Psychometric Properties of Digital Self of Teacher Educators' Scale: A Factor Analysis Approach

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Abstract:

Digital Self is related to individual's self-perception about his own identity, skills, attitudes and practical knowledge in digital environment. It contains not only the technical competence to effectively and efficiently use different kind of digital tools, but also the ability to critically evaluate, adapt, and create digital content related to teaching, learning evaluation and research. To understand and assess the digital self of Teacher Educators it is essential to develop a standardised tool. The objective of the study was to develop and validate a 5-point Likert scale for measuring the digital self of teacher educators. Through EFA and CFA, seven dimensions were identified, including Digital Literacy, Technological Pedagogical Knowledge, Digital Collaboration, Digital Content Creation, Digital Assessment and Feedback, Digital Citizenship, and Digital Adaptability and Innovation. The scale consists of 23 items and 7 dimensions. The CFA results indicated a good fit between the proposed scale model and the observed data, and was supported by CFA. The fit indices, Comparative Fit Index (CFI) value of 0.942, Tucker-Lewis Index (TLI) value of 0.977, Bentler-Bonett Non-normed Fit Index (NNFI) value of 0.954, Bentler-Bonett Normed Fit Index (NFI) value of 0.987, and Standardized Root Mean Square Residual (SRMR) value of 0.080 supported the validity of the model. These findings support the validity and reliability of the instrument for assessing the digital self of Teacher Educators. The identified dimensions provide a comprehensive framework for understanding and measuring educators' digital competencies. This research contributes to the field of teacher training and professional development by offering a tool to assess and improve teacher educators' digital practices.

Keywords: Digital Self, Digital Literacy, Technological Pedagogical Knowledge, Digital Collaboration, Digital Content Creation, Digital Assessment and Feedback, Factor analysis.

Introduction:

The integration of digital technologies in teaching-learning is increasing and transforming the educational landscape. With continuous evolution of digital tools and resources, educators are facing new challenges and opportunities in their effective utilization for improving teaching learning and evaluation processes. Teacher educators have a crucial role in preparing future teachers and orienting in-service teachers on new developments in an effective and efficient manner, in view of resource and time constraints. They also play an important role in preparing future teachers to effectively integrate technology in their classrooms. "Digital Self" is related to individual's self-perception about his own identity, skills, attitudes and practical knowledge in digital environment. Digital Self contains not only the technical competence to effectively and efficiently use different kind of digital tools, but also the ability to critically evaluate, adapt, and create digital content related to teaching, evaluation and research. To understand and assess the digital self of Teacher Educators is essential for developing effective professional development programs as well as, for supporting them in preparation of digitally competent teachers. Several studies have explored the digital self of educators but there is lack of standardized and validated instruments to measure digital self of teacher educators. Teacher educators face a different kind of challenge as they are in role of preparing prospective teachers. Teacher preparation is a different task than teaching at school level. Existing tools primarily focus on student teachers or K-12 teachers. There is need of a reliable and valid instrument to measure digital self of Teacher Educators. This can help in gaining valuable insights into strengths, weaknesses, and professional development needs of teacher educators. This instrument can also help in evaluation

and improvement of the digital competencies of teacher educators and thus improved technology integration and effective use of technology in teacher education programs.

Overall the development and validation of a standardized instrument to capture digital self of teacher educators has significant implications for enhancing and enriching teacher education programs, advancing digital literacy among educators, and improving the quality of teaching-learning in this digital age.

Literature Review:

The concept of self, in psychology, is an individual's perception and understanding of his own identity, personality traits, and cognitive processes. It encompasses multiple dimensions, including self-awareness, self-concept, and self-efficacy (Bandura, 1997; Markus &Nurius, 1986). With the widespread adoption of digital technologies human self has extended to the digital realm, thus giving rise to the concept of the digital self. According to Kapidzic & Herring (2015), the digital self encompasses an individual's online presence, interactions, and activities in the digital world (including social media, online communities and digital tools).

The impact of the digital self on individuals' well-being has been studied in various sectors. Some studies highlighted potential negative effects of excessive social media use in form of social comparison, inferiority, and low self-esteem (Vogel et al., 2014; Kross et al., 2013). Although, Chou and Edge (2012) has emphasized the positive effect of online self-presentation on overall well-being resulting in increased self-expression and social support. Empirical research on the digital self provides valuable insights into the complex interplay among digital technologies, identity formation, self-expression and social interaction.

Understanding the digital self is essential not only for individuals navigating the digital realm but also for policymakers, educators, and mental health professionals seeking to promote digital literacy, privacy protection, and well-being. By leveraging the insights gained from empirical research, we can navigate the complexities of the digital self and harness its potential for positive self-expression, meaningful connections, and personal growth in the digital age. The literature review highlighted the strategic nature of self-presentation in the digital realm. People carefully craft their online profiles to project a desired online self-image, and their digital footprints can have a significant impact on their online reputation and goodwill. The dynamics of social interactions within online communities is complex, because people try to comply the norms and expectations of these spaces. The digital self can have a profound positive or negative impact on individual well-being. Online self-expression can provide a sense of empowerment and connection. It can also be a source of stress and anxiety, as people worry about privacy concerns and negative psychological effects.

