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ICT ethical leadership scale (ICTELS): A study of reliability and validity on Turkish pre-service teachers

Ahmet Naci Çoklar[1]

Abstract

In this study, a scale was developed to determine pre-service teachers' ICT ethical leadership levels. Effective leadership characteristics that were proposed by Harvey (2004) and computer ethics issues suggested by Mason (1986) were benefited by in developing the scale. ICTELS scale consists of 24 scale items. Findings of this study indicate that the reliability coefficient that was calculated using Cronbach's alpha was found to be 0.933. Given that the recommended reliability level for measurement scales that can be used in research is 0.70 (Hair et al., 1998; Namlu and Odabaşı, 2007), it is observed that the reliability level of the scale is high. Two different study groups were formed for the reliability and validity of the ICTELS scale. The study group that was formed for the construct validity of the scale consists of 305 senior students in the computer teaching departments in 9 different universities in Turkey (Anadolu, Atatürk, Dokuz Eylül, Ege, Gazi, İnönü, Onsekiz Mart, Sakarya and Selçuk universities) in the 2008-2009 academic year. 60,7 % of the students were male (185) and 39,3 % were female (120). The second study group was formed to obtain the criterion-related validity of the scale. The number of the students in the study group was 55. 64,5 % of the students were male (36) and 34,5 % were female (19). The scale had a four-factor structure and these factors were named mentorial, visionary, cultural and instructional ICT ethical leadership.

Keywords: Ethical leadership scale; ICT and ethics; computer ethics leadership.

[1] Department of Computer Education and Instructional Technology, Faculty of Education, Selcuk University, Meram, 42090, Konya, Turkey, ahmetcoklar@selcuk.edu.tr

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Introduction

Although flexibility of the digital structure makes the simplest operation called "copy and paste" possible, it also involves more operations. Accessibility to information, which can be reached easily on the internet environment (articles, music, film, software, books, personal information etc.) is also a kind of flexibility. These operations provide very important ease and convenience in daily life. However, drawbacks such as the question of reliability of digitalized information that is shared all over the world, its inappropriate use and infringement of intellectual property rights are among the disadvantages of information (Arigbabu, 2009; Woodson, 2002; Banerje et al., 1998). For example, a piece of information, which is easily accessible on the internet, can be used with reference to its owner or can be used unlawfully for ill purposes. The determining set of rules here concerns ethics.

Ethics and Computer Ethics

Ethical behavior is concerned with the enforceability of moral, social and legal rules as an indication of attitude. Langford (1995) defines ethics as an indicator that reveals whether decisions that have been made are right or not. Blank and Werner (1995), however, defines ethics as a philosophical science that investigates whether consciously performed human actions are right or wrong and emphasizes, regarding unethical behavior, especially the condition of their being performed consciously. On the other hand, it is argued that education is effective on ethical behavior. For example, Akbulut et al. (2008) state that explaining that the use of unlicensed software, besides its legal and personal concerns, is a kind of theft in terms of the information sector may change an individual's views about ethical behavior. These reveal the importance of ethics education and bring to foreground ethical leaders as individuals responsible for ethics education.

Computer ethics, on the other hand, is concerned with ethical behavior that encompasses the use of information and communication technologies (ICT). Various ethical problems have been experienced and are currently being experienced resulting from information and communication technologies in the process of transition to information society where digital information is used effectively. These ethical problems are generally named computer ethics (Floridi, 2001; Forester and Morrison, 1992; Moor, 1985).

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Ethical Leadership and ICT Ethical Leadership

Although leadership is generally defined as forming power and influence on followers, this definition is not sufficient for ethical leadership (Bennis and Nannus, 1986). Brown et al. (2005) state that ethics and leadership are two concepts those are complementary and should not be thought of separately of each other. Ethical leadership is generally defined as acting as leaders in displaying respect to the rights and works of other individuals within the society (Ciulla, 2005). This is a kind of leadership that develops ethical standards in order to direct the behavior of individuals in the society, integrate ethical standards into values and implement these ethical standards effectively (Connock and Johns, 1995). Ethical leadership needs to be considered in two dimensions (Khuntia and Suar, 2004). In the first dimension, ethical leadership requires implementation of a series of roles and behavior that are needed to continue functions and tasks. In other words, leaders need to know the social values very well and abide by them themselves. The process of influencing constitutes the second dimension of ethical leadership. The values, behavior, attitudes and beliefs of the followers must be influenced by leadership. Therefore, leaders should be convincing and acceptable to the society and possess certain qualities (Sergiovanni, 2006; Dimmock and Walker, 2002; Leithwood et al., 2001). Sergiovanni (2006) subsumed the qualities that a leader should have fewer than five headings, namely technical, human, educational, symbolic, cultural, and named these qualities as leadership power.

