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Research Paper

The Effect of Digital Literacy on Creative Thinking Disposition: The Mediating Role of Lifelong Learning Disposition

Ahmet Kesici*[a]

[a](ORCID ID: 0000-0003-1830-497X), Mathematics Teacher, Siirt National Education Directorate, Turkey, ahmetkesici@yahoo.com
*Corresponding author

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ABSTRACT
This study aimed to determine whether digital literacy has a direct effect on creative thinking disposition and an indirect effect through lifelong learning disposition. The study was conducted with 327 teachers working in Siirt Province, Turkey in 2021-2022 academic years. "The Marmara Creative Thinking Dispositions Scale", "Digital Literacy Scale" and "Lifelong Learning Trends Scale" were used in the data collection process. Correlational survey method was employed in this study. The structural equation modeling technique was also used to analyze the relationships of variables. Two models, which explain the direct effect of digital literacy on creative thinking disposition and its indirect effects through lifelong learning disposition, were developed. As a consequence of the analysis, it was determined that structural models were in good agreement with each other. In this study, digital literacy has a statistically significant and positive effect on creative thinking disposition both directly and indirectly through lifelong learning disposition.

INTRODUCTION

Creativity is an ability which leads to the production of products that makes individuals' life easier and which enables individuals to find flexible, original, reasonable and appropriate solutions to the encountered problems. Furthermore, it gives birth to the creation of the masterpieces of art through which individuals live a life in a meaningful way. Creativity, as one of the most significant features, which distinguishes human beings from other species, provides innovation by going beyond the ordinary ways or methods. Through this innovation, creativity causes a change, and in turn ensures the continuation of development with change.

Judkins (2017) describes creativity as a way of one's seeing the world around him/her, communicating with and responding to it. Thus, it can be said that creativity is a skill that is affected by the conditions in which the individual lives. The description of a product or an idea as creative could change from one society to another. An idea or a product which is defined as creative in a society may not be regarded as creative in another society. Creativity may be subjected to change across time. In a society, an idea or product that is not creative today may be considered as creative in the future (Sak, 2020). Therefore, it can be said that there is a social process in which creativity is affected by cultural and individual factors (Daniels & Peters, 2015; Memduhoğlu, Uçar & Uçar, 2017) and cannot be considered as independent from its evaluators (Arik & Arik, 2020). In this regard, the factors that have an effect on creativity may differ by society and time.

In today's information society, developments that have been experienced in the information technologies and on the internet affect every aspect of life. The digital tools and technologies which provide access to internet enable the work and transactions to be done more practically and effectively with new methods in education, art, media, industry, government, commerce and social areas as well as many other fields. There is no limitation in those changes and transformations and innovations continue to enter people's life every day. The digital tools such as computer, cell phones or Ipad bring about the change in people's work life, meeting their social needs, entertainment and communication and learning facilities (Kesici, 2018). As a consequence of this, the skill of using digital tools efficiently is one of the most basic skills in today's society. Accordingly, digital literacy, which is defined as the effective and ethical use of digital tools for a specific purpose, may be efficient to find creative solutions to the problems people encounter in today's society (Hague & Payton, 2010).

Technology, which provides to overcome the limitations of time and space, deeply affects the production, consumption and dissemination of information so the information produced by means of technology becomes more convenient, cheaper, more functional and effective one. Hence, the information has become a factor that has an effect on the economic processes. The prominence of the economic value of information results in a knowledge-based competition between countries. The majority of the society continues to live by dealing with the production, consumption and dissemination of information. Therefore, today's society is defined as information society (Lankshear & Knobel, 2008; Kesici, 2018). In this regard, keeping up with the changes and transformations in the information society can only be possible by keeping one's self updated so it is necessary to keep one's self

updated in order to produce creative products and find out creative solutions to problems. Being able to keep one's self updated requires lifelong learning (Knapper & Cropley, 2000). Thus, it can be said that lifelong learning is also a factor that affects creative thinking.

With the rapid changes in today's information society, individuals are required to acquire creative thinking skills to survive, compete and have a more successful and happier life than before. It is very important to develop the creative thinking potential of individuals in today's world where the focus is on developing creativity capacity of individuals through education (Daniels & Peters, 2015; Memduhoğlu, Uçar, & Uçar, 2017). Determining the factors that affect the creative thinking in the training of creative individuals that are elligible for every sector, and taking into consideration these factors in education will contribute to the development of creative potential. In this respect, this study aims to investigate the relationships among creative thinking, digital literacy and lifelong learning skills (Qadir, Yau, Imran & Al-Fuqaha, 2020; van Laar, van Deursen, van Dijk & de Haan, 2020), which are defined as the 21st century skills. The theoretical explanations with regard to these skills are presented in the following sections.

Digital Literacy

The digitalization in every field has rendered the ability to use digital tools an important skill. In terms of the use of digital tools, digital literacy is an approach that aims to situate the individuals in a position in which they can effectively use digital tools and solve the problems they encounter by using digital tools through innovative methods (Ventimiglia & Pullman, 2016). Therefore, individuals do not use digital tools with the aim of social networking and entertainment in a passive way anymore.

Digital literacy is generally regarded as understanding information by using digital technologies, creating new information, and sharing information as well as evaluating existing knowledge effectively and critically (Parlak, 2019). What is meant by the effective use of digital tools in digital literacy is not only about knowledge of the technical use of digital tools. Digital literacy encompasses the conscious use of technical knowledge for a purpose and solving a problem (MEB, 2018). Leu et al. (2013) define digital literacy as the ability to find, evaluate, organize and create information by using digital technologies to solve a problem. According to Hague and Payton (2010), a person who is characterized as a digital literate person should know what h/she looks for via digital tools and should define where and how h/she can access the information h/she looks for and evaluate the accuracy of the information h/she obtains, and share the results h/she gets. Martin (2008) also defines digital literacy as access to information through use of digital tools and as the identification and evaluation of accessed information, analysis and synthesis skill, and attitude and ability to produce new knowledge. Drawing from this perspective, it can be said that digital literacy includes high-order thinking skills such as analysis, synthesis evaluation, and critical and creative thinking.

While the virtual world that is created by humans and accessed by digital tools offers great benefits to humanity, it may cause some problems such as cyber bullying, cyber attack and digital addiction that people have to deal with (Kesici, 2018). These problems can also cause legal, health, social and psychological problems. There are also subject matters such as plagiarism, copyrights and to name few that digital tool users generally have to comply with. Digital literacy also includes using digital tools with awareness of these issues.

