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AN EXAMINATION OF THE CORRELATION BETWEEN SCIENCE AND TECHNOLOGY ATTITUDES SCALE, FREQUENCY OF SMARTPHONE USAGE SCALE AND LIFELONG LEARNING SCALE SCORES USING THE STRUCTURAL EQUATION MODEL

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Abstract. *Lifelong learning can be defined as all of the activities which aim to develop an individual's skills, knowledge and abilities, socially, individually and professionally. Previous research on lifelong learning has been about using computers, digital competence and the correlation between demographic characteristics and intelligence. However, only one scale was used in this research, and, in general, only scores for demographic characteristics and lifelong learning were compared. In this research, the correlation between distance-learning students' attitudes to technology, their frequency of use of smartphones and their attitudes to lifelong learning were examined. Reliability studies were carried out prior to the study and the Turkish adaptations of the scales published in international journals were administered with permission. The study sample consisted of 881 students studying in 12 different units of Hitit University: six Vocational Schools, four Faculties and two Graduate Schools. The data were analysed by creating a structural equation model on the open source R analysis program. According to the research results, there was a significant correlation between the three scales, and the correlation between the 'lifelong learning' scores and the 'frequency of of smartphone usage' scores was greater than the 'technology attitudes' scores.*

Key words: *lifelong learning, technology attitudes, smartphone usage, technology leadership.*

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Introduction

The current rapid changes in science and technology mean that information that is current in various fields may disappear within short periods of time. Large numbers of people, in particular the active population, need to learn continuously to adapt to various developments. Lifelong learning and education are educational phenomena resulting from the need for continuous education (Lengrand, 1989; Cassin, 2002; Freref, 2004). Terms such as "strong individual" or "strong society" are related to capacities to find, structure, produce and disseminate information. For this reason, individuals who seek to improve themselves and are lifelong learners are needed (Bagnall, 2006). Forming a society composed of lifelong learners will undoubtedly be possible thanks to regulations put into place in educational systems (Gencel, 2013).

Science education is in a state of constant development with regard to the ever-changing conditions of the world. Thus, for efficient teaching, it is very important to create new teaching environments through constantly developing curriculums, and to select materials and methods and determine the attitudes of students toward science and technology lesson and scientific experiences. Attitudes are about coping and controlling emotions that emerge in the process of learning and they play an important role in directing human behaviors. Attitude could be defined as a tendency to react either positively or negatively to individuals, places, events or opinions (Simpson, Koballa, Oliver & Crawley, 1994). Developing a positive attitude toward a lesson involves behaviors such as wanting to participate in a lesson, feeling able to respond, accepting oneself as valuable and viewing the acceptance of others as a value (Özçelik, 1998). The positivity or negativity of attitudes

that are formed according to a specific system of values or beliefs directly affect the learning process and guides the future lives of individuals (Sünbül, Afyon, Yağız & Aslan, 2004; Seferoğlu, 2004). It is necessary to plan, organize and carry out activities for students in order for them to develop more positive attitudes (Pintrich & Schunk, 1996). A number of attitude scales have been developed in the field of science for the purpose of determining student attitudes. These attitude scales include those developed by Hewitt (1990), Oliver and Simpson (1988), House and Prison (1998), Geban, Ertepınar, Yılmaz, Atlan & Şahbaz, 1994), Kind, James & Barmby, 2007), Pell and Jarvis (2001), Reid and Skrybina (2002), Selvi (1996) aimed at science lessons and science laboratory applications. In their study Kaya and Böyük investigated the attitudes of second grade students studying at primary schools in the center of the city Kayseri regarding science and technology lessons and their experiences of science. As a result of the study, it was determined that students had undecided attitudes toward science and technology lessons (X =2.77). However, they had positive attitudes toward scientific experiences (X =3.60).

Because people need to renew their old knowledge constantly, the term "lifelong learning" has emerged (Lambeir, 2005). Although it is true that the media, the internet and the flow of daily news have inevitable effects on lifelong learning, real knowledge can only be attained through science (Cobern, 2015). Grundtvig is accepted as the founder of the lifelong learning tradition, using the term (LLL) for the first time in the 1880s. In addition, the views of Commenius formed the basis of lifelong learning (Wain, 2000). Basil Yeaxlee, who defined the term LLL for the first time in 1929, stated that education continues for life (Smith, 2001). Later, with the Faure's report, UNESCO and then the OECD started to show interest in LLL. These two organizations noted that to assume that education is only for individuals who are attending school is a factor that prevents lifelong learning. They predicted the necessity of lifelong learning "within the contexts of developing economic reality, occupational mobility and self-learning". They also stated that there is a need, within the framework of this prediction, for educational programs focusing on lifelong learning both within and outside school. The idea that the knowledge and information taught at school can be used throughout life becomes more and more inapplicable as time goes by (Budak, 2009).

