VIRTUAL ENVIRONMENT INTERPERSONAL TRUST SCALE VALIDITY AND RELIABILITY STUDY

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ABSTRACT
The purpose of this study is in the process of interpersonal communication in virtual environments is available from the trust problem is to develop a measurement tool. Trust in the process of distance education today, and has been a factor to be investigated. People, who take distance education course, they could may remain within the process communicate with different people and different problems in different ways. In this context, this scale (VEITS) developed for the accurate detection of these problems and has been developed. İt is also can be used for measuring how much the individuals can reflect their real personalities in the virtual environments.
Keywords: virtual environments, interpersonal trust, social networks, validity, reliability

INTRODUCTION

The Internet represents the final point the technology of the modern world reached in terms of communication. Contribution of the Internet to globalization and their joint effect on the social structure brought along concepts such as cyber area and virtual reality (Erenay & Hashemipour, 2003; Ruzgar, 2005; Bostan, 2007; Murray & Waller, 2007). It is possible to assert that in today's complex and dynamic nature, there no longer is a considerable difference between the virtual and the real in terms of the flow of the daily life and life habits (Messinger et al., 2009). People routinely carry out their business-related and personal affairs synchronously both in the real and virtual environments (Riva & Galimberti, 1998; Bartle, 2003). This situation, which we can consider as the natural consequence of the interaction introduced by the Internet and developed depending upon the communication channels in the Internet, also brought along fundamental changes in the lives of people and their behaviors (Cheung & Lee, 2010; Lohse, 1998).

It is known that, in the traditional formal communication environments the source and the receiver are in an exchange of messages and the characteristics of these persons as the source and the receiver are defined and clear (Peters, 1999; Yalın, 2011). In other words, the answers of the questions such as what was learned, from whom it was learned, how was it learned, how much was it learned and what effect it had are clear. However, in virtual environments answers of these questions have mainly informal, or in other words, anonymous characteristics. It is possible to state that the virtual world, and particularly the social networking sites, is an informal world in itself, and it is not really possible to clearly answer the questions what an individual learns, from whom it learns, how much and how it learns in this virtual world (Bartle, 2003; Giard &Guitton, 2010).

The aspect that renders virtual environments, as a new communication channel in interpersonal communication, different from the traditional formal communication is the type of interaction they manifest (Moore, 1989). Interaction is naturally included also in formal communication. However, its type in the virtual environment can be defined as a dynamic simulation that is not only dependent to the technology, but also has an appearance similar to the real world (Bostan, 2007; Gunewardena ve McIsaac, 2004; Reeves, Malone, & O'Driscoll, 2008; Ergul,2005). According to Fiske (1990), communication is the social interaction that occurs by means of messages. In interaction, the important point is to know who provides the information and who controls the distribution in terms of timing and context (Jensen, 1999; Romiszowski ve Mason, 1996; Usta, 2011).

Examining how an individual perceives and interprets the outer world brings forward two apparently similar, but different concepts, namely sense and perception (Cuceoglu, 1997). While sense is defined as the neurotic process that occurs when sense organs are stimulated with the physical energy coming from the outer world, the process of giving meaning to the outer world in the human mind by interpreting sensory data is called perception (Cuceloğlu, 1997). In this process, way of living and the past experiences are important. As a consequence of globalization, which gathered speed with the Internet, the meanings of these two concepts changed, and as it changed the clothes and finery, entertainment, music and game preferences, particularly of the youngsters, it also caused difference in the way they communicate. These differences evolved into a new identity for those and a new informal concept as "virtual world identity" emerged (Li, Chau, & Van Slyke, 2010; Shin, 2008; Mazer, Murphy & Simonds, 2007).