In addition to being aware of the opportunities provided by digital tools and benefiting from them, digital literacy incorporates ethical and legal use with awareness of the threats and dangers which may result from the use of digital tools (Sağıroğlu, Bülbül, Kılıç & Küçükali, 2020). The ethical and legal use of digital tools is associated with cognitive skills. Furthermore, the processes that are related to the interpretation, evaluation, and processing as well as the production of information obtained from digital sources include *cognitive skills*. Issues such as the ability to use digital tools, overcoming technical failures and adapting to new technologies are related to the *technical skills*. Moreover, the *social-emotional dimension* of digital literacy is about making meaning in the social context; therefore, it is also about necessity of acting responsibly towards individuals in communication (Ng, 2012).

Considering its technical, cognitive and social-emotional dimensions, digital literacy can be said to focus on the culture of using a digital tool that is suitable for today's information society. Digital literacy provides a framework with young generations to have the culture of using digital tools (Sağıroğlu, Bülbül, Kılıç, & Küçükali, 2020). The culture of ethical, conscious and effective use of digital tools that digital literacy forms may provide humanity with production, efficiency and profit. On the contrary, it can be said that human beings may experience major problems and disasters originating from the virtual world.

Lifelong Learning

Lifelong learning has brought a new perspective to learning which is different from the view that offers a traditional prespective to economical, technological and social changes as well as the research studies on human brain and rights. In comparison to today's information age, in the period when the change and transformation took place rather slowly, the accepted view was that education had to be for young people and children, and that the learning at school would be sufficient for the individual until the end of his/her life (Doğan, 1976). However, changes in technology, economy and social areas have revealed that people need to constantly update themselves (Polat & Odabaş, 2008). Research studies on adult learning show that human brain maintains its flexibility in adults, and new cells are produced in some regions such as the hypothalamus, and new connections are formed between neurons (Orhon, 2014). Additionally, humanistic approaches, which stress that every individual has the innate ability to learn and develop his/her own abilities and thereby learning is a human right, has led to the acceptance of an understanding defined as lifelong learning (Akkuş, 2008; Polat & Odabaş, 2008).

In a report prepared by the European Union Commission in 2020, lifelong learning is defined as learning activities that enable individuals to actively participate as citizens in society and to acquire social or work-related knowledge and skills as well as competence (Turan, 2005). As a result of this, lifelong learning comprises both formal education and non-formal education. Lifelong learning includes the trainings that an individual has taken for his/her personal, professional and social development and involves learning throughout his/her life (Erdamar, 2011). Lifelong learning has different aspects from traditional ways of learning. These are carried out in line with the willingness of individuals or communities, and they do not have any restrictions such as age, gender, education level and socio-economic background of individuals. Learning can take place at home or at work and the school setting is not mandatory for learning. In this regard, time is not an obstacle to learning due to the opportunities that are provided by technology (Güleç, Çelik & Demirhan, 2012).

Lifelong learning offers many individual and social benefits. Employment may be increased by lifelong learning and adaptation to the job may be provided. Learning their democratic rights and responsibilities, individuals can fulfil their active participatory actions in their society and can be sensitive to social problems and can take initiatives in society. By ensuring the individual's adaptation to the changes and transformations in society, his/her alienation from the society can be prevented. Individuals can achieve self-realization through self-development in the field of interest (Turan, 2005; European Union, 2006).

There are various skills that are aimed to be developed in lifelong learning. These skills are expressed with key competencies (Erdamar, 2011). These are: communication in mother tongue and foreign languages, basic competences in mathematics, science and technology, learning to learn, digital competence, social competences, and entrepreneurship and cultural awareness competence. By developing these competencies and encouraging them to use their creative and innovation skills, individuals can be helped to contribute to the society and be successful in the business world with their creativity and innovative features (Council of the European Union, 2018).

In lifelong learning, basic skills such as learning to learn, learning strategies repertoire, technology skills, and literacy and calculus as well as high-order thinking skills such as problem solving, self-regulation skills, and critical thinking are very important skills (Coşkun & Demirel, 2012). However, these cognitive skills are not sufficient for lifelong learning. In addition to cognitive skills, it is necessary to have a lifelong learning disposition which is an affective quality. Herein, disposition is defined as an internal tendency to want or do something (TDK, 2021, August 30).

An individual's inclination and willingness to do something shows his inclination towards that job. Disposition bridges the gap between doing something and wanting to do it. Disposition arises from the motivation to want to do something and provides the energy that is necessary to perform the action. Disposition enables the individual to use his/her abilities in appropriate environments (Erdoğan & Arsal, 2016). In this respect, lifelong learning disposition can be described as an individual's orientation or predisposition towards lifelong learning. Therefore, individuals who have a high level of disposition towards lifelong learning may have a higher level of participation in lifelong learning (formal, informal) experiences.

Creative Thinking

Creativity, which means producing a new idea or work (product) by using intelligence, ideas and imagination, has been explained with its different aspects by many researchers. For instance, creativity is defined as being able to see something from different perspectives and going beyond the limits of prior knowledge, producing an original product, and creating something new by making extraordinary relationships between unrelated things (Fox & Schirrmacher, 2014). Sylvan (1997) explains creativity as the ability to see what no one else can see, to hear what no one has heard and to think what no one else can think as well as to do what no one else can do (Cited by Üstündağ, 2014). In addition, putting effort into giving a new identity to the old information and into making new synthesis between the known ones can be regarded as the creative pursuits (Yeşilyurt, 2020). From Torrance's (1966) perspective, creativity is composed of the processes of finding gaps in thoughts, offering various solutions to problems, developing new ideas and making new connections between ideas (Cited by Arik and Arik, 2020).

Creativity consists of elements such as flexible thinking, rationality, originality and thinking in detail (Orhon, 2014). Flexible thinking is the ability to look at things from a different perspective, to make relationships between unrelated or independent ideas, and to direct thoughts from one way to another. Rationalism is the ability to generate as many ideas as possible about a topic. Originality refers to uniqueness of the created idea and product. Morever, thinking in detail means analyzing the problem in detail and in depth, not in general terms (Üstüdağ, 2014; Orhon, 2014; Öncü, 2020).

Rewieving the notes and writing of creative persons, Wallas (1926) states that creative products do not emerge randomly but are formed as a result of a process that is followed by one and another and moves on to the next phase after each phase is completed. This process is composed of periods defined as preparation, incubation, enlightenment and verification (Act. Sak, 2020). This also includes processes such as sensing the problem, identifying elements, obtaining information about the problem, and learning different approaches to the problem (Memduhoğlu, Uçar, & Uçar, 2017). The incubation period in which an individual stops dealing with the problem and continues life, and in which the problem is sent back to the subconscious and it is unknown how long this period would last. The problem continues to be examined in the subconscious mind (Üstündağ, 2014). In the enlightenment period, the solution of the problem becomes clear in the mind unconsciously. Solution suddenly emerges and develops (Doğan, 2011). In

the validation phase, the suitability, effectiveness and the solution of the problem can be evaluated. The solution is rearranged by detailing it (Sak, 2020).

