

Connectist: Istanbul University Journal of Communication Sciences

Research Article | Araştırma Makalesi

Open Access | Açık Erişim

Cross-cultural adaptation of the digital literacy scale among Arab immigrants in Türkiye

Dijital okuryazarlık ölçeğinin Türkiye'deki Arap göçmenler üzerinde kültürlerarası adaptasyonu



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Abstract

This study aims to culturally adapt the Digital Literacy Scale (Bayrakçı & Narmanlıoğlu, 2021) into Arabic and evaluate its measurement properties among the Arab immigrant community in Türkiye. The adaptation process followed standard forward and backward translation procedures, followed by a review from an expert committee. A preliminary test involving 30 individuals was conducted to identify potential semantic issues, leading to the finalized Arabic version of the scale. The revised scale was then tested on a sample of 302 Arab volunteers. The adaptation process included exploratory factor analysis, reliability and descriptive analysis, confirmatory factor analysis, and item discrimination analysis. Results from the exploratory factor analysis revealed four factors instead of the six found in the original scale. Cultural and educational differences within the studied community may account for the variation in factors as seen in many adaptation studies. The component correlation matrix indicated significant inter-factor correlations. The Arabic adaptation demonstrated a high internal consistency value of 0.919, reflecting excellent statistical reliability. The item-total correlation for all 23 items exceeded 0.4, ranging from 0.405 to 0.692. Arabic version exhibits strong internal consistency and construct validity, offering a reliable and modern tool for measuring digital literacy levels across Arab communities in various countries.

Öz

Bu çalışma, Dijital Okuryazarlık Ölçeğini (Bayrakçı & Narmanlıoğlu, 2021) Arapçaya kültürel olarak uyarlamayı ve Türkiye'deki Arap göçmen topluluğu arasındaki ölçüm özelliklerini değerlendirmeyi amaçlamaktadır. Uyarlama süreci, standart ileri ve geri çeviri prosedürlerini takip etmiş ve ardından bir uzman komitesi tarafından gözden geçirilmiştir. Potansiyel anlamsal sorunları belirlemek için 30 kişinin katıldığı bir ön test yapılmış ve bu test sonucunda ölçeğin Arapça versiyonu nihai hale getirilmiştir. Revize edilen ölçek, 302 Arap gönüllüden oluşan bir örneklem üzerinde test edilmiştir. Uyarlama süreci, keşfedici faktör analizi, güvenilirlik ve betimsel analiz, madde ayırt edicilik analizi ve doğrulayıcı faktör analizini içermiştir. Keşfedici faktör analizi sonuçları, orijinal ölçekte bulunan altı faktör yerine dört faktör ortaya çıkarmıştır. İncelenen topluluk içindeki kültürel ve eğitimsel farklılıklar, birçok uyarlama çalışmasında görüldüğü gibi faktörlerdeki bu varyasyonu açıklayabilir. Bileşen korelasyon matrisi, faktörler arasında önemli korelasyonlar olduğunu göstermiştir. Arapça uyarlama, 0.919 gibi yüksek bir iç tutarlılık değeri sergilemiş ve bu da yüksek seviyede istatistiksel güvenilirliği yansıtmıştır. 23 maddenin tamamı için madde-toplam korelasyonu 0.4'ü aşmış ve 0.405 ile 0.692 arasında değişmiştir. Arapça versiyon, güçlü bir iç tutarlılık ve yapı geçerliliği sergilemekte olup, çeşitli ülkelerdeki Arap topluluklarında dijital okuryazarlık düzeylerini ölçmek için güvenilir ve güncel bir araç sunmaktadır.

Keywords

Arab immigrants • digital literacy • digital literacy scale • scale adoption • Arabic

Anahtar Kelimeler

Arap göçmenler • dijital okuryazarlık • dijital okuryazarlık ölçeği • ölçek adaptasyonu • Arapça



Citation | Atıf: Bayrakçı, S. & Narmanlıoğlu, H. (2025). Cross-cultural adaptation of the digital literacy scale among Arab immigrants in Türkiye. *Connectist: Istanbul University Journal of Communication Sciences*, (68), 18-35. <https://doi.org/10.26650/CONNECTIST2025-1645089>

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Cross-cultural adaptation of the digital literacy scale among Arab immigrants in Türkiye

The migration crisis in the Middle East has not only impacted Türkiye but has reverberated across numerous countries, especially within the European Union. Official data indicates that 238.768 Syrian (BBC, 2024) migrants have acquired Turkish citizenship. Both Türkiye and European nations have been compelled to allocate substantial resources to address this issue, making migration a top priority in political relations between countries. The academic community has also responded to the migration crisis, with a notable surge in research dedicated to migration-related topics. The migration issue, particularly in the regions directly affected, namely Türkiye and the European Union, has been thoroughly examined through various lenses, including security (Lahav, 2010; Hansen, 2010; Collyer, 2013; Liang, 2016), international relations (Kuz, 2015; Gençer, 2016; Sağnıç, 2017; Eşsiz, 2017), and health (Kouider et al., 2014; Greve, 2016; Akalın, 2016).