Considering that internet users are the members of a virtual society, the individual stuck in between the virtual reality and the real reality is both the creator and the receiver of the message in virtual environments. In this

sense, as the individual has the possibility to make itself visible and step forth as it actually is, it can also conceal itself and always remain virtual (Kir, 2008). The ambiguous, anonymous and informal environment originated by the Internet made the individuals come up with the idea that they can fabricate new identities and enter into new environments with these identities. This may cause insubstantial or contrary to truth situations. For instance, it is known that individuals freed from all external pressures of the face-to-face communication tend to avoid the reality during their existence in the virtual world and in the process of creating identity, either due to their desire to use their imagination or due to personal security and preferences (Altun, 2008; Dunne, Lawlor, &Rowley, 2010). The most significant nature of this area, which is very different from the real life in terms of individual socialization, is that it does not have the various limitations of the real life (such as financial, social and physical limitations) and it can ignore the differences in social statuses. In this sense, the individual adopts an identity it imagines and can create his virtual personality as it is in its mind (Maczewski, 2002; Yee et al, 2007).

Individuals' ability to create their identities as they wish in the virtual platform, as explained above, brings into mind the issue of trust within this communication process. It is doubtless that, for the communication to be healthy, the source and the receiver have to be ready to communicate. However, the case where the receiver does not trust the source is considered as a noise in the communication process (Ergin, 1998). It is possible to state that, in the sense of utilizing internet sources more effectively, it is quite important to reveal how much the individuals trust to internet sources. However, at the end of the literature review carried out, no scale, the validity and reliability of which were demonstrated, for measuring individuals' attitude concerning their trust to each other in interpersonal communication particularly in the virtual environments could be found. The purpose of this study is to develop an attitude scale with the aim of determining individuals' trust-related attitudes in the virtual environments by filling this gap in the literature. Considering that the scale will be the first in its kind, it is believed that it can provide important contributions to the field. The fact that the interaction and fast communication made possible by the virtual environments bring along many problems is a social matter of fact (Pew Internet and American Life Project, 2010; Hinduja & Patchin, 2008). It is believed that the measuring tool to be developed at the end of this study will be useful in terms of manifesting the perception of the new concepts concerning the daily life, new manners of discussion and discourse, new kinds of friendships and new ways of understanding and perceiving, as well as the effects of virtual environments on the individuals' real identities and on the sense of trust in interpersonal communication.

In conclusion, this study is considered important in the way it aims to develop a tool for measuring how much individuals can reflect their own personalities in virtual environments. Within this frame, the purpose of the study is to develop the "Virtual Environment Interpersonal Trust Scale" (VEITS).

METHOD

Study Group

The study group consisted of 343 adult individuals using social networking sites, as 165 women and 178 men, from different cities and age groups. Age and gender related distribution of the study group is summarized in Table 1.

Table 1. Age and gender related distribution of the study group

Age Groups	Female	Male	**Total**
Between 17-19	39	13	**52**
Between 20-29	118	146	**264**
Above 30	8	19	**27**
Total	**165**	**178**	**343**

Scale Development Process

Within the development process, at first a literature review (Murray & Waller, 2007; Marcella, 1999; Belsey, 2005; Jung & Kang, 2010; Nowak & Biocca, 2003; Kim,2006; Lee, 2005; Gross et al., 2002; Taylor, 2002; Meadows, 2007) was carried out. Also five experts of the field were asked to write down the possible items that will be suitable to be included in the scale. 68 students were asked to answer open-ended questions regarding the topic and by analyzing the answers a pool of 36 items was created. Next to each of the items five choices were placed. These choices were arranged and scored as "(1) never", "(2) rarely", "(3) sometimes", "(4) usually" and "(5) always".

The draft items were examined by a linguistics expert, a psychological counseling and guidance expert and two educational technology experts, all having doctoral degrees in their respective fields, in terms of content, expression and wording and spelling and punctuation. After carrying out the necessary adjustments in line with the received criticism, the 36-item draft scale was established.

The draft scale was applied online to a randomly selected study group consisted of persons having profiles in social networking sites such as Facebook and Twitter. Collected data were then entered into the SPSS 15.00 software in order to carry out the validity and reliability analysis of the scale through statistical ways.

As part of the statistical analyses, first KMO and Bartlett test analyses were carried out on the collected data in order to determine whether factor analysis was to be conducted or not. Based on the obtained values, exploratory factor analyses were conducted on the data, the decomposition of the scale was determined by means of principal components analysis, and factor loads were examined via the Varimax rotation technique. After eliminating the items with less than 30 factor load analyses were repeated. Item discrimination power and item-total correlations of the 20 items that remained after removing the eliminated ones were tested with Pearson's r test and the validity of the scale was determined. In order to determine the reliability of the scale, stability tests were carried out with the internal consistency coefficients. In order to determine the level of internal consistency Cronbach alpha reliability coefficient, correlation between two equal halves, Spearman-Brown formula and Guttmann split-half reliability formula were utilized. Stability level of the scale was calculated by determining the correlation of the results of two applications of the scale, the second one made four weeks after the first one.

