

## Research Article

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## Challenges in Teachers' Knowledge and Use of Accessible Digital Technologies for Inclusive Learning in Mongolia

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### Abstract

**Background/purpose.** The purpose of this study is to examine the challenges faced in developing teachers' ability to use accessible digital technologies, as well as their knowledge, understanding, and skills in pedagogical and inclusive technology methodologies. These are aimed at implementing the goal of providing equitable and accessible education to all students, as reflected in Mongolia's long-term policy, "Vision 20250" and the "Medium-Term Education Sector Development Plan 2021-2030". The integration of digital technologies into inclusive education has the potential to significantly enhance access to learning for students with diverse needs. However, teachers face significant barriers, including limited access to reliable digital infrastructure, inadequate professional development, and socio-economic disparities.

**Materials/methods.** The study was conducted using sampling, questionnaire, and document analysis methods. The collected data were analyzed using IBM's SPSS Statistics.v23 and AMOSv23 statistical programs. Based on the research data, structural analysis, descriptive statistics, exploratory and confirmatory factor analysis, and qualitative reliability analysis were conducted in four stages.

**Results.** The main result of the study is that Mongolia has an inclusive education system and legal framework, but the challenges facing teachers in using digital technologies that are more practical and accessible are weak digital tools and methodological capabilities for their use.

**Conclusion.** The results of the study show that the knowledge and understanding of the Mongolian education sector, such as "Inclusive Education" and "Digital Transition", is very high among the teachers surveyed, but the results of the study show that there are difficulties in introducing digital tools and platforms into classroom teaching methods. Although the basic conditions are in place to support the implementation of the goal of providing equal and accessible education to all students in Mongolia, it indicates that there is an opportunity to organize training and development work, considering the high need for teachers to develop digital tools and digital teaching methods.



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## 1. Introduction

Inclusive education aims to provide equal learning opportunities for all students, including those with disabilities. In Mongolia, integrating digital technologies into inclusive education presents both opportunities and challenges. While digital tools can improve learning experiences and accessibility, teachers face significant barriers to implementing them. Digital inclusion in education is crucial to creating an equitable learning environment. Despite progress in promoting digital literacy, technology access remains unequal, especially in rural areas. Our research incorporates various frameworks and theoretical concepts, including the Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2, the European Framework for the Digital Competence of Educators (DigCompEdu, 2017), Inclusive Digital Education (European Agency for Special Needs and Inclusive Education, 2022), Technology and Open and Distance Learning, the Global Education Monitoring Report (GEMR, 2023), the Framework of the Digi-HE project (2020–2022), the Survey on Digitally Enhanced Learning in European Higher Education Institutions, and the TPACK framework (Koehler & Mishra, 2008). These studies and frameworks informed our methodology. This article aims to examine the compliance of teachers' e-teaching methodologies, knowledge, and e-learning platforms (such as Web Content Accessibility Guidelines (WCAG) 2.0, online and distance, blended, and AI-based learning, MOOC, and mobile learning) in the context of inclusive education, taking into account national and international trends. In this way, we surveyed 366 teachers about the challenges they face in using accessible digital technology in an inclusive learning environment in Mongolia, processed and discussed the results, and presented the results to you.