Creativity cannot be limited to fields such as art and science. Creativity can take place in all kinds of human endeavors, including affective and intellectual ones (Kale, 1994). A creative idea or a product must be new; that is, the product is original and unusual. In creativity, the product, which must be appropriate, means that the product must be useful and valuable and provide inspiration to new ideas. The importance and quality of the product determine the creativity level of the product (Sak, 2020).

Creativity is classifed as big creativity, little creativity, and mini creativity. Big creativity is defined as the creative skills which are not seen in everyone and leave deep traces in society, science or art, and defined as skills of people whose names are still mentioned. Big creativity is an innate, different and superior talent (Öncü, 2020). This creativity corresponds to the *special talent creativity* that Maslow (1968) uses while explaining creativity based on the hierarchy of needs (Cited by Sak, 2020). Little creativity is the skills that make life easier by offering different solutions to the problems encountered in daily life or in a profession. This is the type of creativity that is thought to exist in everyone and can be developed. Furthermore, mini creativity is a sub-component of little creativity and the reinterpretation of the information that is obtained based on the experiences (Öncü, 2020). Little and mini creativity is thought to correspond to the creative type that Maslow defines as *self-actualization creativity*. Self-actualization creativity can be related to fields such as science, art, business and home. This type of creativity can be actualized through education (Sak, 2020).

Creative thinking is very important for a creative product or idea. Creative thinking incorporates thinking processes such as intuitive comprehension, visualization, questioning-answering, analysis-synthesis, problem solving, critical thinking, and producing extraordinary original solutions and knowledge (Kale, 1994). In creative thinking, there is an effort to go beyond the ordinary ways with an original and innovative perspective that will cause change in the solution of the problem (Üstündağ, 2014). Creative thinking is based on analogy, embodying abstract ideas, producing original ideas, being open to new ideas, changing ideas, looking at problems from different perspectives, imagination and providing a realistic and rational prediction about the future with models, using imagination, visualizing in mind, and being open to intuition, inspiration and sudden thoughts (Daniels & Peters, 2015; Doğan, 2011).

Creative behaviors are influenced by creative skills and creative disposition. Skills are qualities that must be possessed in order to perform or take an action. These skills are associated with cognitive traits such as flexible thinking, rationality, and originality. Disposition is related to a person's orientation to and attitudes towards performing an action. Dispositons lead people to use their creative cognitive skills (Özgenel & Çetin, 2017; Orhon, 2014). Therefore, it can be said that creative thinking disposition is a driving force for individual to use creative thinking skills, and can also provide information about the individuals' creativity.

In light of findings in literature, it is thought that digital literacy, lifelong learning and creative thinking skills, which are among the requisite skills today, may be related to each other because they cause innovation, development and progress. In creative thinking, genius and practical solutions are produced for problems while digital solutions which are based on technology are produced in the digital literacy (Arik & Arik, 2020; Ventimiglia & Pullman, 2016). In both of these approaches, the aim is to find an innovative solution and production. Considering the widespread use of digital technology in every field today, it can be said that digital technology has an influence on creative thinking. Based on the research studies, it can also be said that using digital technology has an effect on creative thinking. Notably, there are studies in literature that are about various applications of the use of digital tools which positively affect creative thinking (Karakuş, Türkkan & Namlı, 2020; Akyeampong, 2018; Smyrnaiou, Georgakopoulou & Sotiriou, 2020, Haymana & Özalp, 2020; Badeleh, 2021; Çakır, Korkmaz, İdil & Erdoğmuş, 2021; Durak & Şahin, 2018; Tiryaki & Adıgüzel, 2021; Kabadayı, 2019; Noh & Lee, 2020, Mokhtari, MohammadKazemi & Kamkari, 2016, Alt & Raichel, 2020). However, digital literacy also includes the ethical and cultural use of digital technology. For this reason, it is thought that creative thinking disposition in the context of digital literacy will contribute to the production of creative ideas and products for humanity and nature. As creativity is a skill which can be developed through education (Daniels & Peters, 2015) and all kinds of formal and informal learning are evaluated within the scope of lifelong learning, it can be concluded that lifelong learning disposition affects creative thinking. The goal pursued in lifelong learning is to comply with changes, acquire new knowledge, and use and produce that knowledge to prevent people from alienation in life (Erdamar, 2011). Adjusting to changes and developments in the context of digital technology shows that a person is part of the real life. Furthermore, efforts that are put into developing digital literacy can be identified as lifelong learning. Thus, it is thought that lifelong learning disposition mediates the effect of digital literacy on creative thinking disposition. Drawing from the perspective of lifelong learning, it is necessary and fruitful to develop digital literacy and creative thinking as it is worth investigating this subject matter. In this regard, the relationships between the variables of the research are shown in Figure 1.

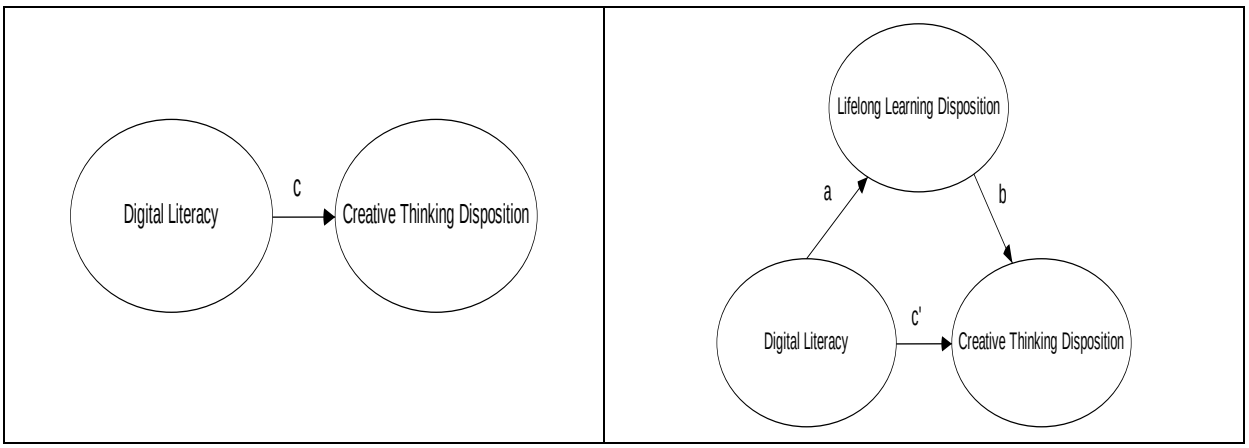


Figure 1. The relationships model among the digital literacy, creative thinking disposition and lifelong learning disposition

In the model in Figure 1, it demonstrates that digital literacy has a direct effect on creative thinking disposition and an indirect effect through lifelong learning disposition.

