



## Attitude Scale for Digital Writing (DWS): Scale Development Study\*

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### Abstract

Considering the technological developments in recent years, it can be said that it is inevitable to use the screen instead of the paper and the keyboard instead of the pen. It is quite a normal process for pre-service teachers to be affected by these technological developments. Determining pre-service teachers' attitudes towards digital writing can be significant in terms of determining their pre-service competencies. This study aims to develop a valid and reliable measurement tool to determine pre-service teachers' attitudes toward digital writing. The study group of the research consists of teacher candidates studying in 2nd and 3rd grades at eleven different departments in the Faculties of Education at Dokuz Eylül (n = 697) and Pamukkale Universities (n = 804). Scale items were applied to a total of 1501 participants (Female = 991; male=510). Both exploratory (EFA) and confirmatory factor analysis (CFA) were used to determine the scale's factor structure. According to the analyzes, DWS consists of three subscales (convenience, motivation, effect subscales) and 25 items. The exploratory factor analysis observed that the items had a factor load between 0.41 and 0.68. It was determined as 38.309% of the variance value determined for the whole scale. CFA result  $\chi^2 = (272, N = 1501) = 1895.32$ ; RMSEA = .063; SRMR = .052; It reached acceptable fit values with CFI = .94 and NNFI = .94. Cronbach's alpha coefficient for the whole scale was calculated as .83.

**Keywords:** Digital writing, teacher candidate, scale development.

### Cited:

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## Introduction

The writing process has undergone many changes from the Sumerian inscriptions until today. It was an action performed by masters of stonemasonry that took days to write a sentence for the writing process, which was first made using written stone tablets. The writing difficulties have been replaced by an easy process for these written materials that shed light on the knowledge of thousands of years of human history. The most important tool that provides this convenience is the digital writing process. Today, writing is mostly done in a digital environment. Writing is the expression of individuals' information and thoughts through their sense organs in writing by certain rules (Köksal, 2001). The act of writing is not just representing the material in question with written symbols. Besides, it requires letters, syllables, words, and sentences to have meaning integrity within themselves (Yaman, 2008). Writing skill helps students expand their thoughts, organize their knowledge, use language, and enrich their knowledge (Güneş, 2013). Written expression skill is the key to expressing oneself both in the teaching process and daily life (Karatay, 2013). It can be defined as writing that individuals transfer on a material with various symbols to interpret the information they obtain in their environment. Writing requires that thoughts are expressed with written symbols; thoughts are also arranged in a certain order. It can be considered that individuals who are successful in the written expression are good at understanding and interpreting in all other lessons because writing requires a critical view and interpretive power. Students who are successful in handling the events in different dimensions can also reveal the difference in understanding and explaining.

Children with improved writing skills can transfer information and organize their thoughts more effectively (Akyol, 2006). For students to acquire fluent and effective speaking and writing skills, one of the most effective ways to realize the mother tongue's features and rules is the development of writing skills (Calp, 2010). Writing skill is the last link of the four basic language skill chains. Writing skills should be considered as a critical thinking process. Writing skill is not a mechanical process. It is transforming a complex and intellectual structure that includes perception and knowing (Demirel, 2004) into written practice. Writing has a structure that requires regular thinking that leads the individual to interpret. It is a field that should be dealt with by the student. Although it seems challenging, it has a quality that develops the student intellectually.

Writing education as a necessity of the changing and developing world has also changed and adapted to new technologies. The concept of digital writing has emerged as a result of this

change. As a necessity of today's world, technology showing its effect in every field has also shown itself in the field of writing.

Digital technologies that enable communication and cooperation make teachers and students effective. It can be said that there has been an explosion of digital writing with the increasing use of technology in recent years. The rapidly spreading computer networks and the use of technology will continue to spread day by day. Depending on these, there is a period of rapid change in how and by which means writing is written. It is an undeniable fact that the importance of digital writing has increased (Grabill, 2012). In recent years, writing has shown a variety in different dimensions beyond writing on paper. It can be shared from a web page, contain links embedded within itself, or be made available in different programs. In addition, digital writing is also prepared for writing. Different skills are now required to use this writing style. It is not only sufficient to develop writing skills, but also the presence of digital skills. According to Vincent (2014), reading and writing competence may change with digital technologies, but this does not mean that writing on paper is excluded.

Digital writing is used to prepare homework, diaries, online use, internet browsing, e-mail, written messages, blogs, software creation, and website design. Texts can sometimes contain multimedia elements such as images and sound. Digital writing has become the social norm of recent years. Digital writing refers to new ways of communicating in a new age.

