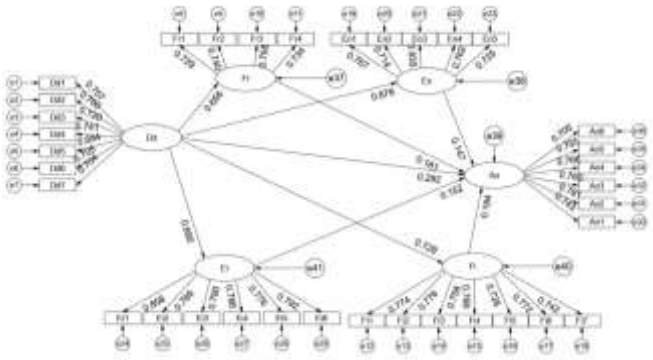

Figure *4*-2 Path Diagram for the structural equation model (with hypotheses)

5. Discussion and conclusion

The analysis of the path results from the structural equation model (SEM) provides insightful findings into the dynamics between the Digital Divide and the adoption of online education platforms. The supported hypotheses (H1-H9) from Table 8 reveal a significant direct influence of the Digital Divide (Dd) on various factors such as Fair Resource Allocation (Fr), Equality of Educational Opportunities (Eo), Fairness in the Education Process (Fi), and Equity in Educational Outcomes (Ei), which in turn affect the Adoption of Online Education Platforms (Ao). Notably, the strongest direct impact is observed in the path from the Digital Divide to Fairness in the Education Process (H4), indicating that the divide significantly affects how fair and equitable the educational process is perceived. This is critical as it highlights the direct consequences of digital disparities on educational fairness. Furthermore, the mediation effect bootstrap test results from Table 9, particularly hypotheses H10-H13, underscore the indirect influence of the Digital Divide on the adoption of online platforms through these mediating variables. The significant effect sizes in these mediation paths suggest that the relationship between the Digital Divide and platform adoption is not merely direct but is substantially mediated by factors like resource allocation, educational opportunities, and equity in outcomes. These findings collectively emphasize the multifaceted impact of the Digital Divide, not only directly influencing various aspects of educational equity but also indirectly affecting the adoption and effectiveness of online education platforms. This comprehensive analysis underscores the need for targeted interventions that address both the direct and indirect impacts of the Digital Divide to enhance the effectiveness and equity of online education.

5.1 Theoretical implications

The theoretical implications of this study, which intertwines Educational Equity Theory and Digital Divide Theory with empirical findings, offer a nuanced understanding of the interplay between digital access and educational equity. The results resonate with and extend the foundational principles of Educational Equity Theory, which posits that equitable resource distribution and equal educational opportunities are pivotal for achieving satisfactory educational outcomes (Gümüş et al., 2021; Zahra, 2021). Our findings corroborate this by demonstrating the significant impact of the Digital Divide on factors like Fair Resource Allocation and Equality of Educational Opportunities, which are crucial for the adoption of online education platforms (H2, H3). This aligns with Druege et al. (2019), who emphasized the importance of equitable resource allocation in education.

Furthermore, the study's results enrich the Digital Divide Theory by highlighting not just the disparity in access to technology but also the consequential effects on educational processes and outcomes (Szymkowiak et al., 2021; Van Dijk, 2020). The significant direct relationships identified between the Digital Divide and aspects like Fairness in the Education Process (H4) and Equity in Educational Outcomes (H5) align with the findings of Caena and Redecker (2019), underscoring the multifaceted nature of the digital divide. However, our study extends this understanding by revealing the indirect effects mediated through these factors (H10-H13), suggesting a more complex relationship than previously acknowledged.

Comparatively, while previous research has often focused on the direct consequences of the digital divide (Reggi & Gil-Garcia, 2021; Zhang et al., 2022), our study contributes to the literature by elucidating the indirect pathways through which the digital divide influences the adoption of online education platforms. This is particularly relevant in the context of the post-pandemic educational landscape, where online platforms have become more prevalent (Azubuike et al., 2021; Papadopoulos & Cleveland, 2023). In conclusion, this study bridges Educational Equity and Digital Divide Theories, providing a comprehensive view of how digital access and equity in education are interrelated. It not only confirms the direct impacts highlighted in previous research but also unveils the nuanced indirect effects, thereby enriching the theoretical discourse and offering deeper insights for future research and policy-making in the realm of educational technology and equity.