Aim of The Study: This research study aims to test the accuracy of the model (Figure 1) on participants who were teachers. In line with the purpose of this study, the study answers the following research questions:

1. What is the effect of digital literacy on creative thinking disposition (path c)?
2. What is the effect of digital literacy on lifelong learning disposition (path a)?
3. What is the effect of lifelong learning disposition on creative thinking disposition (path b)?
4. Is there a mediating role of lifelong learning dispositon in the effect of digital literacy on creative thinking disposition (path c')?

Creativity is seen as a very important skill today and required to develop young generations' creative thinking skills through education. Hence, teachers have a responsibility to develop their students' creative thinking potential (Memduhoğlu, Uçar, & Uçar, 2017; MEB, 2021). Teachers who are role models for their students should have creative thinking skills so as to have learners who should also think in a creative way. Therefore, this research study contributes to teacher training of creative teachers, and in turn to teacher education field. In addition, the study also contributes to the discussions about what skills are necessary to have today and to revelation the effects of using technological tools on people.

METHODOLOGY

Design

This research, which aims to examine the direct effect of teachers' digital literacy level on the creative thinking disposition and the indirect effect through lifelong learning disposition, was employed by correlational survey method. Correlational survey is a method used to identify covariance existence as well as levels between various variables (Karasar, 2014).

Sample and participants

The participants of this study were the teachers from various primary, secondary and high schools in Siirt Province, Turkey in 2021-2022 educational years. There were 327 teachers from 6 primary, 6 secondary and 6 high schools who were selected according to cluster sampling method. 144 of them were females and 183 were males. 91 of them were at primary schools, 126 from secondary schools and 110 were from high schools.

Data collection tools

The Marmara Creative Thinking Dispositions Scale: "Marmara Creative Thinking Disposition Scale" which was developed by Özgenel and Çetin (2017) was used to measure teachers' creative thinking dispositions. The scale was composed of 25 items with a 5 point-Likert Type and was categorized into 6 subcomponents. These are: self discipline (5 items), innnovation search (8 items), courage (4 items), inqusitive (3 items), doubt (2 items) and flexibility (3 items). The Cronbach Alpha coefficient of the Marmara Creative Thinking Disposition Scale which defines 56% for variance was .87. In this study, the Cronbach Alpha coefficient of this scale was calculated as .909.

Digital Literacy Scale: With aim of determining the digital literacy levels of teachers, "Digital Literacy Scale" which was developed by Ng (2012) and was adapted into Turkish by Üstündağ, Güneş and Bahçıvan (2017) was used. It was composed of 10 items with a 5 point-Likert Type. The Cronbach Alpha coefficient of the scale which defines 40% for variance was .86. In this study, Cronbach's Alpha coefficient of Digital Literacy Scale was calculated as .918.

Lifelong Learning Trends Scale: "Lifelong Learning Trends Scale", which was developed by Erdoğan and Arsal (2016), was used to analyze lifelong learning dispositions of teachers. This Scale was composed of 17 items with a 5 point-Likert Type and was categorized into two subcomponents: willingness to learn (11 items) and openness to improvement (6 items). Cronbach Alpha coefficient was .86 and the scale accounts for 43.44% of the variance. In this study, Cronbach's Alpha coefficient of Lifelong Learning Trends Scale was calculated as .90.

Data Analysis

SPSS and AMOS programs were used to analyze the collected data. Mean values of three main variables - namely creative thinking disposition, digital literacy and lifelong learning disposition - were converted into z grades and 6 outlier points were identified between -3 and +3 levels. Outlier points were excluded from the study. Then 11 items having been identified to corrupt multiple normality by means of Mahalanobis distance were also excluded from the study. The remaining 310 were concluded to have (-1,+1) level kurtosis and skewness coefficient which means they were normally distributed. Moreover, multivariate critical level was 6 which means that this level was below 10. Therefore, multiple normality level requirement was achieved in the study (Gürbüz, 2019). Descriptive statistical analysis such as mean values, standard deviation and skewness and kurtosis were applied to the collected data. Correlational analysis was also applied to see whether there was a statistically significant difference between the variables. The correlation level among variables was ($r<.80$) which seemed not to corrupt any multiple relation level (Büyüköztürk, 2011; Can, 2014). Structural equation modelling was used to analyze direct and indirect impact of teachers' digital literacy levels on creative thinking tendencies by means of lifelong learning disposition. Structural equation model is a statistical technique which is used as a combination of factor analysis and regression analysis to test the validity of a theory (Bayram, 2016). The subcomponents of lifelong learning disposition which is a latent variable of the model, willingness to learn and openness to improvement were analyzed as observed variables for this latent one. Moreover, the subcomponents of creative thinking disposition- another latent variable of the model such as self-discipline, innovation search, courage, inquisitive, doubt, flexibility were also evaluated as observed ones for this latent variable. The Maximum Likelihood method was used to test the structural model because the data of the study did not violate the normality assumption.

FINDINGS

Mean values, standard deviation and skewness and kurtosis coeficient values were identified from the collected data. Moreover pearson correlation coefficient level by correlational analysis to see correlation among variable was also given in Table 1.