The definition of the concept of digital writing is made as follows; Digital writing is texts created to read or display on a computer or other device connected to the internet (NWP, 2010, p.7). Digital writing has emerged as a component of digital literacy. Digital writing can be defined as a form of communication that is realized with symbols by using technological possibilities connected to a web network from time to time and can also be offered to use from these networks.

Digital writing can be edited and updated more easily than writing with a pen and paper. According to Taipale (2014), digital writing increases textual productivity as it allows editing in a, particularly fast and efficient manner. According to Lynch (2018), digital literacy is used in every digital writing process stage. Students who learn preparation, writing, reviewing, editing, and publishing skills benefit from digital writing strategies. After the students' digital writing activities, the teacher can check and offer special solutions for the use of grammar. Special software programs help teachers in this regard. Simultaneously, multimedia strategies encourage students to visualize their ideas, explain

them with pictures and drawings, apply audio storytelling techniques, and create special sound effects. Digital writing has a structure that allows some students to communicate using additional elements (visual, auditory, etc.) that they cannot convey in their writings. For example, the value of reading and writing blogs from digital writing studies is to have a real audience. Students who write for blogs learn how to compose their posts for specific audiences, and when those audience members leave comments and leave feedback, the student also writes. In such a situation, the student experiences a broader and more genuine audience connection than what he wrote only for his classmates or teacher. What is written takes on a different dimension, both in terms of content and format.

With the introduction of technology, digital writing has started to prevent writing with paper and pencil. Of course, usability and convenience have been quite effective in this regard. When almost all texts are made available to people in a digital environment, it is expected that digital writing will be an important part of human life. Printed works are transferred to digital media one by one and reach more people. In addition to all these, anyone can share their digital article on a blog they see fit (McGrail & Davis, 2011).

In science, digital writing and digital reading are considered together under the heading of digital literacy, where they are handled separately. However, no matter what concept is expressed, the use of technology alone is not enough for a modern individual. Creating meaning using technology is of great importance (Yamaç, 2019). He should evaluate what is happening in the modern human environment within the framework of technology. Therefore, technology literacy should have an important place in the education program (Shackelford, 2007). One of the most effective ways to adapt to the changing world is to have technological competence. According to Dahlström (2019), schools should develop a writing education that meets students' contemporary writing needs. Increasing the opportunity to access digital tools in the educational environment will provide equal opportunities to all students. This situation is important for the development of digital writing skills. Students' access to equal digital access and equal use of time in studies is effective in developing these competencies.

Attitude is an individual's feelings and evaluations about a person, idea, or object. Typically, attitudes are divided into positive and negative attitudes (Eagly & Chaiken, 1993). Attitudes have three components: an affective component (emotions), a behavioral component (the effect of attitude on behavior), and a cognitive component (belief and knowledge). It is known that many factors affect attitudes. Every person has thousands of

attitudes on family and friends, political figures, musical preferences, and much more. Each of the attitudes has its characteristics. Attitudes are often learned through direct and indirect experiences with attitude objects (De Houwer, Thomas & Baeyens, 2001). On the other hand, attitudes can change through the media. Perceived realities in media presentations can affect mental processes, beliefs, and behaviors (Nabi & Sullivan, 2001; Hargreaves & Tiggemann, 2003; Shapiro & Chock, 2003). Attitudes can also be learned through interactions with the social environment. Interpersonal relationships and friendships affect mental processes. Behaviors of love, hate, or liking towards events, persons, or situations may arise due to these interactions (Malik, 2018; Poteat, 2007; Myers & Diener, 1995). Research has found that some attitudes are partially inherited from parents through genetic transmission (Olson, Vernon, Harris, & Jang, 2001). Genetic traits on personal traits can create attitudes (Conway et al. 2011; Judge, 1992).

Writing attitude is an emotional disposition to write functionally. The act of writing can make the individual feel happy or unhappy (Graham, Berninger, & Fan, 2007, p.518). Writing is a difficult skill that requires being productive. Because it is a challenging skill, considerable effort needs to be put in (Graham, Schwartz, & MacArthur, 1993). Providing an appropriate combination of different language skills for a range of explanations makes a unique contribution to the written text. In addition to knowing the language rules fully, it is expected to have a wide range of ideas and thoughts. Writing requires many mechanics, such as content, vocabulary, and organizing (Apel, 2011; Bashir & Singer, 2010). Jahin & Idrees, 2012). Perkun, Goetz, and Perry (2002) stated that an individual's emotional states are important in the writing process. Stability in the writing process is affected by emotional situations. For example, whether the individual is happy or unhappy while writing greatly affects the quality of the article.

