Examination of the Relationship between Students' Attitudes towards Computer and Self-Directed Learning with Technology [*]

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Abstract

A lot of studies conducted in the past examined the construct of Self-Directed Learning (SDL) and attitude towards computer; however, there are not sufficient number of studies examining these constructs in terms of children and together with concept of technology. Therefore, those two constructs and the relationship between them were examined in terms of children and in the context of concept of technology using structural equation modeling (SEM). In this study, the scales of students' attitudes towards computer (SATC) and self-directed learning with technology for young students (SDLTYS) adapted into Turkish respectively by Demir and Yurdugül (2014) and Demir and Yurdugül (2013) were administered as measurement tools. 2219 students enrolled in either a public middle or secondary school located in Bursa and Ankara constituted the sampling of the study. As a result of this study, it was found that there is a positive high level correlation (r=.74) between aforementioned two constructs. In the full manuscript of the study, discussion regarding the findings of the study is included in detail.

Introduction

Today Web 2 technologies have brought about the emergence of a great deal of information in internet. This information accumulation has rendered Web 3 technologies inevitable and, thus, using tools of having access to information has gained importance. Therefore, individuals need to know a great deal of this unprecedented amount of information in order to be able to gain a place in the society and to go on their lives as productive beings. Nonetheless, due to restrictions such as time and cost, it has become almost impossible for individuals to reach this huge amount of information in formal environments like schools. That is why; students are expected to be able to learn in not only formal but also informal settings. In short, individuals are supposed to have the ability of lifelong learning without the presence of a teacher by identifying their own learning objectives, motivating themselves, choosing

the learning methods that fit best to themselves, assessing their own learning processes, and all in all, taking the responsibility of their own learning. And this could merely be achieved by individuals who are equipped with Self-Directed Learning with Technology (SDLT) skills. It is necessary for individuals to use technology and therefore to adopt positive attitudes towards computer (ATC) in order to develop their ability to learn in a self-directed way (Fishbein and Ajzen, 1975; Liu, Macmillan and Timmons, 1998).

It is the variable of students' attitudes towards the learning product in question that constitutes one of the main factors on their achievement in a certain field or shaping the design of the teaching programs. Therefore, those studies that are about students' attitudes towards learning domains and/or products are considered as noteworthy subjects of study among the studies regarding educational fields (Yurdugül and Aşkar, 2008).

When the literature concerning attitude is examined, it is likely to come across different definitions of the term attitude. Among them, the most general definition of the term accounts for the attitude with three components; cognition, affection and behavior (Bagozzi and Burnkrant, 1979; McGuire, 1985; Rajecki, 1990). Reid (2006) clearly defines these three components as follows:

1) It is some information about an object; beliefs and thoughts are components of it (Cognitive).

2) It is an emotion about an object; likes and dislikes are components of it (Affective).

3) It is a tendency regarding to a behavior; goals are components of it (Behavioral).

According to another definition, attitude is the magnitude of positive or negative impact that one performs towards a psychological object. This psychological object could be any symbol, person, situation, and/or idea (Thurstone, as cited in Kiesler et al., 1969). According to Alport, attitude is the state of being ready to a mental and neural action, forming the referring or operating force over individual's reactions towards all objects and situations acquired by experience (as cited in 2010). To put it another way, attitude is a status or tendency of emotional readiness, which is observed in the form of individuals' acceptance of or rejection to a certain person, group, institution, or thought (Sezen and Yanık, 2012). Attitude, with its the most plain definition, is an overall evaluation related to a psychological object possessing components such as "good-bad", "like-dislike", "helpful-harmful" (Ajzen, 2001).

According to definitions above, whereas some experts handle the components of attitude as a whole (Bagozzi and Burnkrant, 1979; McGuire, 1985; Rajecki, 1990), Fisbein and Ajzen (1975) are of the opinion that the measurement of attitude be only related to affective domain; therefore, behavior and cognitive component of it be evaluated separately. Ajzen (2001) and Crano and Prislin (2006), who allege that three components of attitude be handled irrespective of one another, put forward that attitude should be, broadly speaking, considered as a base for "evaluative judgments". That is to say; when individuals have the attitude, they make judgments among emotional dimensions such as good or bad, helpful or harmful, to be content or discontent, and important or unimportant. These evaluative judgments are always towards an object and, in general, these are called "attitude objects" (Crano and Prislin, 2006).

