Development and validation of a scale for assessing personal digital content management skills of higher education students

Omer Kocak
Department of Information & Document Management
Ataturk University, 25240 – Erzurum, TURKEY
e-mail: kocakomer@atauni.edu.tr

ABSTRACT

The management of high quantities and large volumes of digital content has become one of the most important skills today. Information or content that cannot be managed well can be considered as unnecessary or garbage in this period of intensive digitalization. In this study, a scale was developed to determine personal digital content management skills, which are important skills for higher education in the 21st century. The sample of this study consists of 600 students from different degree levels, departments and universities in Turkey. Personal Digital Content Management Scale (PDCMS) is a five-point Likert-type scale, consisting of 38 items operationalised under seven main skill dimensions - organizing, erasing, digital literacy, privacy, search-retrieval, management of course documents, and backup. The validity and reliability of the scale have been determined by conducting exploratory factor analysis, confirmatory factor analysis, item distinctiveness analyses, and evaluating internal consistency coefficients. As a result, a valid and reliable measurement tool to be used to measure the personal content management skills of the students in higher education has been developed. In this context, it could be said that PDCMS could make significant contributions to the digital skills literature., especially on instruments used to measure digital content management skills.

Keywords: Information management; Digital content management; Personal digital content; Scale development.

INTRODUCTION

The rapid improvements in the new technologies and the increase in media tools have led to changes in the users' relationships and attitudes toward the media; thereby, resulting in a digital culture. That is the case because digital content has now become an integral part of our daily life. As a result of this dependency on technology, there has been a substantial increase in the quantities of the information and the documents created (Karanikolas and Skourlas 2014; Mičunović, Marčetić, and Krtalić 2016). Uncontrollable quantities of information or digital content are produced each day; thus, the protection and organization of these contents have been getting more complicated as their volume increaseS (Adu and Ngulube 2017). Moreover, technological advances not only lead to an increase in the volume of information, but they also result in creating various types of content, more complex data, and large-volume data files. Another reason for this situation is that digital content production tools are cheaper now. Moreover, the disks that can store the produced content have large capacities, and their prices are cheap (Marshall

2011). While Gigabyte (GB), as a memory unit, was a large data size in the past, it is considered a small size nowadays. While the latest cameras used to have a 2-megapixel resolution in the 2000s, the cameras with 16, 32, 64-megapixel resolution are available on smartphones now (Gemmell, Bell and Lueder 2006). In addition to these large file sizes and file numbers brought by technological developments, digital media also resulted in some extraordinary changes in perceptions and understandings. For example, libraries are now regarded as book storage spaces, and even the students and researchers meet their knowledge requirements by searching the digital media (Antonijević and Cahoy 2014). Since digitalization is very common today, almost every individual can do what the archivists did in the past by themselves in the digital environment now.

People have collected and gathered things, digital or not, throughout their lives (Kirk and Sellen 2010). However, in the 21st century, people create all kinds of documents, articles, worksheets, pictures, photographs, audio, and video files, or they save the existing files more frequently compared to the past (Williams, Leighton John and Rowland 2009; Reyes 2013b). For example, it is observed that even the number of photographs taken by smartphones has considerably increased in today's world where the digital information boom has occurred (Richter 2017). However, regular storage of the contents should be considered as a prerequisite for accessing or sharing them later when desired. Otherwise, it may cause the contents to become dysfunctional and decrease their accessibility over time and could cause data degradation (Huvila et al. 2014). Although poorly managed content has such a disadvantage, it can be said that data storage attracts less interest compared to data creation today. Therefore, the importance of personal information management has been increasing, particularly in recent years (Hart et al. 2016). Lately, an increased importance is attached to the management of digital archives because it is more complicated to maintain them compared to the management of printed documents or archives. A large number of documents can be created because they do not occupy a physical space, and there is no need for a destruction process after a certain period as in the past. However, the complexity faced as a result of these situations is one of the most important reasons for this storage space challenge (Zhao, Duan and Yang 2019).

In the literature, personal digital information archiving is discussed from different perspectives. While some studies state that it is a part of personal information management, others maintain that it should not be separated from archiving (Zhao, Duan and Yang 2019). Personal information management involves retrieval, organization, use, and protection of the information or content (Marčetić 2015). Therefore, the management, organization, and storage of this information are very important in terms of re-use (Mičunović, Marčetić and Krtalić 2016; Mosweu and Ngoepe 2019). Recording and organizing digital content, which is a very complex process, requires knowledge and skills (Mosweu and Ngoepe 2019). Although there are several applications and software developed for managing digital information and documents (Alon et al. 2019), most of these applications are not used or cannot be used due to insufficient knowledge, the difficulty of use, and limited organization opportunity for the users (Alon et al. 2019; Condron 2019; Marčetić 2015). However, personal archiving has been becoming more and more important today, and it is considered that individuals in society should receive training on archiving their digital information in a proper manner (Marčetić 2015).

Various studies have examined the content management software usage. Some examined the behavior of individuals to manage their own files while attempting to reveal their usage behavior. IIt can be said that some conceptual confusions have emerged from these literature. The studies were observed in their use the terms Personal Digital Libraries,

Personal Digital Collections, Personnel Digital Archiving, and Personnel Information Management (Karanikolas and Skourlas 2014). It can be concluded that one either of these terms can be used as they do not differ significantly from each other. While examining the situation of archiving personal digital documents, Marčetić (2015) referred to the opinions of the students using an online survey method and concluded that the students had the awareness of personal digital information management, however, there were inconsistencies in the methods they used in archiving. Similarly, in another research that supports the presence of inconsistencies, Bergman, Beyth-Marom and Nachmias (2008) found that users were developing custom methods for managing personal digital content rather than using standard structures, even if they used a software. The behavior related to archiving digital documents is affected by technological and personal characteristics (Sinn, Kim and Syn 2017).