Technology, which has entered almost every field of life, has also significantly affected the individual's writing. Individuals are faced with digital writing, whether they want it or not. Many people who have difficulty taking paper and pen in their daily lives do not avoid writing in digital media. Taking small notes, which are a part of daily life, in a digital environment, writing articles in message channels to speed up communication, and posting comments in the text on the internet revealed that it is necessary to examine the subject. The fact that there are not many scales for digital writing is important in contributing to the field. There is no Turkish scale for digital writing. In the surveys, a "Graded Evaluation Scale" was determined to evaluate pre-service teachers' digital stories,

which was developed only by Özcan, Kukul, and Karataş (2016). However, this scale is specifically for evaluating digital stories. The existence of a scale that will help evaluate the attitudes of pre-service teachers towards digital writing may add a special meaning to examining the subject and making scientific evaluations. The development of a digital writing scale will shed light on future research on this subject. This study aims to develop a scale for evaluating “pre-service teachers' attitudes towards digital writing.”

On the other hand, the fact that the field of study is quite new reveals the confusion of concepts. Writing studies performed on a tablet, phone, computer, or electronic device is expressed differently. For example, when the literature is examined, it is seen that many concepts such as screenwriting, online writing, technical writing, digital writing are used (Aydın & Silik, 2018; Sadık, 2008; Yamaç, 2019). In this study, the term "digital writing" was accepted because it is more comprehensive.

## **Method**

With this study, a scale was developed to determine pre-service teachers' attitudes towards digital writing. In the development of the scale, laptop, desktop computer, tablet, mobile phone, etc., which are a part of contemporary life. It has been acted with the idea of evaluating the attitudes towards writing activities performed on such devices.

## **Participants**

The practice of the trial study of the "Digital Attitude Scale for Writing (DWS)" was carried out in the spring semester of the 2018-2019 academic year. The cluster sampling method, one of the probabilistic sampling methods, was used in determining the research sample (Neuman & Robson, 2014; Şahin, 2014; Yıldırım & Şimşek, 2018). The trial study was carried out with 2nd and 3rd-grade students from eleven different departments at the Education Faculties of Pamukkale and Dokuz Eylül Universities. The first graders were excluded from the sample because they were in the process of adapting to the university environment, and the fourth graders were prepared for the teaching profession entrance exam. Below are the departments and student numbers in which the trial study of the scale was conducted.

Table 1. *Departments and the number of students in the participants*

Department (PAU ve DEU)	Öğrenci sayısı
1. Science Teacher	86
2. Math Teaching	163
3. Social studies teacher	139
4. Turkish Education	210
5. Pre-school Teaching	113
6. Primary School Teaching	190
7. Guidance and Psychological Counseling	170
8. Computer Education and Instructional Technology	63
9. Art Teaching	93
10. English teacher	197
11. Music Teaching	77
Toplam	1501

The study was carried out in the normal education programs of the related departments. 1501 students (female = 991; male = 510) participated in the trial study. Eight hundred four students from Pamukkale University and 697 students from Dokuz Eylül University participated in the study. In light of these data, it is possible to say that the sample is suitable for the feature of having five times the number of items (Child, 2006).

### **Creating Scale Items and Content Validity**

The following path was followed to create the scale items. In order to be the basis for the development of the scale, the literature was reviewed first (Baştuğ & Keskin, 2017; Hamutoğlu, Güngören, & Uyanık, 2017; Sulak, 2019; Sarıkaya, 2019). Five open-ended questions were asked to the pre-service teachers about how they did their digital writing activities. Attitude statements were formed based on the feedback from the teacher candidates and the literature review. Cognitive, affective, and behavioral elements were considered in forming the attitude expressions, and statements were formed to cover these three elements (Tavşancıl, 2019). Sensitivity was shown for each item created to express attitudes towards to digital writing through cognitive, affective, and behavioral elements.

The item pool was determined by bringing together the resulting 54 judgment statements. In order to realize the content validity of the items, expert lecturers were consulted. Materials from the Department of Computer Education and Instructional Technology 2; 2 from Classroom Education Department; 2 from Turkish Education Department; 2 from Measurement and Evaluation in Education Department; Guidance and Psychological Counseling was sent to a total of 10 lecturers, two from the Department. On the other hand, the scale items were evaluated by 11 pre-service teachers from related departments. In line with each expert and student's feedback, the items were re-examined, some items were corrected, and some were removed completely because there were similar ones. Thus, the candidate scale was created with 49 items.