5.2 Practical implications

The study's findings have significant managerial implications for various stakeholders in the realm of education, particularly in the context of online learning and digital equity. These stakeholders include educational policymakers, school administrators, technology providers, and educators.

The direct impact of the Digital Divide on educational equity (H1-H5) underscores the need for policymakers to develop comprehensive strategies that address both access to technology and the quality of educational resources. Policies should focus not only on providing hardware and internet connectivity but also on ensuring that digital resources are pedagogically sound and accessible to all students, regardless of their socio-economic background (Szymkowiak et al., 2021; Van Dijk, 2020). The mediation effects (H10-H13) highlight the importance of policies that foster digital literacy and support inclusive educational practices. Policymakers should consider initiatives that provide training for educators in digital pedagogies and develop curricula that are adaptable to diverse learning needs (Papadopoulos & Cleveland, 2023).

Administrators should focus on implementing fair resource allocation strategies within their institutions. This involves equitable distribution of digital tools and resources, ensuring that all students have equal opportunities to benefit from online education platforms (Druege et al., 2019). The findings also suggest the need for school leaders to invest in professional development for teachers, enabling them to effectively integrate technology into their teaching practices and address diverse student needs (Zahra, 2021).

Companies and organizations that develop and provide educational technology should

consider the diverse needs of their users. This includes designing user-friendly platforms that are accessible to students with varying levels of digital literacy and from different socio-economic backgrounds (Reggi & Gil-Garcia, 2021). Providers should collaborate with educational institutions to ensure that their products align with educational goals and standards, and are adaptable to different teaching and learning contexts (Azubuike et al., 2021). Teachers and instructors should be aware of the digital divide and its implications for student engagement and learning outcomes. They need to employ inclusive teaching strategies that accommodate students with limited access to technology or digital skills (Caena & Redecker, 2019). Educators should also advocate for and participate in professional development opportunities to enhance their digital pedagogy skills, ensuring they can effectively leverage online platforms to support diverse learners (Gümüş et al., 2021). In summary, the study's results call for a collaborative effort among all stakeholders to address the challenges posed by the digital divide. By focusing on equitable access, quality of resources, digital literacy, and inclusive educational practices, stakeholders can work together to enhance the effectiveness and equity of online education platforms.

5.3 Conclusion

The study presents a comprehensive analysis of the interplay between the digital divide and the adoption of online education platforms, framed within the context of educational equity. The results, derived from a structural equation model, reveal significant direct impacts of the digital divide on various aspects of educational equity, including fair resource allocation, fairness in the education process, equality of educational opportunities, and equity in educational outcomes. These findings are supported by strong path coefficients and statistical significance, underscoring the profound influence of digital access disparities on educational practices and outcomes. Moreover, the study extends beyond direct effects to explore the indirect impacts mediated through these factors. The mediation analysis indicates that the relationship between the digital divide and the adoption of online education platforms is nuanced, with significant indirect effects channeled through fair resource allocation, educational opportunity equality, process fairness, and outcome equity. These results highlight the multifaceted nature of the digital divide, suggesting that its influence on educational technology adoption is complex and mediated by a range of educational equity factors.

This study makes several key contributions to the existing body of knowledge. Firstly, it bridges the gap between Educational Equity Theory and Digital Divide Theory, providing a holistic view of how digital access and educational equity are intertwined. This integrative approach offers a more comprehensive understanding of the challenges and dynamics in the realm of digital education. Secondly, the study contributes empirically by employing a robust structural equation model to quantify the relationships between the digital divide and various dimensions of educational equity. The use of advanced statistical techniques to explore both direct and indirect effects adds depth and rigor to the analysis, offering empirical evidence to support theoretical assertions. Lastly, the study provides practical insights for policymakers, educators, and technology providers, highlighting the need for targeted strategies that address both the technological and pedagogical aspects of online education. The findings underscore the importance of equitable resource distribution, digital literacy, and inclusive educational practices in mitigating the effects of the digital divide.