In their study on the behavior of scientists, toward their personal libraries, Antonijević and Cahoy (2014), found that scientists actively used digital tools for storing, organizing and archiving content. However, they also stated that most scientists could not access or they lost various information they had stored over time. Bergman (2013), who researched how computer users managed their personal information, collected data about the behavior of 20 users through interviews. The researcher classified the behavior of the participants into 15 categories including organization, structure and retrieval. In their study on the students' digital or non-digital information and document management practices, Otopah and Dadzie (2013) found that users did not exhibit different behaviors in managing digital and non-digital content. In their study on the participants' behavior of managing digital content, Mičunović, Marčetić, and Krtalić (2016) determined that the participants produced content with a size of between 1 MB and 50 MB daily and that the majority of the content they produced were materials such as textual content, photography, presentations and infographics. They also stated that the majority of the participants used headers when editing the content. In their research on participants' behavior of managing files in the digital environment, Bergman, Beyth-Marom and Nachmias (2008) examined the preference of labeling and folder organization methods. They examined the retrieval behavior of the users via task forms and interviews and found that the users preferred the folder organization methods more. In another study, the strategies of individuals to manage and archive their personal digital photographs were examined, and it was determined that students preferred to arrange the visual content mostly on their computers and phones (Reyes 2013a). Alon and Nachmias (2020), who examined the personal information management levels on digital platforms, concluded that the participants were not satisfied with their performance in this issue and wanted to make more effort. Ali and Warraich (2020), who revealed that digital literacy was an important element in the organization of personal documents, concluded that there was a positive relationship between mobile self-efficacy and personal information management on mobile devices.

It is seen that organization and management of personal digital information require both archiving skills and digital skills. Therefore, it can be said that the content of the scale to be developed within the scope of this research is directly related to personal information management, personal digital archiving and digital literacy skills.

PERSONAL INFORMATION MANAGEMENT (PIM)

Personal Information Management can be defined as receiving, organizing, making information materials accessible for the future, and retrieving various types of printed or non-printed information and documents that we use in daily life such as documents, web pages, e-mails, and photographs (Bass 2013; Bergman 2013). Personal archiving covers the operations of the organization, use, protection and management of personal information and documents (Alon and Nachmias 2020).

Personal Digital Archiving (PDA)

Personal archiving has an important place in all cultures in terms of reflecting a personal perspective on the events of the relevant period. While this type of archiving process was mostly carried out by those who were professionally engaged in these works in the past, almost everyone has begun to archive their materials today. The individuals can create and store their materials in both online and offline environments particularly in line with the developments in information and communication technologies (Sinn, Kim and Syn 2017; Zhao, Duan and Yang 2019). However, it can be said that personal materials are not properly managed and stored. The content that is not properly managed and stored cannot be easily accessed in the future (Rachman 2019). The digital contents have been rapidly increasing and getting complicated to manage, thus giving rise to the emergence of PDA. T. PDA is defined as the collection, organization, storage of digitally created or digitalized content and using or accessing them later (Kucuk and Alir 2003; Huvila et al. 2014; Rachman 2019). These digital files might be e-mails, messages, photographs, videos, audio recordings and articles, i.e. the content that everyone can create every day. Moreover, there may be different types of content in line with personal and professional interests (Rachman 2019). Reyes (2013) describes personal information as information that belongs to an individual and should be kept for later use. PDA is important for individuals not to forget their memory about themselves, their family, their courses, and history and to sustain it. It is also important in terms of facilitating the use of the content for different purposes at a later time (Zhao, Duan and Yang 2019).

Digital Literacy

Digital literacy is an important and essential skill for everyone in the 21st century. It is even called the survival skill for the 21st century by some researchers (Üstündağ, Güneş and Bahçİvan 2017). Digital literacy is generally defined as the skill to receive, use, and understand the content provided through various digital tools (Koltay 2011). Examining the components of digital literacy in detail, it is seen that it is a combination of information literacy, media literacy, and information and communication technologies literacy (Trilling and Fadel 2009; Orhan Goksun and Askim Kurt 2017). Information literacy can be defined as determining the information needed and applying appropriate search strategies accordingly (Kurbanoglu, Akkoyunlu and Umay 2006). Media literacy is not just a process of what to do when someone is exposed to various media tools. One could also make evaluations by analyzing digital media, and produce digital or printed media (Koltay 2011).

Another component of digital literacy is information and communication technologies (ICT) literacy. ICT literacy is defined as the main skill of collecting, managing, producing, researching, and communicating digital information using computer technologies (Kim, Sung and Chong 2019; Scherer and Siddiq 2019). It is understood from the definitions that all three literacy types are important dimensions of digital literacy. One of the reasons why digital literacy is important in personal digital archiving is that it requires technical skills (Sinn, Kim and Syn 2017). Having both computer skills as well as content analysis and

evaluation skills in the organization of personal digital content will contribute to the users in the successful evaluation of the contents and managing the contents using appropriate tools (Van Kleek and O'Hara 2014).

On the other hand, the increase in digital content has raised interest in archiving and protecting personal files (Cox 2009). One of the important requirements in the 21st century is the arrangement and storage of various materials and contents produced in the digital world. If digital materials are not organized and stored well, they may not differ from a pile of garbage. Cox (2009) stated that all people should have certain skills to archive. The relationship between knowledge and learner has changed today. In particular, the people have to protect themselves from the information boom, keep the required information, organize it, and retrieve it when needed. In this context, it was aimed to develop a scale to determine the students' skill levels of organizing, storing, and managing information and files. Using this scale, their skills to manage digital documents can be measured. Also, training programmes can be held to improve these skills of those with low scores. In the literature, the studies usually tried to reveal the digital information and document management skills of the users by using observation, interview, and questionnaire methods. However, no valid and reliable scale has been found for measuring the users' skills. In this respect, the present study is thought to contribute significantly to the literature. Moreover, this study was conducted considering the behaviour of students in higher education in Turkey in terms of personal digital content management. The results of the study should be evaluated in this context.