The integration dimension has been extensively utilized in addressing challenges related to Arab migrants (Şimşek, 2020; Borselli & van Meijl, 2021; Sarsour, 2022; Al-Khanbashi, 2022). Recognizing the significance of digital space in immigrant integration, success in integration for these individuals is increasingly tied to their proficiency in navigating the digital space. With the ubiquity of new communication technologies, access to digitized information empowers individuals to engage in both local and global communities. Immigrants from diverse backgrounds are increasingly leveraging digital communication for social interactions in their host countries.

Drawing insights from the settlement experiences of Syrian newcomers in Canada, migrants are increasingly using social media for various needs, such as experience building and learning (Drolet & Moorthi, 2018). Studies conducted in the United States, particularly focusing on Mexican immigrants, underscore the growing reliance on digital communication as a means of integration and socialization (Ayón et al., 2018). In New Zealand, evidence supports the assertion that digital communication technologies contribute to fostering social engagement within the host country (Andrade & Doolin, 2016).

Recent studies have emphasized a positive relation between digital communication and integration in European countries, which many Arab migrants perceived to be their final destination. For instance, research conducted by Kaufmann (2018) in Austria illuminates how digital technologies facilitate intercultural communication between migrants and the host community. In Sweden, Syrian migrants actively encourage their children to watch *Netflix* series as a means of language acquisition. Notably, migrants who had a higher exposure to cable and satellite television in their home countries exhibit a preference for internet usage in their host country (Khoja, 2020: 42-46). Furthermore, the internet is basic tool of information for local communities to learn about their expectations (Fisher, 2018; Maitland, 2018).

Leurs (2017) conducted research in the Netherlands and discovered that immigrants utilize social media as a means to socialize with Dutch citizens, mitigating feelings of loneliness. In a study by Alencar and Tsagrakroni (2019), which involved in-depth interviews with immigrants, including Afghans, Syrians, and Eritreans residing in the Netherlands, it was observed that immigrants can maintain relationships with locals by establishing connections on social media platforms.

Employing digital communication tools for integration purposes requires a certain level of digital literacy. Furthermore, digital communication can facilitate the formulation of more efficacious integration policies

by governments and international organizations. Academic studies hold the potential to make a important contribution to the advancement for effective integration policies.

From literacy to competencies

Efforts to broaden the concept of traditional literacy to different media are not novel. Extensive discussions have been conducted on subjects such as visual literacy (Debes, 1968), critical visual literacy (Kellner, 2002), cineliteracy (Greenfield, 1984), television literacy (Buckingham, 1993), and information literacy (Bruce, 1997). During the 1990s, new literacy studies introduced and expanded the notion of multiliteracies. This new concept pertains to the social and cultural dimensions of emerging literacies, and the competencies essential for new communication technologies (Cope & Kalantzis, 2000). All definitions of literacy extended to diverse media are considered within the context of a broader framework of media education, surpassing the limitations of mechanical skills.

The foundations of digital literacy are not recent. As the concept can be traced back to the computer literacy debates of the 1980s (Goodson & Mangan, 1996). The swift evolution of technology quickly rendered the notion of computer literacy. Discussions during this period transitioned towards information and communication technology skills. Interest in this field has since expanded from academic studies to policy. United Kingdom government studies have assessed individuals' information and communication technology skills (Williams et al, 2003).

Since the 2000s, the inclusion of digital literacy in reports has seen a notable rise, aligning with the concept of lifelong learning in Europe (From, 2015). While there are a multitude of definitions for digital literacy in the literature, Gilster (1997) is often considered one of the pioneers in defining it as the capability to comprehend and use information from various digital sources via computers. Bawden (2001) relates digital literacy to an awareness of technology that goes beyond basic reading, writing, or interpreting information. Moreover, Gourlay et al. (2013) and Hall et al. (2013) define digital literacy as the practical application of technological skills, akin to the concept of know-how. As per Kinzer (2010), digital literacy is characterized by the capability to locate and evaluate information using technological devices. Expanding on this definition, Vieru (2015) emphasizes the significance of being both active and critical when utilizing information technology in the contexts of employment, learning, personal development, and community participation. The critical approach supported by Kinzer and Vieru stems from a well-established tradition in media studies and education. This knowledge was initially employed to critically evaluate internet content (Fabos, 2004) and has subsequently defined digital literacy.

In addition to digital skills, individuals require a spectrum of cognitive, sociological, and emotional skills (Inoue et al., 1997). Goodfellow (2011) and Martin and Grudziecki (2006) emphasize that digital literacy encompasses competence, awareness, and attitude in the use of digital technologies. Eshet-Alkalai (2004) describes digital literacy as the capability to thrive in the digital age. Hockly (2012) and Pegrum (2011) view digital literacy not merely as a set of skills but also as a collection of attributes. These qualities are closely intertwined with staying abreast of technological developments. For instance, effective communication in virtual groups and participation in various educational platforms require competencies such as technical skills, self-regulation, flexibility, and problem-solving. Basic digital literacy, as defined by Bacon and Mackinnon (2016), encompasses foundational skills essential for every individual, including using a computer and connecting to the internet. The skills required in the workplace are referred to as digital literacy for the general workforce, while those involving specialized processes—such as coding, software development, and project management—are termed digital literacy for professional occupations.