The historical development of LLL was divided into three by Dehmell (Dehmell, 2006). This was as follows:

The First Focus on Lifelong Learning (early 1970): Lifelong learning was discussed in the international arena for the first time. Organizations such as UNESCO, OECD and the European Council started to become concerned with lifelong learning. During this process, social and cultural aims and humanist ideals were given priority.

The Period when Interest in LLL Decreased (mid-1970s - early 1990s): The interest of the aforementioned organizations in lifelong learning decreased. Humanistic ideals almost disappeared. During this process governments were in economic distress. For this reason, economic discourse became prevalent in the theory of lifelong learning.

Second Focus on Lifelong Learning (From early 1990s on): "This is the period when the term became flexible. The humanistic approach changed completely and a pragmatist and economic understanding appeared. One of the main factors that enabled the term to rise again is the fact that not only educationalists but also economists and sociologists have used the term, and that they have started to shape it according to their own needs. During this period UNESCO, the OECD, and the European Union have put the term on the agenda once again." (Beycioğlu & Konan, 2008).

LLL found a place for itself in studies conducted by various international organizations. It can be observed that the EU was more effective than other international organizations with respect to implementing lifelong learning systems (Lee, Thayer and Madyun, 2008). The definition of lifelong learning according to the European Commission (2000) is "all learning activities undertaken in every field of life that will help [people to] survive individually, socially and economically as well as having knowledge and skills." Candy noted that lifelong learning was "equipping individuals with skills and competencies essential for continuing their education after formal education." According to Dinevski and Dinevski (2004) lifelong learning is a process of training or teaching such as formal education, non-formal education, occupational education and in-service training without the limitations of place, time, age or socio-economical status.

Ways to increase and develop the quality of lifelong learning for its sustainable development are still being researched. Redirecting knowledge, values and academic curricula is more effective in terms of raising awareness and understanding sustainable development (Lozano, 2006; Læssøe, Schnack, Breiting & Rolls, 2009; Wals, 2009). Sönmez defined lifelong learning as "the reflection of an understanding that aims to allow individuals to gain knowledge, skills, attitudes and habits for self-development by making use of all learning settings." (Sönmez, 2007). Various researchers have defined different lifelong learning capabilities. There is various research regarding lifelong learning capabilities (Bryce 2006; Cornford, 1996; Knapper & Cropley 2000; Gülmez, Titrek & Özkorkmaz 2015). However, lifelong learning is defined by the European Union as a broader term which includes knowledge, skills

and attitudes. There are eight key capabilities within the concept of lifelong learning which should be developed to enable personal success, active citizenship, social inclusion and employment (European Commission, 2007).

Castelfranchi et al.'s work is entitled "Brazilian opinions about science and technology: the 'paradox' of the relation between information and attitudes." In the first section of their research, they examine the international panorama of research on the public perception of S&T, its history, and its current relevance. They also offer a review of the global debate on the relation between knowledge and attitudes. In the second section they analyze data from the recent nationwide survey conducted by the MCTI and Museu da Vida, which charts Brazilian citizens' interest in S&T topics and their possession of information on these subjects. In the third section they investigate the relation between information and attitudes toward these topics in Brazil today. Their understanding of information regarding S&T topics in the context of this research will be explained later. In the final section they highlight the most relevant outcomes of their analyses and other implications for future research (Castelfranchi, Vilela, Lima, Moreira & Massarani, 2013).

Ouane (2002) determined five capabilities with respect to lifelong learning: communication, living together, adapting to change, being able to change and creativity. Evers, Rush and Berdrow (1998) identified four main capabilities essential for lifelong learning. These were self-management, communication, managing people and tasks, innovation and activating change. Self-organizing learning skills, communication skills, interpersonal skills, problem-solving skills, critical thinking skills, being able to research and having access to information skills, and cooperative work skills were defined by Dong (2004) as lifelong learning skills. The lifelong learning skills defined by Shuman, Besterfield-Sacre and McGourty (2005) were having basic skills such as reading, writing, and listening, being aware of the need for learning, following a learning plan or planned learning, acknowledging, organizing, and having access to information, understanding and recalling new information, having critical thinking skills and reflective thinking. As can be seen, lifelong learning requires individuals to acquire more than the usual information, skills and capabilities in order to cope with their life conditions (Kozikoğlu, 2014).

