

Science Students' Friendship Communication Effectiveness Scale

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ABSTRACT

This study aims to develop a scale regarding the identification of the existing situation for the communication effectiveness in the friendship of students, who are in the last phase of their adolescence period. This scale that developed to identify the communicative effectiveness levels of adolescent science students in their friendships has been introduced as there is no other scientific scale in the literature. The scale was finalised with statistical analyses after administration to 504 students studied in the year of 2016-17. The final version of the scale has an internal consistency coefficient of .853 and a Kaiser-Meyer-Olkin (KMO) value of 0.738. The scale consists of 37 items with a 5 point Likert scale.

Keywords: adolescence, science students, friendship scale, scale development

INTRODUCTION

Mankind lives in a social integration with his surroundings. Healthy living and development require continuous interpersonal communication. Various researches have indicated that individuals can have a healthy life with the relationships among oneself, family, individuals within the community and friends. Sullivan (1953) claims that close friendships are significant in the enhancement of individual values. Friendships have a vital position in every phase of life, make the interpersonal communications easier and contribute to personal development. Such relationships have an indicative role during the maturity period in belonging to a group, sharing and taking responsibilities. There are also some findings related with the impact of communication within the social relationships framework on the learning process (Mangleburg & Bristol, 1998; Rose, 1998; Rose, Bush, & Kahle, 1998). Particularly the friendships in the adolescence period are known to be effective in the development of sexual identity (Atiket, Çoban, Çok, Doğan, & Karaman, 2014; Dinçer, 2008). Briefly, the friendships are crucial in the maturity of emotional, social and cognitive processes (Avcı, 2009).

Adolescence is the period that friendships have the most significance and are needed the most (Hortaçsu, 2003). The phase between the childhood and adulthood starting from the age of twelve until twenty-one is defined as the adolescence period (Yörükoğlu, 1998). During such a period, the adolescents use the majority of their lives for socialisation (Şahin & Özçelik, 2016). While socialisation is significant in every phase of individuals, it is experienced more intensively during the adolescence period through the influence of communication tools. Adolescents figure their maturity in the dimensions of mental, emotional, intellectual, behavioural and attitudinal fields (Steinberg, 2013). The individuals in such a period tend to communicate with their friends about their problems rather than with their families (Avcı, 2006; Steinberg, 2013). Considering the value that adolescents deem for their friends, the friendships have clearly an important role in the personality development.

Individuals must communicate to understand their surroundings, express themselves and live collectively (Üstün, 2005). In a healthy communication, individuals should have common meanings on the shared messages. The delivery of common perceived messages between the source and the receiver of the source in the way that the receiver perceives as well as the formation of correct feedback are important dimensions of the communication process within interpersonal communication (Owen & Bugay, 2014). Individuals should acquire listening and speaking skills for an effective communication (Dilekmen, Başcı, & Bektaş, 2008). Individuals with effective communication skills are generally self-confident, cooperative and sharing as well as working to find solutions to the problems of their own and others. Individuals, who experience problems in communication, stubbornly defend

Contribution of this paper to the literature

- This scale developed to identify the communicative effectiveness levels of adolescent students in their friendships has been introduced as there is no other scientific scale in the literature.
- The communication skills acquired by young people through their experiences from their communication processes with their friends and what they learn afterwards have an effect in the formation of tendencies.
- As there is no scientific scale for friendship communicative effectiveness in the literature, the formation of the scale items is not based on any model scale.

Table 1. Frequency Table of the Study Group

	<i>Study Group</i>	
	N	%
<i>Female</i>	276	54.8
<i>Male</i>	228	45.2
<i>Total</i>	504	100

their own ideas and do not accept any ideas contrary to theirs (Kumcağız, Yılmaz, Çelik, & Avcı, 2011). Individuals with poor communication skills during adolescence mainly end up shy, aggressive people who act inappropriately and are not accepted by their acquaintance (Demir & Kaya, 2008).

The negativities in the interpersonal relationships during the adolescence period might affect the relations in other periods of life. Hence the acquisitions regarding interpersonal relationships within the adolescent are vital. The starting point for the acquisition of communication skills requires knowledge about the status of communicative effectiveness. This study conducted was with the requirement of identifying the status of communication processes in interpersonal relationships during the adolescence period was aimed at developing a scale with the objective of determining the communication skills of adolescents in their friendships. The adolescents were considered within the scope of developing the friendship communicative effectiveness scale as friendship communication occurs at the most intensive level.