A five-point scale was made with a Likert-type scale to indicate the degree of participation of the pre-service teachers in the specified items (Strongly Agree = 5; Agree = 4; Partially Agree = 3; Disagree = 2; Strongly Disagree = 1) In Likert type attitude scales, items are generally graded over five categories. In recent years, the trend regarding attitude scales is that response categories are formed in five or seven dimensions (Buttle, 1996; Dawes, 2008; Finstad, 2010; Johns, 2010). In this scale, scoring requiring a five-point Likert type answer was preferred.

### **Data Collection and Analysis**

The trial study of the Attitude Scale for Digital Writing (DWS) was conducted in the spring semester of the 2018-2019 academic year. The scale was administered to prospective teachers voluntarily. The obtained data were transferred to the computer environment, and the rating was made starting from 5 for positive items and 1 for negative items. The data were analyzed with SPSS 22.0 Program and Lisrel 8.71 program (Eroğlu, 2009). Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to analyze the data. The subscales and their factor load values were determined with EFA. The Cronbach's alpha coefficient of each sub-scale and scale was determined. Maximum likelihood was applied to the data with CFA.

### **Construct Validity of the Scale**

In order to determine the construct validity of DWS, exploratory, and confirmatory factor analysis was applied to the data obtained from the trial study. Factor analysis is used to reveal the dimensions of the feature that is desired to be measured in the scale (Büyüköztürk, 2012). The subscales of the scale were created with factor analysis.



## Findings

In this section, analyses are made to determine the attitude scale's psychometric properties, which are being developed to determine university students' attitudes towards digital writing. First of all, there is exploratory factor analysis, one of the first analyses to be made during the development of a measurement tool. Afterward, confirmatory factor analysis results were included in determining the extent to which the items obtained as a result of the exploratory factor analysis were sufficient for construct validity. Then, internal consistency reliability calculations are given.

### Exploratory Factor Analysis (EFA)

One analysis to be made for the construct validity of a measurement tool to be developed is factor analysis (Worthington & Whittaker, 2006). The sample size should be appropriate before testing the first data obtained with exploratory factor analysis (EFA). Kaiser-Meyer-Olkin (KMO) and Barlett tests were applied to determine whether the data showed normal distribution and the correlation matrix between items was suitable for factor analysis (Gorsuch, 1997). The Kaiser-Meyer Olkin value was calculated as .90 for the 49-item Digital Attitude Scale (DWS) items. Bartlett's test [ $\chi^2 = 11662.49$ ,  $sd = 300$   $p < .0001$ ] was found to be significant. It is considered sufficient to have KMO values of .60 and above (Tabachnick & Fidell, 2001).

The principal axis factoring method was used for factor analysis to determine the structure of all items in the item pool. As a result of the experimental data analysis with EFA, it was determined that there were 9 factors with an eigenvalue above 1 at the beginning. While the variance for the first three factors was above 5,000%, the others remained below this value. For this reason, EFA was applied for the second time in order for the scale to have a three-factor structure. At this stage, items that were included in more than one factor in the scale were eliminated. Secondly, it was decided to exclude items with a factor load value below 0.40. Based on these two criteria, 24 items out of 49 items were excluded from the measurement tool. In its final form, there were 25 items on the scale. According to the exploratory factor analysis results, it was determined that DWS consists of three subscales. Definitions, items, varimax rotated factor loadings of Attitude Scale for Digital Writing DWS subscales are presented in Table 2.

Table 2. *Varimax rotated factor loads of DWS items variance and eigenvalues (N = 1501)*

Sub Scales	Item No Before EFA	Item No After EFA	Items	Convenience	Motivation	Effect
Convenience Sub Scale	19	1	When writing digitally, I can adjust the font style and size as I wish.	<b>.67</b>		
	37	2	I can give the articles in the digital environment an aesthetic appearance in line with the features of the program.	<b>.66</b>	.10	
	40	3	Digital media is a great convenience for those who type ten fingers.	<b>.65</b>		
	20	4	I can easily correct the mistake in digital writings due to the features of the program.	<b>.64</b>		
	26	5	It is easier to share what is written in the digital environment in the digital environment than writing on paper.	<b>.64</b>		
	32	6	When I write in digital media, I adjust the light of the screen as I want.	<b>.63</b>		
	33	7	There is no possibility of wear/tear of the texts in the digital environment.	<b>.63</b>		
	30	8	When I write digitally, I adjust the line spacing as I want.	<b>.62</b>		.12
	34	9	I can write with both hands and one hand in a digital environment.	<b>.61</b>		.15
	23	10	I easily quote other sources while writing digitally.	<b>.60</b>		.11
	44	11	When writing digitally, drawings (tables, graphics, etc.) are created more easily.	<b>.57</b>		
	39	12	It is easy to add emoticons (emoji, symbols, etc.) that describe emotions while writing in	<b>.57</b>	.13	.10