In another piece of research which analyzed lifelong learning behaviors (Lia, Liu, Pi & Chou, 2011), students' behaviors in a web-based learning environment were examined within a theoretical framework. The data collected from university members was analyzed using the partial small square structural model, and the results showed that course flexibility, course quality, system functionality and interaction with the system affected students' perceptions towards learning. The importance of defining the ability of the learning group to comprehend new knowledge within lifelong learning was also emphasized (Liao & Liu & Pi and Chou, 2011). In this context, during a lifelong learning process that functions with the help of online platforms, the specific characteristics of the learning group should also be taken into consideration. Components such as online learning platforms, course content and system support should be designed in line with students' perceptual and cognitive skills.

Karakuş (2013) examined the lifelong learning capabilities of students in vocational schools, and found that students' capacity for lifelong was good. In the study, no difference was found among departments, and it was also concluded that lifelong capabilities were at a higher level in students in higher grades. In the study carried out by Plavsic and Dikovic, 553 students from Educational Sciences, Humanities and Economics departments were examined regarding their views on three different education types, namely formal, non-formal and informal education. It was seen that students from the Educational Sciences and Humanities had positive views regarding these education types. In addition, students in the fourth year of study had more positive attitudes towards education types and this continued during their educational lives. The study revealed that students with higher income levels had more positive attitudes compared to students with lower income levels. However, the educational status of the parents had no effect on the students' attitudes (Plavsic & Dikovic, 2016).

Dindar & Bayraktar (2015) investigated factors affecting university students' lifelong learning and used the ANOVA and t-test to analyze the data. They found that gender had no effect on lifelong learning, but female students' curiosity scores were higher than the male students' scores. Furthermore, there was no statistically meaningful difference in terms of age, grade, and family income levels, althought the situation tended to favor students from Literature departments.

Titrek (2015) examined headmasters' innovation management levels with 1436 participants from Istanbul, Kocaeli, and the Sakarya cities in Turkey. Titrek used the "Innovation Management Scale" for which validity testing had previously been carried out. In this study, a descriptive model was used to compare headmasters' characteristics, such as gender, age, residence and seniority with their innovation management levels. Positive differences were observed in favour of male participants with regard to gender. Furthermore, headmasters' innovation management levels were higher than teachers'.

Lifelong Learning and Using Technology

The results of research studies on the contribution of technology to education have revealed that effective and efficient use of educational technologies is beneficial for students (Winn, 2002).

Digital competency in the process of lifelong learning involves using Information Society Technology (ITS) in the workplace, during leisure time activities and for private and secure communication. This competency is supported with basic ICT (Information Communication Technology) skills which include communicating and participating in open networks and being open to online cooperation by using computers to present, evaluate, store, produce and share information (European Commission, 2007). To be a lifelong learner, one needs to have basic information literacy, technological literacy, digital literacy, media literacy and also internet and computer literacy (Adams, 2007; European Commission, 2007; Bryce, 2006; Candy, Crebert & O'Leary; 1994).

Using Mobile Technologies

Recently, there has been an increase in the number of studies on the importance of mobile devices in our daily lives, and many researchers have referred to this topic (Aldhaban, 2012). Many people prefer to use tablets, computers or smartphones that can support various applications. The most important reasons for this choice are ease of use, variety of applications and the richness of functions (Kesen, 2012).

Mobile devices have gone through a major transformation in a short period. Smartphones are similar to computers and the rate of use of smartphones is increasing every day. According to IDC (International Data Corporation) data, 305 million smartphones were sold in 2010. In 2011, this number rose to 494 million, and the rate of increase was 62%. In another study (IDC, 2012) it was expected that 660 million smartphones would be sold between 2012 and 2015. Sales rates and the popularity of using mobile devices have affected our lives in a significant way (Dewitt and Siraj).

Moreover, the importance of having access to information without the limitation of time and place is increasing each day. The contributions of learning with mobile devices to lifelong learning should be investigated (Korucu and Alkan, 2011). Revealing the correlation of the rapid increases in mobile device sales and the use of mobile devices with lifelong learning is something which it is believed will contribute to the significance of this research.