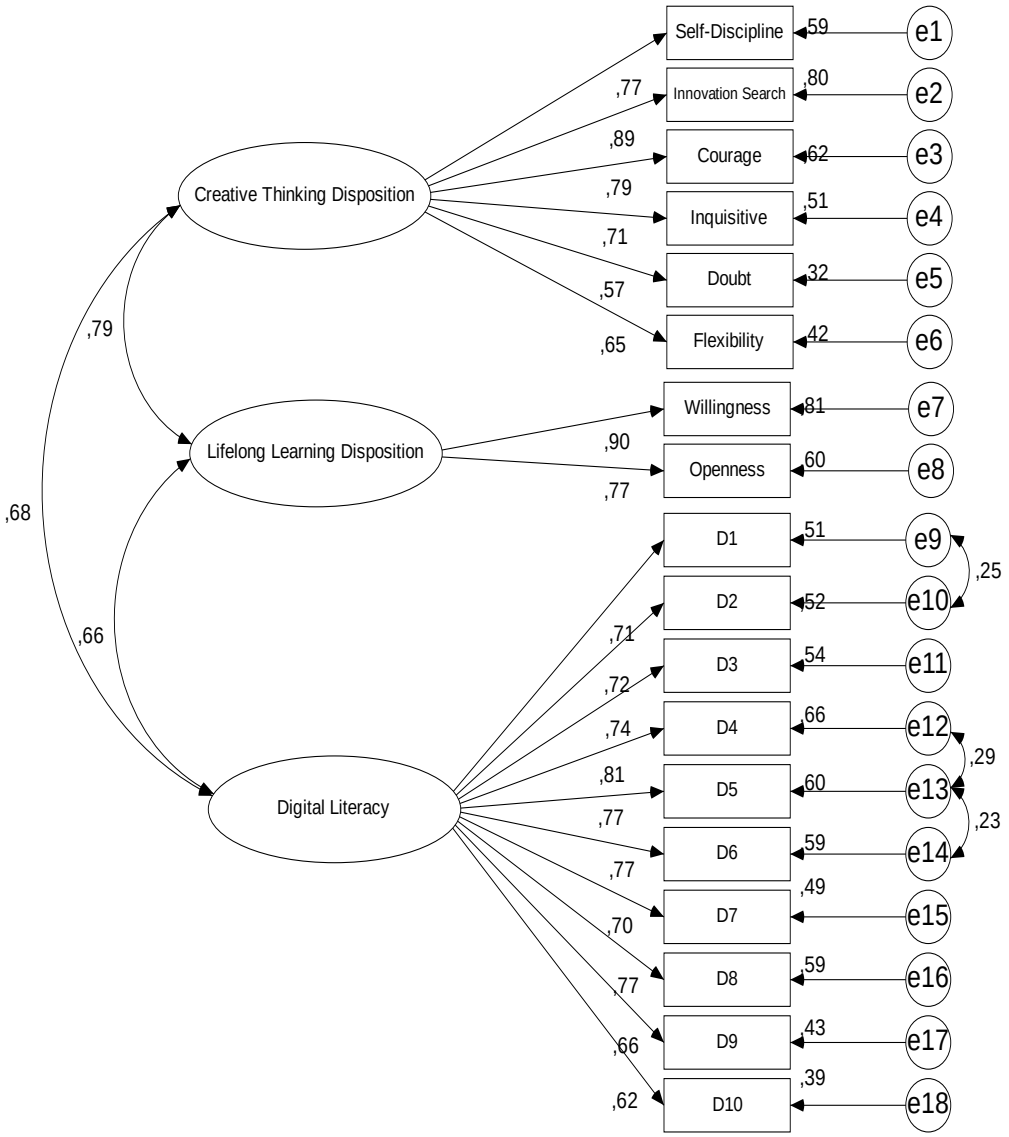
Table 1. Descriptive Statistics and Correlation Analysis of Variables.

	N	Mean	Sd.	Skewness	Kurtosis	(1)	(2)	(3)
Digital Literacy (1)	310	3.84	0.64	-0.40	-0.25	1	-	-
Lifelong Learning Disposition (2)	310	4.22	0.42	-0.27	-0.12	.58*	1	-
Creative Thinking Disposition (3)	310	4.14	0.41	-0.10	-0.43	.62*	.68*	1

*$p<0.01$

As seen in Table 1, the values of digital literacy levels, lifelong learning disposition and creative thinking disposition are 3.84 (sd.=.64), 4.22 (sd.= .42), and 4.14 (sd.=.41) respectively. The skewness and kurtosis level between the values of variables and mean levels were observed to be between (-1, +1). Moreover there was a medium level positive statistically significant difference between creative thinking disposition and digital literacy levels ($r=.62$; $p<.01$). Moreover there also appeared to be a positive medium level statistically significant difference between creative thinking disposition and lifelong learning tendencies level ($r=.68$; $p<.01$) as well as between digital literacy and lifelong learning disposition level ($r=.58$; $p<.01$).

Initially there was a measurement model composed of variables such as digital literacy, creative thinking disposition and lifelong learning disposition was tested. The analysis showed that the levels were below the levels of required incremental fit index however the emergent values were close to this indices level. After this finding, some modification was applied and the analysis were repeated. After repeated analysis, it was determined that the model, given the standardized path coefficients in Figure 2, was concluded to have a good of compatibility.



CMIN=282,256;DF=129;p=,000;CMIN/DF=2,188;GFI=,903;CFI=,953;NFI=,917;RMSEA=,062

Figure 2. Measurement Model

Figure 2 presents the goodness of indices obtained from the data regarding the structural model among the variables. As it is demonstrated, the $\chi 2$/df value was found as 2.188 ($\chi 2$/df <3); RMSEA is .062 (RMSEA <.08); NFI is .917 (.90 <NFI); CFI is .953 (.95<CFI); GFI is .903 (.90 <GFI) and the SRMR is .0481 (SRMR<.05). These obtained values are at an acceptable level within the specified ranges (Gürbüz, 2019). Therefore, the measurement model was validated with the data of the study. Standardized path coefficients, standard errors, critical ratios and 'p' values of the measurement model are shown in Table 2.

Table 2. Standardized Path Coefficients, Unstandardized Path Coefficients, Standard Errors, Critical Ratios and 'p' Values of the Variables of the Measurement Model.

Measurement Model			β_0	β_1	S.E.	C.R.	P
C1	<---	Creative Thinking	0.766	1.000			
C2	<---	Creative Thinking	0.892	1.053	0.064	16.583	<0.001
C3	<---	Creative Thinking	0.788	1.292	0.090	14.397	<0.001
C4	<---	Creative Thinking	0.711	0.973	0.076	12.767	<0.001
C5	<---	Creative Thinking	0.565	0.796	0.080	9.908	<0.001
C6	<---	Creative Thinking	0.649	0.846	0.074	11.491	<0.001
L1	<---	Lifelong Learning	0.899	1.000			
L2	<---	Lifelong Learning	0.774	0.919	0.064	14.351	<0.001
D1	<---	Digital Literacy	0.713	1.000			
D2	<---	Digital Literacy	0.720	0.985	0.070	13.982	<0.001
D3	<---	Digital Literacy	0.735	1.031	0.083	12.395	<0.001
D4	<---	Digital Literacy	0.811	1.286	0.094	13.638	<0.001
D5	<---	Digital Literacy	0.773	1.270	0.098	13.014	<0.001
D6	<---	Digital Literacy	0.766	1.431	0.111	12.853	<0.001
D7	<---	Digital Literacy	0.701	0.975	0.083	11.699	<0.001
D8	<---	Digital Literacy	0.770	1,236	0.096	12.813	<0.001
D9	<---	Digital Literacy	0.658	0.843	0.077	10.972	<0.001
D10	<---	Digital Literacy	0.623	1.065	0.103	10.375	<0.001

β_0: Standardized path coefficients; β_1: Unstandardized path coefficients; S.E.: Standard errors; C.R.: Critical ratios.

