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Original Article

Validation of Digital Readiness for Academic Engagement (DRAE) Scale in Pakistani Healthcare Students

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ABSTRACT

Introduction: Digitalization in the 21st century has transformed nearly all aspects of our society, including education. However, many believe that this transformation is occurring with little strategic planning and much may not be ready for all that it brings to the table. The Digital Readiness for Academic Engagement (DRAE) scale is a useful tool and merits validation in different contexts for effective use.

Objective: To validate the DRAE scale in healthcare students in Pakistan.

Methods: The scale was circulated electronically via Google forms to faculty members of different medical colleges and universities of Punjab using convenience-sampling method for sharing with their students. A total of 7 institutions participated. The responses were collected from a sample of 1744 undergraduate students. The demographic variables included gender, semester enrolled, and age. Data was analyzed using SPSS version 25 (for exploratory factor analysis) and AMOS version 26 (for confirmatory factor analysis).

Results: The mean age of the respondents stood at (SD=20.55 ± 1.6). The largest proportion of students were from MBBS (41%), followed by allied health science and Dentistry. EFA results in the two-factor model which was confirmed by CFA. The goodness-of-fit indices were achieved by removing four items (1, 2, 7, 8) with factor loading below .80 and by drawing covariance between errors.

Conclusion: The original model with 5 factors was not applicable and a 2-factor model was validated by CFA for our context.

KEYWORDS: Digital Readiness, Academic Engagement, Medical Education, Digitization & Validation.

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INTRODUCTION

Among the many marvels of the 21st century is unparalleled digital advancement. Often referred to as digitization, the phenomenon is limited not only to the work environment but has transformed nearly all aspects of our society, including education (Schmidt & Tang, 2020). Though integrating digital technology in the educational context is nothing new, the pace of digitization in education in the recent past is unparalleled (Islam & Jahan, 2018). The COVID-19 pandemic has further contributed to pushing all teaching and learning towards virtual platforms and ushered education into a new digital world (Sun, Tang, & Zuo, 2020).

It is believed that this transformation is occurring with little strategic planning. The unprecedented pace of transformation may not have allowed many to get ready for this change (Schmidt & Tang, 2020). The lack of readiness may put the quality of teaching and learning in jeopardy, proving counter productive for students, especially in developing countries as orientation to the digital realm in these regions is not at par with the rest of the world (Bisht, Jasola, & Bisht, 2020).

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In the developed world, students are often called "digital natives" because of their exposure to digital technologies from an early age. They have experienced online education first-hand for some time now (starting with print-based mail learning and broadcasting systems and eventually leveling up to formal online distance learning). They had time to become well oriented with this system; having gained the skills needed to reap the benefits from online learning opportunities (Levy, 2017).

Elsewhere, the same is not true and most may still not be ready for the transition. The lockdowns and shift to online education have made it imperative to learn the use of digital devices and software (Hong & Kim, 2018). Published evidence suggests that students without prior exposure to the technology-rich environment may cope poorly with modern technology (Kim, Hong, & Song, 2018).

Digital readiness is an ongoing process. It includes learning both in the academic and social domains. Research shows that undergraduate students still prefer to use printed text to complete their academic assignments. Now that most students do not have a choice, how their lack of readiness will affect their academic performance is anyone's guess (Guzmán-Simón, García-Jiménez, & López-Cobo, 2017). With evidence reporting that the students' learning curve towards information technology is not up to the mark, it is becoming necessary to assess the students' digital readiness so that the underlying truth

be revealed (Woreta, Kebede, & Zegeye, 2013). Once the gap in digital readiness is identified, efforts may be directed towards making improvements. This research aims to validate the Digital Readiness for Academic Engagement scale in our context (Hong & Kim, 2018).

METHODS

The DRAE scale comprises of 5 domains, Digital tool application (DTA), Digital application usage (DAU), Digital Media Awareness (DMA), Information Seeking Skills (ISS), Information Sharing Behavior (ISB). Items in each domain are as follows:

(DTA): Item number 1,2,3,4

(DAU): Item number 5,6,7

(DMA): Item number 8,9,10

(ISS): Item number 11,12,13

(ISB): Item number 14,15,16,17

This scale was circulated electronically (as a google form) whose link was circulated by WhatsApp to faculty members of Medical and Dental Colleges of Punjab according to convenience sampling. A sample of 1744 undergraduate students of medicine, dentistry, and allied health science responded. The demographic variables included gender, semester enrolled, and age. After rooting out responses with missing values and incomplete answers (by deleting such entries list wise), the data was analyzed using SPSS version 25 and AMOS version 26.