the digital environment.					
Motivation Sub Scale	27	13	Writing in digital media prevents waste of paper.	<b>.56</b>	.13
	47	14	I like to take notes in the digital environment.		<b>.68</b>
	46	15	I feel incomplete the day I do not write digitally.	.17	<b>.65</b> .13
	8	16	I feel the satisfaction of writing more when I write digitally.	.29	<b>.62</b> -.14
	9	17	I think more fluently when writing digitally.	.14	<b>.60</b> .23
	45	18	Writing in digital media is a great pleasure for me.	.17	<b>.59</b> .21
	41	19	Writing in the digital environment increases my self-confidence.	.15	<b>.54</b>
	17	20	Digital writing cannot be effective in developing sustainable writing habits.	.13	.15 <b>.60</b>
	16	21	In digital writing, the pleasure of touching paper is not taken.	.29	<b>.55</b>
	24	22	Writing in digital media causes radiation exposure.		<b>.55</b>
Effect Sub Scale	3	23	Writing in a digital environment makes my eyes tired.	.15	<b>.50</b>
	15	24	Writing in digital media can lead to health problems related to posture.		<b>.46</b>
	49	25	I feel good when I write digitally.	.16	-.15 <b>.41</b>
	Eigenvalue			6.274	3.160 1.982
Variance				21.390	9.525 7.394

As seen in Table 2, the first subscale was named "convenience." The convenience subscale was defined as follows: "This subscale is used to form, edit, add, subtract, etc. to text in the digital writing process. It includes attitudes about convenience in situations. It also emphasizes the economics of digital writing." Items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13

(13 items in total) were included in the convenience subscale. The items in this factor reflect their attitudes towards the advantageous features of digital writing.

In the second sub-scale, there are mainly items that emphasize digital writing, prompting individuals to write. This subscale was defined as follows: "This subscale includes attitudes towards writing satisfaction and fast and fluent writing in the digital writing process." Therefore, this subscale was named "motivation." Motivation subscale; 14., 15., 16., 17., 18., 19. It consisted of 6 items (in total).

Since the third subscale items were mainly related to digital writing difficulties, this subscale was named "Effect." This subscale was defined as follows: "This subscale includes attitudes towards possible problems encountered while writing digital writing. It emphasizes the challenges of digital writing, such as health and attention. " This subscale includes 20th, 21st, 22nd, 23rd, 24th, and 25th items (6 items in total). The convenience subscale eigenvalue was 6,274; the eigenvalue of motivation subscale 3.160; It was determined as 1.982 for the impact subscale. Explanation power (variance) of each subscale on the whole scale was 21.390 for convenience subscale, 9,525 for motivation subscale, and 7,394 for effect subscale. This value reached an explanation power of 38.309 in total. The lowest factor load value of the items in the scale is .41, and the highest factor load value is .68. (For the final version of the scale, see in Turkish section ANNEX-1)\*.

### **Confirmatory Factor Analysis (CFA)**

As a result of EFA, Confirmatory Factor Analysis (CFA) was conducted to test the appropriateness of this structure of DWS, which consists of three factors and 25 items. In the obtained data, maximum likelihood data were studied (Joreskog & Sorbom, 2004).

Table 3. *Confirmatory Factor Analysis Results*

Item No	SH	R <sup>2</sup>	SEFY	t
1	.53	.47	.69	29.02
2	.57	.43	.66	27.36
3	.60	.40	.63	26.27
4	.54	.46	.68	28.59
5	.59	.41	.63	26.66
6	.60	.40	.63	25.99

\* It has been taken into consideration that there are rules for translating the scale into a different language, and the final version of the DWS is included only in the section written in Turkish

7	.61	.39	.63	25.93
8	.59	.41	.64	26.66
9	.63	.37	.61	24.89
10	.61	.39	.62	25.58
11	.67	.33	.57	23.10
12	.65	.35	.59	23.52
13	.67	.33	.57	23.13
14	.65	.35	.59	22.45
15	.75	.25	.50	18.66
16	.54	.46	.68	26.75
17	.54	.46	.68	26.70
18	.54	.46	.68	26.55
19	.70	.30	.55	20.48
20	.78	.22	.47	16.34
21	.63	.37	.61	21.97
22	.59	.41	.64	23.02
23	.79	.21	.46	15.90
24	.73	.27	.52	18.41
25	.78	.22	.47	16.31