METHOD

Sample

A total of 600 students studying at the undergraduate and associate degree programmes at 10 different Turkish universities and 15 different departments were approached to participate in this study. Of the participants (aged between 18-42 years), 176 were male and 424 were female. All students acknowledged that they used digital platforms to manage their personal information and documents. In the first phase of data collection, the data collected from 13 participants were found to be missing or inaccurate; therefore, they were not included in the analysis. In the second phase, the data from 9 participants were excluded for the same reason. Therefore, the final analysis was carried out using the data collected in two phases from 578 participants in total. The demographic information of the students such as gender, grade, and age distribution are presented in Table 1.

While the data collected from the respondents in Phase 1 were used to perform Exploratory Factor Analysis (EFA), the data collected in Phase 2 was used to conduct Confirmatory Factor Analysis (CFA). Different participants took part in the first (n=302) and second (n=276) phases of the study.

Development Process of the Scale

There is no standard approach to the process of scale development, however there have been works that describe in detail how scales are to be developed. Therefore, the following seven steps were followed in line with the suggestions of Bas (2013), Carpenter (2018) and Kyriazos and Stalikas (2018) as shown in Figure 1.

Table 1: Respondents Demographics Based on Gender, Grade, and Age Group

	Phase I		Phase 2	
Gender	f	%	f	%
Male	77	25.5	86	31.2
Female	225	74.5	190	68.8
Grade	f	%	f	%
Grade I	58	19.2	31	11.2
Grade II	109	36.1	51	18.5
Grade III	70	23.2	44	16.0
Grade IV	65	21.5	150	54.3
Age	f	%	f	%
18-20	82	27.1	40	14.5
21-23	183	60.6	167	60.5
23 or above	37	12.3	69	25.0
Total	302	100	276	100

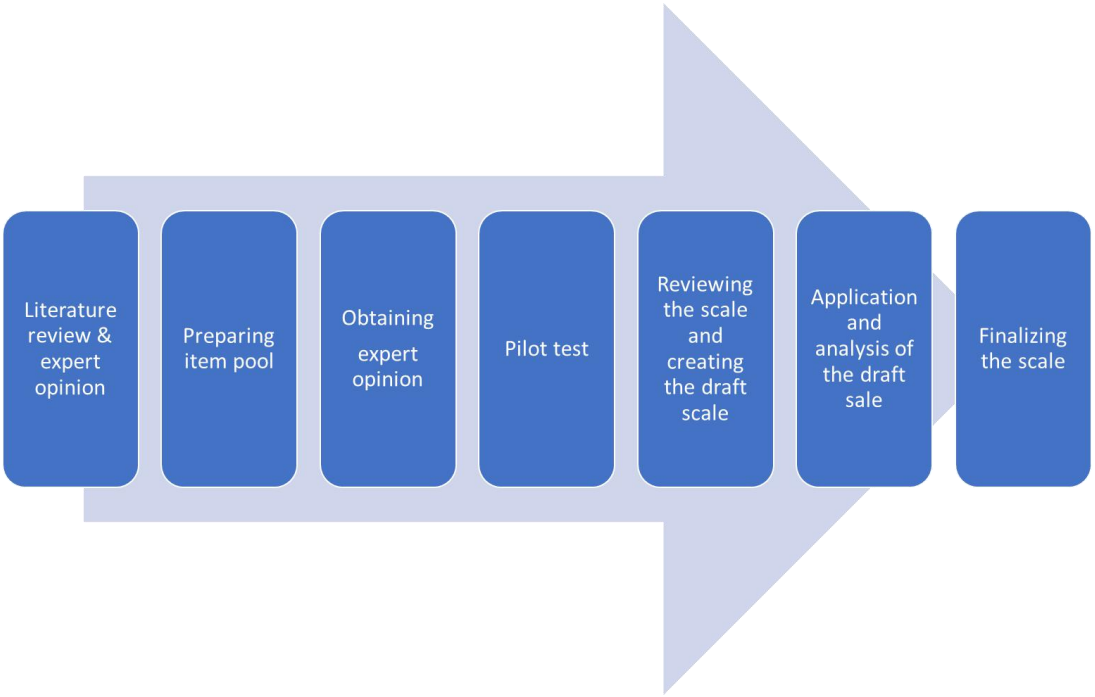

Figure 1 : The Scale Development Process

In this study, the dimensions of the scale and the item pool were determined in line with what have been reported in the literature (Bernstein et al. 2008; Antonijević and Cahoy 2014; Mičunović, Marčetić, and Krtalić 2016; Sinn, Kim and Syn 2017; Üstündağ, Güneş and Bahçİvan 2017; Zhao, Duan and Yang 2019; Alon and Nachmias 2020), and opinion as well as responses elicited from experts. Then, these dimensions and items were reviewed by two experts having doctoral degrees in the field of information and document management. In line with the feedback obtained from these experts, a pilot test was carried out on 30 students who were not part of the study participants. At this stage, the items and dimensions of the scale were revised by interviewing both the experts and participants for pilot study; thus, several new items were added, and some items were

removed from the scale. One the pilot study was completed, the items that were misunderstood or not understood were edited, and the final version of the draft scale was prepared. Viability, readability, style and formatting accuracy, and the clarity of the language of the final version of the draft scale were checked by a Turkish language specialist, and necessary corrections were made for items that were misunderstood or difficult to understand.