Digital literacy is a crucial aspect of modern education policies. As per a report by the United Kingdom Joint Information Systems Committee (JISC, 2011), digital literacy is vital for individuals to thrive in society, both in terms of learning and working. The Organisation for Economic Co-operation and Development report (2001) on the digital divide underscores the critical need to develop digital skills for bridge the divide between people who can access to technology and people who cannot. The report identifies three essential skill categories for today's world: foundational skills, specialized competencies, and problem-solving ability. The European Digital Competence Framework established by the European Commission in 2013 to define digital competence. Its purpose is to promote digital competencies in Europe, support legislation and policy, and formulating training programs for target groups. Aligned with the European Digital Competence Framework objectives, several countries have formulated new government policies to elevate the digital literacy levels of marginalized communities, such as migrants (Reichel et al., 2015).

Aim and methodology

The objective of this study is to adapt the Digital Literacy Scale to the cultural context of immigrants. The Digital Literacy Scale developed by Bayrakçı and Narmanlıoğlu (2021) was used for the Arabic adaptation. The scale entails of six factors: general knowledge and functional skills, professional production, daily use, ethics and responsibility, social dimension, and privacy and security, which cover the different definitions found in the literature.

The Digital Literacy Scale consists of 29 items and has undergone testing for both validity and reliability. The Cronbach Alpha internal consistency value is 0.911 and the content validity index is 0.94, indicating that the scale is reliable and valid (Büyüköztürk, 2002; Lawshe, 1975; Tavşancıl, 2010; Yeşilyurt & Çapraz, 2018). The scale has been used in various studies (İnan Karagül et al., 2021; Kaya & Korucuk, 2022; Yeşilyurt & Vezne, 2023; Ketanci, 2023) consistently demonstrated its reliability and validity across diverse samples.

Aim

The study aims to assess the measurement properties of the Arabic version of the Digital Literacy Scale. Within this framework, the exploratory factor structure of the scale was analyzed to determine the total variance explained and to examine factor loadings. Another key objective is to evaluate the scale's reliability, which pertains to the consistency of its items. This analysis aims to determine the extent to which the scale accurately measures the intended construct. Additionally, item discrimination analysis and confirmatory factor analysis were conducted to further evaluate the scale's statistical properties.

Method

The research of this article received Ethics Committee Approval in accordance with the decision of Marmara University Social Sciences Research Ethics Committee numbered 2022-76. The method proposed by Hambleton and Patsula (1999) was adhered to in adapting the Digital Literacy Scale into Arabic, ensuring equivalence between the two languages. The concept of digital literacy is equivalent in both languages (Almazan, 2022; Asasi & Asasi, 2021; Hilal, 2019). Expert translators well-versed in both languages and cultures were engaged in the translation process. Arabic translation of scale was completed by an academican who specializes in Arabic language and literature and with a deep understanding of both cultures. Following this, the Arabic version of the scale was reviewed by 7 students from Saudi Arabia, Jordan, Kuwait, Egypt, Yemen, and Syria at Marmara University, Türkiye. These students reviewed the scale items for language proficiency, expression, and grammatical accuracy. The subsequent phase involved back translation, where the final Arabic text was produced by a professional Turkish-Arabic translator with expertise in communication technologies. An

expert committee compared the versions for semantic, idiomatic, and conceptual equivalence and found no discrepancies between them.

A pilot study was conducted involving 30 native Arabic-speaking students from various departments at Marmara University to assess their comprehension of the items. The results indicated that all expressions were understood by the participants, leading to the adaptation of the scale.

Findings

Opinions vary regarding the ideal sample size. Kline (1994) and Burns and Susan (2001) contend that the size of the sample must be at least ten times the number of items in the scale, whereas Comray and Lee (1992) propose a minimum of one hundred. The scale was administered to 302 Arab volunteers. Data collected through both face-to-face and online surveys were imported into IBM SPSS Statistics 28, and outliers and unanswered questions were expunged.

Participants

The study's validity and reliability analyses were conducted on data from 302 participants who completed all data. Table 1 displays the participants' demographic variables.