FINDINGS

The procedures followed and the findings obtained as part of the validity and reliability analyses of the scale are presented herein below.

Findings Concerning the Validity of the Scale

Within the scope of the validity analyses of the Virtual Environment Personality Description Scale (VEITS), primarily construct validity and item-total correlations were calculated. Findings are submitted below:

Construct Validity

In order to test the construct validity of the VEITS, fist Kaiser-Meyer-Oklin (KMO) and Bartlett test analyses were conducted on the data and KMO was determined as = 0,798 and Bartlett test value as x^2= 4111,30; sd=210 (p=0,000). From these values, it was understood that factor analysis can be made on the 36-item scale. Factor analysis is used in order to determine whether the items of scale can be put into a fewer number of factors that exclude each other (Balci, 2009). On the other hand, in consequence of the Principal Components Analysis and the Varimax Rotation technique made in line with this, the items with less than 0,30 factor load and the items that do not have at least 0,100 between their loads on two factors were excluded from the analysis (Buyukozturk, 2002).

In this respect, at first the principal components analysis was carried out in order to determine whether the scale is one-dimensional. In order to determine whether the scale is divided into factors that are unrelated with each other, Varimax rotation technique was implemented and the factor loads were examined. After the 16 items that had less than 0,30 factor load were removed accordingly, factor analysis was carried out on the remaining 20 items. The key criterion in evaluating the results of factor analysis is the factor loads included in the scale and that can be considered as the correlation between the factors (Balci, 2009; Gorsuch, 1983). Having high factor loads is considered as an indication that the variable can be included within the particular factor (Buyukozturk, 2002).

After these procedures, it was determined that the total 20 remaining items in the scale are gathered under three factors. It was determined that the KMO value of the 20-item final state of the scale is 0,810, while the values obtained from Bartlett Test werex^2=2513,707; sd=210; p<0,001. It was determined that the unrotated factor loads of the remaining 20 items were between the values of 0,348 and 0,769, while the rotated loads obtained after the Varimax rotation technique were between 0,485 and 0,876. On the other hand, it was determined that the items and factors included within the scope of the scale explain 48,763% of the total variance. As it is known, having no factor load less than 0,30 and having 40% of the variance explained in terms of behavioral sciences is considered sufficient (Buyukozturk, 2002; Eroglu, 2008). On the other hand, 20 items were gathered under three factors. Factor names were determined by examining the items included in the factors. While 9 items were gathered under the factor designated as "Virtual Honesty", there were 7 items under the factor designated as "Virtual Negativity" and 4 items under the factor designated as "Virtual Distrust".

This is shown in Figure 1, plotted according to the eigenvalues. It can be seen from Figure 1 that the first three factors feature rapid falls and consequently have significant contribution to the variance, yet the falls of the other factors start to become horizontal and therefore the contributions of their factors are close to each other (Buyukozturk, 2002; Eroglu, 2008).

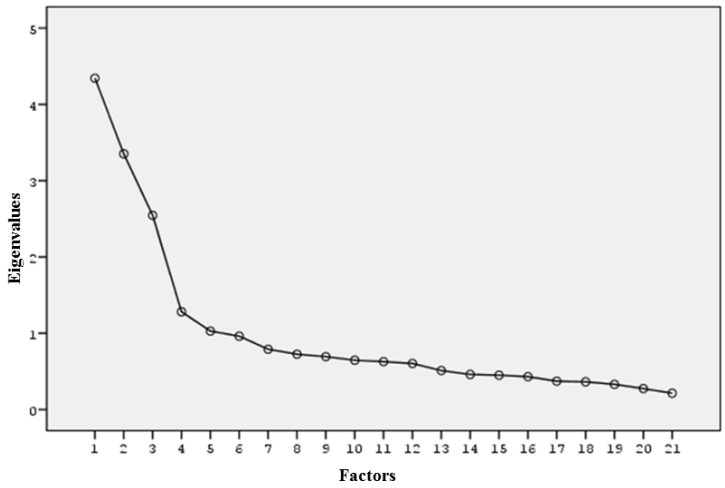

Figure 1. Eigenvalues as per the Factors

In consequence of these procedures findings regarding factor related item loads of the remaining 20 items, the eigenvalues of the factors and their rates in explaining the variance are presented in Table 2.