## 2. Literature Review

### *2.1. International Policy Trends in Inclusive Education*

Globally, the paradigm of inclusive education is increasingly recognized and integrated into educational policies and frameworks. A variety of international organizations and governmental bodies emphasize the importance of accessibility and inclusive practices in education. UNESCO's Inclusive Education Framework (2020) defines inclusion as a process that embraces diversity and fosters a sense of belonging, recognizing the inherent value and potential of each individual. This framework underscores the necessity of training educators to implement inclusive pedagogical practices, advocating for learning environments where all students can thrive (UNESCO, 2020). The advent of digital technologies has transformed education, creating open digital learning opportunities accessible to all. According to UNESCO, digital technologies have evolved into networks of tools and programs that connect people and things across the globe, addressing both personal and global challenges. These innovations have demonstrated the ability to complement, enrich, and transform education, potentially accelerating progress toward Sustainable Development Goal 4 (SDG 4) for universal access to education. During crises like pandemics, distance learning becomes crucial in mitigating educational disruption (UNESCO, 2020). UNESCO's guidelines for ICT in education policies emphasize the strategic planning and integration of Information and Communication Technologies (ICT) in educational systems. These guidelines provide a roadmap for developing ICT masterplans that align with educational goals and promote inclusion (Miao et al., 2022). To prepare both educators and students for the future, UNESCO has developed AI competency frameworks. These frameworks aim to equip teachers and students with the necessary skills to navigate and leverage artificial intelligence in educational contexts, promoting digital literacy and inclusivity (Miao et al., 2024). The U.S. Access Board through its independent research findings, identifies the benefits and risks of artificial intelligence for people with disabilities and emphasizes the need to ensure equity, accessibility, and inclusion in the development of artificial intelligence (U.S. Access Board, 2024). The European Union's Digital Education Action Plan highlights the importance of digital literacy among educators and the adoption of inclusive teaching practices. This plan advocates for policies

and funding initiatives aimed at enhancing digital literacy and accessibility in schools, ensuring that all students, including those with disabilities, can benefit from technological advancements in education (European Union, 2020).

The Global Education Monitoring Report (2023) by UNESCO examines the role of technology in education, assessing its impact on accessibility and inclusion. The report underscores the critical need for policies that ensure equitable access to digital resources and technologies, fostering an inclusive educational environment (UNESCO, 2023). The Web Content Accessibility Guidelines (WCAG) 2.0 ensure that digital content is perceivable, operable, understandable, and robust for all users, making them crucial for inclusive education. Compliance with these guidelines is essential for creating accessible e-learning platforms that cater to students with disabilities (Weber, 2021).

UNICEF has been proactive in evaluating and promoting inclusive education through various country programs. Their reports highlight efforts to enhance access to quality education for children with disabilities, advocating for policies that support blended and remote learning models (UNICEF, 2021). The studies like "Teachers Training for the Use of Digital Technologies" (Danielle Aparecida do Nascimento dos Santos et al., 2016) and "MOOC Relevance" (Wang et al., 2023) highlight the importance of digital training and relevance in educational success. Inclusion is both a principle and a process, as emphasized by the World Education Forum (2015) and UNESCO (2020). Originally associated with disability, the concept now encompasses a broader range of groups, reflecting the complexities of diverse societies (Soriano, Watkins, & Ebersold, 2017). ICTs have long been expected to cater to a diverse user base, but true accessibility ensures that technology is efficient, informative, convenient, and enjoyable for all users, including those with disabilities (Weber, 2021).

## ***2.2. Current State of Accessible Digital Technologies in Mongolia***

Mongolia's long-term development policy, "Vision 2050," includes the goal of supporting human development or "providing equal opportunities for every citizen to receive quality education, ensuring equal inclusion, ensuring continuity of education at all levels, and improving the quality of training and activities" in the education sector. To ensure the implementation of this goal, the need for digitally accessible education is increasingly recognized in education policies aimed at implementing the goal of providing equal and inclusive education to all students as reflected in the Education Sector Mid-Term Development Plan 2021-2030. However, several challenges hinder effective implementation. Rural regions face limited infrastructure, lacking reliable internet access and modern technological resources, which restricts opportunities for both teachers and students (Gantsetseg & Sugarjav, 2021). This digital divide exacerbates educational inequalities, especially for students with disabilities who rely on technology for learning support. Additionally, professional development focused on inclusive education and digital competencies is insufficient, particularly in rural areas where teachers have limited access to training programs, resulting in a significant gap in digital competencies (Li et al., 2019). Cultural perceptions of disability and technology also affect the adoption of digital tools in classrooms, with some educators feeling unprepared or unsupported in addressing diverse student needs (Batjargal & Tserendorj, 2021). The lack of high-quality, accessible digital educational materials further hampers teachers' ability to create inclusive learning environments (Asian Development Bank, 2020).