Resick et al. (2006) investigated studies on ethical leadership and found that these studies were conducted mostly on directors of an institution or organization and that ethical leadership was connected with orientation and the issue of administration Brooks and Normore (2005) and Starratt (2005), on the other hand, stated that the issue of administration came to the foreground in ethical leadership and that ethical leadership was valid for any field of discipline where behavior might be guided in terms of ethical rules as right or wrong and be a model. In this context, one of the disciplines for which ethical leadership needs to be defined and where ethical problems are frequently encountered is the computer and ICT technologies. Various different problems are being experienced concerning the use of digital information in the information age such as the use of illegal software, ready-made assignments on the internet and downloading of illegal mp3 from the internet. As a solution to such ethical problems, “ICT ethical leadership” should be defined as a new field of ethical leadership which does not exist in the relevant literature, but can act

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as a guide in the correct usage of computer and information technologies. In this regard, ICT ethical leaders need to posses both ethical leadership qualities and knowledge of ethical issues and rules in terms of information and communication technologies. A structural model suggestion was made in Figure 1 for ICT ethical leadership with its two dimensions.

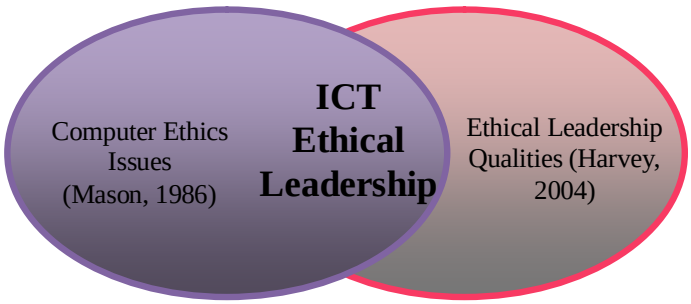

Figure 1. The Two Dimensions of ICT Ethical Leadership

As is seen in Figure 1, ICT/computer ethics leadership should be handled in two dimensions. In the first dimension, computer ethics leaders need to know the problems that are encountered in the field of computer ethics and be able to make suggestions for a solution. Computer ethics leaders do not need to be experts in the use of information and communication technologies, but they need to be aware of the problems that are encountered in this field, be able to make suggestions for a solution and know the importance of behaving ethically. In a study, that UNESCO (2002) conducted on ICT technological leadership as a similar subject emphasized that it was not necessary for technological leaders to be experts in the use of technology but it was important that they know the power that technology possesses and be aware of the significance of technology. Hackers can be given as an example in this regard. Hackers, who can use the computer very well, cannot be expected to act as ethical leaders. Instead, parents who can barely use the computer and tell their children not to download music from the internet illegally though they do not know how to do it are closer to being computer ethics leaders because of their responsible behavior concerning computer ethics. In this framework, awareness of issues of computer ethics comes into prominence. Mason (1986) investigated issues of computer ethics in detail. Another dimension is that being ethical leaders has certain requirements. Harvey (2004) states that a person should possess certain qualities to be called an ethical leader.

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Issues of ICT Ethics and Ethical Leadership Qualities

Mason (1986) subsumed the scope of computer ethics under four major topics on the basis of ethical problems that are experienced on the issue of computer ethics. These issues are intellectual property, privacy, accessibility and accuracy. The issues of computer ethics that were proposed by Mason (1986) (PAPA - Privacy, Accuracy, Property, Accessibility) maintain their relevance today in the use of ICT and are also used in studies (Akbulut et al., 2008; Marturano, 2002; Fairweather, 1997). These four concepts are explained as follows by Akbulut et al. (2008) (Table 1);

Table 1.
Issues of Computer Ethics (ICT) – PAPA (Mason, 1986)