Using the above facilitative technologies for access to information is important for lifelong learning. Having possession of the intellectual ability and necessary learning skills are two major elements for lifelong learning (Livneh&Livneh, 1999). Especially nowadays, having technology attitudes and using smartphone abilities are important for access to information. The objevtive of the current study is to contribute to the understand of correlation between lifelong learning and technology attitudes and using smartphones, and also correlation between technology attitudes and using smartphones.

Methodology of Research

Research Design

This investigation is a correlational research study. It used Structural Equation Modeling (SEM) to analyze the structural correlations between distance education students' attitude to technology, their frequency of usage of smartphones and their lifelong learning attitudes. Participants were asked to complete survey questionnaires, consisting of a series of questions pertaining to their attitudes towards technology, the frequency of their smartphone usage and lifelong learning attitudes. All of the participants were informed about the purpose of this research prior to responding to the questions during the 2015-2016 academic year.

General Background of Research

The research data were collected via three different scales: the lifelong learning scale, the attitude to technology scale and the frequency of smartphone usage scale. Information regarding the scale questions and options can be accessed via the following website: http://moodle.hitit.edu.tr/lifelonglearning/ (Scales, 2016). The data collection process was carried out with three stages every two weeks. Permission from the scale writers was obtained via email. The three different scales of information can be seen in Table 1.

Table 1. Information of the scales used.

Scale Name	Number of items	Number of options
Lifelong Learning Scale	15	5
Technology Attitude Scale	16	5
Smartphone Usage Frequency scale	14	10

Sample of Research

The population for the research comprised 4927 first semester students (academic year 2015-2016) from Hitit University, enrolled in a general course in the Distance Education Center. However, only 881 students filled the three scales in the survey completely, so the sample for the research consisted these students. The sample contained students from four faculties and eight vocational schools belong to Hitit University. All of the participants were informed about the purpose of the research prior to responding to the questions.

Instrument

The instrument used in this research consisted of three parts. These sections were the lifelong learning scale, the attitude to technology scale and the frequency of smartphone usage scale.

Lifelong learning scale (LLL): This scale, created by Wielkiewicz and Meuwissen, was introduced in an article entitled "A Lifelong Learning Scale for Research and Evaluation of Teaching and Curricular Effectiveness". The Turkish adaptation of this scale was carried out by Engin, Erbay & Kör (2016). This scale was brought under a single category by means of factor analysis. Respondents indicate their responses using a five-point Likert-type scale (from 1 = 'almost never' to 5 = 'almost always'), based on the frequency with which what is described in each item is experienced. For the general scale the Cronbach Alpha reliability coefficient was found to be 0.930.

Table 3. Reliability statistics for lifelong learning scale.

Cronbach's Alpha	N of Items
0.930	15

The research was carried out with 15 criteria after eliminating one of the criteria in the Turkish adaptation. The general scale's Cronbach Alpha reliability coefficient was found to be 0.930, as seen in Table 3.

Technology Attitude Scale (TECH): A 16-item Attitude to Technology scale, which was developed by Rosen et al. was used. The Technology Attitude scale was a five-point Likert-type scale (from 1 = 'strongly disagree' to 5 = 'strongly agree'.) The scale's Cronbach's alpha reliability coefficient was found to be 0.939.

Table 4. Reliability statistics for technology attitude scale.

Cronbach's Alpha	N of Items
0.939	16

In the second and third stages of the data collection, a 16-item Technology Attitude scale, the Turkish adaptation of which was developed by Engin et al., and a 14-item Frequency of Smartphone Usage scale was administered. The Technology Attitude scale was a five-point Likert scale consisting of the following answers: (1) 'Strongly Disagree', (2) 'Disagree', (3) 'Undecided', (4) 'Agree' and (5) 'Strongly Agree'. The Cronbach's Alpha value was found to be 0.939 in the Turkish adaptation conducted with 727 students, as is shown in Table 4. This value shows that the data is highly reliable. The Technology Attitude scale was unidimensional and had a total of 16 points.

SmartPhone Usage (SPU): The second section included SmartPhone Usage (SPU), a researcher-designed questionnaire based on the works of Rosen and others, which was designed to determine the frequency of smartphone

usage. SPU was a 14-item instrument measuring various aspects of students' smartphone usage. Respondents indicated their responses using a 10-point Likert-type scale (from 1 = 'almost never' to 5 = 'almost all the time'). The scale was gathered under a single category and the Cronbach Alpha reliability coefficient was found to be 0.948.