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were done using the complete set of data. EFA was done using the 'principal components analysis' for extraction and was rotated with 'orthogonal varimax'. Criteria were set as Eigenvalue greater than 1 for factor extraction, Kaiser-Meyer Olkin (KMO) measure of sample adequacy greater than .5 for an adequate sample, and Bartlett's test of sphericity value less than .05 to indicate significance of factor analysis for the data set (Shrestha, 2021). An item with factor loading less than .4 was deleted (Lee et al., 2004). The final number of components to be included in CFA was based on eigenvalue, scree plot, factor loadings of each item, and the number of items within each component. CFA was done to confirm the results of EFA.

RESULTS

The mean age of the respondents was 20.55 (SD ± 1.6). The largest proportion of students were from the medical background (41%), followed by allied health sciences and dentistry. EFA revealed a two-factor structure according to data collected in the Pakistani healthcare context. It was carried out with Varimax rotation to identify the stable factor structure. The KMO value was .933 and Barlett's Test of Sphericity reached statistical significance (p=.00). The initial eigenvalues showed that the first factor explained 49.59% of the variance and the second factor with 57.84% of the variance. The two-factor model was preferred as it shows leveling off of eigenvalues on the Scree plot (figure 1) after two factors with difficulty in interpreting more than two factors. The rotated component matrix showed 16 items of the DRAE scale with a factor loading above .40 and only one item (4) with factor loading below .40 (Table1). The item (4) with factor loading less than .40 was removed, resulting in a 16-item scale to be confirmed by CFA. The initial CFA with two factor model shows poor model as parsimonious fit was not within adequate range of fitness: Parsimonious fit (ChiSq/df=7.810), Absolute fit (ChiSq=546.713, df=70, p-value= .000, GFI=.964, RMSEA=.063), Incremental fit (TLI=.958, CFI=.975, AGFI=.930, NFI=.972). Alteration in the initial model structure was made by removing four items (1, 2, 7, 8) with factor loading below .80 (Chin et al., 1997). Goodness-of-fit indices (figure 2) for the final model were achieved by making covariances between errors as suggested by modification indices.

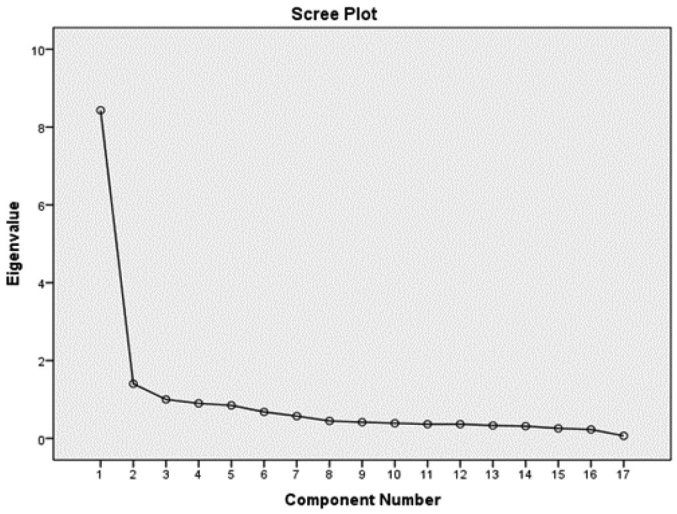

Fig.I: Principal component analysis for factor extraction, Kaiser Mayer Olkin (KMO) = .933, Bartlett's Test of sphericity (p= .00)

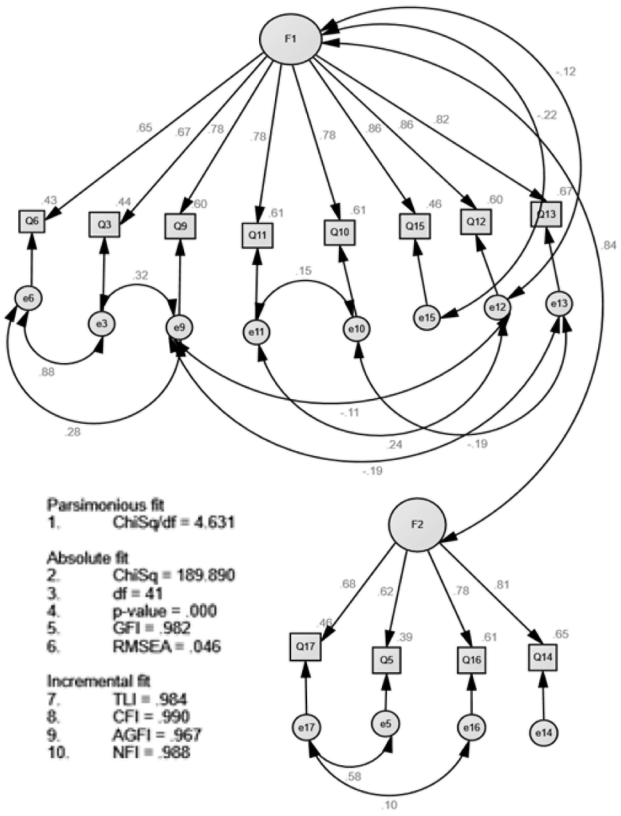

Fig. II: CFA model with two factor structure

Table I: Factor Loading based on Principal component analysis and Varimax rotation of 17 items