Attitudes are accepted as determiner of behavior and intention of it in the literature related to social psychology. Fishbein and Ajzen (1975) propose "the theory of reasoned action" assuming that attitude brings about intention of behavior concerning object. In this theory, intention of behavior affects the real behavior concerning object. For instance, it may be asserted that individuals' attitude towards usage of computer has an influence on their intention of usage (their desire in the future) and real computer usage. In this sense, ATC does not only explain students' acceptance of computer as a learning tool, but also plays crucial role in determining behaviors concerning computers such as using it in the future (Rosen and Weil, 1995; Teo, 2007).

The fact that Turkish National Ministry of Education has changed its educational policy and adopted the constructivist approach since 2005-2006 academic year has increased the importance of having the SDL with technology skill for Turkish students. Accordingly, in constructivist approach,

student-centered approach has been preferred instead of teacher-centered one and it has been seen as the duty of students to reach the information on their own and generate it rather than obtaining it from teacher directly, in a passive way. And this could be achieved by students who are using technology for their own learning and on their own, which is termed as self-directed learning with technology.

SDL is a complex concept and it is clearly defined by very few experts (Grow, 1991). Likewise, Brockett and Hiemstra (1991) point out that SDL concept is comprehended incorrect and the reason for this is the fact that in the literature there are many terms having similar or very close meanings. SDL is generally defined as follows:

"A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes"(Knowles, as cited in O'Shea, 2003).

Pilling-Cormich (1996:2) defines SDL as follows: "It is an approach to learning in which individuals determine their priorities and choose from various resources available".

There is a long-lasting debate in the literature as to whether SDL is a teaching method (teaching-learning process) or a learner characteristic (personality) or both of them at the same time. Nevertheless, teaching method approach is much more prevalent in the literature (Brockett and Hiemstra, 1991).

In the literature, SDL emerged in the 1960s as a learning characteristic of adults. In the subsequent decades, the concept was developed and amended. As a result of this process, the idea that SDL might also be valid for children came into being (Merriam and Caffarella, as cited in Nor and Saeednia, 2009). Similarly, Nor and Saeednia (2009) also indicate that children need to have SDL skills as well. Hence, the concept of SDL in children was dealt with in this study.

Another point that needs to be specified is that there has been a transition from SDL to Self-directed Learning with Technology (SDLT) (Demir and Yurdugül, 2013; Teo et al., 2010). In the literature, it was asserted that technology has an effect on SDL. Prior to 2000, during the times when internet has not been completely common, SDL was still possible. Yet, at present SDL has become unachievable without making use of the capabilities provided by the internet such as search engines, online libraries, social networking sites, and so forth. For this reason, SDLT substituted for SDL in the present day. Here, what is meant by the word technology is the electronic devices, which narrow the meaning of the word itself, and more narrowly the facilities provided by the internet.

In the present study, based on Teo et al. (2010), SDL is considered to consist of the integration of two constructs, which are intentional learning and self-management. Candy (as cited in Teo et al., 2010) defines self-management as individuals' eagerness and ability to manage their own learning. As far as intentional learning is concerned, it could be defined as individuals' consciously utilizing the technologies like computer and internet for the sake of their self-directed learning.

In today's world, information can be accessed anywhere and anytime in a fast and cheaper way thanks to mobile devices such as smart phones, tablet computers, and so forth. Briefly, technology is mandatory to be able to have an access to information in a self-directed way and to learn at anywhere and anytime. On the other hand, students' attitudes towards computers (SATC) play a key role in their acceptance of computers as a learning tool since their attitudes' has a direct influence on the fact that whether they will accept the tool provided to them or not (Fishbein and Ajzen, 1975; Rosen and Weil, 1995). Thus, it might be concluded that one of the learning characteristics that we need to take into consideration when we handle SDLT as a teaching and learning method should be students' attitudes towards computers. Besides, learning about students' attitudes towards computers, will guide us to construct their self-directed learning and reconstruct their learning, as well. Henceforth, the relationship between the two constructs, namely attitudes towards computers and the level of self-directed learning with technology, in middle and secondary school students was investigated within the scope of this study.

Method

Within current study, quantitative research paradigm was adopted utilizing correlational statistics.

Population and Sampling:

All middle and secondary school students in Ankara and Bursa comprised the population of this study. While the sampling for this study consists of 2219 students enrolled in twenty four different schools providing education at middle and secondary levels and located in Ankara and Bursa. Sampling was gathered by employing convenient sampling method. The distribution of participants according to some demographic variables is presented in Table 1.