P < .05 Note. SH = Standard Error, R2, SEFY = Standardized Factor Loads

There are many fit values in the CFA data. Chi-square, CFI, GFI, NNFI, SRMR, RMSEA, which are among the most widely used of these fit values, were examined. Of these fit indices, .90 is acceptable for CFI, GFI, and NNFI; values of .95 and above are accepted as a good fit index. Also, if the SRMR is .08 or less, if the RMSEA has a value of .06 or less, it is considered a good fit index (Hu & Bentler, 1999). Confirmatory factor analysis was performed based on the results of the exploratory factor analysis performed with the data of this study. When the obtained fit values were examined, the chi-square value was  $\chi^2(272, N = 1501) = 1895.32, p < .001$ . However, among the CFA measurements, RMSEA = .063, SRMR = .052, CFI = .94, NNFI = .94 and GFI = .91. These fit values are at acceptable levels. The 90% confidence interval (CI) limit for RMSEA ranges from .060 to .066. In other words, possible RMSEA changes are within acceptable limits depending on the sample size. As a result of the path analysis of the observed variables obtained as a result of the CFA application, the question items expressing the latent variables, and the sub-

scales, it was determined that the items of the scale had a factor load between .46 and .69. It was also observed that all items were at a significant level in terms of t values (Table 3 and Figure 1).