Table 5. Reliability statistics for smartphone usage frequency scale.

Cronbach's Alpha	N of Items
0.948	14

The Frequency of Smartphone Usage scale was a 10-point Likert scale and consisted of the following answers: (1) 'Never', (2) 'Once a month', (3) 'A couple of times a month', (4) 'Once a week', (5) 'A couple of times a week', (6) 'Once a day', (7) 'A couple of times a day', (8) 'Once an hour', (9) 'A couple of times an hour', and (10) 'Always'. The minimum and maximum scores that could be obtained from the Technology Attitude scale were 16 (16x1) and 80 (16x5), respectively, and the minimum and maximum scores that could be obtained from the Frequency of Smartphone Usage scale were 14 (14x1) and 70 (14x5), respectively (Scales, 2016). The Cronbach's Alpha value was found to be 0.948 in the Turkish adaptation, as is shown in Table 5.

Procedure

This scale was applied to the university students who were receiving education from the distance education centre of Hitit University and were registered in 12 different education units via a survey every two weeks. For the infrastructure of the application, the PHP web programming language and MYSQL database were preferred. Prior to application of the survey, the aims of the survey and the time required for the survey were explained to the students. User information of 4987 students registered in the distance education centre was recorded in the database. In accordance with the principle of confidentiality of personal data, names of participants were not included in the survey. The information from the 881 students who provided complete answers out of those participating in the survey voluntarily was analyzed as the survey data.

Validity and Reliability

Scales used in the research were used with the permission of the authors of articles in the literature. The reliability values of the scale whose validity tests were carried out in previous studies are shown in the table. When the reliability coefficients included in the table are examined, it is seen that the coefficients of lifelong learning, technology attitude and frequency of using smart phone scales are 0.930, 0.939 and 0.948, respectively.

Data Analysis

Data obtained from 3 different scales applied in the research was analyzed through R data analysis program. The structural equation model was used in the analysis. Structural equation model - structural equation modelling - as a second generation analysis method (Bagozzi & Fornell, 1982) allows for addressing a complicated research problem in a single process in a systematic and comprehensive manner through the modelling of relations among numerous dependent and independent variables when compared to first-generation statistical techniques (Anderson & Gerbing, 1988). Results of the established model are given in the conclusion with graphs and tables.

Table 2. Reliability coefficient of scales.

Scale Name	Cronbach's Alpha
Lifelong Learning scale	0.930
Technology Attitude Scale	0.939
Smartphone Usage Frequency scale	0.948

Results of Research

In this part of the study, the findings of the data analysis from the scales are presented. The first figure shows an overall analysis of the results. Figure 1 shows the correlations between the three scales. The other tables show the separate item loads of each scale. The last two tables show the statistical correlations of the scales created via the structural equation model.

In Figure 1, the structural equation model is shown, which indicates the relational structure between smartphone usage (SPU), lifelong learning (LLL) and technology attitude (TECH). The structural equation model was created by the R analysing program. According to the model, there is an interrelation between smartphone usage, lifelong learning and attitude to technology, as well as between lifelong learning and attitude to technology. In Figure 1, the path coefficients between latent and observed variables are given beside the theoretical model. They show standard error values for every observed variable with path coefficients.