Table 1. The Distribution of Participants According to Some Demographic Variables

Variable	Sub-Variable	Frequency (N)	Percentage (%)
Gender	Female	1101	49,6
	Male	1118	50,4
Grade level	5.grade	174	7,8
	6. grade	342	15,4
	7. grade	320	14,4
	8. grade	315	14,2
	9. grade	319	14,4
	10. grade	350	15,8
	11. grade	229	10,3
	12. grade	170	7,7
Total		2219	100

Based on Table 1, it is ascertained that sampling shows nearly a balanced distribution in terms of gender (female=49.6 % N=1101, male=50.4 % N=1118).

Data Collection Tools:

The data collection tool used in this study consisted of three parts. In the first part, participants were asked to answer some demographic questions such as gender. Then, the scales of SATC and Self-Directed Learning with Technology for Young Students (SDLTYS) were employed respectively.

The scale of SATC, developed by Knezek, Christensen and Miyashita (1998) and the short form of which was constituted by Teo (2008), was adapted into Turkish by Demir and Yurdugül (2014). The measurement tool of twenty items consists of three factors, which are computer enjoyment, computer importance, and computer anxiety. Each of first two factors consists of six items while the last one consists of eight items. Reliability coefficient of the scale was reported as 0.95. Cronbach alpha reliability coefficients of the factors of computer enjoyment, computer importance, and computer anxiety were calculated as 0.75, 0.80, and 0.81 respectively.

On the other hand, the original form of the scale of SDLTYS was developed by Teo et al. (2008) and it was adapted into Turkish by Demir and Yurdugül (2013). The six-item measurement tool consists of two factors, which are self-management and intentional learning, consisting of two and four items respectively. Reliability coefficient of the overall scale was reported as 0.73. When it comes to the reliability of the factors of the scale, it was reported to be 0.53 and 0.72 for self-management and intentional learning respectively.

Data Collection Procedure and Data Analysis:

First, necessary permission was obtained from the owners of data collection tools. Data were collected in paper-pencil format. After that, collected data were digitalized by entering into SPSS program. Frequencies and percentages were employed for statistical reporting. Data were checked in order to find out whether they are normally-distributed or not. Besides, independent-samples t-test was performed as the analysis method in order to identify whether or not there is a statistically significant difference in terms of variable in question according to gender. Furthermore, through Structural Equation Modeling (SEM) correlations amongst constructs were examined.

Findings

Within the context of current study, construct scores were obtained by digitalizing responses given to the aforementioned scales. Demographic findings with respect to these scores are presented in Table 2.

Table 2. Demographic Findings with respect to SDLTYS and SATC and Reliability Coefficients of the Related Scales

Main Construct	SDLTYS		SATC		
Dimensions	Self-Management	Intentional Learning	Computer Enjoyment	Computer Importance	Computer Anxiety
Observed	2216	2209	2208	2201	2197
Missing data	3	10	11	18	22
Mean	6,13	14,36	21,26	20,97	30,43
Expected Value (rank)	6	12	18	18	24
Standard Deviation	2,22	3,51	4,39	4,84	5,38
Skewness	-0,106	-0,612	-0,50	-0,274	-1,07
Kurtosis	-0,785	-0,12	0,01	-0,182	1,44
Minimum	2,00	4,00	7,00	6,00	8,00
Maximum	10,00	20,00	30,00	30,00	40,00
Reliability	0,59	0,77	0,72	0,79	0,80

In Table 2, when distributions of sub-sales scores in terms of skewness and kurtosis are taken into consideration it might be said that they comply with the rules of multi-variate normal distribution because they are between suggested levels which are -1.96 and 1.96 (Kline, 2011). In the table, reliabilities of the scales for current study were also reported. In addition to this finding, those obtaining higher scores from the computer anxiety factor must be interpreted as those having lower anxiety level because of negatively-worded items. On the other hand, mid-points of sub-scales were presented as expected rank value and this value was made use of in interpreting means. Based on this interpretation, students' values obtained from all sub-scales were larger than expected values. The differences of means according to gender were examined and the results were presented in Table 3.

Table 3. The Differences of SDLTYS and SATC Scores According to Gender

Main Construct	Dimensions	Gender	Mean	Standard Deviation	Homogeneity of Variance Significance	Difference Significance	Partial Eta Squared
SDLTYS	Self-Management	Female	6,17	2,19	0,46	0,59	0,00
		Male	6,12	2,24			
	Intentional Learning	Female	14,33	3,43	0,15	0,44	0,13
		Male	14,44	3,56			
SATC	Computer Enjoyment	Female	20,93	4,32	0,47	0,00	0,24
		Male	21,60	4,41			
	Computer Importance	Female	20,94	4,84	0,72	0,50	0,10
		Male	21,08	4,81			
	Computer Anxiety	Female	30,32	5,15	0,09	0,24	0,26
		Male	30,59	5,56			

* Homogeneity of variance: The test statistics of Levene for the homogeneity of the variance and t test statistics for the significance of the difference between means were employed.