Table 2. Results of the Factor Analysis of the Scale

		Items	F1	F2	F3
Virtual Honesty	I1	In virtual environments I express my own world views (religious, political, ideological).	,743		
	I2	In virtual environments, I become member of the groups that reflect my world view.	,730		
	I3	In virtual environments, I share the contents that reflect my own world view (photo, music, article, etc).	,718		
	I4	In virtual environments, I discuss my own world view within groups.	,680		
	I5	The personality I put forth in the virtual environments is identical to my real personality.	,679		
	I6	I do not abstain from defending my political opinion in the virtual environment.	,677		
	I7	In virtual environments, I can easily express and share what I think.	,608		
	I8	In virtual environments, I give my real name, gender, address and age information.	,540		
	I9	My opinions and thoughts in the virtual environments are identical to those I have in real life.	,485		
Virtual Negativity	I10	In virtual environments, I share the photos of my friends without asking for their permission.		,702	
	I11	I curse and use slang in virtual environments.		,687	
	I12	I trust my virtual friends more.		,639	
	I13	I am often misunderstood in virtual environments.		,611	
	I14	I have difficulty in expressing myself in virtual environments.		,559	
	I15	I do not answer others' questions truthfully in virtual environments.		,547	
	I16	I am not interested in who someone I know from the virtual environment is in reality.		,537	
Virtual Distrust	I17	I do not trust to my virtual friends.			,876
	I18	I doubt my virtual friends.			,853
	I19	Virtual friendship is not my thing.			,769
	I20	I consider friendships in the virtual world as fake.			,705
		Eigen value	4,033	3,357	2,850
		Explained Variance	19,206	15,985	13,571

As it is seen from Table 2, the "Virtual Honesty" factor of the scale covers 9 items and factor loads vary between the values of 0,743 and 0,485. While the eigenvalue of this factor within the general scale is 4,033, the contribution it makes to the general variance is 19,206%. The factor “Virtual Negativity” covers 7 items. Factor loads of the items vary between 0,702 and 0,537. While the eigenvalue of this factor within the general scale is 3,357, the contribution it makes to the general variance is 15,985%. The factor “Virtual Distrust" includes 4 items. Factor loads of these items vary between the values of 0,876 and 0,705. While the eigenvalue of this factor within the general scale is 2,850, the contribution it makes to the general variance is 13,571%.

Item Discrimination

In this part item discrimination level was tested by calculating the correlations between the scores obtained from the factors and the scores obtained from each item in the factors according to the item total correlation method, or in other words, the level each item serves the general purpose was determined. The item-factor correlation values obtained for each item are presented in Table 3.

Table 3. Item-Factor Scores Correlation Analysis

F1 (Virtual Honesty)		**F2 (Virtual Negativity)**		**F3 (Virtual Distrust)**	
M. No	**R**	**M. No**	**R**	**M. No**	**r**
M1	,733(**)	**M10**	,683(**)	**M17**	,883(**)
M2	,696(**)	**M11**	,670(**)	**M18**	,846(**)
M3	,724(**)	**M12**	,638(**)	**M19**	,781(**)
M4	,628(**)	**M13**	,648(**)	**M20**	,737(**)
M5	,720(**)	**M14**	,613(**)		
M6	,657(**)	**M15**	,607(**)		
M7	,608(**)	**M16**	,555(**)		
M8	,593(**)				
M9	,563(**)				

N=343; **=p<, 000

As it can be seen from Table 3, item-factor correlation coefficients for the first factor vary between the values of 0,733 and 0,563, between 0,683 and 0,555 for the second factor and between 0,883 and 0,737 for the third factor. It is determined that each factor is significant and is in a positive relation with the general scale (p<0,000). These coefficients are the validity coefficients of each item separately and indicate the related item's consistency with the whole of the scale, or in other words, their level of serving for the general purpose of the scale (Carminesi, Zeller, 1982).