Despite its contributions, the study has limitations that offer avenues for future research. One limitation is the cross-sectional nature of the data, which precludes the ability to infer causal relationships. Longitudinal studies could provide deeper insights into how the relationships between the digital divide and educational equity evolve over time. Another limitation is the study's geographical and demographic scope. Future research could expand the sample to include diverse populations and settings, enhancing the generalizability of the findings. Additionally, qualitative studies could complement the quantitative approach, providing richer, context-specific insights into the experiences and perceptions of individuals affected by the digital divide. Furthermore, future research could explore the role of emerging technologies, such as artificial intelligence and virtual reality, in shaping the digital divide and its impact on educational equity. Investigating these technologies could provide a forward-

looking perspective on the challenges and opportunities in digital education.

In conclusion, while this study advances our understanding of the digital divide's impact on educational equity and the adoption of online education platforms, it also opens up new directions for research that can further enrich our knowledge and inform effective interventions in the field of digital education.

6. References

Aditya, D. S. (2021). Embarking Digital Learning Due to COVID-19: Are Teachers Ready? *Journal of Technology and Science Education*, *11*(1), 104-116. https://doi.org/10.3926/JOTSE.1109

Alam, A. (2022). Platform utilising blockchain technology for eLearning and online education for open sharing of academic proficiency and progress records. In *Smart Data Intelligence: Proceedings of ICSMDI 2022* (pp. 307-320). Springer.

Ali, W. (2020). Online and remote learning in higher education institutes: A necessity in light of COVID-19 pandemic. *Higher Education Studies*, *10*(3), 16-25. https://doi.org/10.5539/hes.v10n3p16

Azubuike, O. B., Adegboye, O., & Quadri, H. (2021). Who gets to learn in a pandemic? Exploring the digital divide in remote learning during the COVID-19 pandemic in Nigeria. *Int J Educ Res Open*, *2*, 100022. https://doi.org/10.1016/j.ijedro.2020.100022

Badham, J., Elsawah, S., Guillaume, J. H., Hamilton, S. H., Hunt, R. J., Jakeman, A. J., Pierce, S. A., Snow, V. O., Babbar-Sebens, M., & Fu, B. (2019). Effective modeling for Integrated Water Resource Management: A guide to contextual practices by phases and steps and future opportunities. *Environmental Modelling & Software*, *116*, 40-56. https://doi.org/10.1016/J.ENVSOFT.2019.02.013

Baydas, O., & Cicek, M. (2019). The examination of the gamification process in undergraduate education: a scale development study. *Technology, pedagogy and education*, *28*(3), 269-285. https://doi.org/10.1080/1475939x.2019.1580609

Bekova, S., Terentev, E., & Maloshonok, N. (2021). Educational Inequality and COVID-19 Pandemic: Relationship between the Family Socio-Economic Status and Student Experience of Remote Learning. *Вопросы образования*(1 (eng)), 74-92. https://doi.org/10.17323/1814-9545-2021-1-74-92

Belay, D. G. (2020). COVID-19, Distance Learning and Educational Inequality in Rural Ethiopia. *Pedagogical Research*, *5*(4). https://doi.org/10.29333/pr/9133

Blossfeld, H.-P., & Von Maurice, J. (2019). *Education as a lifelong process*. Springer.

Bratton, B. (2022). *The revenge of the real: Politics for a post-pandemic world*. Verso Books.

Burbules, N. C., Fan, G., & Repp, P. (2020). Five trends of education and technology in a sustainable future. *Geography and Sustainability*, *1*(2), 93-97. https://doi.org/10.1016/j.geosus.2020.05.001

Caena, F., & Redecker, C. (2019). Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework for Educators (Digcompedu). *European Journal of Education*, *54*(3), 356-369. https://doi.org/10.1111/EJED.12345

Carrillo, C., & Flores, M. A. (2020). COVID-19 and teacher education: a literature review of online teaching and learning practices. *European journal of teacher education*, *43*(4), 466-487. https://doi.org/10.1080/02619768.2020.1821184

Chang, J. E., Lai, A. Y., Gupta, A., Nguyen, A. M., Berry, C. A., & Shelley, D. R. (2021). Rapid Transition to Telehealth and the Digital Divide: Implications for Primary Care Access and Equity in a Post-COVID Era. *Milbank Q*, *99*(2), 340-368. https://doi.org/10.1111/1468-0009.12509