According to Table 3, it is seen that error variances of all sub-scale scores are equal and except for the dimension of computer enjoyment in all other sub-scales there are no significant differences between male and female students at the significance level of 0.95. Solely in the dimension of computer enjoyment, it was uncovered that male students like computers more than female ones do. In order to

identify on which factor variable across genders is more influential, effect sizes based on Partial Eta Squared may be studied.

Findings with respect to Relationship between SATC and SDLTYS:

In this study, it was aimed to examine the relationship between SATC and SDLTYS. These relationships were handled in two steps: relationships between overall constructs (SATC and SDLTYS) and cross-relations amongst the components of these constructs (self-management, intentional learning, computer enjoyment, computer importance, and computer anxiety). For the general relationship between constructs, second order factor solutions of measures regarding SDL and SATC were computed and the findings were provided in Figure 1.
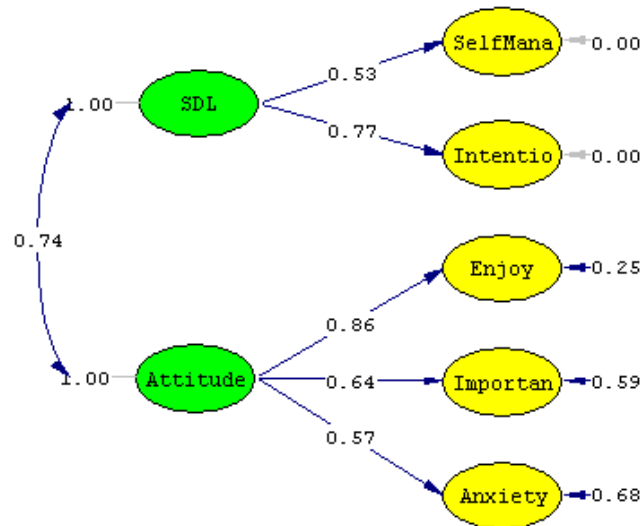

Figure 1. Relationship between SATC and SDL

The values of Goodness of Fit Indices (GFI), attained by the analysis of the model provided in Figure 1, were calculated as follows: GFI=0.92, CFI=0.90, NNFI=0.92, RMSEA=0.07. The data is in accordance with the hypothesized model (Schermelleh-Engel and Moosbrugger, 2003). Besides, as the correlation parameter of the model, the value of 0.74 was obtained (t=35.21; P≤.01). As a result, a strong positive relationship (Büyüköztürk, 2002) between two concepts was found out.

On the other hand, reaching more analytical results was aimed by also computing cross-relations among the components comprising the constructs of SATC and SDLTYS. That is why; correlational parameters obtained by having analyzed of the model provided in Figure 1 are presented in Table 4. According to these results, all cross-relations amongst components were found to be statistically significant, notwithstanding their being in various magnitudes. In particular, intentional learning, a component of SDLT, produced high level correlations with all components of SATC, while self-management component of it produced only significant correlations with all components of it, being in low level. As it was previously mentioned, self-management is students' willingness and ability to manage their own learning, yet intentional learning is their consciously benefiting from technologies such as internet and computer for the sake of their self-directed learning. In sum, students whose ATCs are positively high are found out to have more tendency to use computers and internet with the purpose of SDL, as well. Just the opposite of it is also proved valid.

Table 4. Cross-relations among the Components of the Construct of SATC and SDLTYS

		SATC		
		Computer Enjoyment	Computer Importance	Computer Anxiety
SDLTYS	Self-management	0,32**	0,17*	0,41**
	Intentional Learning	0,60**	0,58**	0,52**

(*) P≤0,05 and (**) P≤0,01

Discussion

At the end of this study, it was found that middle and secondary school students' SDLT levels showed no significant difference according to gender. When effect sizes of factors are examined, while effect size of the factor of self-management is reported as relatively low, that of the factor of intentional learning is found out to be a bit higher. Likewise, Abd-El-Fattah (2010) found that the self-management, motivation, and self-monitoring factors that were approached as the dimensions constituting SDL showed no significant difference according to gender. In addition, findings of the Carson (2012) promoted that of Abd-El-Fattah (2010), yielding no significant difference according to gender. Lastly, Oliveira and Simoes's (2006) findings supported that gender has no significant impact on SDL level of university students. In the literature, there are more studies supporting the fact that there is no significant impact of gender on students' SDLT levels (Hung, Chou, Chen and Own, 2010; Litzinger, Wise, Lee and Bjorklund, 2003; Yuan, Williams, Fang and Pang, 2012). As it is seen, there is a consensus in literature regarding the fact that students' SDLT levels do not change depending on gender.