Understanding digital self is essential for individuals, policymakers, educators, and mental health professionals. By leveraging the insights gained from empirical research, we can navigate the complexities of the digital self and harness its potential for positive self-expression, meaningful connections, and personal growth in the digital age.

Research Objectives:

1. To develop and standardize a scale of digital self of Teacher Educators.

Available Instruments and Their Dimensions:

Table 1 presents a brief review of instruments developed by different researchers to assess various dimensions and constructs related to digital self in different domains. These tools provide valuable insights into individuals' online behaviours and experiences. One of the earliest instruments listed is the Sense of Virtual Community Scale by McMillan and Chavis (1986). This instrument measures individual's sense of community in online spaces. It focusses on their sense of belongingness within virtual communities. Another tool was developed by Young (1988) which evaluates individual addiction to the internet and assesses the severity of internet addiction.

In the area of online identity and self-presentation, the OIQ (Online Identity Questionnaire) by Hamburger and Furnham (2004) measures dimensions of identity presentation and self-disclosure, providing insights into individuals' online self-presentation and disclosure patterns. Another instrument by Suler (2004) – The Self-Presentation on the Internet Scale focuses on individuals' self-presentation strategies in online environments. On a related note, the Internet Self-Disclosure Scale by Joinson (2004) measures the level of self-disclosure individuals engagement in online environment and their willingness to disclose personal information in virtual settings.

In the context of social media platforms, Facebook Intensity Scale (Ellision, Steinfield, & Lampe, 2007) assess the intensity of individuals' engagement with Facebook, measuring their level of involvement and interaction on the platform. The social Networking Site Motive Scale by Ridings et. al. (2002) explores individuals' motivations for using social networking sites and provides insights into the reasons of their engagement with social media.

Privacy and online reputation management are also important aspects of digital self in different questionnaires. The online Privacy Paradox Scale developed by Racherla and Friske (2012) explores the discrepancy between peoples concerns about privacy and their actual behaviors. Thus it measures individuals' perceived concerns and their self-reported online behaviors related to their online privacy. It also sheds light on the fact that there is difference in the concerns and reflected behavior in actual situation. Online Reputation Management Scale by walrave et al. (2012) assesses strategies and behaviors related to managing one's online reputation and offers insights into individuals' efforts to shape and control their digital image.

Additionally, the Social Media Behavior Scale (Van Deursen et al., 2015) measures various aspects of individuals' social media behavior and explores their engagement, usage patterns, and interactions on social media platforms. The Online Social Support Scale (Li & Wang, 2013) examines individuals' perceived online social support and provides insights into the support they receive from online sources.

Table 1:
A brief review of instruments available to measure concepts related to digital self.

S.No.	Tool Name	Developers	Year	Dimensions/Constructs	Relevant Information
1.	Sense of Virtual Community Scale	McMillan & Chavis	1986	Sense of community in online spaces	Assesses the sense of belonging in virtual communities
2.	Internet Addiction Test	Young	1998	Addiction to the internet	Measures the level of addiction to the internet
3.	Online Identity Questionnaire (OIQ)	Amichai-Hamburger & Furnham	2004	Identity presentation, self-disclosure	Measures online self-presentation and disclosure
4.	Self-Presentation on the Internet Scale	Suler	2004	Online self-presentation	Assesses self-presentation strategies online
5.	Internet Self-Disclosure Scale	Joinson	2004	Self-disclosure online	Measures the level of self-disclosure online
6.	Facebook Intensity Scale	Ellison, Steinfield, & Lampe	2007	Intensity of Facebook use	Assesses the intensity of Facebook engagement
7.	Online Community Engagement Scale	Hsu & Lu	2007	Engagement in online communities	Measures the level of engagement in online communities
8.	Social Capital Scale	Ellison, Steinfield, & Lampe	2007	Social capital	Assesses the level of social capital in online settings
9.	Facebook Intensity Scale	Ellison, Steinfield, & Lampe	2007	Intensity of Facebook use	Assesses the intensity of Facebook engagement
10.	Social Networking Site Motives Scale	Ridings, Gefen, & Arinze	2002	Motives for using social networking sites	Measures motivations for using social networking sites