Cheshmehzangi, A., Zou, T., Su, Z., & Tang, T. (2023). The growing digital divide in education among primary and secondary children during the COVID-19 pandemic: An overview of social exclusion and education equality issues. *Journal of Human Behavior in the Social Environment*, *33*(3), 434-449. https://doi.org/10.1080/10911359.2022.2062515

Chiu, T. K. (2021). Student engagement in K-12 online learning amid COVID-19: A qualitative approach from a self-determination theory perspective. *Interactive learning environments*, 1-14. https://doi.org/10.1080/10494820.2021.1926289

Chohan, S. R., & Hu, G. (2022). Strengthening digital inclusion through e-government: cohesive ICT training programs to intensify digital competency. *Information Technology for Development*, *28*(1), 16-38. https://doi.org/10.1080/02681102.2020.1841713

Chowdhury, S., Dey, P., Joel-Edgar, S., Bhattacharya, S., Rodriguez-Espindola, O., Abadie, A., & Truong, L. (2023). Unlocking the value of artificial intelligence in human resource management through AI capability framework. *Human Resource Management Review*, *33*(1), 100899. https://doi.org/10.1016/j.hrmr.2022.100899

Cugueró-Escofet, N., Ficapal-Cusí, P., & Torrent-Sellens, J. (2019). Sustainable Human Resource Management: How to Create a Knowledge Sharing Behavior through Organizational Justice, Organizational Support, Satisfaction and Commitment. *Sustainability*, *11*(19).

Dodd, E., Singh, S., Micsko, J., Austin, K., Morison, C., & Upton, S. (2021). Equalizing and widening access to higher education during a pandemic: Lessons learned from a multi-university perspective. *Student Success*, *12*(3), 58-72. https://doi.org/10.5204/ssj.1715

Druege, U., Hilo, A., Perez-Perez, J. M., Klopotek, Y., Acosta, M., Shahinnia, F., Zerche, S., Franken, P., & Hajirezaei, M. R. (2019). Molecular and physiological control of adventitious rooting in cuttings: phytohormone action meets resource allocation. *Ann Bot*, *123*(6), 929-949.