Table 1

Participants' demographic variables

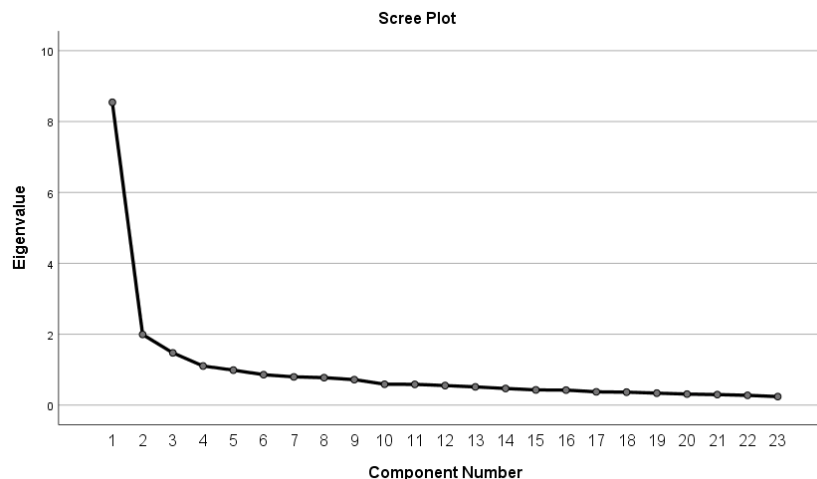
Demographic variables		Frequency	Valid (%)
Gender	Women	103	34.2
	Male	198	65,8
	Total	301	100
	Missing	1	
Age group	Under 20 Years	41	13.7
	21-25	76	25.3
	26-30	50	16.7
	31-35	26	8.7
	36-40	23	7.7
	41-45	24	8.0
	Over 46 Years	60	20.0
	Total	300	100
	Missing	2	
	Primary/Sec-ondary	14	4.8
	High School	47	16.2
Education status	Bachelor's Degree	163	56.0
	Postgraduate	67	23.0
	Total	291	100
	Missing	11	

Exploratory factor analysis

Exploratory factor analysis allows researchers to investigate important variables and construct theories or models from large latent dimensions, often represented by a set of items (Henson & Roberts, 2006; Swisher, Beckstead et al. 2004).

The Kaiser-Meyer-Olkin (KMO) measure, devised by Kaiser (1974), assesses the suitability of data for factor analysis by evaluating the correlation among observed variables, yielding a value within the range of 0 to 1. Bartlett's Test, introduced by Bartlett in 1950, examines relationships among variables within a dataset. Factor analysis is justified by a significant test statistic (usually considered at $p < 0.05$), signifying substantial relationships among variables (Bartlett, 1950). Then the suitability of the data for factor analysis was evaluated. For this aim data calculated by the KMO measure of sampling adequacy and Bartlett's test of sphericity. The KMO value was 0.921, indicating high sampling adequacy. In addition, Bartlett's sphericity test yielded significant results ($\chi^2 (253) = 3102.031, p < 0.001$), confirming the assumption of multivariate normality. Principal component analysis was used as the extraction method, as it is used to decompose the original data into a set of linear variables, creating a smaller number of components to explain the variables in the dataset (Tabachnick & Fidell, 2001). Given the correlation between the factors, direct oblimin was preferred as a rotation method.

Figure 1
Scree plot



During the examination of the scree plot—a graphical representation of eigenvalues used to identify breaks or discontinuities—a significant decline in the slope was observed. Additionally, the analysis of the total variance table revealed four factors with eigenvalues exceeding 1.

Table 2
Total variance explained

Factors	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
Effective safe use	8.542	37.14	37.14	7.264
Advanced production	1.993	8.666	45.806	3.525
Ethics and responsibility	1.474	6.409	52.215	4.58
General knowledge and functional skills	1.103	4.796	57.011	3.916

Extraction method: Principal component analysis.

Analysis of the eigenvalues revealed that ‘effective safe use’ factor had an eigenvalue of 8.54, accounting for 37.14% of the variance. The ‘advanced production’ factor had an eigenvalue of 1.99, explaining 8.66% of the variance, while the ‘ethics and responsibility’ factor had an eigenvalue of 1.74, contributing 6.41% of the variance. The ‘general knowledge and functional skills’ factor, with an eigenvalue of 1.10, accounted for 4.8% of the variance. Cumulatively, these four factors explained a total variance of 57.01%. In line with the 40-60% benchmark established in social sciences (Thompson, 2004; Tavşancıl, 2005; Scherer et al., 1988), the variance ratio calculated in this study falls within an acceptable range.

Table 3*Factor loadings*

Items	Effective safe use	Advanced production	Ethics and responsibility	General knowledge and functional skills
I can change the privacy / security settings on my social media posts and profile.	0.859			
I am aware of how to create a strong password.	0.754			
I can use digital technologies effectively in daily practice such as booking, shopping, address finding etc.	0.751			
With the assistance of digital technologies, I can change various images (photography, sound recording and video, etc.) as well as produce new content.	0.676			
I can use cloud computing technologies (Google Drive, iCloud, Dropbox, etc.) effectively in daily life.	0.623			
I can add a web page that I use to bookmarks or favorites.	0.611			
I can perform tasks such as uploading videos / broadcasting online.	0.586			
I can effectively use eGovernment applications	0.583			
I can effectively use at least one software related to my field (Photoshop, SPSS, Premiere, Office Word, etc.)	0.560			
I can recognize and block unwanted / spam emails and phishing messages.	0.551			
I can use at least one of the programming languages (Java, C, Visual Basic, PHP, etc.)		0.851		
I can design and publish a website using web design systems (Weebly, WordPress, etc.).		0.760		
I can develop software / applications based on digital technologies.		0.746		
I am aware of the ethical and legal implications that may arise from copyright violations in digital environments.			0.825	
I am aware of the ethical and legal responsibilities of behaviors such as cyberbullying			0.753	