11.	Online Privacy Paradox Scale	Racherla&Friske	2012	Perceived privacy and behavior	Assesses the paradox between privacy and behavior online
12.	Online Reputation Management Scale	Walrave et al.	2012	Reputation management online	Assesses strategies and behaviors related to online reputation management
13.	Social Media Behavior Scale	Van Deursen et al.	2015	Social media behavior	Measures various aspects of social media behavior
14.	Online Social Support Scale	Li & Wang	2013	Perceived online social support	Measures individuals' perception of online social support
15.	Online Privacy Protection Behavior Scale	Gerber et al.	2018	Online privacy protection behavior	Measures behaviors related to protecting online privacy
16.	Digital Identity Scale	Rahman	2019	Digital self-concept, identity fusion	Measures digital self-concept and identity fusion
17.	Community Identification Scale	Bartle-Haring et al.	2016	Identification with online communities	Measures individuals' identification with online communities
18.	Social Media Addiction Scale	Kuss et al.	2014	Addiction to social media	Assesses the level of addiction to social media

The tools listed in table 1 also cover dimensions of community identification, digital identity, and social media addiction. These instruments provide understanding of individuals' experiences, behaviours, and challenges in the digital space, enabling researchers to study and analyze the multidimensional nature of digital self. It is important to note that these instruments measure several related dimensions of digital self, they don't measure the digital-self of teacher educators. Thus standardization and validation of a tool to measure digital self of teacher educators can have important implications for training of teacher educators and pupil teachers. There are some instruments that assess dimensions related to digital self, they are not specifically designed for teacher educators. Thus, there is a need for a standardized instrument that captures the unique aspects of the digital self in the context of training of Teacher Educators and their professional development.

Significance of the study
The significance of the study on standardization and validation of the proposed tool to measure digital self of teacher educators is based on its potential contribution in integration of the fields of education and technology. Following key points summarize the significance of the study
The study aims to fill a critical gap in the existing literature by proposing a validated measure of digital self for teacher educators. By understanding the digital self of teacher educators, teacher training institutions can design and implement targeted professional development programs to develop their digital competencies and self-efficacy about digital self.The findings of the study can inform the development of relevant training initiatives and enhanced quality of teacher education programs.It will support technology integration in teacher educators training as well as teacher training programs. Teacher educators play a vital role in preparing future teachers, so any research contributing to enrich digital self of teacher educators would have a significant impact on preparation of future teachers. This can also assist policymakers, educational institutions, and administrators in making evidence based decisions regarding teacher education, technology integration and, professional development activities. This can help in framing of effective policies and practices according to the needs of digital age. Availability of an instrument to measure digital self of teacher educators would also enhance data availability for

further research and advancement of theories and paradigms regarding self.Overall, the significance of the study lies in its potential to improve the preparation of teacher educators and quality of education through the effective integration of digital technologies in curriculum and teaching learning processes. By standardizing an instrument to measure the digital self of teacher educators, it offers possibilities of exploring an underexplored area in field of teacher education and preparation.

Method: This study was performed by the use of exploratory factory analysis for the first phase of the tool construction and validation while for the second phase was performed with the confirmatory factor analysis technique.

Population: The population of this study comprised all teacher educators involved in teaching within the 2-year B.Ed program.

Sampling Procedure: For this study, a purposive sampling approach was employed. A total of ten private and ten government B.Ed institutes were selected as the sampling frame. From these institutes, all teachers were approached to participate in the survey, utilizing the proposed scale as the measurement tool.

Sample: The study successfully obtained participation from 143 teacher educators (112 Male and 31 Female), who constituted the sample. Prior to data collection, both institutional and individual informed consent were obtained from the participants. Upon analysis, incomplete responses were excluded from the dataset, resulting in a final sample size of 120 teacher educators (81 Male and 39 Female). Among them, 75 teachers were affiliated with government institutions, while the remaining 45 teachers belonged to private institutions.

The aforementioned sampling strategy and data collection procedures were implemented to ensure a representative sample of teacher educators within the targeted B.Ed program.

Identifications of the Dimensions

Literature review of relevant researches was conducted for identifying the dimensions of digital-self of teacher educators. 18 different scales were also reviewed for this purpose. It was identified that digital self could be measured by focussing on self-beliefs about knowledge, attitudes, competencies and practices of individuals in digital environments. Based on the literature review and expert advice, 8 dimensions were chosen for item construction of proposed **Digital- Self of Teacher Educators (DSTE) Scale**.

1. Digital Literarcy: This dimension is related to the ability to use digital tools and technologies relevant to their context of teaching learning. It assesses their ability to use digital tools and technologies effectively and responsibly to support student learning. It assesses their ability to search for and evaluate digital information. Staying updated with advancements in educational technologies and troubleshooting common technological issues are related with this dimension.

2. Technological Pedagogical Knowledge: This dimension assesses the teacher educator's knowledge and understanding of different technology integrated pedagogical strategies in context of teaching-learning and action research. It measures their ability to adapt and modify digital resources and tools to meet the diverse and complex learning needs of students. It also measures the ability to design and implement technology-enhanced assessment for enriching instructional practices and utilize research-based frameworks and models for integrating technology into teaching-learning.