The draft of the personal digital content management scale was structured to consist of 8 skill dimensions and 77 items. The 8 dimensions were Organizing (16 items), Erasing (6 items), Digital literacy (10 items), Privacy (7 items), Search-retrieval (6 items), Management of course documents (11 items), Backup (6 items) and Storage (15 items). A Five-point Likert-type scale to indicate how frequently participants demonstrate the skills was used in developing the final scale for assessing Personal Digital Content Management - ranging from Never (1), Rarely (2), Sometimes (3), Usually (4), and Always (5).

Data Analysis

The Statistical Product and Service Solutions (SPSS) and SPSS AMOS 23 software package were used to analyse the validity and reliability of the scale. Due to the nature of the scale development process, the exploratory factor analysis (EFA) was conducted first; followed by the confirmatory factor analysis (CFA); and finally, the reliability analysis was performed. Firstly, the Kaiser-Mayer-Olkin (KMO) test and Bartlett's Test of Sphericity were performed to determine the suitability of the data for the EFA before proceeding to this analysis. If the value of the KMO test which determines whether the amount of data collected is sufficient, is above 0.9 it is considered to be excellent; if it is between 0.80 and 0.90 it is considered to be quite good; and if it is below 0.50 it is interpreted that more data is required. Also, Bartlett's Test of Sphericity has to provide a significant p-value ($p < .05$) (Field 2009; Tabachnick and Fidell 2012; Secer 2015). Before starting EFA, the normality of the dataset should be analyzed in terms of skewness and kurtosis coefficients, while the outliers of the dataset should be analyzed considering Mahalanobis distance measurements, linearity, and multicollinearity problems. The skewness and kurtosis values between -1.96 and +1.96 reveal that the data has a normal distribution. On the other hand, the Mahalanobis distance measurement is expected to be significant at the level of .001. The linearity level should be assessed using a scatter plot. The multicollinearity problem is faced when the correlation coefficient between the variables is over .90 (Field 2009; Tabachnick and Fidell 2012).

The EFA was performed based on the results obtained. Principal component analysis and the Varimax rotation technique were used to clarify the relationship among factors and to maximize the variance shared among items. In the factor analysis stage, the factor load of each item was checked not to be below 0.40, and the difference between the factor loads of the items taking part in two factors at the same time was 0.10. It is also stated that the minimum number of items of a factor should be 3, however, a factor can consist of even 2 items when necessary (Field 2009; Hair et al. 2010). Thirty-two (32) items that did not meet these criteria were excluded. Finally, it can be stated that the value of the variance explained should be over 52% in the scale studies (Secer 2015).

After the EFA was completed, CFA was performed. CFA examines how much a previously designed structure is supported by the data obtained. In other words, it is aimed to reveal the relationship between hidden variables designed by the researchers and the observed measurements. It is considered perfect when the following results are obtained from the CFA: RMSEA < .05, CMIN/DF (x^2/df) < 3, NFI >= .95, CFI >= .95, and GFI >= .90; on the other

hand, it is considered acceptable when the following results are obtained: RMSEA < .08, CMIN/DF (x^2/df) < 5, NFI >= .90, CFI >= .90, and GFI >= .85 (Gürbüz and Şahin 2017). After completing the CFA, internal consistency analysis was performed as the reliability analysis. Cronbach's alpha reliability coefficient was determined for this analysis. The reliability coefficient with a value of 0.70 and above is considered to be sufficient and acceptable (Taber 2018). Whether there was a significant difference between the responses of the participants in the top 27% and bottom 27% groups to each item was determined to calculate the item distinctiveness levels. In this analysis, a significant difference between these two groups is expected for each item (Buyukozturk 2018).

RESULTS

Findings of the Exploratory Factor Analysis (EFA)

As with any statistical analysis, the required assumptions were checked for the suitability of the analysis. Therefore, the KMO test and Bartlett's Test of Sphericity were carried out to determine the suitability of exploratory factor analysis. The KMO value was calculated as .88 and the sample was determined to be adequate. Bartlett's Test of Sphericity was applied to determine the adequacy of the dataset distribution, and the significance value was found to be $x^2(2850) = 11374.4$, $p < .001$. Moreover, the skewness and kurtosis values were examined to determine whether each item showed normal distribution, and they were found to meet this assumption since they were in the range of [-1.96; +1.96]. The Mahalanobis distance coefficients were examined for the assumption of multivariate normality, and no outlier was determined. Also, no variable was detected to have a correlation value of over .90, which could cause a multicollinearity problem. As a result, EFA was conducted because the assumptions were met.

EFA was performed with the data collected in Phase I using 77 items in the draft scale. At the beginning of this stage, the principal components analysis was performed to determine whether the scale is one-dimensional. According to the results of the analysis using the Varimax rotation technique, 22 items were excluded from the scale due to the reasons such as low factor loadings (<.40), not having enough items in the factor (<3), and small correlation coefficient (< .30). According to the EFA results, an 8-factor structure was revealed. This finding can be seen in the Scree plot presented in Figure 2. As can be seen from this plot, the curve has become quite flat after the eighth factor. Also, in line with the suggestions of Henson and Roberts (2006), who stated that the eigenvalue must be above 1 to generate a factor, it can be confirmed that 8 factors were obtained from the analysis that was made.

After the rotation, these scale factors and items, which consist of eight dimensions, were found to explain 56.63% of the total variance. These factors can be listed as Organizing, Erasing, Digital literacy, Privacy, Search-retrieval, Management of course documents, Backup, and Storage. It was determined that the factor loads of all items were above 0.40. According to the results of the analysis process, the number of items in the draft scale, which was 77 at the beginning, was reduced to 45. In line with these findings, the values of factor loadings, eigenvalues, and percentages of explained variance are presented in Table 2.