Items	Effective safe use	Advanced production	Ethics and responsibility	General knowledge and functional skills
(insulting, swearing, hate speech, etc.) and online abuse.				
I can cross-reference information obtained online by consulting various sources to verify its accuracy.			0.599	
I am aware that everything I do online is recorded.			0.547	0.301
I am aware that my personal or legal rights (privacy, copyright, freedom of speech, etc.) continue in digital media as well as in daily life			0.545	
I know how to behave to protect myself and others' personal data (photo, address, family information, etc.) online			0.456	
I am familiar with the meanings of terms such as Torrent, Internet, and World Wide Web (WWW).				0.656
I can change the proxy / dns settings of devices		0.395		0.601
I am familiar with the concepts of licensed software, demo software, pirated software, malware, and cracks.				0.586
I am knowledgeable about both hardware and software technologies.				0.553

Extraction Method: Principal Component Analysis.

Transformation Method: Kaiser Oblimin

An analysis of the factor loadings revealed that the lowest factor loading was 0.43, exceeding the critical threshold of 0.30 established in the literature (Tabachnick & Fidell, 2001). The factor loadings for items ranged from 0.55 to 0.85 in the first factor, while those in the second factor ranged from 0.74 to 0.85. For items which are in the third factor, the loadings varied between 0.45 and 0.82, and for those in the fourth factor, the loadings fell between 0.55 and 0.65.

Table 4

Component correlation matrix

Component	Effective safe use	Advanced production	Ethics and responsibility	General knowledge and functional skills
Effective safe use	1			
Advanced production	0.428	1		
Ethics and responsibility	0.574	0.258	1	
General knowledge and functional skills	0.689	0.426	0.499	1

Extraction Method: Principal component analysis.

Rotation Method: Oblimin with Kaiser normalization.

Examining the correlations between the four factors in Table 4, there is a statistically significant correlation ($p < 0.001$) of moderate strength was observed (ranging from $r = 0.25$ to 0.68) among the factors. The

strongest correlation was found between general knowledge and functional skills and effective safe use, which is consistent with the original scale.

Reliability and descriptive analysis

Reliability refers to the consistency of items within a measurement tool and the extent to which the scale accurately reflects the problem being studied. In this research, the Cronbach's Alpha internal consistency coefficient was employed to assess the consistency among the items. Table 5 presents the Cronbach's Alpha coefficients, as well as the mean and standard deviation values, for individual factors and the overall scale.

Table 5

Mean values and reliability analysis of Digital Literacy Scale

	F1	F2	F3	F4	Total
Cronbach's Alpha	0.902	0.780	0.765	0.776	0.919
Mean	3.941	2.470	3.882	3.324	3.627
SD	0.753	1.009	0.669	0.924	0.643

Cronbach alpha coefficients ranging from .765 to .902 for the factors. That means the Arabic version of the reliability analysis showed good internal consistency. The internal consistency value for the whole scale for Arabic adaptation is 0.919, with the effective safe use dimension at 0.902, advanced production at 0.78, ethics and responsibility at 0.765, and general knowledge and functional skills at 0.776.

Table 6

Item means and internal consistency

Item	N	Mean	SD	Corrected item-total correlation	Cronbach's Alpha if item deleted
M1	302	3.60	1.153	0.430	0.918
M2	302	3.58	0.997	0.539	0.913
M3	302	3.79	0.988	0.573	0.913
M4	302	4.09	0.983	0.427	0.915
M5	302	4.10	0.926	0.405	0.916
M6	302	4.13	0.902	0.445	0.915
M7	302	3.70	1.183	0.557	0.913
M8	302	3.42	1.214	0.646	0.911
M9	302	3.43	1.147	0.590	0.912
M10	302	2.75	1.236	0.543	0.913
M11	302	3.75	1.086	0.507	0.914
M12	302	3.90	1.022	0.645	0.911
M13	302	4.08	0.940	0.585	0.913
M14	302	4.14	0.987	0.667	0.911
M15	302	3.98	1.072	0.681	0.910
M16	302	2.59	1.177	0.382	0.917
M17	302	2.36	1.236	0.431	0.916
M18	302	3.89	1.009	0.692	0.910
M19	302	4.19	0.882	0.669	0.911
M20	302	4.29	0.886	0.658	0.912
M21	302	2.45	1.221	0.482	0.915

Item	N	Mean	SD	Corrected item-total correlation	Cronbach's Alpha if item deleted
M22	302	3.50	1.260	0.559	0.913
M23	302	3.70	1.225	0.652	0.911

Table 6 presents the averages of all items in the Arabic adaptation and the item discrimination values that would result from their removal from the scale. Each of the items have a value below than 0.919 indicating that none of them affect the internal consistency and reliability of the scale. The corrected item-total correlation shows the correlation between the items and the sum of the other items in the scale and gives an idea about the ability of the items to discriminate between the participants in the scale. The item statistics demonstrate good variability around the mean scores of all items, suggesting effective performance.

Item discrimination analysis

Item discrimination analysis evaluates the capacity of measurement tools to distinguish between individuals with high and low levels of the measured characteristics. The term “discrimination power” refers to the capacity to differentiate between groups and identify differences (Hudson, 1990; Büyüköztürk, 2002). Table 7 presents the means, standard deviations, and outcomes of an independent sample t-test for the upper and lower groups in relation the Arabic adaption.