3. Digital Collaboration: This dimension focuses on educator's involvement in online communities and academic networks for exchange of ideas and resources with other educators and researchers. It assesses their ability to collaborate with colleagues and co-creating digital learning resources and tools for enhancing the effectiveness of instruction and assessments. The dimension also measures ability of educators to facilitate communication and collaboration among students and their encouragement of student collaboration using digital tools.

4. Digital Content Creation: This dimension measures the educator's skills in creating and curating digital content that aligns with the learning objectives of their teaching. It assesses their ability to integrate multimedia elements effectively to enhance student engagement and understanding. It also examines their guidance and support provided to students in creating their own digital content to demonstrate their understanding of

concepts, as well as their promotion of creativity and critical thinking through the use of digital tools for content creation.

5. Digital Assessment and Feedback: This dimension focuses on the teacher educator's ability to use digital tools and platforms to assess progress of students and provide timely feedback for improvement in learning. It also assesses the ability to analyze and interpret data from digital assessments for informing and enhancing instructional practices. Assessment of how teachers promote self-assessment and reflection among students using digital tools and technologies is an integral part of this dimension. This also captures how teachers provide constructive feedbacks to students using digital platforms to enhance their learning outcomes.

6. Digital Citizenship: This dimension measures the ability to use technology responsibly and ethically. It includes understanding of copyright and intellectual property rights, online safety and responsible use of digital resources for improvement of educational practices. Modelling positive digital citizenship by setting up good examples for students through responsible and respectful use of technology is also related with this dimension. Guiding students in critically evaluating online information and fostering a culture of digital ethics where students feel comfortable discussing digital ethics and feel encouraged to use technology in a responsible way also comes under this dimension.

7. Digital Adaptability and Innovation: This dimension emphasizes upon educator's openness to exploring new technologies and using them to enhance their teaching and learning experiences. Being aware to new digital tools and technologies useful to support student learning and active seeking of new opportunities to innovate and experiment with these tools is also related to this dimension. Embracing technological changes and continuously updating digital skills and knowledge by keeping up with the latest trends in educational technology is also part of this dimension.

8. Digital Reflectivity: Digital reflexivity refers to the ability to reflect on one's own digital practices and behaviours and its effectiveness and find gaps to improve as well to seek help from others in order to improve it. It is an essential skill in today's digital age allowing educators to continuously improve their teaching practice and to ensure that they are using digital tech to in most effective manner. Educators who are more reflective are able to assess the impact of their digital integration practices on student learning and outcomes. The reflectivities add in the professional development of educators and keep them updated. Digital self of teacher educators is self-evaluation of their reflexivity about their digital practices.

Development of First Draft and Exploratory Factory Analysis:
Based on a comprehensive review of instruments to measure related concepts of digital self in various realms, the initial draft of the Digital Self of Teacher educators' Scale (DSTES) was prepared which comprised 32 items. A 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree" was utilized to capture respondents' perceptions. The response options were carefully arranged to reflect the continuum of agreement and disagreement.

Exploratory Factor Analysis with 1st Draft.

Table 2: Bartlett's Test

X²	df	P
∞	496.000	< .001

Bartlett's test is used to determine if the observed correlation matrix is significantly different from the identity matrix, suggesting the presence of underlying factors in the data. In this case, the very low p-value (< .001) suggested that the correlation matrix is significantly different from the identity matrix and it is appropriate to proceed with exploratory factor analysis to uncover the underlying factors in the dataset.

Table 3 presents Factor loadings of the data. Factors with Eigenvalues greater or equal than 1 were selected. 7 factors were identified. Items 8,5 and 7 loaded on factor 1. Items 3,1 and 2 loaded on Factor 2. Items 14,16 and 15 loaded on Factor 3. Items 26,27,25,28 loaded on Factor 4. Items 17,18,19,20 loaded on factor 5. Items 21,22,23 loaded on Factor 6. Items 10,11,12 loaded on factor 7.

Table 2: Factor Loadings

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Uniqueness
Item 8	1.034							0.003
Item 5	1.034							0.003
Item 7	1.034							0.003
Item 3		1.019						0.002
Item 1		1.019						0.002
Item 2		1.019						0.002
Item 14			1.032					0.054
Item 16			0.912					0.225
Item 15			0.868					0.263
Item 26				0.845				0.254
Item 27				0.8				0.327
Item 25				0.738				0.46
Item 28				0.7				0.486
Item 17					0.993			0.1
Item 19					0.808			0.334
Item 20					0.646			0.413
Item 18					0.553			0.635
Item 22						0.877		0.244
Item 21						0.875		0.253
Item 23						0.83		0.306
Item 11							1.008	0.08
Item 10							1	0.142
Item 12							0.608	0.65
Item 30								0.229
Item 4								0.928
Item 6								0.963
Item 9								0.929
Item 13								0.866
Item 24								0.889
Item 29								0.834
Item 31								0.987
Item 32								0.824

Factor 1: Technological Pedagogical Knowledge and Integration Items 8, 5, and 7 loaded on this. This factor tells us about educators' knowledge of pedagogical strategies that integrate technology effectively into the classroom, their ability to adapt and modify digital tools to meet diverse learning needs, and the challenges they face in

designing and implementing technology-enhanced assessments. So, this factor was named "Technological Pedagogical Knowledge and Integration."