Several projects and initiatives in Mongolia are actively addressing these challenges. Initiatives by Save the Children, such as "Promoting Inclusive Education for Every Last Child" I&II project and "Promoting Holistic and Inclusive Developmental Support in Early Childhood" and "Improving literacy skills of herder parents of children with special educational needs" focus on enhancing inclusive education through professional development and infrastructure improvements. Projects like "Strengthening Teachers' Ability and Reasonable Treatments for Children with Disabilities (START)" by JICA aim to improve services and support for inclusive education. The Asian Development Bank

and World Bank have also launched various projects to improve inclusive education, digital learning infrastructure, and post-COVID-19 recovery efforts in Mongolia's education sector.

Additionally, the "Training Teachers for Inclusion in Mongolia" and "European Studies and Digital Inclusive Education" projects, which aim to increase access to education for students with disabilities and develop online courses and accessible pedagogies that reflect modern educational practices and meet diverse learning needs, are aimed at strengthening the capacity of higher education (MELINC, MONEUL, 2021). The above studies also show that the Government of Mongolia is making significant efforts to ensure the participation of people with disabilities, improve services, and develop inclusive schools and kindergartens (Nurbyek R., Zhiyenbayeva., 2024). Collectively, these studies underscore a global commitment to leveraging technology and fostering inclusive educational environments where every student could succeed. Also, Mongolia's first "Medle" e-school aims to create equal opportunities for students who do not have the conditions to study "elective subjects" in high school through online learning based on their needs and interests <https://e-school.edu.mn>.

These studies indicate that when using digital technology in educational activities, it is necessary to adjust accessibility settings and use support tools and assistive technologies according to appropriate methodologies to suit the characteristics of learners with different needs. Inclusive education should be a fundamental right that ensures the opportunity for all children to receive a quality education, regardless of their needs. To ensure this right and create an accessible educational environment for every student to succeed, Mongolia amended the General Law on Education in 2023 and implemented a multi-faceted initiative to develop inclusive education, which is an achievement. These reforms are clearly aimed at creating a major change in the education sector, ensuring the right to education of children with disabilities, ensuring equal access to educational resources, eliminating educational disparities, and developing inclusive education.

### 3. Methodology

The survey design focused on inclusive education and digital pedagogy concepts, drawing inspiration from several established theories and frameworks. To explore the challenges faced by teachers in utilizing accessible digital technologies within inclusive learning environments in Mongolia, a comprehensive survey was developed. The survey consisted of three key sections. Demographics: Basic information about the participants, including age, gender, years of teaching experience, and educational background, was collected.

#### 1. Knowledge and understanding survey questionnaire

- Inclusive Digital Accessibility and Educational Strategies,
- Digital Integration and Inclusivity in Education: Focused on teachers' knowledge and usage of digital technologies for inclusive education, accessibility of digital platforms, and barriers to implementing inclusive education.

#### 2. Usage and usability survey questionnaire

- Innovative Digital Learning and Immersive Technologies: Assessed familiarity with special education needs, inclusive pedagogy, and understanding of digitalization and digital transformation in education.
- Inclusive and AI-Powered Educational Technologies: Evaluated teachers' awareness and usage of assistive technologies, accessible educational materials, AI-powered accessibility tools, and guidelines for inclusive online and distance learning.

The survey, conducted using a sampling method, targeted selected teachers from various levels of education across Mongolia, including preschool, primary, secondary, technical, and higher education institutions. A total of 366 teachers participated in the survey, offering valuable insights

into the current state of accessible digital technologies in inclusive education. The survey was distributed online through institutional email lists and Google Forms platforms, ensuring broad accessibility and participation. The survey was conducted over a period of 2 months, from April to May, 2024. Participants were informed about the purpose of the survey and assured of the confidentiality of their responses. The study was conducted using sampling, questionnaire, and document analysis methods. The collected data were analyzed using IBM's SPSS.Statistics.v23 and AMOSv23 statistical programs. Based on the research data, structural analysis, descriptive statistics, exploratory and confirmatory factor analysis, and qualitative reliability analysis were conducted in four stages.