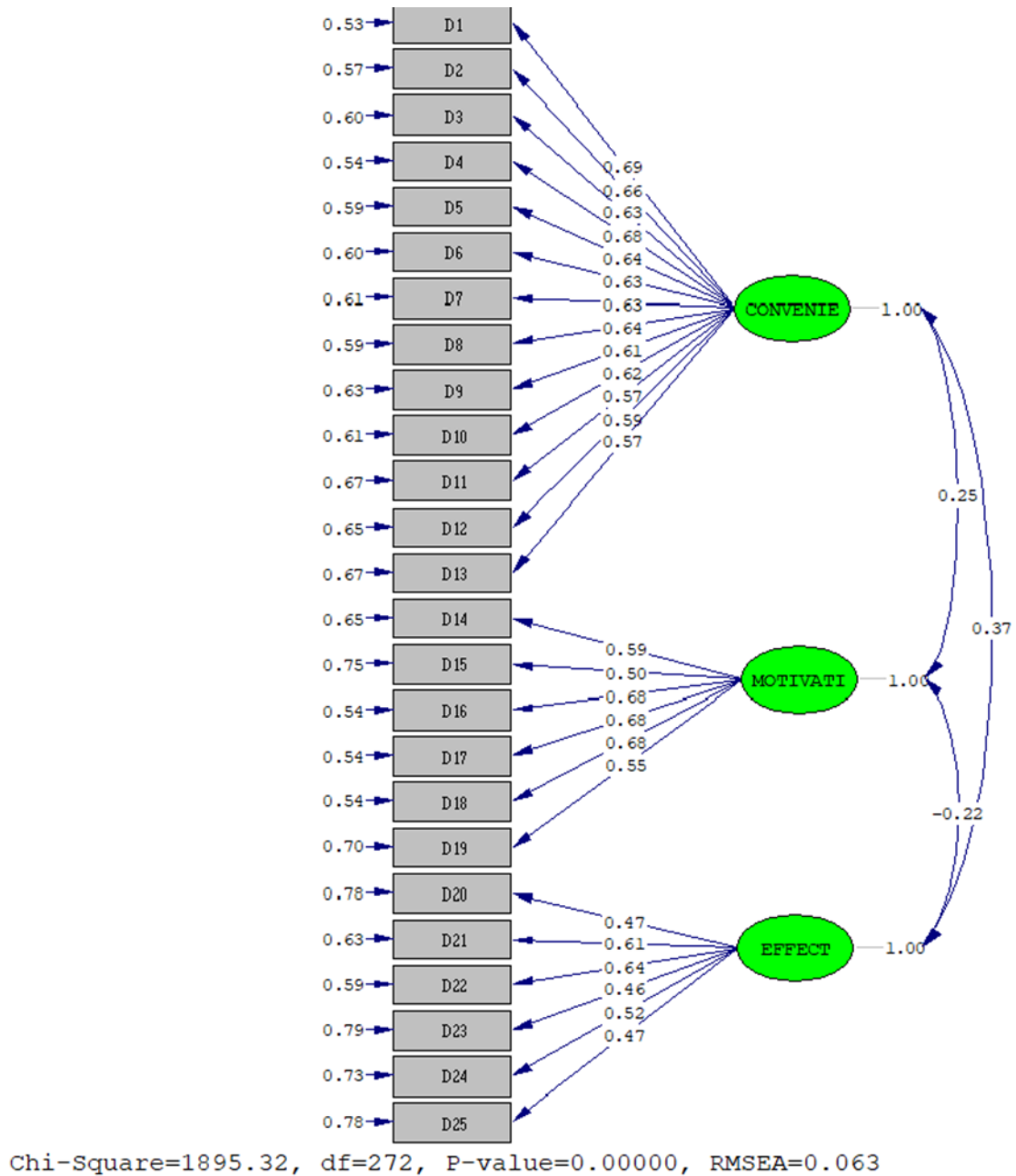


Figure 1. Path Analysis of DWS Items Regarding Standardized Values

### Reliability of the Scale

Cronbach's Alpha internal consistency analysis calculated the reliability of the scale. As a result of the calculations, the Cronbach's Alpha coefficient for the items in the first subscale

called "convenience" was  $\alpha = .89$ , the second subscale called "motivation" was  $\alpha = .79$ , and the subscale called "effect" was  $\alpha = .70$ . Calculated  $\alpha = .83$  for all items. Cronbach's Alpha values calculated in Table 3 and Cronbach's Alpha coefficients in case of deletion of each item are also presented.

Table 4. Average, Standard Deviation, Item Total Correlations, Item Deletion Alpha Values and Cronbach's Alpha Values Obtained as a Result of Analyzes Performed on DWS Data

Item No	Mean	SD	Item Total Correlation	Item Deletion Alpha	Cronbach's Alpha Values
1	4.3364	.84660	.638	.883	.89
2	4.1739	.87010	.620	.884	
3	4.2605	.95119	.601	.884	
4	4.1679	.85233	.628	.883	
5	4.1859	.92561	.608	.884	
6	4.2099	.87059	.596	.885	
7	4.2818	.88987	.594	.885	
8	4.1712	.92844	.602	.884	
9	4.1439	.93556	.574	.886	
10	4.2159	.84462	.579	.886	
11	4.1539	.99313	.542	.888	
12	4.0826	.89657	.551	.887	
13	4.0879	.99746	.541	.888	
14	2.8934	1.25935	.560	.747	.79
15	2.6955	1.24361	.496	.763	
16	2.7608	1.18691	.548	.750	
17	2.9660	1.16140	.548	.750	
18	3.3658	1.11421	.572	.745	
19	3.3804	1.11109	.489	.764	
20	3.2632	1.12577	.418	.661	.70
21	3.8914	1.08852	.493	.635	
22	4.0886	.96236	.486	.641	
23	3.8155	1.03791	.386	.670	

24	3.7695	.99674	.430	.657
25	3.9074	1.13317	.365	.679
Cronbach's Alpha value for all items				.83

### Scoring of the Scale

The scale consists of 3 sub-factors and 25 items. In the scale's implementation, the weighted raw score that a participant can get from the scale is at least 25 and at most 125. The high total score that the teacher candidates will get from DWS will be interpreted to indicate that they have positive attitudes towards digital writing. The low level indicates that they have negative attitudes towards digital writing.

### Discussion

With this study, a scale was developed to evaluate prospective teachers' attitudes towards the digital writing process. As a result of the factor analysis performed for the scale's construct validity, a measurement tool consisting of 30 items and three subscales was found. The first subscale, called "convenience," consists of 13 items (between 1 and 13). The second subscale, called "motivation," was formed by combining 9 items (between 14-19). The third subscale is named "Impact" and includes 6 items (between 20-25). According to the exploratory factor analysis (EFA), the overall scale's factor load value is over .40. Confirmatory factor analysis was also performed for the appropriateness of the three-factor and 25-item structure of the scale obtained by EFA. As a result of CFA, it was determined that the fit indices reached the values in the literature (Hu & Bentler, 1999).

Cronbach's Alpha internal consistency analysis calculated the reliability of the scale. As a result of the calculations,  $\alpha = .89$  for the "convenience" subscale of the scale,  $\alpha = .79$  for the "motivation" subscale, and  $\alpha = .70$  for the "effect" subscale, it was found to be  $\alpha = .83$  for the whole scale. The values obtained after the calculations show that DWS is a reliable measurement tool in measuring the attitudes of pre-service teachers towards digital writing (Büyüköztürk, 2012).

The scale requires scoring between 1 and 5 in Likert type. The lowest score that the participants can get from the scale is 25, and the highest score is 125. If the score is high, it is stated that the pre-service teachers have positive attitudes towards the digital writing process; If it is low, comments can be made that they have negative attitudes. There are also similar scales on the subject. It is seen that the scales determined in the literature are not directly directed to digital writing but are mostly evaluated together with digital reading. For



example, Üstündağ, Güneş, and Bahçivan (2017) adapted to the “Digital Literacy Skills Scale,” which was previously developed by Ng (2012) with their pre-service teachers. The scale addresses digital reading and digital writing skills together.