Table 7

Item discrimination values

	Groups	N	Mean	SD	p Asymp. Sig. (2-tailed)
M1	Upper	85	4.15	1.029	0.000
	Lower	92	3.07	1.117	0.000
M2	Upper	85	4.22	0.73	0.000
	Lower	92	2.96	1.005	0.000
M3	Upper	85	4.47	0.683	0.000
	Lower	92	3.14	0.99	0.000
M4	Upper	85	4.6	0.676	0.000
	Lower	92	3.52	1.114	0.000
M5	Upper	85	4.64	0.652	0.000
	Lower	92	3.62	1.036	0.000
M6	Upper	85	4.56	0.626	0.000
	Lower	92	3.63	1.146	0.000
M7	Upper	85	4.47	0.81	0.000
	Lower	92	2.82	1.213	0.000
M8	Upper	85	4.48	0.717	0.000
	Lower	92	2.51	1.053	0.000
M9	Upper	85	4.33	0.878	0.000
	Lower	92	2.57	0.987	0.000
M10	Upper	85	3.71	1.203	0.000
	Lower	92	2.07	1.003	0.000
M11	Upper	85	4.33	0.931	0.000
	Lower	92	3.01	1.218	0.000

	Groups	N	Mean	SD	p Asymp. Sig. (2-tailed)
M12	Upper	85	4.74	0.492	0.000
	Lower	92	3.1	1.12	0.000
M13	Upper	85	4.75	0.434	0.000
	Lower	91	3.46	1.068	0.000
M14	Upper	85	4.87	0.371	0.000
	Lower	92	3.26	1.118	0.000
M15	Upper	85	4.81	0.393	0.000
	Lower	92	3.09	1.135	0.000
M16	Upper	85	3.29	1.289	0.000
	Lower	92	2.07	0.981	0.000
M17	Upper	85	3.19	1.367	0.000
	Lower	92	1.76	0.93	0.000
M18	Upper	85	4.73	0.497	0.000
	Lower	92	3.05	1.113	0.000
M19	Upper	85	4.84	0.373	0.000
	Lower	92	3.45	1.042	0.000
M20	Upper	85	4.89	0.31	0.000
	Lower	92	3.65	1.063	0.000
M21	Upper	85	3.38	1.291	0.000
	Lower	92	1.76	0.894	0.000
M22	Upper	85	4.44	0.823	0.000
	Lower	92	2.57	1.17	0.000
M23	Upper	85	4.61	0.619	0.000
	Lower	92	2.62	1.212	0.000

To analyse item discrimination, scores from the Likert-type scale were ranked in descending order based on the total scores achieved. Participants were then divided into upper and lower 27% groups, following Cureton's (1957) recommendation, which identifies the tails of the standard normal distribution. An independent samples t-test was applied to assess if there was a statistically significant difference between the means of the two groups. The findings showed that the Arabic scale effectively measured the difference between high and low levels of digital literacy, with statistical significance ($p = 0.00 < 0.05$).

Confirmatory factor analysis

When interpreting construct validity, it is important to consider multiple values rather than relying on a single value (Tabachnick & Fidell, 2001; Hair et al., 2010; Byrne, 2001). The model was subjected to confirmatory factor analysis in SPSS AMOS 24, and the following values were obtained for the Arabic Digital Literacy Scale: The Arabic Digital Literacy Scale yielded $CMIN=\chi^2$ [220 N=297] value of 416.78 ($p<0.01$), χ^2/sd value of 1.89, CFI value of 0.93, RMSEA value of 0.05, AGFI value of 0.86, and GFI value of 0.9. According to Schermelleh-Engel et al. (2003), an AGFI value of approximately 0.90 suggests a favourable fit with respect to the baseline model, while values surpassing 0.85 could be considered as satisfactory in terms of fitting the model. The goodness-of-fit indices demonstrate that the Arabic version of the digital literacy scale is structurally valid and maintains consistency with the original Turkish version.

Discussion and conclusion

The objective of this study was to culturally adapt the Digital Literacy Scale for Arab culture and test its measurement properties. To evaluate the appropriateness of the data for factor analysis, Bartlett's Test of Sphericity and the KMO Measure of Sampling Adequacy were performed, both of which produced favorable outcomes. The KMO value ratio of the Arabic scale was 0.921, which is considered acceptable according to Kaiser and Rice's (1974) standards. In determining whether the data exhibited a multivariate normal distribution, Bartlett's Test of Sphericity was conducted ($\chi^2(253) = 3102.031, p < 0.001$), confirming the assumption of multivariate normality.

The original scale comprises six factors: general knowledge and functional skills, daily use, privacy and security, ethics and responsibility, advanced production, and social dimension. The scree plot indicates a significant decrease in slope after the fourth factor. The eigenvalues of the factors and the total variance ratio explained by the four factors are acceptable (57.01%). The factors of ethics, responsibility, advanced production, general knowledge, and functional skills in the Arabic-adapted identifies scale remain consistent with the original. However, the factors of daily use, privacy and security, and social dimension were grouped together in the first factor with the highest eigenvalue. This initial factor is denoted as effective safe use, pertaining to the utilization of digital technologies and privacy security. The Arabic Digital Literacy Scale identifies four factors: effective safe use, ethics and responsibility, advanced production, and general knowledge and functional skills.