As seen in Table 2, the standardized path coeffiecient (β_0) of each item belonging to a factor appeared to be statistically significant ($p<.001$).

Structural model in which digital literacy was seen as external variable and creative thinking disposition as internal one was tested as seen in Figure 3 to see impact of digital literacy on creative thinking disposition.

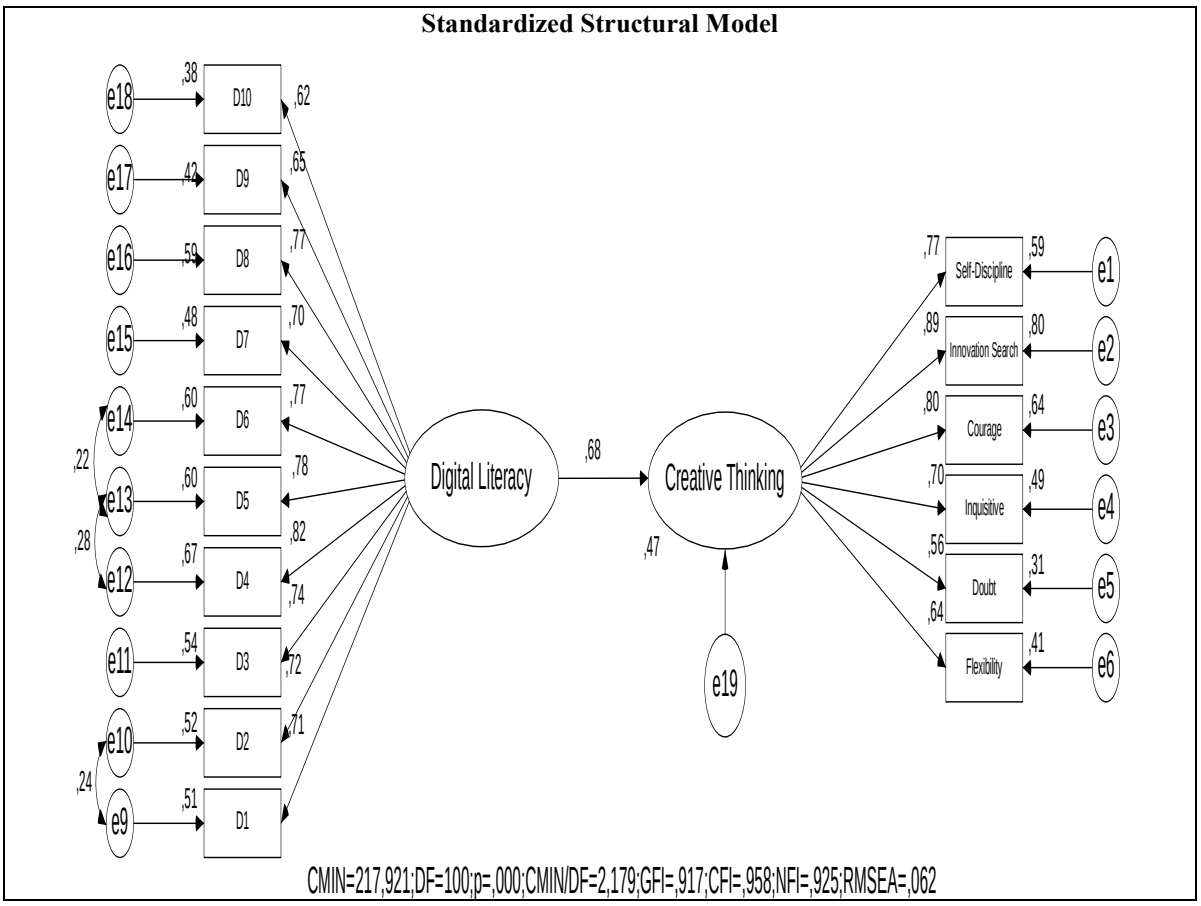


Figure 3. Structural Model for the Effect of Digital Literacy on Creative Thinking Disposition

The fit indices for the structural model, which the effect of digital literacy level on creative thinking disposition stated in Figure 3, indicated that $\chi 2$/sd.=2.179; GFI=.917; CFI=.958; NFI=.925; RMSEA=.062 and SRMR=.0471. These indices were among required levels (Gürbüz,2019). Thus, the structural model given in Figure 3 has been verified. The analysis for this structural model was given in Table 3.

Table 3. Analysis of Structural Model for the Effect of Digital Literacy Level on Creative Thinking Disposition

Measurement Model			β_0	β_1	S.E.	C.R.	R^2	P	Path
Digital Literacy	->	Creative Thinking	0.683	0.474	0.048	10.042	0.467	<.001	c

β_0: Standardized path coefficients; β_1: Unstandardized path coefficients; S.E.: Standard errors; C.R.: Critical ratios.

As seen in Table 3, digital literacy is statistically significantly and positively predicted creative thinking disposition (β_0=.683; β_1=.474; p<.001). Digital literacy affect positively to creative thinking disposition. Digital literacy on its own describes the changes in creative thinking disposition 46.7%. The standardized total effect of digital literacy on creative thinking disposition is .683.

In the research, in order to examine mediator effect of lifelong learning disposition in the effect of digital literacy on creative thinking disposition, the structural model given in Fig. 4 was tested by adding the lifelong learning disposition to the model presented in Fig. 3.