#### 4. Results

A total of 366 teachers were included in the study, and it is considered necessary to conduct an exploratory factor analysis based on data from at least 300 participants (Hair, 2010). From the total data collected, data from 44 teachers who did not understand the research instructions, chose only one answer, or left blank were removed, and the data from the remaining 322 teachers was used for further processing. The survey participants were 85.1 percent female and 14.9 percent male, which is related to the female-dominated education sector in Mongolia. Considering the age group, 35.1 percent of the survey participants were between 26 and 35 years old, which is directly related to the high proportion of this age group in the total population of Mongolia. Considering the educational level of teachers, 3.7 percent had a diploma degree, 68.9 percent had a bachelor's degree, and 27.3 percent had a master's degree. In terms of profession, 54.7 percent were secondary school teachers, while 92.2 percent held the position of "teacher" in general education schools. In terms of work experience, 43.5 percent of teachers had 2-9 years of experience, and 28.3 percent had 10-19 years of experience, indicating that the majority of teachers had knowledge and experience. In terms of professional qualifications of the participants, 47.8 percent were qualified teachers, 31.1 percent were lead teachers, 2.8 percent were consultant teachers, and 18.3 percent were teachers (Table 1).

**Table 1.** Demographics of Participants

	Criteria	Frequency	Percentage
Gender	Male	48	14.9
	Female	274	85.1
Age (years)	18-25	47	14.6
	26-35	113	35.1
	36-40	51	15.8
	41-45	52	16.1
	46-50	28	8.7
	51-55	20	6.2
	55 up	11	3.4
Education Level	Diploma degree	12	3.7
	Bachelor degree	222	68.9
	Master degree	88	27.3
Profession	Teacher of preschool education	26	8.1
	Teacher of primary education	59	18.3
	Teacher of secondary education	176	54.7
	Teacher of technical education	6	1.9

	Teacher of higher education	53	16.5
Position	Teacher	297	92.2
	Senior teacher	12	3.7
	Executive officer	13	4.0
Teaching experiences (years)	Up to 1 year	18	5.6
	2-9 years	140	43.5
	10-19 years	91	28.3
	20-29 years	56	17.4
	30 up	17	5.3
Teachers professional level	Specialized Teacher	154	47.8
	Leading Teacher	100	31.1
	Adviser Teacher	9	2.8
	Regular Teacher	59	18.3
Location of the schools	Capital	282	87.6
	Province	26	8.1
	Sum	14	4.3

Descriptive data analysis, i.e., mean, standard deviation, skewness, and height (Kurtosis), were examined using the Kolmogorov test (Table 2). The mean of the variables is between 2.64 and 3.77, and the standard deviation is between 1.025 and 1.203. However, researchers believe that if the distribution data, i.e. asymmetry and kurtosis values, are less than 3 and 8, depending on the task, the data will meet the requirements of normal distribution (Kline, 2010), and the asymmetry value of the distribution is between -0.003 and -0.362, and the kurtosis value is between -0.354 and -0.831, indicating a normal distribution. Also, the Kolmogorov-Smirnov distribution measure shows that the indicator is above 0.05, doubling the normal distribution requirements.

**Table 2.** Descriptive statistics of survey items

Sub-indicators	Skewness	Kurtosis
1. Special education, Special educational needs, Differentiated learning	-0.258	-0.661
2. Inclusive education	-0.362	-0.831
3. Inclusive pedagogy, special pedagogy	-0.204	-0.655
4. How well do you know the terms digitalization and digital transformation in the field of education?	-0.168	-0.763
5. How you familiar is the concept of digital integration, inclusive education, digital technology integration or inclusive education?	-0.173	-0.585
6. How would you rate current classroom management practices that promote inclusiveness?	-0.004	-0.599
7. In your opinion, how well is accessibility achieved at the secondary school level?	0.026	-0.492
8. How well do you know about accessible educational materials (AEM) and assistive technology (AT) for online and distance learning?	0.016	-0.475
9. How aware are you of the Web Content Accessibility Guidelines (WCAG2.2) for online and distance learning?	0.057	-0.593
10. How well do you know how full AI-Powered Accessibility Widget technology can be used for inclusive online and distance learning?	0.231	-0.354