https://doi.org/10.1093/aob/mcy234
Du Preez, P., & Le Grange, L. (2020). The COVID-19 pandemic, online teaching/learning, the digital divide and epistemological access. *Unpublished paper*, *1*, 90-106.
Gates, K. M., Fisher, Z. F., & Bollen, K. A. (2020). Latent variable GIMME using model implied instrumental variables (MIIVs). *Psychol Methods*, *25*(2), 227-242. https://doi.org/10.1037/met0000229
Gomez, K., Gomez, L. M., & Worsley, M. (2021). Interrogating the role of CSCL in diversity, equity, and inclusion. *International handbook of computer-supported collaborative learning*, 103-119.
Gran, A.-B., Booth, P., & Bucher, T. (2020). To be or not to be algorithm aware: a question of a new digital divide? *Information, Communication & Society*, *24*(12), 1779-1796. https://doi.org/10.1080/1369118x.2020.1736124
Gümüş, S., Arar, K., & Oplatka, I. (2021). Review of international research on school leadership for social justice, equity and diversity. *Journal of Educational Administration and History*, *53*(1), 81-99. https://doi.org/10.1080/00220620.2020.1862767
Guo, C., & Wan, B. (2022). The digital divide in online learning in China during the COVID-19 pandemic. *Technol Soc*, *71*, 102122. https://doi.org/10.1016/j.techsoc.2022.102122
Gupta, P., & Yadav, S. (2022, 2022//). A TAM-based Study on the ICT Usage by the Academicians in Higher Educational Institutions of Delhi NCR. Congress on Intelligent Systems, Singapore.
Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*, 275-285. https://doi.org/10.1016/j.susoc.2022.05.004
Iglesias-Pradas, S., Hernandez-Garcia, A., Chaparro-Pelaez, J., & Prieto, J. L. (2021). Emergency remote teaching and students' academic performance in higher education during the COVID-19 pandemic: A case study. *Comput Human Behav*, *119*, 106713. https://doi.org/10.1016/j.chb.2021.106713
Jamil, S. (2021). From digital divide to digital inclusion: Challenges for wide-ranging digitalization in Pakistan. *Telecommunications Policy*, *45*(8), 102206. https://doi.org/10.1016/J.TELPOL.2021.102206
Jiang, S., & Pu, R. (2022). An empirical investigation on sustainable consumption behaviors in the online Education industry: perspectives from Chinese college student. *International Journal of Entrepreneurship*, *26*, 1-17.
Kamanzi, P. C., Goastellec, G., & Pelletier, L. (2021). Mass university and social inclusion: The paradoxical effect of public policies. *Social Inclusion*, *9*(3), 32-43. https://doi.org/10.17645/SI.V9I3.4165
Kizilcec, R. F., & Lee, H. (2022). Algorithmic fairness in education. In *The ethics of artificial intelligence in education* (pp. 174-202). Routledge.
Lal, R., Bouma, J., Brevik, E., Dawson, L., Field, D. J., Glaser, B., Hatano, R., Hartemink, A. E., Kosaki, T., & Lascelles, B. (2021). Soils and sustainable development goals of the United Nations: An International Union of Soil Sciences perspective. *Geoderma Regional*, *25*, e00398. https://doi.org/10.1016/J.GEODRS.2021.E00398
le Roux, M., & Lesch, E. (2023). Exploring the caring of fathers in low-income, rural communities in South Africa. *Journal of Family Studies*, *29*(3), 1198-1221. https://doi.org/10.1080/13229400.2022.2035246
Lim, C. P., Ra, S., Chin, B., & Wang, T. (2020). Leveraging information and communication technologies (ICT) to enhance education equity, quality, and efficiency: case studies of Bangladesh and Nepal. *Educational Media International*, *57*(2), 87-111. https://doi.org/10.1080/09523987.2020.1786774
Lospinoso, J., & Snijders, T. A. (2019). Goodness of fit for stochastic actor-oriented models. *Methodological Innovations*, *12*(3), 2059799119884282. https://doi.org/10.1177/2059799119884282
Lythreatis, S., Singh, S. K., & El-Kassar, A.-N. (2022). The digital divide: A review and future research agenda. *Technological Forecasting and Social Change*, *175*, 121359. https://doi.org/10.1016/j.techfore.2021.121359
Ma, D., & Li, X. (2021). Allocation Efficiency of Higher Education Resources in China. *International Journal of Emerging Technologies in Learning (iJET)*, *16*(11), 59-71. https://doi.org/10.3991/IJET.V16I11.23315
Malodia, S., Dhir, A., Mishra, M., & Bhatti, Z. A. (2021). Future of e-Government: An integrated conceptual framework. *Technological Forecasting and Social Change*, *173*, 121102. https://doi.org/10.1016/j.techfore.2021.121102
Mei, W., & Symaco, L. P. (2021). Higher Education for Development: The Role of University Towns in China. *SAGE Open*, *11*(3), 21582440211046586. https://doi.org/10.1177/21582440211046586
Mitsch, F., Lee, N., & Morrow, E. R. (2021). Faith no more? The divergence of political trust between urban and rural Europe. *Political geography*, *89*, 102426. https://doi.org/10.1016/J.POLGEO.2021.102426
Morgan, A., Sibson, R., & Jackson, D. (2022). Digital demand and digital deficit: Conceptualising digital literacy and gauging proficiency among higher education students. *Journal of Higher Education Policy and Management*, *44*(3), 258-275. https://doi.org/10.1080/1360080X.2022.2030275
Mueller, R. O., & Hancock, G. R. (2018). Structural equation modeling. In *The reviewer's guide to quantitative methods in the social sciences* (pp. 445-456). Routledge.
Onyema, E. M., Deborah, E. C., Alsayed, A. O., Noorulhasan, Q., & Sanober, S. (2019). Online discussion forum as a tool for interactive learning and communication. *International Journal of Recent Technology and Engineering*, *8*(4), 4852-4859. https://doi.org/10.35940/ijrte.d8062.118419
Papadopoulos, N., & Cleveland, M. (2023). An international and cross-cultural perspective on 'the wired consumer': The digital divide and device difference dilemmas. *Journal of Business Research*, *156*, 113473. https://doi.org/10.1016/j.jbusres.2022.113473