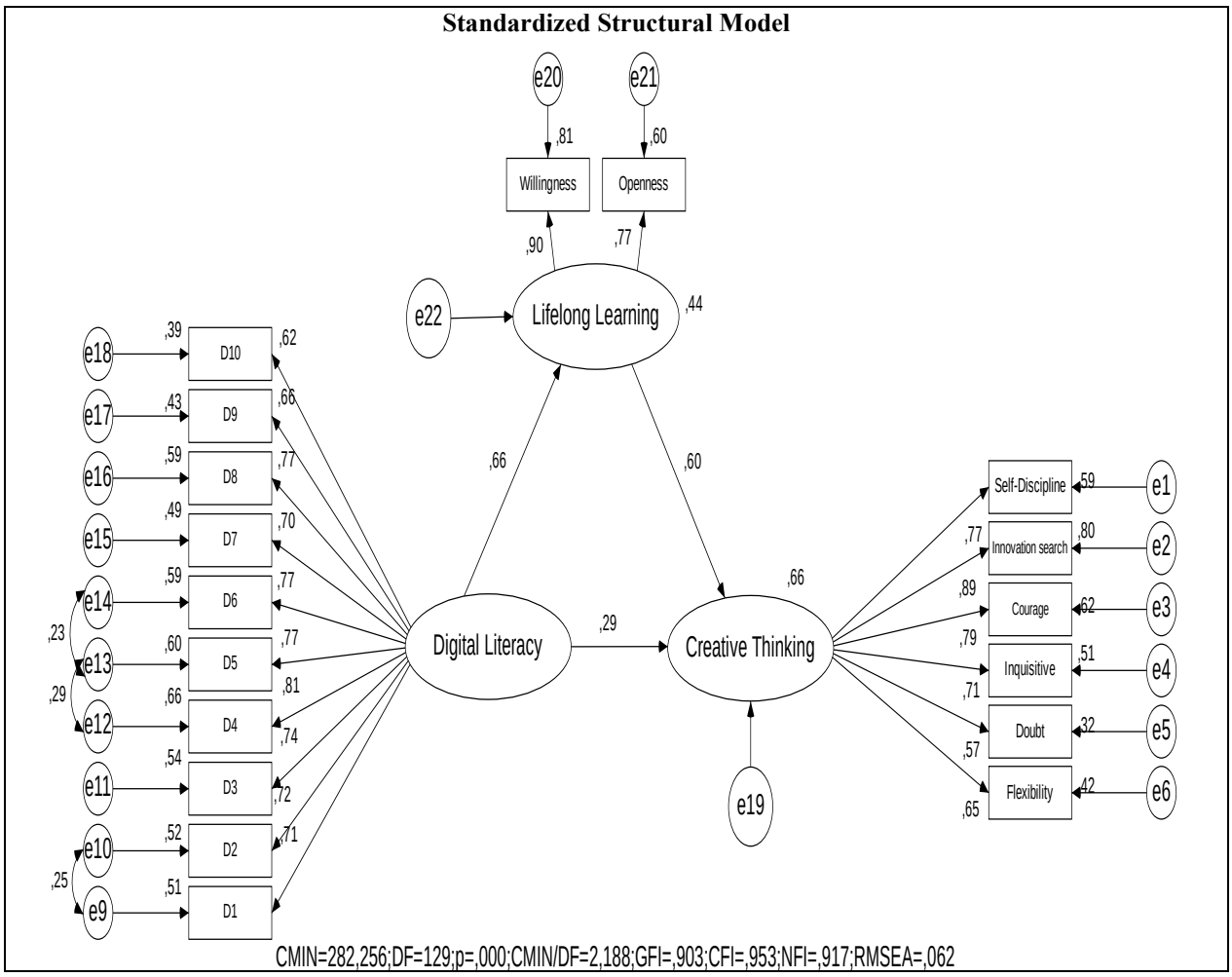


Figure 4: Structural Model for the Effect of Digital Literacy on Creative Thinking Disposition Through Lifelong Learning Disposition

In the analysis performed to determine the fit indices of the model, standardized path coefficients are given in Figure 4 are calculated as $\chi 2$/sd.=2.188; GFI=.903; CFI=.953; NFI=.917; RMSEA=.062 and SRMR=.0481. All of the values obtained for the fit indices are within the acceptance limits. Therefore, the structural model shown in Figure 4 has been validated with the data. The analysis results for the model are presented in Table 4.

Table 4. Analysis for the Effect of Digital Literacy on Creative Thinking Disposition Through Lifelong Learning Disposition

Measurement Model			β_0	β_1	S.E.	C.R.	R^2	P	Path
Digital Literacy	->	Lifelong Learning	0.663	0.485	0.048	10.042	0.44	<.001	a
Digital Literacy	->	Creative Thinking	0.288	0.199	0.048	4.148	0.664	<.001	c'
Lifelong Learning	->	Creative Thinking	0.595	0.565	0.075	7.491		<.001	b

β_0: Standardized path coefficients; β_1: Unstandardized path coefficients; S.E.: Standard errors; C.R.: Critical ratios.

As seen in Table 4, digital literacy predicts lifelong learning disposition (path a) positively and statistically significantly (β_0=.663; β_1=.485; p<.001). Digital literacy explains 44% of the changes in lifelong learning diposition. Lifelong learning disposition predicts creative thinking disposition (path b) in a positive and statistically significant way (β_0=.595; β_1=.565; p<.001). The effect of digital literacy on creative thinking disposition through of lifelong learning disposition (Path c') positively and statistically significantly (β_0=.288; β_1=.199; p<.001). In the mediator effect of lifelong learning disposition, digital literacy explains 66.4% of the change in creative thinking tendency. The standardized direct effect of digital literacy on creative thinking disposition was determined as .288.

In the mediator effect analysis made with the Bootstrap technique, 5000 sampling results, the standardized indirect effect of digital literacy on the creative thinking disposition at the 95% confidence interval and the confidence interval determined for the indirect effect are presented in Table 5.

Table 5. Standardized Indirect Effect and 95% Confidence Interval

Standardized Indirect Effect	Lower Bound	Upper Bound
.395	.287	.509

As seen in Table 5, the standardized indirect effect (standardized total effect - standardized direct effect) of digital literacy on creative thinking disposition through lifelong learning disposition was calculated as .395. In the mediator effect analysis performed with Bootstrap technique with 5000 samples and 95% confidence interval, it was found that for the confidence interval obtained the lower bound was .287 and the upper bound was .509. Since the confidence interval (.287-.509) determined for the mediator effect does not contain "zero" value, the indirect effect is statistically significant (Gürbüz, 2019). Therefore, it was concluded that lifelong learning disposition has an mediatring role in the effect of digital literacy on creative thinking disposition

DISCUSSION AND CONCLUSIONS

This study aimed to examine the relationships among digital literacy, lifelong learning disposition and creative thinking disposition. In line with the aim of this study, two models were developed explaining the direct effect of digital literacy on creative thinking disposition and its effect through lifelong learning disposition. The models were tested on teachers as the participants of this study. This study shows that digital literacy level has a positive effect on creative thinking disposition (path c) both directly and indirectly through lifelong learning disposition (path c).