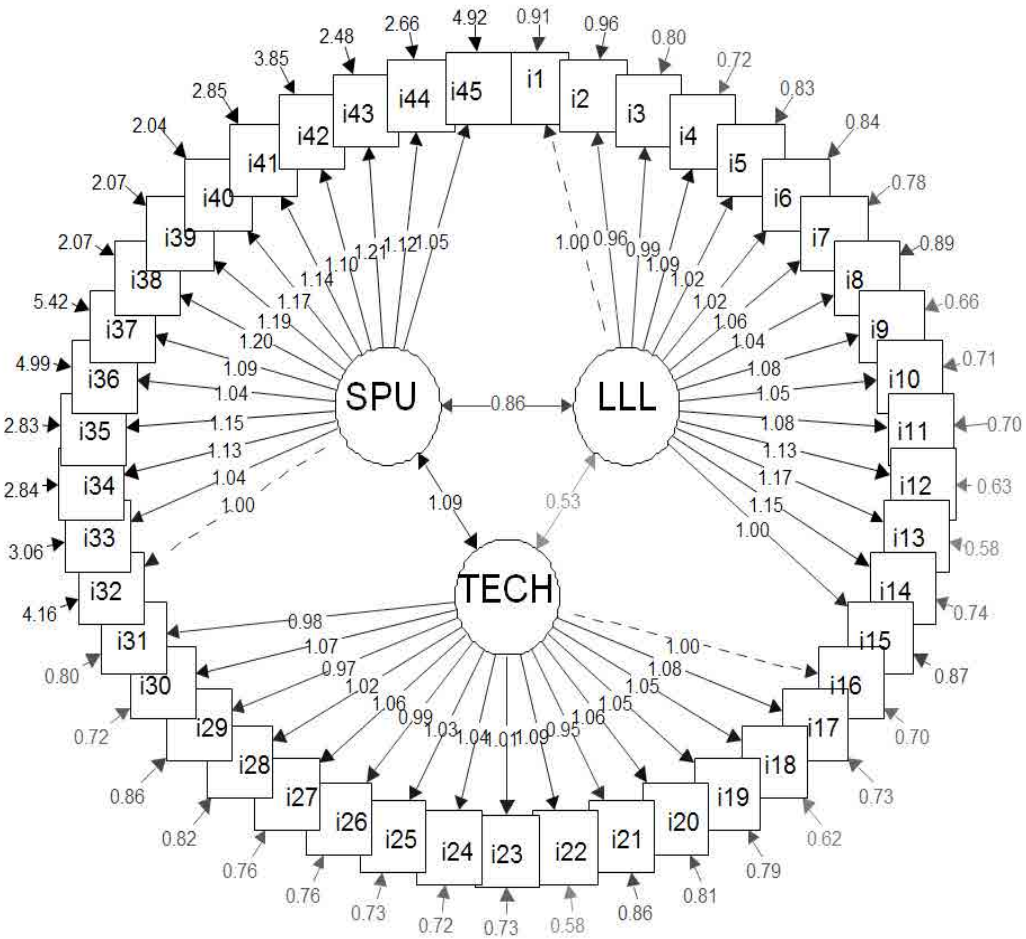

Figure 1: Structural equation model displayed graphically.

Table 6 shows the model statistics regarding the questions within the lifelong learning latent factor. All of the questions in the lifelong learning scale have a statistically meaningful effect on the latent factor ($p<0.05$). The most effective lifelong learning latent factor is "I pursue a wide range of learning interests". However, the least effective is "I discuss new things I have learned with other people."

Table 6. Model statistics regarding lifelong learning scale.

LLL	Parameter Estimate	Std. Err	Lower Bound	Upper Bound	Z-value	Sig.<
Q1	1					
Q2	0.957	0.057	0.845	1.069	16.896	0.0001
Q3	0.988	0.055	0.880	1.096	17.963	0.0001
Q4	1.093	0.057	0.981	1.205	19.212	0.0001
Q5	1.016	0.056	0.906	1.126	18.078	0.0001
Q6	1.016	0.056	0.906	1.126	18.007	0.0001
Q7	1.060	0.057	0.948	1.172	18.675	0.0001
Q8	1.041	0.058	0.927	1.155	17.971	0.0001
Q9	1.077	0.055	0.969	1.185	19.410	0.0001
Q10	1.052	0.055	0.944	1.160	18.977	0.0001
Q11	1.083	0.056	0.973	1.193	19.234	0.0001
Q12	1.130	0.057	1.018	1.242	19.917	0.0001
Q13	1.172	0.057	1.060	1.284	20.481	0.0001
Q14	1.152	0.059	1.036	1.268	19.510	0.0001
Q15	0.999	0.056	0.889	1.109	17.726	0.0001

Table 7 shows the model statistics regarding the questions within the technological attitude latent factor. All of the questions in the technology attitude scale have a statistically meaningful effect on the latent factor ($p<0.05$). The most effective lifelong learning latent factor is "Technology will provide solutions to many of our problems". However the least effective is "I am dependent on technology".

Table 7. Model statistics regarding technology attitude scale.