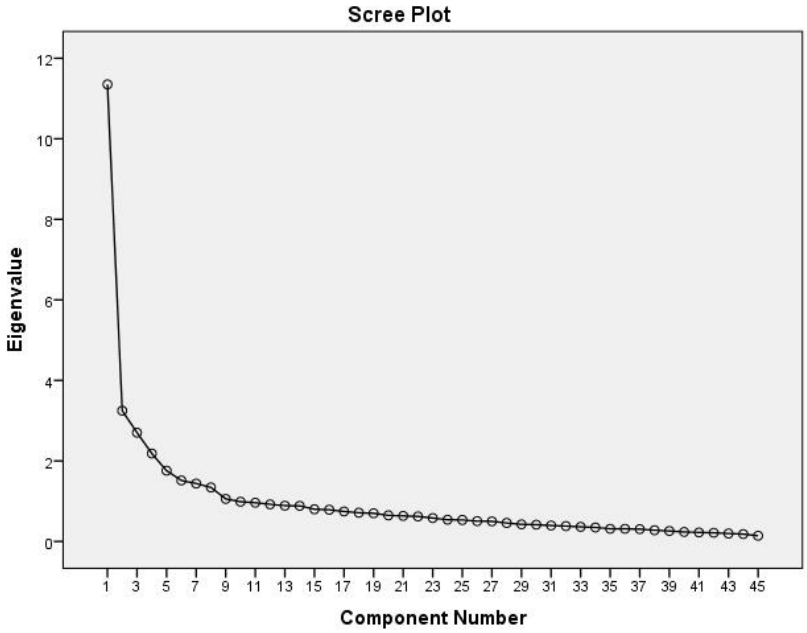

Figure 2: The Scree Plot and the Extracted Principal Components

As can be seen in Table 2, the "Organizing" factor consists of 11 items, and their factor loads vary between .510 and .711. The eigenvalue of this factor is 5.65, and the percentage of its contribution to the explained variance of the scale is 12.55%. The “Erasing” factor includes 8 items, and the factor loads of these items vary between .845 and .461. The eigenvalue of this factor is 4.75, and the percentage of its contribution to the explained variance is 10.55%. The “Digital literacy” factor consists of 5 items, and their factor loads range between .633 and .759. The eigenvalue of this factor is 2.83, and the percentage of its contribution to the explained variance is 6.29%. The “Privacy” factor includes 4 items, and the factor loads of these items vary between .469 and .757. The eigenvalue of the factor is 2.80, and the percentage of its contribution to the explained variance is 6.23%. The “Search-retrieval” factor consists of 5 items, and their factor loads are between .599 and .738. The eigenvalue of this factor is 2.77, and the percentage of its contribution to the explained variance is 6.16%. All of the items of this factor are reverse. The “Management of course documents” factor includes 4 items, and their factor loads vary between .553 and .778. The eigenvalue of this factor is 2.65, and the percentage of its contribution to the explained variance is 5.88%. The "Backup" factor consists of 3 items, and their factor loads range between .627 and .822. The eigenvalue of this factor is 2.12, and the percentage of its contribution to the explained variance is 4.27%. Lastly, the "Storage" factor includes 4 items, and their factor loads vary between .514 and .741. The eigenvalue of this factor is 1.90, and the percentage of its contribution to the explained variance is 4.20%.

Table 2: Rotated Factor Loading of Items, Percentages of Variance, and Eigenvalues (N=302)

Factor	Items	F1	F2	F3	F4	F5	F6	F7	F8
Organizing	I12	.531							
	I19	.510							
	I22	.641							
	I23	.693							
	I24	.607							
	I25	.607							
	I27	.711							
	I28	.711							
	I29	.772							
	I30	.563							
	I31	.674							
Erasing	I32		.699						
	I33		.800						
	I34		.789						
	I35		.776						
	I36		.845						
	I37		.596						
	I43		.461						
	I77		.610						
Digital Literacy	I66			.662					
	I67			.713					
	I68			.633					
	I69			.759					
	I70			.686					
Privacy	I40				.469				
	I44				.685				
	I45				.573				
	I46				.757				
	I47				.738				
Search-Retrieval	I20					.599			
	I39					.693			
	I41					.735			
	I64					.738			
	I65					.699			
Management of Course Documents	I56						.778		
	I57						.743		
	I58						.724		
	I59						.553		
Backup	I52							.769	
	I53							.822	
	I54							.627	
Storage	I2								.514
	I5								.635
	I6								.741
	I7								.690
Eigenvalues		5.65	4.75	2.83	2.80	2.77	2.65	2.12	1.90
Explained variance		12.55	10.55	6.29	6.23	6.16	5.88	4.72	4.20

Findings of the Confirmatory Factor Analysis (CFA)

According to the results of the EFA, the number of items in the draft scale decreased from 77 to 45, and an 8-factor structure was formed. CFA was performed using data collected from 276 students in Phase II to validate the factor structure and construct validity of the developed personal digital content management scale.

Goodness of fit values were considered for the application of CFA, and the values of $x^2(644) = 1305.08$, $p < .001$ CMIN/DF = 2.08, RMSEA = .06, RMR = .099, CFI = .92, NFI = .90, and GFI

= .86 were obtained. The value of CMIN/DF being below 3 was considered perfect, while the value of RMSEA being below .08 was considered acceptable. Also, other values of the goodness of fit (CFI, NFI, GFI) for the model were found to be at an acceptable level, so CFA was performed. The factor structure of the scale and item-factor load values are shown in Figure 3.