Within the perspective of this scope, this scale was limited to the views of university science students` friendship communicative effectiveness, a study group comprised of students from the universities located in the North Cyprus and involving the university students of the 2016-17 academic year.

METHOD

Study Group

The population of this study is the students from science department of private universities including the Maths Department, Geography Department, Physics Department and Environmental Sciences Departments in North Cyprus. No sampling was further conducted within the population. The research data were collected through a study group of 504 comprising of science department students of universities located in the North Cyprus. The gender distribution of study group formed among the students of the 2016-17 academic year was 54.8% female (n=276) and 45.2% male (n=228). The data concerning the study group are given in [Table 1](#).

Scale Development Process

As there is no scientific scale for the science students` friendship communicative effectiveness in the literature, the formation of scale items was not based on any model scale. A five phase process was followed in the development of the science students` friendship communicative effectiveness scale.

In the first phase of the scale development process, a group of 205 people comprising of 140 students from the science departments of universities located in the North Cyprus and 65 lecturers from the science departments of Eastern Mediterranean University, Cyprus International University and Near East University, respectively were asked open ended questions regarding friendship and communicative effectiveness and they wrote an essay of at least 250 words.

In the second phase of the scale development process, a pool of items given in the essays on the friendship communicative effectiveness scale was established. A draft scale with a total number of 51 items together with the items derived from the analyses of 205 essays collected as open ended and items aimed at measuring the behaviours collected directly by the researchers was created and then presented to 16 lecturers working in the field of communication in pedagogy communication and education psychology for their expert comments concerning the

Table 2. Item Analysis of Science Students` Friendship Communicative Effectiveness Scale

My friends that I chat with,	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's alpha if Item Deleted
1. ... act as if they know the things, which they don't.	85.3670	225.937	.403	.847
2. ... know when to talk.	85.6637	228.923	.336	.849
3. ... enjoy our conversations.	86.2832	228.492	.417	.847
4. ... have difficulties in communicating due to family perspectives.	85.8101	232.328	.174	.854
5. ... think that I understand them well.	86.1095	230.127	.305	.850
6. ... express themselves clearly.	85.9943	227.120	.430	.847
7. ... give me the trust to rely on what they say.	86.0673	222.904	.532	.844
8. ... trust what I say.	86.5057	229.301	.442	.847
9. ... think that what they tell is clearly understood.	86.0973	230.464	.332	.849
10. ... give me the feeling not to believe what they say.	85.2360	233.740	.161	.854
11. ... tell if they do not believe what they hear.	85.5287	223.163	.395	.848
12. ... feel that everybody listens to them carefully when they speak.	85.6484	227.195	.437	.847
13. ... tell meaningful things when they speak.	85.7801	226.830	.456	.847
14. ... support their words with visuals (image, shape, phone footage...).	85.3131	230.068	.253	.851
15. ... give examples about the issues in a conversation.	85.6246	230.551	.311	.850
16. ... emphasize the important points of a topic.	85.8161	223.026	.557	.844
17. ... hide some issues about me from me.	85.6155	230.927	.223	.852
18. ... tell the similar subjects about an issue.	85.5879	230.954	.329	.849
19. ... remind the surroundings how they acted before when the subjects become complicated.	85.6460	230.185	.332	.849
20. ... try to listen to me when I talk.	86.2259	228.382	.464	.847
21. ... want to talk about the topics that I need to talk.	86.0910	225.132	.473	.846
22. ... support their words with evidences.	85.5522	229.556	.343	.849
23. ... make an effort to impress me by changing their tones of voice.	85.3748	229.350	.297	.850
24. ... get ready to talk if the topic is known.	85.2328	230.374	.269	.851
25. ... try to observe my reactions about a subject.	85.8192	224.912	.484	.846
26. ... speak clearly for me to understand them.	85.5785	226.203	.400	.847
27. ... notice their mistakes during their speech.	85.3205	233.217	.196	.852
28. ... can talk easily in every place.	85.5579	228.389	.326	.849
29. ... always try to find a mistake when I speak.	85.6464	234.993	.103	.856
30. ... sometimes act as if they listen to me when they are not.	85.5822	235.891	.081	.857
31. ... observe my head movements during a conversation.	85.4488	228.946	.311	.850
32. ... make me feel that they try to understand my facial expressions.	85.7155	223.672	.507	.845
33. ... prefer to be physically close when the issue is important.	85.6799	226.768	.392	.848
34. ... try to tell me good things.	85.8246	226.000	.462	.846
35. ... ask me anything that they don't understand.	85.9478	230.057	.360	.849
36. ... explain to me the unclear issues when I ask them.	85.8289	228.486	.366	.848
37. ... sometimes nod to approve what I say.	86.0367	230.652	.268	.851