Factor 2: Digital Literacy and Confidence Items 3, 1, and 2 loaded on this factor. It reflects educators' confidence in using various digital tools and technologies. It also reflects their struggles in searching for and evaluating digital information, and their difficulties in troubleshooting technological issues. This factor was named "Digital Literacy and Confidence."

Factor 3: Digital Content Creation and Multimedia Integration Items 14, 16, and 15 loaded on this factor. It represents educators' skills in creating and curating digital content and their challenges in integrating multimedia elements effectively. It also reflects their efforts in guiding students to create their own digital content. This factor was named "Digital Content Creation and Multimedia Integration."

Factor 4: Digital Adaptability and Innovation Items 26, 27, 25, and 28 loaded on this factor. It represens educators' openness to exploring new technologies and the problems they face in actively seeking opportunities to innovate and experiment with emerging digital tools. This factor was named "Digital Adaptability and Innovation."

Factor 5: Digital Assessment and Feedback Items 17, 18, 19, and 20 loaded on this factor. It represents educators' utilization of digital tools and platforms to assess student learning progress and providing timely feedback. It also reflects their challenges in analyzing and interpreting data from digital assessments, their promotion of self-assessment and reflection among students. This factor was named "Digital Assessment and Feedback."

Factor 6: Digital Citizenship and Ethical Behavior Items 21, 22, and 23 loaded on this factor. It reflects educators' efforts in promoting ethical and responsible digital behavior among students and educating them about online safety and digital citizenship. Modeling positive digital citizenship was also part of this dimension. This factor was named "Digital Citizenship and Ethical Behavior."

Factor 7: Digital Collaboration and Communication Items 10, 11, and 12 loaded on this factor. It represents educators' limitations in developing and co-creating digital learning materials and resources with colleagues. The effective use of digital platforms for facilitating communication and collaboration among students, and the encouragement of student collaboration using digital tools also represent the dimension. This dimension was named "Digital Collaboration and Communication."

These factors incapsulate different dimensions of the digital self of educators and include their pedagogical knowledge and integration of technology, digital literacy and confidence. Digital content creation and multimedia integration, digital adaptability and innovation, digital assessment and feedback, digital citizenship and ethical behavior, and digital collaboration and communication were also covered by these dimensions.

Fig.1 : Path diagram of the 7 factor model .
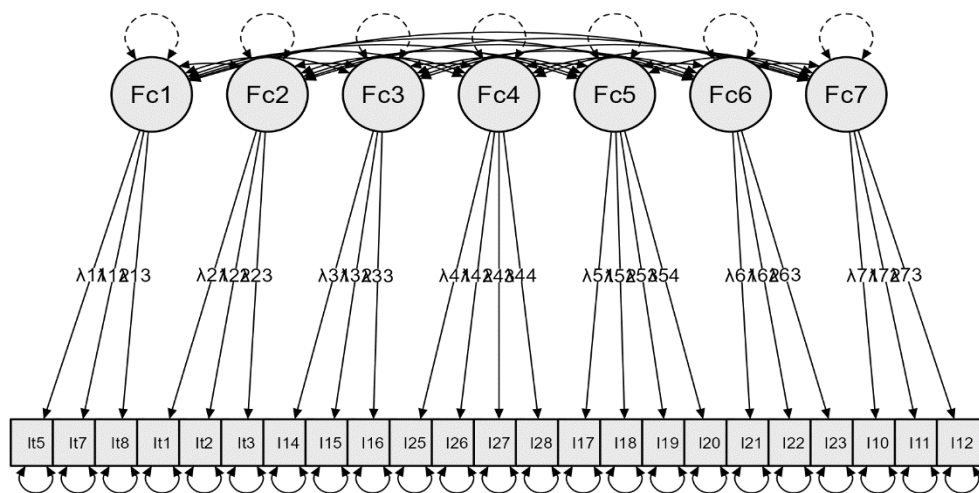
The path diagram shows a 7-factor model of the instrument. However, 9 items (4, 6, 9, 13, 24, 29, 30, 31, 32) did not load significantly on any of the factors, indicating that they did not have a strong relationship with the underlying constructs. These items were excluded from the factor model in subsequent drafts.

Confirmatory Factor Analysis with 2ⁿᵈ Draft.