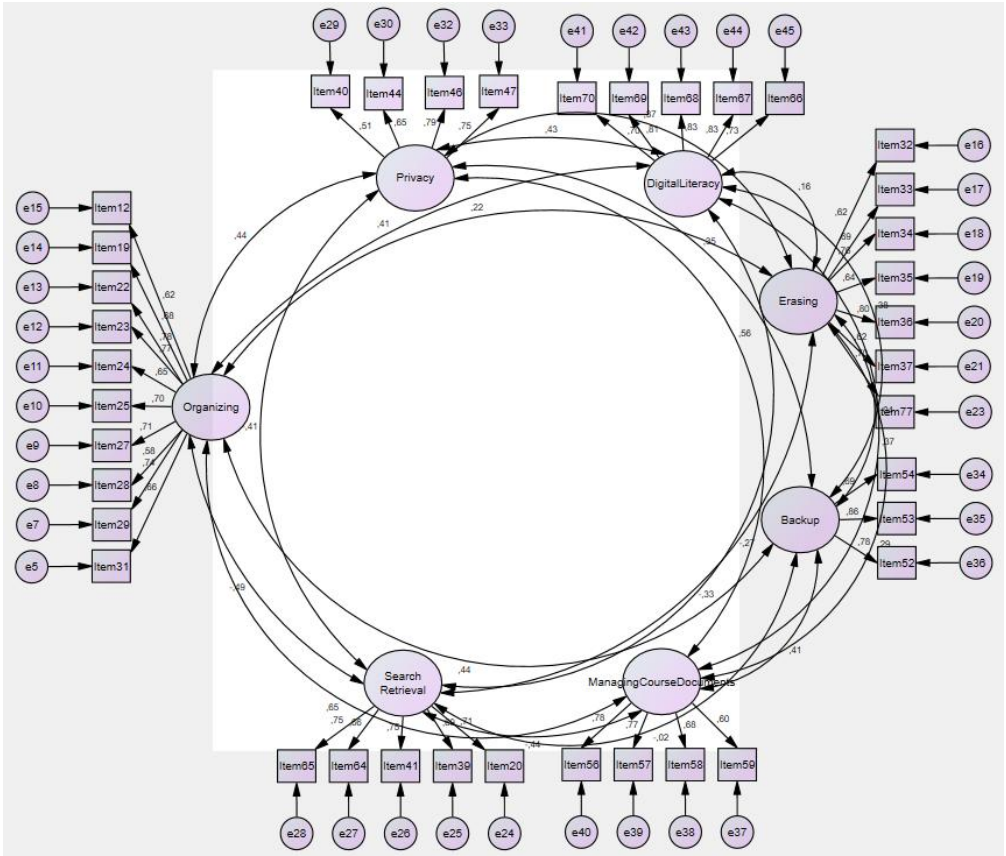

Figure 3: Confirmatory Factor Analysis Diagram of the Scale

According to the results of CFA performed using 45 items in total, Item 2 (0.34), Item 7 (0.47), Item 30 (0.49), Item 43 (0.47), and Item 45 (0.38) were excluded from the scale due to their low factor loads. After the exclusion of Item 2 and Item 7, two items remained in the factor "Storage", which was generated according to exploratory factor analysis. The remaining two items (Item 5 and Item 6) were also excluded from this factor, resulting in the exclusion of this factor from the scale. The results of CFA revealed 7 dimensions for the scale, and the construct validity of the scale consisting of 38 items was validated by testing. The final version of the scale contained 38 items. The standardized regression weights of the items are given in Table 3.

The factor-item correlation values are given in Table 4. As can be seen, the values of item correlations vary between .62 and .89 for the scale. The factor-item correlation values for the "Organizing" factor vary between .62 and .80; they vary between .68 and .81 for the factor "Erasing"; they vary between .70 and .86 for the factor "Digital literacy"; they vary between .60 and .82 for the factor "Privacy"; they vary between .77 and .81 for the factor "Search-retrieval"; they vary between .73 and .81 for the factor "Management of course documents"; and they vary between .86 and .89 for the factor "Backup". According to

these correlation values, it can be said that the items serve the factors and the general purpose of the scale.

Table 3: Standardized Regression Weights of Items by CFA Results (N=276)

F1 Organizing		**F2 Erasing**		**F3 Digital Literacy**		**F4 Privacy**		**F5 Search-Retrieval**		**F6 Management of the Course Documents**		**F7 Backup**	
Item		Item		Item		Item		Item		Item		Item	
I12	.62	I32	.62	I70	.70	I40	.51	I65	.75	I56	.78	I54	.69
I19	.68	I33	.69	I69	.81	I44	.65	I64	.66	I57	.77	I53	.89
I22	.78	I34	.78	I68	.83	I46	.79	I41	.75	I58	.68	I52	.78
I23	.77	I35	.64.	I67	.83	I47	.75	I39	.69	I59	.60		
I24	.65	I36	.80	I66	.73			I20	.71				
I25	.70	I37	.62										
I27	.71	I77	.70										
I28	.58												
I29	.74												
I31	.66												

Table 4: Item-Factor Correlation Analysis

F1 Organizing		**F2 Erasing**		**F3 Digital Literacy**		**F4 Privacy**		**F5 Search-Retrieval**		**F6 Management of the Course Documents**		**F7 Backup**	
Item	r	Item	r	Item	r	Item	r	Item	r	Item	r	Item	r
I12	.67	I32	.71	I70	.79	I40	.60	I65	.77	I56	.81	I54	.86
I19	.73	I33	.75	I69	.85	I44	.80	I64	.77	I57	.80	I53	.89
I22	.80	I34	.78	I68	.85	I46	.82	I41	.80	I58	.81	I52	.89
I23	.78	I35	.72	I67	.86	I47	.82	I39	.75	I59	.73		
I24	.69	I36	.81	I66	.79			I20	.81				
I25	.73	I37	.68										
I27	.74	I77	.75										
I28	.62												
I29	.77												
I31	.68												