11. How much do you know about the Mobile Accessibility Guidelines for online and distance learning?	0.070	-0.622
12. How much do you know about Universal Design for Learning (UDL) methodologies and technologies in inclusive education?	0.083	-0.568
13. How much do you know about the adaptive use of Augmentative & Alternative Communication (AAC) technologies in inclusive education?	0.105	-0.522
14. How much do you know about ways to provide Digital Continuous Professional Development (DCPD)?	0.166	-0.566
15. In your opinion, how accessible are the websites and digital learning platforms of educational institutions in Mongolia?	0.127	-0.534
16. How big do you think are the barriers to implementing inclusive education methods using digital technologies?	0.109	-0.531
17. Does your school have an independent strategy for digitalization of teaching and learning?	-0.003	-0.647
18. In your opinion, how effective are current teacher training programs in providing future teachers with inclusive teaching methods using digital technology accessibility settings in online and distance learning?	0.057	-0.611
19. Online Teaching and Distance Learning, Interactive teaching technology methodologies	-0.675	-0.192
20. Blended Teaching and Learning, Flexible learning methodologies	-0.688	-0.046
21. Massive open online course (MOOC) technology methodologies	-0.412	-0.475
22. Virtual Reality, Augmented Reality technology	-0.142	-0.809
23. Technology based on artificial intelligence (AI)	0.045	-0.663
24. Technology based on big data	-0.054	-0.672
25. Robot assistant (Avatarion)	0.207	-0.751
26. Accessible educational material	-0.106	-0.598
27. Assistive Technology	-0.052	-0.660
28. Methodology and technology based on Universal Design for Learning UDL	-0.128	-0.653
29. Web Content Accessibility Guidelines (WCAG2.2) for online and distance learning	-0.166	-0.699
30. How full AI-Powered Accessibility Widget technology is used for inclusive education in online and distance learning	0.000	-0.766
31. How to use the Mobile Accessibility Guidelines for online and distance learning	-0.165	-0.621

Kaiser-Meyer-Olkin (KMO) and Bartlett's tests were performed to determine whether the data were suitable for factor analysis. A sample adequacy value of more than 0.06 indicates that the data can be used for explanatory factor analysis (EFA) (Hoque, 2016). For our data, the KMO sample adequacy indicator was 0.956, which is a sufficiently high value and indicates that the data is suitable for factor analysis. Bartlett's test (BTS) checks whether the correlation matrix of the data is not a unit matrix. As can be seen from Table 7, the results of the Bartlett's test show that the Chi-square statistic is 10221.602 (df=465,  $p < 0.001$ ), indicating that the data can be decomposed into factors.

**Table 3.** Results of Bartlett's test and sampling adequacy measure

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.956
Bartlett's Test of SphericityApprox. Chi-Square	10221.602
df	465
Sig.	.000

Exploratory Factor Analysis (EFA) was performed on the research data to determine whether the relationships between variables and the data structure could be explained by factors. This revealed four factors with a mean value greater than Kaiser's criterion of 1 (Kaiser, 1960). Therefore, it can be assumed that the "research questionnaire" measures four factors, and the results in the table show that the four factors explain 74.73% of the total data (Table 4). In social sciences and humanities, this figure is considered normal to be between 50 and 60% (Pett, 2003), indicating that the results are well explained by factors of data structure.

**Table 4.** Results of factor analysis

Total Variance Explained					
Factor	Total	% of Variance	Cumulative %	Total	Cumulative %
1	15.253	49.203	49.203	8.582	27.684
2	4.951	15.972	65.176	8.361	54.655
3	1.827	5.894	71.069	4.032	67.663
4	1.135	3.662	74.731	2.191	74.731