Pérez-Castro, M. Á., Mohamed-Maslouhi, M., & Montero-Alonso, M. Á. (2021). The digital divide and its impact on the development of Mediterranean countries. *Technology in Society*, *64*, 101452. https://doi.org/10.1016/j.techsoc.2020.101452
Pu, R., & Jiang, S. (2021). Understanding the consumption behaviors in online education towards promoting the sustainable development goals (SDGs). *Academy of Entrepreneurship Journal*, *27*(6), 1-16.
Rafique, G. M., Mahmood, K., Warraich, N. F., & Rehman, S. U. (2021). Readiness for Online Learning during COVID-19 pandemic: A survey of Pakistani LIS students. *The Journal of Academic Librarianship*, *47*(3), 102346. https://doi.org/10.1016/j.acalib.2021.102346
Reggi, L., & Gil-Garcia, J. R. (2021). Addressing territorial digital divides through ICT strategies: Are investment decisions consistent with local needs? *Government Information Quarterly*, *38*(2), 101562. https://doi.org/10.1016/j.giq.2020.101562
Reimers, F. M. (2022). *Primary and secondary education during Covid-19: Disruptions to educational opportunity during a pandemic*. Springer Nature.
Rizki, P. N. M., Handoko, I., Purnama, P., & Rustam, D. (2022). Promoting self-regulated learning for students in underdeveloped areas: The case of Indonesia Nationwide Online-Learning Program. *Sustainability*, *14*(7), 4075. https://doi.org/10.3390/su14074075
Ruiz-Alba, J. L., Abou-Foul, M., Nazarian, A., & Foroudi, P. (2022). Digital platforms: customer satisfaction, eWOM and the moderating role of perceived technological innovativeness. *Information Technology & People*, *35*(7), 2470-2499. https://doi.org/10.1108/itp-07-2021-0572
Saiyad, S., Virk, A., Mahajan, R., & Singh, T. (2020). Online Teaching in Medical Training: Establishing Good Online Teaching Practices from Cumulative Experience. *Int J Appl Basic Med Res*, *10*(3), 149-155. https://doi.org/10.4103/ijabmr.IJABMR_358_20
Santamaría, L. J., & Jean-Marie, G. (2014). Cross-cultural dimensions of applied, critical, and transformational leadership: women principals advancing social justice and educational equity. *Cambridge Journal of Education*, *44*(3), 333-360. https://doi.org/10.1080/0305764x.2014.904276
Shin, S.-Y., Kim, D., & Chun, S. A. (2021). Digital divide in advanced smart city innovations. *Sustainability*, *13*(7), 4076. https://doi.org/10.3390/SU13074076
Singh, S., Singh, U. S., & Nermend, M. (2022). Decision analysis of e-learning in bridging digital divide for education dissemination. *Procedia computer science*, *207*, 1970-1980. https://doi.org/10.1016/j.procs.2022.09.256
Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988-2018). *American Journal of Distance Education*, *33*(4), 289-306. https://doi.org/10.1080/08923647.2019.1663082
Song, X.-F., Zhang, Y., Guo, Y.-N., Sun, X.-Y., & Wang, Y.-L. (2020). Variable-size cooperative coevolutionary particle swarm optimization for feature selection on high-dimensional data. *IEEE Transactions on Evolutionary Computation*, *24*(5), 882-895. https://doi.org/10.1109/TEVC.2020.2968743
Su, J., Yang, W., & Zhong, Y. (2023). Influences of gender and socioeconomic status on children's use of robotics in early childhood education: A systematic review. *Early Education and Development*, *34*(4), 910-926. https://doi.org/10.1080/10409289.2022.2078617
Sukawati, N. N., Gunawan, I., Ubaidillah, E., Maulina, S., & Santoso, F. B. (2020). Human resources management in basic education schools. 2nd Early Childhood and Primary Childhood Education (ECPE 2020),
Sulistyawati, S., Rokhmayanti, R., Aji, B., Wijayanti, S. P. M., Hastuti, S. K. W., Sukesi, T. W., & Mulasari, S. A. (2021). Knowledge, Attitudes, Practices and Information Needs During the COVID-19 Pandemic in Indonesia. *Risk Manag Healthc Policy*, *14*, 163-175. https://doi.org/10.2147/RMHP.S288579
Szymkowiak, A., Melović, B., Dabić, M., Jeganathan, K., & Kundi, G. S. (2021). Information technology and Gen Z: The role of teachers, the internet, and technology in the education of young people. *Technology in Society*, *65*, 101565. https://doi.org/10.1016/J.TECHSOC.2021.101565
Tamah, S. M., Triwidayati, K. R., & Utami, T. S. D. (2020). Secondary school language teachers' online learning engagement during the COVID-19 pandemic in Indonesia. *Journal of Information Technology Education: Research*, *19*, 803-832. https://doi.org/10.28945/4626
Tewathia, N., Kamath, A., & Ilavarasan, P. V. (2020). Social inequalities, fundamental inequities, and recurring of the digital divide: Insights from India. *Technology in Society*, *61*, 101251. https://doi.org/10.1016/j.techsoc.2020.101251
Thomas, J., Barraket, J., Wilson, C. K., Holcombe-James, I., Kennedy, J., Rennie, E., Ewing, S., & MacDonald, T. (2020). Measuring Australia's digital divide: The Australian digital inclusion index 2020. https://doi.org/10.4225/50/57A7D17127384
Tonegawa, Y. (2022). Education in SDGs: What is Inclusive and Equitable Quality Education? In *Sustainable Development Disciplines for Humanity: Breaking Down the 5Ps—People, Planet, Prosperity, Peace, and Partnerships* (pp. 55-70). Springer.
Toquero, C. M. (2020). Challenges and opportunities for higher education amid the COVID-19 pandemic: The Philippine context. *Pedagogical Research*, *5*(4). https://doi.org/10.29333/pr/7947
Turnbull, D., Chugh, R., & Luck, J. (2021). Transitioning to E-Learning during the COVID-19 pandemic: How have Higher Education Institutions responded to the challenge? *Education and Information Technologies*, *26*(5), 6401-6419. https://doi.org/10.1007/s10639-021-10633-w
Van Dijk, J. (2020). *The digital divide*. John Wiley & Sons.
Vaske, J. J., Beaman, J., & Sponarski, C. C. (2017). Rethinking internal consistency in Cronbach's alpha.