Cultural and educational differences within the studied population may explain the observed variation in factors. Adaptation studies have demonstrated that cultural differences can result in either the merging or modification of factors. For example, the adaptation of Chen and Starosta's (2000) intercultural sensitivity scale to different cultures revealed different factors. The German version of the scale was tested by Fritz et al. (2002), uncovered 5 factors, consistent with the original. However, Tamam's (2010) adaptation to Malaysian culture resulted in only three factors, deviating from the expected five. Similarly, Bekiroğlu and Balcı (2016) identified four factors in their Turkish adaptation study. These results show the importance of considering the culture of the adapted social group as a significant variable. Stordy (2015, p. 472) defines digital literacy as the digital skills of individuals and social groups, emphasizing its socio-technological character.

It is possible that the cultural characteristics of the immigrants may have contributed to the variation in factors during the adaptation of the scale into Arabic. The elimination of items may be related not only to the cultural context but also to the digital competency levels of the Arab community. As emphasized in Aidini's (2023) study, the digital divide in the Arab world is significant, and digital skills are generally lower compared to other societies. According to research based on the ICT Index developed by the International Telecommunication Union, digital skills are notably low in most Arab countries (Teniou & Dehane, 2019). Similarly, a report prepared by Yusuf (2021) for the Economic Research Forum presents the same findings.

This situation may have led to items related to advanced digital skills in the original scale (such as installing operating systems, restricting app permissions, installing and managing applications, blogging) showing low variance within the sample group, thereby reducing item discrimination. From a statistical perspective, in order to maintain the validity and reliability of the scale, it is recommended to remove items that show low loadings in factor analysis (typically below .30) or low item-total correlations (<.30) (Tavşancıl, 2014). Some of the removed items in the study did not demonstrate sufficient factor loadings in the factor analysis due to homogeneous response patterns. These items were excluded on the grounds that they could compromise the statistical integrity of the scale.

According to the component correlation matrix, it can be concluded that there is a significant correlation between the factors of the scale. The most substantial correlation was identified between general knowledge and functional skills which is consistent with the original version.

Cronbach's alpha was employed to evaluate the internal consistency of the scale items. The internal consistency coefficient was calculated using a lower limit of $\alpha=0.70$ (Büyüköztürk, 2002; Tavşancıl, 2010), indicating that all sub-dimensions had alpha values exceeding 0.7. The Arabic adaptation of the scale demonstrated an excellent level of statistical reliability, with an internal consistency value of 0.919. The internal consistency values for the factors are as follows: effective safe use (0.902), advanced production (0.78), ethics and responsibility (0.765), and general knowledge and functional skills (0.776). The item-total correlation of all 23 items in the Arabic scale is above 0.4, ranging from 0.405 to 0.692. This indicates that the items effectively identify respondents who participated in the Arabic Digital Literacy Scale (Büyüköztürk, 2002).

Confirmatory factor analysis is used to evaluate the validity of a predefined number of factors and how well they represent the underlying structure. It tests if the sample data align with the proposed model (Brown, 2015) and identifies the factors that emerge based on the correlations among variables (Tabachnick & Fidell, 2001). In this study, the confirmatory factor analysis of the scale examined multiple values, and all model fit indices were found to fall within acceptable ranges. These results confirm the validity of the Arabic adaptation of the scale.

Digital literacy is the capacity to engage in online activities within one's community. The emergence of new communication technologies has enabled individuals to become more involved in civil society. Digital communication enables people to socialise, seek online support for their issues, and express themselves. Virtual communities provide a platform for individuals to connect and socialise based on shared values and interests. Information required for daily life is increasingly obtained through digital communication technologies.

Digital technologies not only facilitate social connections but also exert a significant impact on the economy. In today's business landscape, individuals with digital technology skills are in high demand, replacing traditional employees. Remote collaboration and problem-solving have become more accessible to work groups and organizations. Moreover, digital technologies are driving transformative shifts in the realm of education. While formal education has been widely accessible since the Industrial Revolution, it is now transforming into a more adaptable model through digital information technologies. Access to digital resources enables individuals to engage with both local and global online communities. The involvement of community members with technological expertise is crucial for promoting social inclusivity and active engagement.

For decades, numerous states and organizations, such as the European Union and the Organisation for Economic Co-operation and Development, have integrated digital literacy into their education policies to address the digital divide. To further reduce this gap within society, it is essential to enhance the digital literacy rates among disadvantaged groups. There is a significant population of Arab immigrants who face integration challenges in the countries they reside in. Presently, many countries are working towards the social, cultural, and economic integration of Arab immigrants. Digital literacy presents a significant opportunity for Arab communities to socialise, participate in economic activities, and receive education. In countries where Arab immigrants reside, researchers can use the Digital Literacy Scale to determine the intra-community digital divide and produce the necessary information. This data will provide valuable contributions to the development of integration policies.