As can be seen from the table below (Table 5), the first factor includes 5 questions on "Digital Integration and Inclusivity in Education (DIIE)", and the second factor includes 13 questions measuring "Inclusive Digital Accessibility and Educational Strategies (IDAES)". The third factor includes 3 questions on "Innovative Digital Learning and Immersive Technologies (IDLIT)". The fourth factor includes 10 questions on "Inclusive and AI-Powered Educational Technologies (IAPET)". The correlations of the variables with their factors are above 0.6 for most variables, indicating that the questionnaire structure is well organized. Also, when calculating the Cronbach's Alpha coefficient, 0.965 was obtained for the entire questionnaire, while the reliability coefficient of each factor was above 0.90, and some factors reached 0.96, indicating that the internal consistency of the questionnaire is very good. Some variables tend to belong to more than one factor, but since they are highly correlated with their main factor, it can be considered that there is no problem in classification. Based on these results, it can be concluded that the study data is suitable for factor analysis and the questionnaire structure is reliable. Therefore, it is possible to continue using this questionnaire model in future studies.

**Table 5.** Results of factor analysis

Item	Average	Standard deviation	DIIE	IDAES	IDLIT	IAPET	Cronbach's Alpha
Q1	3.42	1.167	<b>0.792</b>				<b>0.912</b>
Q2	3.77	1.044	<b>0.826</b>				
Q3	3.45	1.076	<b>0.762</b>				
Q4	3.43	1.075	<b>0.715</b>				
Q5	3.21	1.085	<b>0.63</b>				
Q6	3.16	1.103		<b>0.652</b>			