TECH	Parameter Estimate	Std. Err	Lower Bound	Upper Bound	Z-value	Sig.<
Q16	1					
Q17	1.082	0.052	0.980	1.184	20.770	0.0001
Q18	1.047	0.049	0.951	1.143	21.199	0.0001
Q19	1.051	0.052	0.949	1.153	20.068	0.0001
Q20	1.060	0.053	0.956	1.164	20.070	0.0001
Q21	0.950	0.051	0.850	1.050	18.632	0.0001
Q22	1.086	0.050	0.988	1.184	21.885	0.0001
Q23	1.013	0.050	0.915	1.111	20.107	0.0001
Q24	1.036	0.051	0.936	1.136	20.423	0.0001
Q25	1.035	0.051	0.935	1.135	20.309	0.0001
Q26	0.989	0.050	0.891	1.087	19.667	0.0001
Q27	1.058	0.052	0.956	1.160	20.341	0.0001
Q28	1.016	0.052	0.914	1.118	19.529	0.0001

TECH	Parameter Estimate	Std. Err	Lower Bound	Upper Bound	Z-value	Sig.<
Q29	0.972	0.052	0.870	1.074	18.835	0.0001
Q30	1.069	0.052	0.967	1.171	20.690	0.0001
Q31	0.976	0.051	0.876	1.076	19.247	0.0001

Table 8 shows the model statistics regarding the questions within the latent factor of using a smartphone. All of the questions for the smartphone usage scale have a statistically meaningful effect on the latent factor ($p<0.05$). The most effective lifelong learning latent factor is "Browse the web on a mobile phone". However the least effective is "Read e-mail on a mobile phone".

Table 8. Model statistics regarding frequency of using smartphones scale.

SPU	Parameter Estimate	Std. Err	Lower Bound	Upper Bound	Z-value	Sig.<
Q32	1					
Q33	1.035	0.051	0.935	1.135	20.314	0.0001
Q34	1.132	0.053	1.028	1.236	21.297	0.0001
Q35	1.153	0.054	1.047	1.259	21.441	0.0001
Q36	1.044	0.057	0.932	1.156	18.210	0.0001
Q37	1.089	0.060	0.971	1.207	18.211	0.0001
Q38	1.204	0.053	1.100	1.308	22.739	0.0001
Q39	1.188	0.052	1.086	1.290	22.659	0.0001
Q40	1.166	0.052	1.064	1.268	22.598	0.0001
Q41	1.137	0.053	1.033	1.241	21.318	0.0001
Q42	1.103	0.055	0.995	1.211	19.883	0.0001
Q43	1.206	0.054	1.100	1.312	22.200	0.0001
Q44	1.119	0.052	1.017	1.221	21.448	0.0001
Q45	1.050	0.057	0.938	1.162	18.333	0.0001

According to the results of the structural model, there is a dual and statistically meaningful correlation between lifelong learning and technology attitudes and using smartphones ($p<0.05$). Similarly, there is a dual and statistically significant correlation between technology attitudes and using smartphones ($p<0.05$). These results show that there is a reciprocal interaction between using technology and lifelong learning.

Table 9. Results of the structural equation model.

Pairs	Estimate	Std. Err	Z-value	Sig.<
LLL <->TECH	0.529	0.041	12.929	0.0001
TECH <-> SPU	1.088	0.086	12.693	0.0001
LLL <-> SPU	0.856	0.077	11.099	0.0001

The table above shows the fit index values regarding the structural equation model. Fit indexes determine whether the structural equation model is valid or not. According to the fit index values, the chi square/degrees of freedom were smaller than 10. CFI, IFI, RFI and NFI values were close to 1. Also, the RMSEA value was smaller than 0.10. Since the fit index values are within the acceptable limits, our structural equation model is statistically valid.

Table 10. Structural equation model fit ındexes.

Validity of fit index	Value
CHISQ/df	6.126
CFI	0.827
IFI	0.828
RFI	0.791
RMSEA	0.076
NFI	0.801

Discussion

The concept of lifelong learning and the relevant practices to achieve it are topics of interest for many national initiatives as well as international commissions. These topics attract the attention not only of educators but also researchers in other disciplines such as economists and sociologists. As technology has developed and become less expensive, the use of communication tools has become more effective. In this context, people can share their knowledge in digital environments like the internet extremely quickly. People produce knowledge through such sharing, but the knowledge created loses its validity in a relatively short period of time. Continuously updating their knowledge has today become a necessity for most people. Individuals are enabled to update their knowledge thanks to lifelong learning.

In today's world, individuals need to acquire knowledge for many different purposes apart from fulfilling their professional roles. Socialising, learning foreign languages, engaging in handicrafts, playing a musical instrument and improving basic communication skills are among the many activities requiring lifelong learning. Among these activities, those requiring physical skills may be most easily engaged in through face-to-face training in state or private educational institutions. However, knowledge-based learning is generally achieved through different means of communication. One of the best examples of these is, without doubt, the internet.