Leisure sciences, *39*(2), 163-173. https://doi.org/10.1080/01490400.2015.1127189
Vilchez, J. A., Kruse, J., Puffer, M., & Dudovitz, R. N. (2021). Teachers and School Health Leaders' Perspectives on Distance Learning Physical Education During the COVID-19 Pandemic. *J Sch Health*, *91*(7), 541-549. https://doi.org/10.1111/josh.13030
Wang, J., Yang, M., & Maresova, P. (2020). Sustainable development at higher education in China: A comparative study of students' perception in public and private universities. *Sustainability*, *12*(6), 2158. https://doi.org/10.3390/su12062158
Warren, D., & Khan, Z. (2023). Education for Social Justice: An Integrative Framework for Inclusive Curriculum Redesign to Enable Fair Outcomes and Promote Social Change. In *Integrative Curricula: A Multi-Dimensional Approach to Pedagogy* (Vol. 50, pp. 25-45). Emerald Publishing Limited.
Xiao, F., & Zhang, J. (2022). China's Approach to Digital Transformation of Higher Education: Digital Infrastructure and (Open) Educational Resources. In. https://doi.org/10.5944/openpraxis.12.2.1071
Zahra, S. A. (2021). The resource-based view, resourcefulness, and resource management in startup firms: A proposed research agenda. *Journal of Management*, *47*(7), 1841-1860. https://doi.org/10.1177/01492063211018505
Zallio, M., & Clarkson, P. J. (2022). Designing the metaverse: A study on inclusion, diversity, equity, accessibility and safety for digital immersive environments. *Telematics and Informatics*, *75*, 101909. https://doi.org/10.1016/j.tele.2022.101909
Zhang, Z., Wen, F., Sun, Z., Guo, X., He, T., & Lee, C. (2022). Artificial intelligence-enabled sensing technologies in the 5G/internet of things era: from virtual reality/augmented reality to the digital twin. *Advanced Intelligent Systems*, *4*(7), 2100228. https://doi.org/10.1002/aisy.202100228