The Arabic-adapted Digital Literacy Scale enables comparative analyses by incorporating multiple variables. This facilitates the comparison of digital literacy levels among Arab communities based on factors such as age, education, monthly income, internet access, age of initial smart device use, and total number of smart devices. To measure the digital literacy levels of various Arab communities, researchers can use the validated Arabic version of the Digital Literacy Scale.



Ethics Committee Approval	The research of this article received Ethics Committee Approval in accordance with the decision of Marmara University Social Sciences Research Ethics Committee numbered 2022-76.
Informed Consent	Informed consent was obtained from the participants.
Peer Review	Externally peer-reviewed.
Author Contributions	Conception/Design of study: S.B., H.N.; Data Acquisition: S.B., H.N.; Data Analysis/ Interpretation: S.B., H.N.; Drafting Manuscript: S.B., H.N.; Critical Revision of Manuscript: S.B., H.N.; Final Approval and Accountability: S.B., H.N.
Conflict of Interest	The authors have no conflict of interest to declare.
Grant Support	This study funded by The Scientific and Technological Research Council of Türkiye (TÜBİTAK) (Project Number: 122G140).
Acknowledgement	We would like to thank Selman Fargali and Laila Nayer Abdalhameed for supporting our work as TÜBİTAK scholars. We are grateful to all the immigrants who volunteered for our research.
Etik Kurul Onayı	Bu makalenin araştırması, Marmara Üniversitesi Sosyal Bilimler Araştırma Etik Kurulu'nun 2022-76 sayılı kararı uyarınca Etik Kurul Onayı almıştır.
Bilgilendirilmiş Onam	Katılımcılardan bilgilendirilmiş onam alınmıştır.
Hakem Değerlendirmesi	Dış bağımsız.
Yazar Katkısı	Çalışma Konsepti/Tasarımı: S.B., H.N.; Veri Toplama: S.B., H.N.; Veri Analizi /Yorumlama: S.B., H.N.; Yazı Taslağı: S.B., H.N.; İçeriğin Eleştirel İncelemesi: S.B., H.N.; Son Onay ve Sorumluluk: S.B., H.N.
Çıkar Çatışması	Yazarlar çıkar çatışması bildirmemiştir.
Finansal Destek	Bu çalışma Türkiye Bilimsel ve Teknolojik Araştırma Kurumu (TÜBİTAK) tarafından finanse edilmiştir (Proje Numarası: 122G140).
Teşekkür	TÜBİTAK bursiyeri olarak çalışmalarımızı destekleyen Selman Fargali ve Laila Nayer Abdalhameed'e teşekkür ederiz. Araştırmamıza gönüllü olarak katılan tüm göçmenlere minnettarız.
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Appendix | Ek

Appendix 1

Arabic version of Digital Literacy Scale

موافق بشدة	موافق	محايد	غير موافق	غير موافق تماماً	العوامل	مقياس الإلمام الرقمي
٥	٤	٣	٢	١	الاستخدام الآمن والفعال	١- يمكنني تغيير إعدادات الخصوصية على مواقع التواصل الاجتماعي.
٥	٤	٣	٢	١		٢- أعرف كيفية إنشاء كلمة مرور قوية
٥	٤	٣	٢	١		٣- أستطيع استخدام التقنيات الرقمية بفعالية في حياتي اليومية مثل الحجوزات الإلكترونية (الفنادق - التذاكر - التسوق - استخدام تقنية الخرائط)
٥	٤	٣	٢	١		٤- أستطيع استخدام تقنيات المونتاج للتعديل على أي محتوى (الصور، الفيديوهات، التسجيلات الصوتية) أو لإنتاج محتوى جديد
٥	٤	٣	٢	١		٥- يمكنني استخدام تقنيات التخزين السحابي وغيرها في حياتي اليومية
٥	٤	٣	٢	١		٦- يمكنني وضع إشارة مرجعية على صفحة ويب أستخدمها باستمرار
٥	٤	٣	٢	١		٧- يمكنني القيام بأنشطة مختلفة على مواقع التواصل الاجتماعي كنشر المحتوى وعمل بث مباشر
٥	٤	٣	٢	١		٨- يمكنني استخدام تطبيقات الحكومة الإلكترونية مثل: وما إلى ذلك من تطبيقات و المواقع الإلكترونية بشكل فعال
٥	٤	٣	٢	١		٩- يمكنني استخدام برنامج واحد على الأقل يتعلق بمجالي من هذه البرامج
٥	٤	٣	٢	١	الإنتاج الإبداعي	١٠- يمكنني التعرف على رسائل البريد الإلكتروني العشوائية، والرسائل الغير مرغوب فيها وحظرها
٥	٤	٣	٢	١		١١- يمكنني استخدام على الأقل واحدة من لغات البرمجة التالية
٥	٤	٣	٢	١		١٢- يمكنني تصميم موقع على شبكة الإنترنت ونشره باستخدام- أنظمة تصميم الويب وبيبلي وورد، إلخ
٥	٤	٣	٢	١		١٣- يمكنني برمجة تطبيقات تعتمد على التقنيات الرقمية