friendship and communicative effectiveness relationships. Finally a scale draft was developed based on the comments of the lecturers.

In the third phase of developing the science students` friendship communicative effectiveness scale, a pilot test was conducted with a total of 504 science students, which is equal to 12 times more than the number of items in the scale to test the reliability and validity of the tool created with the expert views. For the test analysis of scale reliability level, the internal consistency coefficient calculation was performed as a reliability test. The Cronbach's alpha coefficient was calculated to determine whether the scale is suitable for the study, and then the analyses were interpreted. Following the calculation performed with the Cronbach's alpha coefficient, the level of consistency of each behaviour of the science students` friendship communicative effectiveness with the total scale was determined.

After the reliability analyses and as can be seen in [Table 2](#), a total number of 5 items, which are items 3, 15, 16, 31 and 33, out of 42 items were eliminated as they have low correlation, and the third phase related to the validity and reliability test of the scale comprising of 37 items was completed. The items with low correlation value have lower distinctive feature showing relatively lower relation between the related items and the scale (Büyüköztürk, 2010).

In the next phase of the scale development process, the scale with 37 items changed from 42 items after the reliability analysis was subjected to an analysis, and following statistical analyses conducted for the reactions given to the items within the complete tool and the reactions for the general scale, the scale integrity with an alpha coefficient of .853 as seen in [Table 3](#) and a high correlation between the items was identified.

Table 3. Reliability Coefficient of Science Students` Friendship Communicative Effectiveness Scale

Reliability	r
Cronbach's alpha	.853
Inter-n From Correlation	.774
Spearman- Brown (r)	.796

Table 4. Correlation Matrix of Science Students` Friendship Communicative Effectiveness Scale