Item no.	Item Statement	Component	
		1	2
1	I can fix a computer virus or malware on my laptop or desktop computer.		.591
2	I can upload and download media, including online photos, files, video files, and sound files	.635	
3	I can manage software or apps from a computer or mobile devices	.894	
4	I can set up and change security options in a web browser.		.306
5	I can use the fundamental functions of a presentation program (e.g., Microsoft PowerPoint) for class presentations.		.718
6	I can use the fundamental functions of word-processing programs to create and edit documents for class assignments.	.895	
7	I can use spreadsheet programs (e.g., Microsoft Excel) to handle data and analyze it for class assignments	.692	
8	I can recognize bias or rumors in digital media content		.726
9	I can critically interpret digital media content.	.754	
10	I know how to protect intellectual property rights when I use digital media content.	.667	
11	I can use a variety of available options to search for information that my colleagues are not aware of	.679	
12	I can inform my classmates of different ways to effectively search for information.	.586	
13	I can generate keywords to search information for academic work.	.579	
14	I can interact with classmates using real-time communication tools, for example, video conferencing tools or messengers		.620
15	I can share my opinions online, for example, with blogs, social networking services, or web pages	.586	
16	I can share my files with classmates using online software		.629
17	I can collaborate with classmates using online software		.726

DISCUSSION

This study aimed to validate the DRAE scale amongst the population of Pakistani healthcare students. The fitness of the model was achieved in the local context after deleting some items and altering the original model. This change is probably owing to two factors. First is the original scale developed in South Korea and tested on a cohort of University students (who probably had better Digital readiness and computer understanding) as compared to Pakistani healthcare students owing to lack of facilities and digital prowess in the later (Arshad & Ameen, 2018). Secondly, the digital readiness of students in non-healthcare disciplines has been greater than students in health care, as they use patient-centered and hands-on learning techniques (Back et al., 2016). Another important factor to keep in mind is the fact that this study was performed during the COVID-19 pandemic, which led to a complete disruption of the teaching system and an overnight shift to online learning .

The initial scale comprised five domains whereas analysis in this study confirmed two domains. This is consistent with other studies carried out for scale validation in different countries which shows that losing factor structure is due to cultural mismatch (Hung, Chou, Chen, & Own, 2010). A closer look at larger well-known scales such as Dundee Ready Education Environment Measure (DREEM) also corroborates this fact that for a scale to be validated in multiple contexts, the cultural component needs to be catered to include a variety of people and factors (Junaid Sarfraz, Tabasum, Yousafzai, & Fatima, 2011). The scale understudy (DRAE) used a single population from one university in Korea during the time of its development, hence it validates the change in structure when applied to the local context. In our study we achieved goodness of fit in all three indices proving the reliability of the DRAE scale.

To our knowledge, no study has been done to validate a digital readiness scale for health care students in Pakistan. However, studies on digital readiness environments were consistent with the items kept in our subsets such as lack of hardware knowledge, lack of programming skills, and the presence of basic information-seeking skills (Kanwal, Rehman, Bashir, & Qureshi, 2017). We used the English version of the questionnaire which is a secondary language of instruction in the country. A translation into Urdu, which is the mother tongue, might yield different results. Moreover, digital readiness of students in the private and public health sectors may give different results because of socioeconomic factors pertaining to computer and software availability.

CONCLUSION

Given that most of our indices fit well in CFA, this shows that the DRAE is a sound scale and may be used for checking digital readiness. The original model with 5 factors was not applicable and a 2-factor model was validated by CFA for our context.

DECLARATION OF INTEREST

The author report no declaration of interest.

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AUTHOR'S CONTRIBUTION

1. Komal Atta. Conception, writing and data analysis.
2. Zakia Saleem. Conception, writing and data analysis.
3. Nabila Talat. Conception, writing and data analysis.
4. Muhammad Muneeb Chouhan. Review of language references.
5. Muhammad Haroon Hamid. Review and editing.