In the current study, no significant difference was found in SATC according to gender, except for the factor of computer enjoyment. As far as the factor of computer anxiety is concerned, even though no significant difference across genders was found, higher effect size than other factors of SATC was obtained. Similar to this finding, Çelik and Ceylan (2009) compared secondary-school students' attitudes towards computers according to gender and found no significant relationship between them. Kılıçoğlu and Altun (2002) measured students' attitudes towards computer-based instruction and found that secondary school students' attitudes show no difference in terms of gender. Likewise, in a study carried out in the USA, Francis and Evans (1995) revealed that ATC does not change according to gender. Nonetheless, in contrast to findings of current and above studies, Köse, Gencer and Gezer (2007) examined the attitudes of students, recently started to vocational school of higher education , towards the use of internet and computer and found that male students show more positive attitudes than female students do. Like Köse et al. (2007), and Francis and Evans (1995) there are other studies in the literature attaining results revealing the fact that there is a difference of ATC according to gender amongst primary and secondary school students (Brosnan, 1998; Graff, 2003; Kadijevich, 2000; Sáinz and López-Sáez, 2010). All of the differences above are in favor of males. As it can be seen in above discussion as well, in the literature, it is not quite clear whether there is a difference of ATC across gender or not.

In this study, a strong positive relationship between SATC and SDLTYS was revealed when computer was adopted as an attitude object. When the literature was examined, it was seen that there are relationships between attitude regarding the attitude object and SDL in different contexts, as well. For instance, in a study conducted with students aged 4-16, Schwartz (2006) uncovered a relationship between freedom in educational settings and students' attitudes toward school. In another similar study, Faisal and Eng (no date) gave SDL tasks to highly-talented primary school students in the context of science education and ascertained that this increases students' attitudes. In the literature, similar results were also obtained in the studies carried out with adults. Mahmud, Haroon, Munir and Hyder (2014) revealed a significant relationship, albeit being not strong, between medicine students' SDL levels and their attitudes toward research. As it can be seen above, there are many studies in the literature attaining almost the same result that of current study concerning the relationship between attitude and SDL.

Conclusion

Attitudes are disposition, namely, an assessment towards an object, event, or a thought. Students respond to technological innovations as attitude objects cognitively, affectively, as well as behaviorally. These responses were classified into two as verbal and nonverbal ones by Ajzen (2005:4). Details with respect to this classification are presented in Table 5.

Table 5. Responses Used to Infer Attitudes (Ajzen, 2005:4)

Response Category			
Response mode	**Cognition**	**Affect**	**Conation**
Verbal	Expressions of beliefs about attitude object	Expressions of feelings toward attitude object	Expressions of behavioral intentions
Nonverbal	Perceptual reactions to attitude object	Physiological reactions to attitude object	Overt behaviors with respect to attitude object

The concept of attitude behind the adoption takes an important place in accepting new technological products. Particularly verbal-behavioral responses in the behavioral dimension reveal the intention of using computer within the scope of this study. Some students use computers as tools of having fun, whereas others use them in order to have access to information. On account of explaining this individual differences in using computer, in current study, the construct of SDLT was handled as the second variable. According to the results obtained in current study, it was revealed that students have moderate level ATC; furthermore, as students adopt computers more, they use them more often for SDL. Students are exposed to learning experiences based on officially-prepared instructional programs in that there are pedagogical learnings in middle and secondary schools. Therefore, self-directed learning with technology occurs in the experiences at the outside of schools. As a result, SATC promote their disposition regarding using technology with purpose of learning outside the schools.

Today e-learning approach has spread more and more and descended to secondary and even primary level (Etherington, 2008; Oreški and Savić, 2013). On the other hand, handling the concepts of SATC and SDLT from the point of e-learning readiness is possible, too. SDLT takes part at the core of e-learning readiness construct and SATC is related to computer self-efficacy (Hung et al., 2010). E-learning environments by nature are more autonomous and require students to learn in a self-directed way. Furthermore, to be able to interact with e-learning environments, students need to have positive ATCs. In conclusion, the concepts explored within the scope of this research might be handled from the point of e-learning readiness and these two concepts might be utilized with a view to having students become readier to e-learning or to adopt it.

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