Public institutions may allow the widespread use of the internet by individuals to be transformed into a series of opportunities. Courses in foreign languages, mathematics and artistic subjects prepared by experts in these fields can be offered to individuals free of charge. In this way, every individual can be given an equal opportunity in the field of education.

On the other hand, it can be seen that the frequency of smartphone usage has as great a positive impact as the attitude of an individual towards technology and lifelong learning. In this respect, transforming the information available in web environments into applications for smartphones will be highly useful.

Transforming the courses delivered in public education institutions into platforms on which open source courses are provided, and, similarly, making them accessible via smartphones will ensure a more effective use of national resources.

The effects of this study were investigated in different areas, such as the lifelong learning attitude scale, smartphone usage frequency scale and technology attitude scales, education, sport and medicine. In research using smartphones and applications compatible with mobile learning platforms, students were more effective when using mobile collaborative learning software (Boticki et al., 2015). In addition, it can be said that mobile learning has motivational and individual learning orientation characteristics (Ciampa, 2014; Jaradat, 2014; Martin & Ertzberger, 2013).

Online learning environments are influenced by internal and external factors. The most common external factors are access to computers and software, inadequate time for lesson planning, inadequate technical and administrative support (Al-Ruz & Khasawneh, 2011). Among the internal factors, teachers' attitudes and their trust and belief in the use of ICT are frequently found in the existing literature (Al-Ruz & Khasawneh, 2011; Chen 2008; Lin, Wang & Lin, 2012; Sang et al., 2011; Tezci 2011). Some research examines all possible external and internal factors affecting the use of ICT (Al-Ruz & Khasawneh, 2011; Lin, Wang & Lin, 2012; Sang, et al., 2011; Tezci, 2011). Examination of external and internal variables can also help demonstrate the relationships between them assisting teachers, students and administrators to better understand the problems of ICT use while at the same time revealing solutions to existing obstacles based on the relationships between different variables (Fu, 2013).

In different research, the effects of attitudes to lifelong learning and technology, social media usage and mobile devices were examined separately. In this research, the relations between technology use, frequency of smartphone use and lifelong learning were investigated. In this context, this research differs from the other research with single scale and other studies performed on only one dimension. When the results are examined, it is seen that the life-long learning scores of individuals with a desire for intellectual learning were found to be the most effective relativityof "I pursue a wide range of learning interests" on the LLL scale. Also, it is believed that most of the technology, which is the most effective content in the TECH scale, will provide a penetrating solution, and that the most effective item on the SPU scale is interaction with mobile technology. In other words, it can be said that individuals with higher scores for life-style learning prefer mobile devices, the internet and other technological tools to meet their learning needs.

Conclusions

The research findings show that the three scales were interrelated. The greatest correlation was between technology attitude and frequency of smartphone usage. The second greatest correlation was between lifelong learning and smartphone usage and the smallest correlation was between lifelong learning and technology attitude.

Furthermore, it is possible to say that the frequency of smartphone usage had a better correlation with the two other scales. In this sense, it can be noted that technological devices and settings are effective in lifelong learning, and that smartphones have a significant place among these devices. Recently, there has been a significant increase in the number of users who follow current affairs, course contents, occupational and technical information, news and other sources online. Individuals preparing online lifelong learning settings are advised to prepare content compatible with mobile devices and mobile applications.

It is thought that there is a correlation between the item affecting the lifelong learning latent factor the most and the item affecting the lifelong learning latent factor the least. Individuals should be given opportunities to share information through different platforms, so that engaged learners will be provided with information flow from more channels. In addition, opportunities to share resources such as books, journals or articles should be more widespread.

One item affecting the technology attitude latent factor was "Technology will solve many of our problems."This shows that the people in this research generally trust technology. However, it is it is also important to be cautious in using technology to access information. The daily information obtained from media, newspapers and television is primarily aimed at communicating and delivering news. It should be remembered that real knowledge consists of information and knowledge that has been scientifically proven (Cobern, 2015).

The item most affecting the latent factor of smartphone usage was "Surfing the net on a smartphone". This points out the importance of using smartphones to access information. It was predictable that there was a statistically significant and clear correlation between attitudes to technology and the frequency of usage of smartphones.

Individuals with positive attitudes towards technology are more likely to use technological devices. This research is limited to students studying at the Hitit University Distance Education Center. Different results might be obtained by carrying out this research in many universities simultaneously.

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