With the same purpose, also the corrected correlations between the score of each item and the total score of the factor minus the score of the given item, were calculated and presented in Table 4.

Table 4. Item-Factor Scores Corrected Correlation Analysis

F1 (Virtual Honesty)		**F2 (Virtual Negativity)**		**F3 (Virtual Distrust)**	
M. No	**r**	**M. No**	**R**	**M. No**	**r**
M1	,630	**M10**	,552	**M17**	,770
M2	,600	**M11**	,511	**M18**	,718
M3	,629	**M12**	,474	**M19**	,597
M4	,509	**M13**	,479	**M20**	,540
M5	,622	**M14**	,440		
M6	,535	**M15**	,417		
M7	,492	**M16**	,357		
M8	,465				
M9	,426				

N=343

As it can be seen from Table 4, corrected correlation coefficients between of each items in the scale and the factors they belong to vary between the values of 0,770 and 0,357. It is known that having a corrected correlation coefficient higher than 0,20 indicates that the item significantly serves the purpose of the related factor (Tavsancil, 2010). According to this, all of the items included in the scale serve the purpose of the factor they belong to.

Findings Concerning the Validity of the Scale

For the purpose of calculating the reliability of the scale, internal consistency and stability analyses were carried out on the data. Followed procedures and obtained findings are presented below:

Internal Consistency Level

Factor-based and in general reliability analysis of the scale that consists of 20 items and 3 factors, were calculated by utilizing Cronbach alpha reliability coefficient, correlation between two equal halves, Spearman-Brown formula and Guttmann split-half reliability formula. Reliability analysis values of each factor and the scale in general are summarized in Table 5.

Table 5. Results of Reliability Analysis Concerning the Scale in General and its Factors

Factors	Number of Items	Two Equal Halves Correlations	Spearman Brown	Guttmann Split-Half	Cronbach Alpha
Virtual Honesty	9	,676	,807	,786	,836
Virtual Negativity	7	,541	,702	,705	,744
Virtual Distrust	4	,667	,800	,800	,828

As it can be seen from Table 5, two equal halves correlations of the scale consisting of 3 sub-factors and total 20 items vary between the values of ,541 and ,676, Spearman Brown reliability coefficients between ,702 and ,807, Guttmann Split-Half values between ,705 and ,800 and Cronbach Alpha reliability coefficients vary between ,744 and ,836. According to this, it is possible to assert that the consistency levels of all three factors are high.

Stability Level

Stability level of the scale was determined with the use of test-retest method. As it is known, a reliable measuring tool has to make stable measurements (Balci, 2009). The final 20-item form of the scale was reapplied to the 73 students to whom the initial application was made. The relation between the scores obtained at the end of the both applications was examined at both separate item level and general scale level. In this way the capability of making stable measurements of the separate items and of the scale itself was tested. Findings are summarized in Table 6.

Table 6. Test-Retest Results of the Items of the Scale

M. No	*r*	M. No	*R*	M. No	*R*
M1	,897(**)	**M8**	,922(**)	**M15**	,860(**)
M2	,885(**)	**M9**	,917(**)	**M16**	,932(**)
M3	,901(**)	**M10**	,892(**)	**M17**	,951(**)
M4	,876(**)	**M11**	,876(**)	**M18**	,910(**)
M5	,855(**)	**M12**	,918(**)	**M19**	,948(**)
M6	,855(**)	**M13**	,652(**)	**M20**	,903(**)
M7	,873(**)	**M14**	,908(**)		

N: 73; **=p<0,000

From Table 6 it can be seen that the correlation coefficients of each of the items forming the scale, obtained by means of test-retest method, vary between the values of 0,932 and 0,652, and that each correlation is significant and positive (p<0,000). As it is known, reliability is related with the stability, consistency and sensitivity levels

of the scale. Due to this reason, these values determined as stability coefficients are considered as the evidence of the reliability of the scale (Hovardaoglu, 2000). According to this, it is possible to assert that the scale is capable of making stable measurements. The findings exhibiting the test-retest values of the factors of the scale are summarized in Table 7:

Table 7. Test-Retest Results of the Factors of the Scale

			Second Application		
			F1	**F2**	**F3**
Initial Application	**F1: Virtual Honesty**	**F1**	,872(**)		
	F2: Virtual Negativity	**F2**		,864(**)	
	F3: Virtual Distrust	**F3**			,876(**)

N: 73; **=p<0,000

It is seen from Table 7 that the correlation coefficients of the factors, obtained by means of test-retest method vary between the values of 0,864 and 0,876, and that each correlation is significant and positive (p<,000). According to this, it is possible to state that also the factors in the scale are capable of making stable measurements. According to the values obtained within the scope of reliability analysis, it is possible to consider that the VEITS is a reliable scale in terms of its capability of making consistent and stable measurements.

CONCLUSION

In this study a measuring tool that will determine to what extent individuals reflect their real personalities in virtual environments was developed. Being a five point likert-type scale, the VEITS consists of 20 items gathered under three factors. Each of the items included under the factors have choices as Never (1), Rarely (2), Sometimes (3), Usually (4) and Never (5).

Validity of the scale was tested through two different methods. The methods employed to test validity were (1) factor analysis and (2) item discrimination. According to exploratory factor analysis results, the scale consists of three factors. Considering the factor loads included in the factors, eigenvalues of the factors and the rates of explained variance, it is possible to assert that the scale has construct validity. Besides, having factor loads higher than 0,30 and having at least 40% of the variance explained is considered sufficient in terms of behavioral sciences (Kline, 1994; Scherer at al., 1988) .

Item-factor correlations on the data were calculated in order to determine the extent with which each of the items in the scale can measure the attributes that the related factors try to measure. Calculation of the correlation between the scores obtained from each of the items and the score obtained from the related factor, is used as a criterion in order to determine the level of each item in serving the general purpose of the factor (Balci, 2009). Accordingly it was determined that the correlation values between the scores obtained from singular items and the factors they are included in vary between the values of 0,357 and 0,770. Considering this, it is possible to assert that all items and all factors included in the scale serve to the purpose of the scale for measuring a particular attribute in a significant way and that all items are as discriminative as required.

Internal consistency coefficients of the scale were calculated by utilizing Cronbach Alpha, Spearman-Brown formula and Guttmann split-half reliability formula. It was determined that the two equal halves correlations of the scale vary between the values of ,541 and ,676, while Spearman Brown reliability coefficients are between ,702 and ,807, Guttman Split-Half values are between ,705 and ,800 and Cronbach alpha reliability coefficients vary between the values of ,744 and ,836. Pursuant to these values, it is possible to state that the scale is capable of making reliable measurements in terms of both its factors and in itself. As a matter of fact, having a reliability coefficient higher that ,70 is considered as an indication of the reliability of the scale (Buyukozturk, 2002; Gorsuch, 1983).

In order to determine the time-dependent stability level of the items of the scale, test-retest method was employed by using the data collected in two separate applications carried out with an interval of four weeks. The test-retest method was utilized both for the separate items and the sub-factors of the scale. It was determined that the test-retest correlation coefficients found for the separate items vary between the values of 0,652 and 0,932. As for the test-retest correlation coefficients calculated in terms of factors, they were determined to be varying between the values of 0,864 and 0,876. All of these correlations are positive and significant at the level of p<0,001. The reliability coefficient, which exhibits consistency level, increases as it gets closer to 1,00 and

decreases as it gets closer to 0,00 (Gorsuch, 1983). As it is known, while a correlation coefficient between the values of 0,00 and 0,30 generally indicates the presence of a low correlation, a value between 0,30 and 0,70 indicates a medium and an amount between 0,70 and 1,00 indicates high level of correlation (Buyukozturk, 2002). According to this, all of the items included in the scale are in a high level of correlation. Similarly, also the factors are determined to be in high correlation. Therefore, each item and each factor included in the scale are capable of making stable measurements in terms of time-dependent invariance.

In conclusion it is possible to state that the VEITS is a reliable and valid scale that can be used for measuring how much the individuals can reflect their real personalities in the virtual environments.

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