All items are significant at the .01 level

To determine the item distinctiveness levels, it was tested whether there was a significant difference between the bottom 27% group (74 participants), who received the lowest scores, and the top 27% group (74 participants), who received the highest scores, among the 276 participants in Phase II to whom CFA was applied. Therefore, firstly, the data were sorted in descending order. Independent Samples t-test analysis was conducted to determine item distinctiveness powers. The findings are presented in Table 5. Based on the results of the analysis, it was determined that there was a significant difference between the top and bottom groups in terms of 38 items ($p < .05$). According to these findings, it could be said that the distinctiveness level of each item is high; therefore, the distinctiveness of the scale is also high.

Table 5: The Discriminating Power of Items

F1 Organizing		F2 Erasing		F3 Digital Literacy		F4 Privacy		F5 Search-Retrieval		F6 Management of the Course Documents		F7 Backup	
Item	t	Item	t	Item	t	Item	t	Item	t	Item	t	Item	t
I12	8.22	I32	4.77	I70	6.76	I40	7.84	I65	-2.57	I56	12.84	I54	11.27
I19	7.58	I33	4.76	I69	9.31	I44	8.59	I64	-1.97	I57	9.69	I53	10.86
I22	10.61	I34	4.90	I68	10.90	I46	9.25	I41	-2.13	I58	9.05	I52	9.11
I23	8.79	I35	2.69	I67	8.95	I47	9.54	I39	-4.84	I59	8.76		
I24	7.48	I36	4.99	I66	8.81			I20	-4.48				
I25	9.86	I37	3.94										
I27	9.02	I77	4.38										
I28	6.10												
I29	10.14												
I31	10.39												

All items are significant at the .01 level

Findings of the Reliability Analysis

The reliability analysis was carried out using the data collected in the second phase of the research to determine the internal consistency of the factors of the PDCM scale. The results of the reliability analysis are presented in Table 6. Considering the Cronbach's alpha and Guttman Split-Half reliability coefficients, all dimensions of the scale were found to have these values over .70. Cronbach's alpha reliability coefficient with a value of .70 and above is considered sufficient and acceptable (Taber 2018). The Cronbach's alpha reliability coefficient of the entire scale was found to be .88. According to all these findings, it can be said that a consistent measurement can be made using this scale.

Table 6: Results of the Reliability Analysis on the Factors and the Scale

Factor	Number of Items	Cronbach's Alpha	Guttman Split-Half
Organizing	10	.90	.83
Erasing	7	.86	.81
Digital Literacy	5	.89	.83
Privacy	4	.76	.77
Search-Retrieval	5	.84	.73
Management of the Course Documents	4	.79	.79
Backup	3	.81	.76
Total	**38**	**.88**	**.79**

DISCUSSION

In this study, a scale was developed to measure the university students' level of managing their personal digital content. Personal Digital Content Management Scale (PDCMS) is a Five-point Likert-type scale and consists of 38 items. These items were grouped under 7 factors. The items were scaled as never (1), rarely (2), sometimes (3), usually (4), and always (5). To determine the validity of the scale, EFA was performed in Phase I, then CFA and internal consistency analysis were performed to determine the reliability level. It was determined that PDCMS has construct validity, and a 7-factor structure consisting of "Organizing", "Erasing", Digital literacy", "Privacy", "Search-retrieval", "Management of course documents" and "Backup",was formed. Item-factor correlation analysis was conducted to determine the extent to which the items in the scale served its purpose.

According to these findings, all items were found to be significantly correlated with the factors. Moreover, whether there was a significant difference between the top 27% group and the bottom 27% group was analyzed using Independent Samples t-test to determine item distinctiveness levels. The result of the test revealed that all items had sufficient distinctiveness level. To test the reliability of the scale's internal consistency, Cronbach's alpha and Guttman Split-Half reliability coefficients were calculated, and all of the factors were found to have both of these reliability coefficients above .70. Also, the total reliability coefficient of the scale was determined to be above .70. These findings reveal that PDCMS, which has been developed in the scope of the present study, is a very reliable scale. The final version of the scale is presented in Appendix 1.

The fact that the scale has a multi-dimensional structure should be evaluated as a normal situation. If the scale is validated and reliable, it can be said that all of its dimensions are important for the management of personal digital content. Similarly, the following dimensions were found in the descriptive frameworks of the studies in the literature: erasing, effective retrieval (Robinson and Johnson 2012; Alon and Nachmias 2020), organizing (Bergman 2013; Zhao, Duan, and Yang 2019), digital and technological competence or literacy (Adu and Ngulube 2017; Sinn, Kim, and Syn 2017), backup (Rachman 2019; Zhao, Duan, and Yang 2019), privacy or security (Pikas 2007; Otopah and Dadzie 2013; Adu and Ngulube 2017). Moreover, since this study was aimed at determining the students' personal digital content management levels, a dimension for "management of the course documents" had also been created. At the beginning of the study, it was thought that the scale might have a dimension for "storage". However, the validity and reliability analyses of the scale revealed that the scale did not consist of the dimension "storage", possibly because storage is a natural element of organizing. In reality, the recording or storage of content is carried out in the organization of personal digital content (Lush 2014; Warraich et al. 2018).