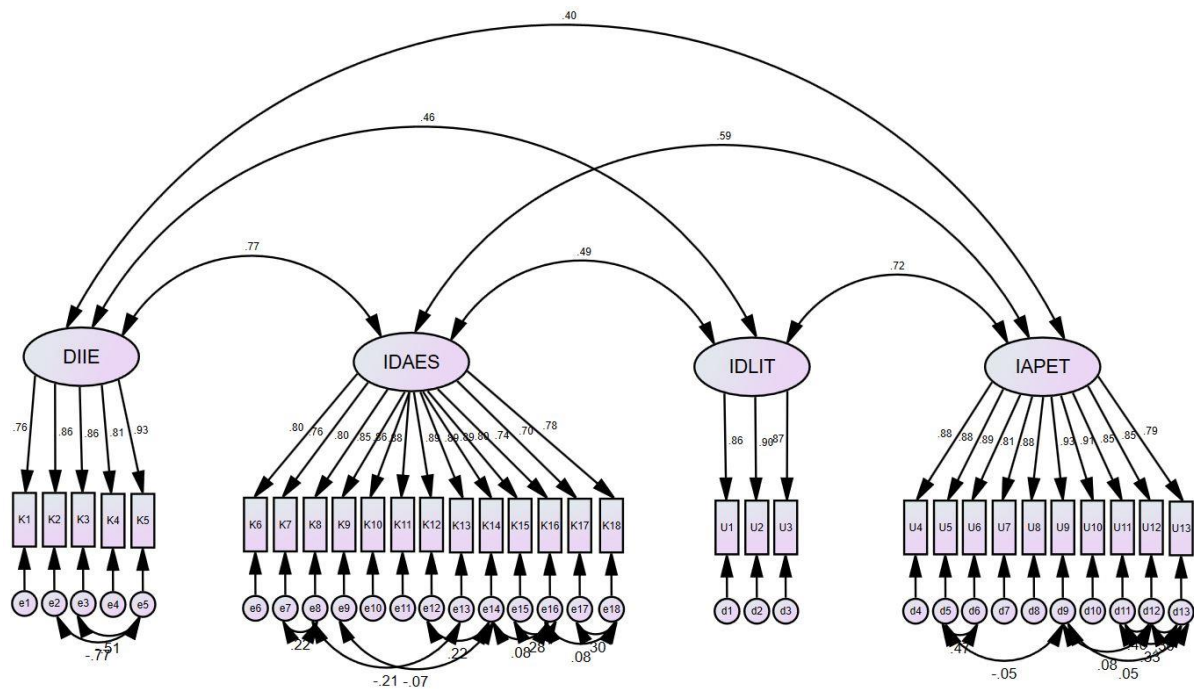


Q7	3.13	1.025	<b>0.664</b>	
Q8	3.20	1.038	<b>0.660</b>	
Q9	3.13	1.055	<b>0.735</b>	
Q10	2.78	1.085	<b>0.747</b>	
Q11	3.12	1.062	<b>0.795</b>	
Q12	3.00	1.094	<b>0.788</b>	
Q13	2.86	1.084	<b>0.797</b>	
Q14	2.89	1.080	<b>0.819</b>	
Q15	2.94	1.085	<b>0.823</b>	
Q16	3.05	1.052	<b>0.743</b>	
Q17	3.17	1.058	<b>0.700</b>	
Q18	3.02	1.076	<b>0.786</b>	
Q19	3.73	1.124	<b>0.772</b>	
Q20	3.79	1.058	<b>0.803</b>	<b>0.903</b>
Q21	3.42	1.160	<b>0.637</b>	
Q22	3.08	1.209	<b>0.805</b>	
Q23	2.90	1.177	<b>0.860</b>	
Q24	2.94	1.156	<b>0.860</b>	
Q25	2.64	1.203	<b>0.831</b>	
Q26	3.09	1.130	<b>0.829</b>	<b>0.966</b>
Q27	2.98	1.144	<b>0.876</b>	
Q28	3.00	1.145	<b>0.861</b>	
Q29	3.08	1.170	<b>0.807</b>	
Q30	2.90	1.178	<b>0.843</b>	
Q31	3.18	1.141	<b>0.766</b>	

The four factors identified in the factor analysis are confirmed by the following indices: the chi-square to the degrees of freedom ratio ( $\chi^2/df$ ) value is between 2 and 5, the comparative fit index (CFI) and incremental fit index (IFI) values are each greater than 0.9, the tucker-lewis index (TLI) value is greater than 0.9, the parsimony comparative fit index (PCFI) value is greater than 0.6 (Bentler, 1990), and the root mean square error of approximation (RMSEA) value is considered good if it is less than 0.05, acceptable if it is between 0.05 and 0.08, poor if it is between 0.08 and 1, and unsatisfactory if it is greater than 1 (Fabrigar, 1999). The table below (Table 5) shows the values of each index and each has an acceptable value. The CFA was verified as an excellent fit for the data ( $\chi^2=1264.400$ ,  $df=465$ ,  $p=.00$ ,  $RMSEA=.079$ ,  $TLI=.913$ ,  $CFI=.923$ ,  $IFI=.923$ ,  $PCFI=.816$ ). This indicates that the “content of the study” fits the four-factor model. The model of the confirmatory factor analysis results is shown in Figure 1.

**Table6.** Four-factor validation analysis

	p	$\chi^2/df$	RMSEA	TLI	CFI	IFI	PCFI
Acceptable value	.00	2-5	< .08	> .9	> .9	> .9	> .6
Original model	.00	3.737	.091	.885	.894	.895	.823
Adjusted model	.00	3.189	.081	.897	.906	.907	.812
Final model	.00	3.076	.079	.913	.923	.923	.816



**Figure 1.** Teachers' knowledge and use of accessible digital

Technologies in inclusive learning

This model's left-hand side features two sets of questions that assess teachers' knowledge and understanding, while the right-hand side presents two sets of questions aimed at determining the use, application, and learning process. Altogether, the model showcases these inquiries in four sets. The structural analysis confirms that the survey questions are well-suited for representing the subject matter.