The second draft consisted of 23 items. 9 items were excluded from first draft based on exploratory factor analysis. The second draft with 23 items was administered on 120 (80 Male and 40 Female) teacher educators. Fit indices were calculated using JASP 0.17.2.0 version.

Table 3: Additional fit measures

Fit indices	
Index	**Value**
Comparative Fit Index (CFI)	0.942
Tucker-Lewis Index (TLI)	0.977
Bentler-Bonett Non-normed Fit Index (NNFI)	0.954
Bentler-Bonett Normed Fit Index (NFI)	0.987
Parsimony Normed Fit Index (PNFI)	0.943
Bollen's Relative Fit Index (RFI)	0.939
Bollen's Incremental Fit Index (IFI)	0.951
Relative Non-centrality Index (RNI)	0.98

Confirmatory Factor Analysis suggests that the model explained the data well, as indicated by the Comparative Fit Index (CFI) value of 0.942. This is above the generally accepted threshold of 0.95, indicating a good fit. The Tucker-Lewis Index (TLI) value of 0.977 also indicated a strong fit, while the Bentler-Bonett Non-normed Fit Index (NNFI) value of 0.954 and the Bentler-Bonett Normed Fit Index (NFI) value of 0.987 suggested an appropriate fit. The Standardized Root Mean Square Residual (SRMR) value of 0.080 indicates a reasonable fit. Overall, the model fits the data well, according to the fit indices.

Table 4 : Factor loadings in CFA.

Factor	Indicator	Estimate	Std. Error	z-value	p	95% Interval Lower	Confidence Upper
Factor 1	Item 5	0.759	0.084	9.015	< .001	0.594	0.924
	Item 7	0.782	0.083	9.364	< .001	0.618	0.945
	Item 8	0.713	0.082	8.733	< .001	0.553	0.874
Factor 2	Item 1	0.78	0.076	10.254	< .001	0.631	0.929
	Item 2	0.996	0.08	12.405	< .001	0.838	1.153
	Item 3	0.887	0.092	9.681	< .001	0.707	1.066
Factor 3	Item 14	1.016	0.093	10.97	< .001	0.835	1.198
	Item 15	1.05	0.089	11.847	< .001	0.877	1.224
	Item 16	1.041	0.09	11.551	< .001	0.864	1.218
Factor 4	Item 25	0.754	0.101	7.486	< .001	0.557	0.951
	Item 26	0.965	0.079	12.188	< .001	0.81	1.121
	Item 27	0.51	0.061	8.405	< .001	0.391	0.629
	Item 28	0.723	0.089	8.163	< .001	0.55	0.897

Factor 5	Item 17	0.555	0.072	7.7	< .001	0.413	0.696
	Item 18	0.243	0.084	2.901	0.004	0.079	0.407
	Item 19	0.717	0.067	10.754	< .001	0.587	0.848
	Item 20	0.934	0.077	12.055	< .001	0.782	1.086
Factor 6	Item 21	0.862	0.081	10.688	< .001	0.704	1.02
	Item 22	0.712	0.093	7.66	< .001	0.53	0.895
	Item 23	0.804	0.077	10.41	< .001	0.653	0.956
Factor 7	Item 10	1.214	0.122	9.986	< .001	0.975	1.452
	Item 11	1.339	0.121	11.087	< .001	1.102	1.576
	Item 12	2.031	0.324	6.262	< .001	2.666	1.395

The confirmatory factor analysis (CFA) with 2nd draft supported the factor structure observed in EFA. The factor loadings in CFA for each indicator within their respective factors were all statistically significant (p < .001).The factor loadings in CFA aligned with the factor loadings observed in EFA. It provided further evidence for the validity and reliability of the identified dimensions and items.The Cronbach's α was calculated for measuring reliability of the proposed scale. The instrument has a reliability of 0.701 that indicates a high level of reliability.

Conclusion:
The objective of this study was to develop and validate an instrument to measure the digital self of Teacher Educators. Through the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) procedures, the researchers identified 7 dimensions that capture different aspects of digital self in educators. These dimensions are:
1. Digital Literacy
2. Technological Pedagogical Knowledge
3. Digital Collaboration
4. Digital Content Creation
5. Digital Assessment and Feedback
6. Digital Citizenship
7. Digital Adaptability and Innovation

The instrument consisted of 22 items, each representing one of these dimensions. The EFA helped in identifying the initial factor structure, and the CFA further confirmed and refined the factor loadings of the items. The proposed model fits the data well, as indicated by the fit indices. The CFI value of 0.942 and the TLI value of 0.977 suggest a good fit, while the NNFI value of 0.954 and the NFI value of 0.987 indicate an excellent fit. The SRMR value of 0.080 suggests a reasonable fit.

Overall, the results of this study supported the validity and reliability of the instrument for measuring the digital self of Teacher Educators. The identified dimensions provided a comprehensive framework for understanding and assessing the digital self of educators. These findings have important implications for teacher training and professional development programs to enrich enhance educators' digital competencies and practices.