Ocak and Karakuş (2018) also conducted a scale development study to determine pre-service teachers' digital literacy self-efficacy. Like other scales in the literature, digital reading and digital writing skills were discussed in this study. A Likert-type scale named “Digital Literacy Self-Efficacy Scale of Pre-service Teachers (SLPRS)” was developed in the study. Gu, Xu & Hong (2019) developed the "Technological Literacy Scale (TLSCP)" with high school students in a study they conducted in China. Sulak (2019) has developed an assessment tool to measure teacher candidates' digital literacy skills, teachers, and educators, and assessed their digital literacy skills. Like other scales in the literature, this scale handles digital reading and digital writing skills together. The same scale was adapted into Turkish by Hamutoğlu, Canan Güngören, and Kaya Uyanık (2017).

In the adaptation of the scale, linguistic equality was achieved first. With the data obtained from 185 teacher candidates in total, EFA; CFA was conducted with the data obtained from 210 pre-service teachers. According to the study, a correlation coefficient of .89 was determined between the Turkish and English original forms of the scale. In the correlation analysis performed for the subscales, .80 for the Attitude subscale; .93 for the technical subscale; .73 for the cognitive subscale;.73 were determined for the social subscale. All relationships of the scale were found to be significant at the 0.01 level. The scale in question is not only for digital writing. The scale is generally developed with a focus on digital literacy skills. Evaluating the separate setting of digital reading and digital writing processes can be seen as a meaningful approach in enriching the literature and making healthier evaluations of these skills.

As can be seen, the scales have been developed to measure digital literacy skills together. Kurudayıoğlu and Tüzel (2010) state that many literacy types have emerged in recent years (such as media literacy, cultural literacy). This situation is a necessity of modernization. Digital literacy is one of the current issues that can be addressed in this context, and it needs to be supported by research and literature. However, considering that digital reading and digital writing processes require different skills, it is more meaningful to evaluate both areas with different scales. It is possible to say that the digital writing process is related to the digital reading process. However, the fact that it requires different skills should not be overlooked. Just as reading and writing are separate skill areas according to

the MEB's (2019) Turkish teaching program, digital reading and digital writing are skill areas that are more appropriate to be evaluated separately. Acting with this understanding with the scales to be developed can provide more meaningful data in determining the positive and negative aspects experienced in both areas.

Baştuğ and Keskin (2017) developed the "Paper-to-Digital Writing Attitude Scale", which takes a stand-alone approach to digital writing, with a unique approach. This scale is the first scale developed digital writing skills alone in dealing with Turkey. Scale 7-12. It was developed to evaluate students' paper-to-digital writing attitudes between classes.

Dahlström (2019) aimed to identify students' views on digital story writing with the questionnaire developed in Switzerland. Participants are students between the ages of 10-12. The questionnaire consists of 15 questions. Again, the study was not directed towards digital writing but was carried out to evaluate digital story writing skills.

An attitude scale for digital writing directly directed to prospective teachers was not encountered in the literature review. It is possible to say that DWS is one of the original scales developed to evaluate pre-service teachers' attitudes towards digital writing. It is possible to say that DWS is a valid and reliable scale as a result of the expert opinion process, EFA, and CFA analysis. In this scale, the evaluation of attitudes towards digital writing, the dimensions of convenience, motivation, and impact are discussed. Scale development studies can be done that also address different dimensions of digital writing. Especially, the development of scales that address the attitude towards digital writing is important in determining the reflection of the rapid technological change in recent years on individuals' perspective.

The similarities and differences between digital writing, which is almost an important part of life with the development of technology, and writing on paper are beneficial to conduct scientific studies to reveal the positive and negative sides. In addition, scientific studies about how effective digital writing is in developing young people's writing habits can help create meaningful evaluations. Considering the importance of digital writing in the contemporary individual's life, scales for evaluating digital writing can be developed at all levels of education. Thus, a meaningful contribution will be made to enrich the field writing in digital writing. Today, individuals have increasingly turned to digital writing. However, despite all the developments in today's technology world, it should be kept in mind that a mass does not give up or do not want to give up pen and paper. It is necessary to investigate whether the differences between individuals' preferences are influenced by age,

gender, and other demographic characteristics. Besides, considering that attitude elements are a psychological phenomenon, it can be investigated whether there is a relationship between individuals' attitudes towards digital writing and personality traits. Therefore, this scale can enable researchers from different disciplines to conduct research.

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