## 5. Discussion

The main result of this study is to identify the challenges and opportunities for teachers to use accessible digital technologies in the context of inclusive education in Mongolia. It remains a pressing issue for teachers to master the inclusive education policy, content, and methodology implemented in Mongolia and to provide quality and accessible education to every child. One way to solve this problem is to implement the digital transition reform policy in the education sector. Therefore, we conducted a 31-question questionnaire survey to determine teachers' knowledge and understanding of inclusive education and the use of digital technologies, integrating inclusive education and accessible digital teaching and learning policies. The results of the study revealed that teachers have a high level of knowledge and understanding of inclusive education and the digital transition in the education sector. However, the research results confirm our hypothesis that the ability to use accessible educational materials, accessible digital platforms, and accessible materials based on artificial intelligence in teaching and learning activities in accordance with accessibility standards, in line with the characteristics of learners with different needs, in online and distance learning, is weak, and the need to learn to use them optimally in accordance with accessibility standards is very high. The results of our research are consistent with and in agreement with the proposals put forward in published works such as A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2, European Framework for the Digital Competence of Educators: DigCompEdu (2017), Inclusive Digital Education, European Agency for Special Needs and Inclusive Education (2022), Technology and Open and Distance Learning, Global Education Monitoring Report (2023), Framework of the Digi-HE project (2020-2022), Survey on digitally enhanced learning in European higher education institutions, TPACK framework and its knowledge components (Koehler & Mishra, 2008). The theoretical implications of our research results are that they explore the possibility of integrating and creating optimal use of

digital education technologies that meet accessibility standards and the concept of inclusive education, which is of particular importance both internationally and in Mongolia. In this way, in the future, other researchers, following our research methodology, can fully utilize the above two theoretical concepts to study their practical implications. The results of the study will help to understand ways to provide equal and accessible quality education to all children in the Mongolian education sector, and help teachers make a significant contribution to the digital transition in the education sector and fill the knowledge gap in accessible teaching and learning. We will limit the study to special education, special needs teaching, and detailed issues of content and methodology of learning. Based on the results and limitations of the study, we propose that future graduate teachers may be surveyed. It also offers the opportunity to study more useful topics for teachers, such as Teaching and learning with digital technologies, Empower education with artificial intelligence, and ICT supported project based learning.

## 6. Conclusion

The results of the second part of the study show that the knowledge of the teachers involved in the study about inclusive education and the digital transition in the education sector is very high, which clearly demonstrates that the basic conditions are met to support the implementation of the goal of providing equal and accessible education to all students in Mongolia. The results of the third part of the study, which clarifies how the above knowledge is used, show that the use of teachers is very weak, confirming our hypothesis. However, the results of the study confirm that teachers have a very high desire to use accessible digital technologies in teaching activities, and are very interested in developing their own digital technology skills and learning. Considering the challenges faced by teachers, there remains a significant lack of comprehensive opportunities for them to enhance their skills in using digital technologies such as virtual reality, augmented reality, AI-powered accessibility widgets, avatars, big data, accessible educational materials, assistive technology, universal design for learning, web content accessibility guidelines, and mobile accessibility guidelines. This gap persists despite the availability of modern teaching formats and platforms, including online teaching and distance learning, interactive teaching, blended teaching and learning, flexible learning, and massive open online courses. The importance of this study lies in the fact that in the future, government agencies implementing policies, school administrations, and teachers will take these challenges into account and provide opportunities to ensure the continuous professional development of teachers. We encourage readers and researchers to explore the opportunities for every child to receive quality education in the digital transition of education, which is a major challenge in the modern world, in the fields of inclusive digital accessibility and educational strategies, digital integration and inclusivity in education, inclusive and AI-powered educational technologies, and innovative digital learning and immersive technologies.

## 7. Suggestion

The researchers recommend that young teachers and researchers in the field of education conduct research on the following topics that are being widely studied internationally:

- “Future-Proofing Inclusion: Global Accessibility Standards and Teacher Readiness in Special Education.”
- “Bridging the Gap: Equipping Special Educators with AI, UDL, and WCAG 2.2 for Inclusive Classrooms.”

It is believed that research within the framework of the above interesting topic can provide methodological support to teachers.

## Declarations

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**Conflicts of Interest.** The authors declare that there are no conflicts of interest in publishing this article.

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**Ethical Approval.** The study adhered to ethical guidelines to ensure the integrity and confidentiality of the participants. All participants provided informed consent, and their anonymity was maintained throughout the research process. The study was approved by the institutional review board of Abai Kazakh National Pedagogical University, ensuring compliance with ethical standards.

**Data Availability Statement.** We would like to inform you that the data supporting the results of this study are stored by the authors.

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