Implications:
The findings of this study have several implications for teacher education and professional development of teacher educators. The study can inform policy a framework aimed at enhancing Teacher educators' digital competencies and has potential to improve trainings organized for in-service teacher educator training programs.

First, the identification of seven dimensions of digital self provides a comprehensive understanding of the factors which contribute to educators' digital skills, knowledge and competencies. This understanding can guide the development of targeted interventions, programs, strategies and initiatives to enhance Teacher educators' digital competencies.Second, the dimensions and items identified in this study can serve as a foundation for integrating digital technology across courses and curriculum for Teacher Educators. By focusing on these dimensions, teacher

education programs can provide relevant and effective training to prospective teacher educators and equip them with the necessary skills to integrate technology into their teaching practices.

Third, the study highlights the importance of the conclusions in supporting technology integration in K-12 schools. Educational leaders and administrators can utilize the findings to provide targeted support and resources to Teacher Educators and open avenues for fostering a culture of technology integration as well as innovative teaching practices in schools.

Suggestions for Further Research:

To advance the understanding of teacher educators' digital self and its implications, several areas warrant future research attention. Firstly, longitudinal studies could be conducted to examine the development and changes in Teacher educators' digital self over time. Such studies would shed light on long-term impact of professional development programs, the influence of evolving digital technologies,sustainability of digital competencies and changing notion of digital self.

Secondly, examining the beliefs, attitudes, and perceptions of teacher educators towards technology integration may provide insights into the factors that determine their evaluations of digital self. Exploring the role of personal experiences, pedagogical beliefs, and institutional support in impacting beliefs and attitudes of teacher educators would contribute to a better understanding of their digital competencies and technology integration practices.

Thirdly, exploring the relationship between Teacher educators' digital self and student outcomes is an underexplored area. Research investigating how teacher educators' digital competencies impact student engagement, achievement, and digital literacy would provide valuable insight about the effectiveness of technology integration and its impact on student learning.Additionally, organizational and contextual factors such as school culture, community support, and policy frameworks should be examined for their influence on Teacher educators' digital self. Understanding how these factors interact together with educators' digital competencies and determine their technology integration practices would provide understanding about creating conducive environments for effective technology integration.Furthermore, the specific digital competencies required for effective online and blended learning environments warrant moreexploration. Research on how Teacher educators' digital-self aligns with the contingencies of online teaching and the strategies they applyfor creating engaging and meaningful digital learning experiences would contribute to the knowledge base in this area.

The effectiveness of different professional development paradigms in enhancing Teacher educators' digital self should also be investigated. Comparing the impact of face-to-face workshops, online courses, blended learning, coaching, and collaborative learning communities on educators' digital competencies as well as instructional practices has potential to provide valuable informationabout effective approaches to professional development.Cross-cultural studies could be conducted to examinehow cultural factorsinfluence Teacher educators' digital self. Investigations on how cultural values, beliefs, and norms impact educators' attitudes towards technology integration and the challenges they face in different cultural contexts would provide insights into a more comprehensive understanding of the interplay between culture and digital competencies. Exploring the digital self of pre-service teachers and investigating the relationship between their digital competencies and competence to integrate digital technology in their future classrooms would inform pre-service teacher education programs.

References:
[1] Amichai-Hamburger, Y., & Furnham, A. (2004). The positive net: The internet as a source of psychological well-being. CyberPsychology&Behavior, 7(2), 167-171.
[2] Bandura, A. (1997). Self-efficacy: The exercise of control. W.H. Freeman.
[3] Bartle-Haring, S., Slesnick, N., & Collins, W. A. (2016). Longitudinal effects of sport participation on adolescent substance use and violence: A latent growth model. Journal of Adolescent Health, 59(4), 399-404.
[4] Carretero, S., Vuorikari, R., & Punie, Y. (2017). DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use. Publications Office of the European Union.
[5] Chou, H. T. G., & Edge, N. (2012). "They are happier and having better lives than I am": The impact of using Facebook on perceptions of others' lives. *Cyberpsychology, behavior, and social networking*, *15*(2), 117-121.

[6] Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. Journal of Personality Assessment, 49(1), 71-75.

[7] Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. Journal of Computer-Mediated Communication, 12(4), 1143-1168.

[8] Eshet-Alkalai, Y., &Chajut, E. (2009). Changes Over Time in Digital Literacy. CyberPsychology&Behavior, 12(6), 713-715.

[9] Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Duckworth, D. (2014). Preparing for life in a digital age: The IEA International Computer and Information Literacy Study international report. Springer.

[10] Gerber, N., Gerber, P., &Volkamer, M. (2018). Users' perception of Facebook apps: An empirical study. Computers in Human Behavior, 88, 340-351.