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
S1	.382	.367	.403	.122	-.016	.161	.020	.011	.038	.233	-.120	-.333
S2	.373	.145	.261	-.438	-.206	.184	-.233	-.258	-.076	.044	.288	-.083
S3	.445	.384	-.242	-.175	.090	-.127	.269	.011	.110	.090	.187	.247
S4	.133	.564	.046	.036	.193	-.175	.269	.028	.096	.193	.031	.024
S5	.344	.252	-.169	-.229	.368	.393	.225	.175	.151	.017	-.052	-.047
S6	.509	.106	-.180	-.307	-.019	.173	-.004	.053	.012	-.048	.377	-.111
S7	.575	.310	.065	-.213	-.153	.056	.033	-.075	-.155	-.178	-.081	-.103
S8	.522	.315	-.418	-.203	-.051	-.178	.157	-.146	.077	-.010	-.119	-.078
S9	.402	.339	-.463	-.005	.011	-.091	.155	-.240	-.074	.018	-.323	.083
S10	.119	.450	.429	-.082	-.007	-.059	.052	.209	.414	-.165	.042	-.247
S11	.452	.017	.105	-.295	-.316	-.035	-.128	.158	-.099	-.227	-.195	.007
S12	.525	.056	-.316	-.170	-.150	-.163	-.032	.228	-.126	-.280	-.060	.032
S13	.516	.243	-.147	-.284	-.350	.116	-.218	-.030	-.121	.101	.120	-.207
S14	.350	-.475	.394	-.335	.191	-.020	.089	-.217	-.036	.157	.037	.006
S15	.406	-.359	.317	-.256	.276	-.146	.234	-.260	-.171	.069	-.052	.121
S16	.598	.055	.299	-.114	.222	-.070	.144	-.043	-.270	.032	-.194	.147
S17	.181	.536	.265	.139	.351	.028	-.008	.051	-.286	-.105	.010	-.218
S18	.405	-.226	.179	.269	-.288	-.055	.143	-.348	.252	.195	-.145	-.055
S19	.388	-.231	.395	.141	-.168	-.037	.007	-.151	.246	-.318	.052	.040
S20	.515	.233	-.115	.412	-.170	.036	.016	-.358	.122	.135	.149	-.032
S21	.544	.116	-.107	.506	.060	-.101	-.134	-.169	-.118	-.225	.103	-.062
S22	.431	-.248	.080	.224	.014	-.127	.088	-.171	-.137	-.467	.245	.183
S23	.396	-.342	-.123	.282	.244	.050	.210	.225	-.188	-.083	.241	-.103
S24	.395	-.456	-.155	.093	-.260	.247	.017	.185	-.093	.053	-.063	-.182
S25	.565	-.134	.043	.246	.012	.036	.139	.188	-.119	-.089	-.278	-.227
S26	.475	-.169	.065	.207	-.190	.352	.453	.156	.075	-.008	.016	-.004
S27	.267	-.340	.044	-.011	-.342	.150	.255	.256	.004	.305	.160	.404
S28	.395	-.087	-.028	.146	.105	.099	-.416	-.056	-.446	.357	-.035	.039
S29	.039	.647	.221	.237	-.185	-.064	-.007	.146	-.093	.193	-.026	.259
S30	.013	.646	.220	.226	-.130	-.078	-.153	.124	-.021	-.041	.106	.306
S31	.421	-.352	-.082	.116	.102	-.484	-.125	.258	.082	.193	.185	-.138
S32	.571	-.122	.149	-.039	.016	-.392	-.067	.378	.009	.180	.084	-.035
S33	.492	-.210	.035	-.245	.065	-.353	-.265	.062	.319	-.021	-.195	.080
S34	.542	-.047	-.148	.268	.026	-.009	-.285	.012	.200	.142	-.092	.021
S35	.428	.013	-.192	.026	.394	.190	-.212	-.132	.287	.040	.305	.060
S36	.466	-.205	-.102	.031	.205	.297	-.224	-.014	.274	-.028	-.310	.162
S37	.290	.028	.200	.069	.189	.379	-.321	.220	.073	-.132	-.087	.315

Extraction Method: Principal Component Analysis.

a. 12 components extracted.

The Cronbach's alpha (α) reliability coefficient as .853 of the science students` friendship communicative effectiveness scale performed on 504 students is a significant indicator of high reliability of the scale (Gadernann, Guhn, & Zumbo, 2012).

The content validity and construct validity of the scale were undertaken in the further phase of the science students` friendship communicative effectiveness scale development process. The content validity of the scale was created conforming with the views from 12 field expert lecturers while for the construct validity, exploratory factor analysis was used as an indicator within the framework that the known eigenvalue is more than (Kaiser, 1960).

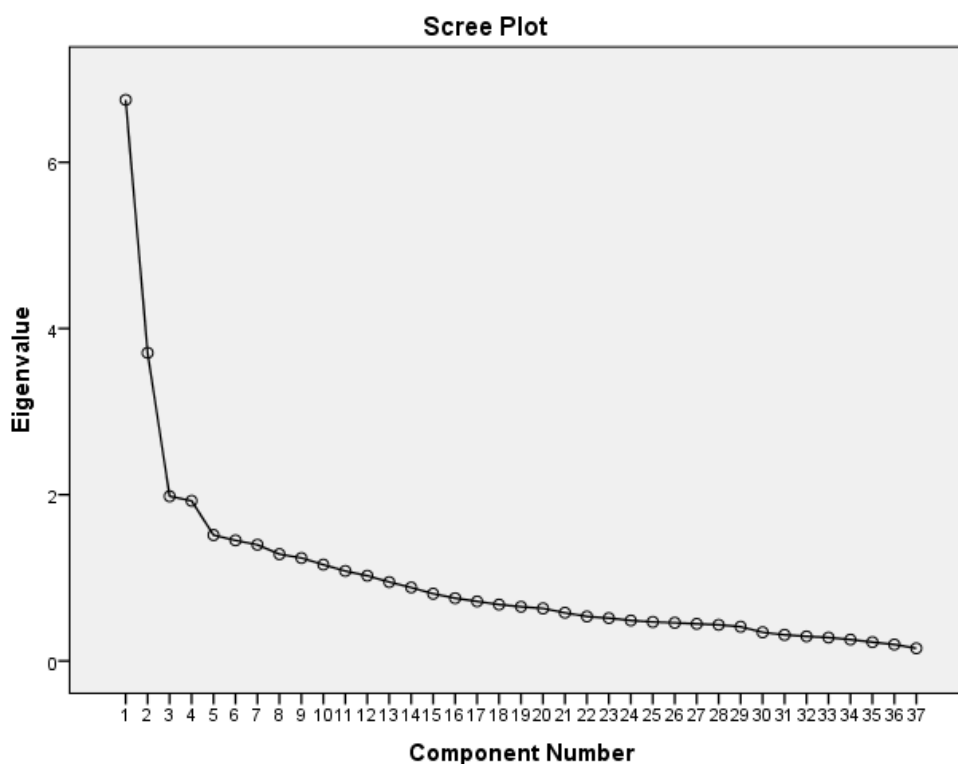
A 5 point Likert scale was used in the identification of communicative effectiveness levels under the science students` friendship communicative effectiveness scale. This rating is as follows: "Always (5), More than Average (4), Average (3), Less than Average (2), and Never (1)."