In today's information society, digital tools are used in education on the grounds that they are effective to use in learning. According to Zhao et al. (2018) and Černochová and Selcuk (2019), digital technologies have a great potential for creativity and learning. Barajas, Frossard, and Trifonova (2018) state that robotic coding and educational games, which are associated with digital literacy, are suitable for the constructivist approach and can contribute to the development of creativity. Regarding the research studies in literature which also underpin the results of this study, digital storytelling that can be associated with digital literacy (Karakuş, Türkkan & Namlı, 2020; Akyeampong, 2018; Smyrnaiou, Georgakopoulou & Sotiriou, 2020), robotic coding (Haymana & Özalp, 2020; Badeleh, 2021; Çakır, Korkmaz, İdil & Erdoğmuş, 2021; Durak & Şahin, 2018; Tiryaki & Adıgüzel , 2021; Kabadayı, 2019; Noh & Lee, 2020) and educational digital games (Naeini & Masood, 2012; Mokhtari, MohammadKazemi & Kamkari, 2016; Hutton & Sundar, 2010) enhance the development of creative thinking. Alt and Raichel (2020) find out that gamified problem-based learning environment increases the creative self in order to enhance digital literacy. Ulukök (2012) indicates that computer-assisted problem-based learning management affects creativity positively. In their study, Allen, Caple, Coleman, and Nguyen (2012) state that social media can be used in the development of creativity, and it can contribute to the development of personality traits such as, risk-taking and not being afraid of failure that are necessary for creativity.

The effect of digital literacy on creativity can be explained by the need for information in the process of cerativity. In the preparatory period which is the first stage of creativity, theoretical knowledge about the problem is required (Aktan, 2015). At this stage, the research is conducted about the problem (Öncü, 2017). In today's information age, creative individuals can carry out the research they need in the creative process through use of digital tools. As a result of this, digital literacy skills may affect the creative thinking disposition with its contribution to obtaining information about the problem through use of digital tools, seeing different perspectives on the problem and determining possible solutions. According to Zagalo and Branco (2015), digital tools and software are not only tools that promote the development of creativity, but they are creative products. Given the fact that new syntheses are creative products (Yeşilyurt, 2020; Sak, 2020) among the known ones providing that they are original and appropriate, it can be said that the occupations of digital literates are creative ones. As a consequence of this, it can be concluded that the level of digital literacy is a factor affecting the creative thinking disposition.

In digital literacy, solving a problem or sharing the product in an effective way is seen as an important skill (Hague & Payton, 2010). In Judkins's opinion (2017), creative individuals can find effective ways to convey an idea to others in a memorable way. Therefore, it can be said that the efforts that digital literates put into an effective sharing are creative efforts and these efforts affect the creative thinking disposition. In addition, the finding, which indicates that lifelong learning disposition has a mediating role in the effect of digital literacy on creative thinking disposition, can be explained by the fact that teachers' efforts to develop digital literacy skills are their lifelong learning activities.

In the study, it was determined that the level of digital literacy had a positive effect on the lifelong learning disposition (path a). Therefore, it has been concluded that the disposition for lifelong learning increases as the level of digital literacy increases. Supporting the findings of the study, Bahadır (2020) says that there is a positive, moderate and significant relationship between teachers' self-efficacy perceptions for using technology effectively in learning environments and their lifelong learning dispositions. Furhetmore, Gürkan (2017) finds out that there is a positive, moderate and significant relationship between the technology leadership of school principals and their lifelong learning competencies. Kozikoğlu and Altunova (2018) also state that there is a low-level, positive and significant relationship between teachers' lifelong learning dispositions and their knowledge, media and technology skills. Similarly, in a study conducted with pre-service teachers, Boyacı (2019) mentions that there is a positive, moderate and significant relationship between digital literacy and lifelong learning dispositions. However, in his study, Özoğlu (2019) indicates that there is not a statistically significant relationship between digital literacy and lifelong learning tendencies. This finding contradicts the findings of the study. The reason is that Özoğlu (2019) conducted the study with first-year university students. This

research study was conducted during the Covid 19 pandemic. During the pandemic process, teachers were given the responsibility of providing distance education to their students. This responsibility has required teachers to increase their level of digital literacy. In order to fulfill their responsibility, it can be said that teachers' demands for their competence in digital literacy affect the lifelong learning disposition.

Digital technology has a great contribution to people's overcoming the limitations of time and space while communicating and having access to information (Kesici, 2018). Digital tools offer an opportunity to individuals to achieve their personal development that they cannot achieve because of the obstacles such as time and space. For this reason, it can be said that the increase in the digital literacy level leads to an increase in lifelong learning disposition by having a positive impact on individual's beliefs that h/she has towards their personal development. In addition, the requirement which digital technology brings about to follow the innovations in the way things are done, promotes digital literacy level. The increase in digital literacy level positively affects the individual's lifelong learning disposition by having a positive impact on his/her self-confidence about learning new things. Furthermore, it can be concluded that motivation to have career and financial opportunities by increasing qualifications and opportunities such as open education and distance education which are provided by digital technology affect lifelong learning disposition.

In this study, lifelong learning disposition had a positive effect on creative thinking disposition (path b). Therefore, it can be concluded that the change in lifelong learning disposition had a similar effect on the creative thinking disposition. This can be explained by personality traits. Individuals who have a high level of lifelong learning have a desire to constantly improve themselves and have learned to learn (Erdamar, 2011). Creative individuals are people who do not see themselves as experts on a particular subject matter and who want to improve their skills and can learn things by themselves (Judkins, 2017). Based on the existence of similar and compatible features of both skills, it can be said that creative thinking disposition is a factor affecting lifelong learning disposition. According to Tsai (2012), creativity is not actualized through a one-time effort. Creativity takes place at the end of a long process. This situation can be associated with lifelong learning. Therefore, it can be concluded that creative thinking disposition is affected by lifelong learning disposition.

As a consequence of this study, it should be beneficial to test the model of this study with other samples. Thus, it can be determined whether or not the relationships between the variables of the study are valid for different groups. Based on the results of the study, teachers should be provided with training to improve their digital literacy levels within the scope of lifelong learning. Thus, creative thinking can be promoted by improving the ability of teachers to solve the problems with the help of digital tools. Research studies should be employed to increase the awareness of teachers about the significance of lifelong learning in today's information society. Teachers' field of interests should be determined and trainings or digital content should be prepared for their field of interests. Thus, lifelong learning disposition of teachers can be developed by encouraging their self-actualization. By encouraging teachers to receive education in a new field or to take postgraduate education through open and distance education, their creative thinking disposition can be promoted through lifelong learning. Teachers should be encouraged to prepare digital learning materials in their branches. In so doing, both creative thinking skills and digital literacy skills of teachers can be developed. The use of digital tools in education should also be encouraged. Similar practices can be developed and can become common by determining the creative practices.

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