[11] Hsu, C. L., & Lu, H. P. (2007). Consumer behavior in online game communities: A motivational factor perspective. Computers in Human Behavior, 23(3), 1642-1659.

[12] Hsu, C. C., Wang, T. I., & Hsieh, Y. C. (2020). Teacher Professional Development for Digital Competence: Lessons Learned from UNESCO IITE's ICT in Education Projects. In F. Reimann & M. N. Kapur (Eds.), Classroom of the Future (pp. 295-315). Springer.

[13] Joinson, A. N. (2004). Self-disclosure in computer-mediated communication: The role of self-awareness and visual anonymity. European Journal of Social Psychology, 34(2), 177-206.

[14] Kapidzic, S., & Herring, S. C. (2015). From "participatory culture" to "public engagement": Exploring the dimensions of civic engagement in the digital age. Journal of Broadcasting & Electronic Media, 59(4), 586-606.

[15] Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., ... & Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PloS one*, *8*(8), e69841.

[16] Kukulska-Hulme, A., & Traxler, J. (2007). Design Principles for Mobile Learning. In M. Sharples (Ed.), Big Issues in Mobile Learning (pp. 13-15). Report of a Workshop by the Kaleidoscope Network of Excellence Mobile Learning Initiative.

[17] Kumar, S., & Vigil, K. (2016). Self-Assessment of Technology Integration Skills: Validating an Instrument for Pre-Service Teachers. Journal of Information Technology Education: Research, 15, 159-184.

[18] Kuo, Y. C., Walker, A. E., Schroder, K. E., & Belland, B. R. (2021). Developing the Digital Identity Engagement Scale: An investigation of factor structure, reliability, and validity. Journal of Educational Computing Research, 59(6), 1020-1051.

[19] Kuss, D. J., Griffiths, M. D., Karila, L., &Billieux, J. (2014). Internet addiction: A systematic review of epidemiological research for the last decade. Current Pharmaceutical Design, 20(25), 4026-4052.

[20] Kyriazos, T. A. (2018). Applied psychometrics: sample size and sample power considerations in factor analysis (EFA, CFA) and SEM in general. *Psychology*, *9*(08), 2207.

[21] Li, Q., & Wang, Y. (2013). Online self-disclosure: The roles of social support, perceived benefits, and negative impacts in Chinese microblogging. Computers in Human Behavior, 29(2), 439-443.

[22] Markus, H., &Nurius, P. (1986). Possible selves. American Psychologist, 41(9), 954-969.

[23] McMillan, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. Journal of Community Psychology, 14(1), 6-23.

[24] Prensky, M. (n.d.). From Digital Natives to Digital Wisdom: Hopeful Essays for 21st Century Learning. Corwin Press.

[25] Racherla, P., & Friske, W. (2012). Perceived 'useful' marketing ethics research: An investigation of research published in the Journal of Macromarketing. Journal of Macromarketing, 32(1), 91-106.

[26] Rahman, M. M. (2019). Digital identity and the complexity of self: A review and synthesis of research on digital identity. Computers in Human Behavior, 99, 95-110.

[27] Ridings, C. M., Gefen, D., & Arinze, B. (2002). Some antecedents and effects of trust in virtual communities. Journal of Strategic Information Systems, 11(3-4), 271-295.

[28] Suler, J. (2004). The online disinhibition effect. CyberPsychology&Behavior, 7(3), 321-326.

[29] Teo, T. (2015). Modelling Technology Acceptance in Education: A Study of Pre-Service Teachers. Computers & Education, 8(9), 49-58.

[30] Van Deursen, A. J., Bolle, C. L., Hegner, S. M., &Kommers, P. A. (2015). Modeling habitual and addictive smartphone behavior: The role of smartphone usage types, emotional intelligence, social stress, self-regulation, age, and gender. Computers in Human Behavior, 45, 411-420.

[31] Vogel, E. A., Rose, J. P., Roberts, L. R., & Eckles, K. (2014). Social comparison, social media, and self-esteem. *Psychology of popular media culture*, *3*(4), 206.

[32] Walrave, M., Vanwesenbeeck, I., &Heirman, W. (2012). An empirical investigation of adolescents' explicit and implicit attitudes toward online privacy and security. Computers in Human Behavior, 28(5), 1614-1621.

[33] Yıldırım, S. (2015). Investigating Pre-service Teachers' Technological Pedagogical Content Knowledge and Self-Efficacy Beliefs Regarding Digital Literacy. Journal of Educational Technology & Society, 18(1), 34-46.

[34] Young, K. S. (1998). Internet addiction: The emergence of a new clinical disorder. CyberPsychology&Behavior, 1(3), 237-244.

[35] Zhao, S., Grasmuck, S., & Martin, J. (2008). Identity construction on Facebook: Digital empowerment in anchored relationships. Computers in Human Behavior, 24(5), 1816-1836.