A specific interest was given to keep the item factor load at least .30 for more than 80% of items under the scale during the exploratory factor analysis. In terms of validity, the item factor structure generated from the exploratory factor analysis was tested for the model fit through the confirmatory factor analysis during the analysis.

The correlation matrix was reviewed whether there were any significant correlations for the items under the exploratory factor analysis within the scope of construct validity in the science students` friendship communicative effectiveness scale. **Table 4** indicates that there are significant relations suitable to conduct factor analysis.

Table 5. KMO and Bartlett's Test of Science Students' Friendship Communicative Effectiveness Scale

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.738
Bartlett's Test of Sphericity	Approx. Chi-Square	6641.898
	df	666
	Sig.	.000

**Figure 1.** Scree Plot Diagram of the Scale

Pursuant to the analyses concerning the correlation matrix conformation relation, Kaiser-Meyer-Olkin (KMO) and Bartlett's Sphericity tests were conducted. As known, KMO is an index comparing the extent of observed correlation coefficients and extent of partial correlation coefficients (Bastas, 2016). The rate of KMO more than .60 and less than .01 with a significant p value in the Bartlett's test show that the data set have the conformity for the Principal Components Analysis (Büyükoztürk, 2010).

As seen from the results of **Table 5**, KMO values are high (.738) and Bartlett test values are significant ($p < .01$) and data have conformity to the Principal Components Analysis. KMO value was .738 and is significant since $0.738 > 0.6$. The Bartlett's test Chi-Square is 6641,898 and degrees of freedom is 45 and significant ($p=0.00$, $p < 0.05$).

The results of Scree Plot analysis conducted as the last phase of the science students' friendship communicative effectiveness scale development process are given in **Figure 1**.

Pursuant to **Figure 1**, the items of the scale represent a factor between two points as a result of scree plot analysis. The finding that the curve related with the items in the table becomes straight is a crucial indicator for the validity of scale.

DISCUSSION & CONCLUSION

The continuation of friendships with strong background from the adolescence period for longer time periods have a significant influence for a young adult, who will go into professional and family life. According to Baiocco, Pallini, and Santamaria (2014), the strong relationships are usually developed with a best friend, one of the most important sources of emotional and social support both for children and adolescents (Baiocco, Di Pomponio, Nigito, & Laghi, 2011; Chen, French, & Schneider, 2006) - can positively influence individuation from the family (Baiocco, Laghi, Cacioppo, & Tafà, 2013; Cacioppo, Pace, & Zappulla, 2013; Wilkinson, 2004), and the formation of personal identity (Dunn, 2004). The communication skills acquired by young people through their experiences from their communication processes with their friends and what they learn afterwards have a determinant effect in the

formation of tendencies to be accepted in their family and work environment. For young people in the midst of the transition to adulthood, keeping 'in touch' is part of a dynamic process of constructing a social identity (Henderson, Taylor, & Thomson, 2002). In consideration of the starting point in relation with the communication skill levels of young people in their friendships, the science students' friendship communicative effectiveness scale has 37 items, which is developed as a result of the need to measure the communicative effectiveness of young people. Developed using a 5 point Likert scale, the science students' friendship communicative effectiveness scale has an internal consistency coefficient of .853 with .738 KMO values.

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