The validity and reliability of the scale, which was developed within the scope of this study, were verified. The dimensions of the scale could be briefly described as follows:
Organizing: It refers to operations such as classification, storage, naming, and identification of the contents (Bass 2013). Organizing is crucial so that digital content can be used effectively again later (Hicks et al. 2008).
Erasing: According to Alon and Nachmias (2020), it refers to the removal of any unnecessary digital content. Erasing unnecessary content helps us save both time and memory in managing and organizing personal content.
Digital literacy: Koltay (2011) defines this dimension as the skill to evaluate information and content in digital sources. This term is preferred instead of "computer literacy". This is because it is important to evaluate the content in the management of personal information. Also, the fact that this dimension was also obtained in our study supports the interpretations of Ali and Warraich (2020) that digital literacy was an important factor in the management of digital content.
Privacy: According to Otopah and Dadzie (2013), it refers to the control of the entry and exit of the areas containing personal information. It can be said that it is an important dimension in terms of increasing threats today when almost all kinds of contents are digitalized. Therefore, privacy awareness is an important issue to be considered in personal content management (Cox 2009).
Search-Retrieval: It is defined as searching for or accessing previously created content. Although the search tools have been improved more in recent years, it is still observed that users prefer to access their organized content by switching between folders in a hierarchical order (Bergman and Yanai 2018).

Management of the course documents: Since the target audience of the scale developed in this study is university students, this dimension is titled as the management of the course documents (Robinson and Johnson 2012). Since students deal with different types of content, they need more skills to manage their documents (Otopah and Dadzie 2013). *Backup:* It refers to transferring the contents to an external platform or another area for protection (Bass 2013). However, backup is not only defined as the replication of the created files, but also as a means for risk management (Zhao, Duan, and Yang 2019).

The volume of various types of digital content, which can be called our digital footprints, has been increasing day by day, and management of these ever-increasing contents has become an important issue (Elsden, Kirk and Durrant 2016). Particularly, today's students, who are referred to as digital citizens, use their smartphones to record all kinds of contents such as photographs, sounds, images, and course contents (Kelly and Rosenbloom 2019). The management of personal content can be quite complicated and difficult for the students today, when the books, assignments, and courses, in short, all kinds of learning materials, as well as the types of above-mentioned content, are mostly digitalized (Robinson and Johnson 2012). Therefore, it is thought that the scale developed within this study will contribute to practice and literature in terms of its contribution to the determination of students' personal content management levels.

CONCLUSIONS

It can be concluded that the PDCM scale is a statistically valid and reliable tool and can be used to determine the university students' personal digital content management skills. The study on the validity and reliability of this scale was carried out with the participation of 600 students from different departments, universities, grades, and ages. It can be said that the scale developed as a result of this study will contribute significantly to the literature since such a comprehensive study with validity and reliability analyses has not been observed before. This scale was developed to determine Turkish university students' personal digital content management levels. Therefore, it is recommended to perform validity and reliability analyses again when it is desired to apply it to different target audiences. Also, the scale consists of a 7-factor structure. Future researchers can use these factors separately if they wish. Finally, since the target audience's skills of using digital technologies affect their personal digital content management levels, the exclusion of this issue from the scope of the study can be considered as a limitation of the study.

ACKNOWLEDGEMENT

No grant from any public, commercial, or non-profit funding agency was offered for the conduct of this research.

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APPENDIX 1

Personal Digital Content Management Scale (PDCMS)

	Item Number	Item statements	Never	Rarely	Sometimes	Frequently	Always
Organizing	12	I keep old and new files on the same subject separately from each other.					
	19	I distinguish files that have been completed or are still being worked on.					
	22	I divide my files into folders according to their subject.					
	23	I behave consistently when naming different files on the same topic.					
	24	I create metadata/header/descriptive tag information about my files.					
	25	I frequently classify the memory I hold my files by reviewing them.					
	27	By giving the date, sequence number, or version number to the new files I created on the same subject, I indicate which one is the most recent.					
	28	When there is more than one file on the same subject, I can easily understand which is the latest version.					
	29	I create folders in a hierarchical structure.					
	31	I group applications/programs on my devices into folders by topic.					
Erasing	32	I delete the emails I don't need.					
	33	I check and delete duplicate (same) files.					
	34	I delete files I don't use.					
	35	I delete the files I backed up from my device so that they don't take up any space.					
	36	I delete the files I do not need in order not to take up memory.					
	37	After taking a lot of photos, I check to avoid taking up too much space and delete the photos with shooting errors or bad.					
	77	I erase all the content I don't need so I don't confuse myself.					
Search-Retrieval	20	*Since I do not store my files regularly, I cannot access the file I am looking for most of the time.					
	39	*I find it very difficult to access my files without a search box.					
	41	*I lose a lot of time searching for my files.					
	64	*I think it is difficult to archive files.					
	65	*I usually store them randomly because I think it is difficult to archive files.					
Privacy	40	I can access the file I am looking for quickly and easily.					
	44	I encrypt files that I don't want anyone else to access.					
	46	I pay attention to the privacy of my files.					
	47	I keep my private files out of the reach of others.					
Backup	52	I keep a few copies of my files on an external hard drive, in the cloud, or on other devices.					
	53	I create a backup of the same file in more than one place.					
	54	I back up my files periodically.					
Management of Course Documents	56	I regularly archive my notes or documents about my courses.					
	57	I can access my files related to my courses quickly when necessary.					
	58	I classify the photographs, videos, or sound recording files that I took during the classes.					
	59	I think I will be able to use my lecture notes in the future when necessary.					
Digital Literacy	66	I know how to solve my own technical problems.					
	67	I can learn new technologies easily.					
	68	I keep up with important new technologies.					
	69	I know about a lot of different technologies.					
	70	I have good ICT skills.					

* Reverse coded items