Issue	Explanation
Intellectual Property	It concerns ownership of information, or who it belongs to. Electronic copying of works that have been prepared by others is easy and free of cost. The concept of intellectual property is related to both law and ethics. Moreover, students can have their homework done in the internet environment in return for a certain payment. This is also an issue that is connected with intellectual property.
Privacy	This involves security issues concerning personal information that is digitally stored in the computer environment. For example, ill-intentioned people who have the required knowledge may gain access to other people's computers by using gaps in the software or special software and learn private information about them.
Accessibility	This is the dimension that involves knowledge of using the required technology to access information and economic power that is needed for this. Some people experience problems accessing information or software especially due to economic difficulties.
Accuracy	This involves problems that are experienced concerning accuracy of information that is obtained from the internet especially because of a lack of supervision. Inaccurate information may be spread on the internet as if it were correct by ill-intentioned people.

As is seen from Table 1, four major issues need to be taken into consideration regarding computer ethics. These concepts are important in that they are major issues that should raise consciousness of followers of computer ethics leaders.

Ethical leadership is associated with the concept of Social Learning Theory proposed by Bandura and Moral Development Theory developed by Kohlberg (Brown et al., 2005). According to the social learning theory, ethical leaders should be reliable and followable models for followers. Moreover, social learning theory also deals with issues such as how

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and why ethical leaders should influence their followers (Bandura, 1977). On the other hand, the power that they possess and their social status have great importance as two factors that enable ethical leaders to be influential on followers (Brown et al., 2005). In his study, Harvey (2004) responded to the question "What qualities should an ethical leader possess?" and explained in detail the qualities that an ethical leader should possess under ten headings as can be seen in Table 2;

Table 2.
Qualities that an Ethical Leader Should Possess (Harvey, 2004)

Quality	Explanation
Raising consciousness of ethics	Ethical leaders regularly make reference to common values, business principles and ethical standards and ensure that they are understood, supported and adopted
Vesting people with responsibility	Leaders hold themselves and other people responsible for behaving in accordance with ethical values.
Being an example to people	Since ethical leaders speak and act with integrity, they have the right to expect the others to do so.
Making decisions in accordance with certain values	Ethical leaders take into consideration others and guiding principles at the decision making stage. They manifest their values in all their deeds.
Taking pains so that policies and practices are in harmony	This quality is in support of leaders' rules, standards, values and ethical principles. When they are faced with an ethical dilemma, they solve the problem within a short time and audaciously.
Offering education on ethics	Ethical leaders allocate time and resources to help people acquire confidence and skills that are required to transform correct beliefs into good behavior.
Paying attention to perceptions	Ethical leaders attach importance to the feelings, views and reactions of their colleagues, employees and all the others who fall in their sphere of influence.
Focusing on a stable and accelerating change	Ethical leaders make large numbers of small improvements in many fields. They easily adapt to ethical values and rules thanks to their sophistication.
Working with people who have ethical values and promoting them	While they are making decisions about choosing and promoting people who they will work with, ethical leaders use their mission, vision and values as criteria.
Supporting individuals on the issue of ethical behavior	Ethical leaders motivate followers to take initiative and act as guides rather than making complaints, accusing some others or waiting for others to take lead. Individuals should prioritise ethical values in the decision making process and question the results of the decisions in terms of ethical values.

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The ten-item ethical leader qualities that were proposed by Harvey (2004) are important in that they identify the duties and responsibilities of ethical leaders. Computer ethics leadership can be regarded as a combination of issues of computer ethics proposed by Mason (1986) and qualities of ethical leaders that were determined by Harvey (2004). In this sense, the use of information and communication technologies appropriately, with proper respect for personal rights, and reliably by the community is connected with computer ethics leadership.

Teachers' ICT Ethical Leadership Vision

All teachers have an important mission concerning teachers' ICT ethical leadership. This mission was emphasized within the standards of National Educational Technology Standards for Teachers (NETS•T), which were last updated in 2008, with the words "Teachers advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources" (NETS, 2008). Teachers' leadership roles were especially emphasized by UNESCO (2002), and teachers were assigned the leadership role under the title of "Social Issues" in terms of computer ethics in the model proposal for pre-service teacher training. Likewise, Leithwood et al. (2001) stated that teachers are models in terms of behavior, modeling and education as individuals who can influence their students in all fields. Sergiovanni (2006) argued that teachers were leaders in the school environment together with the administrators and that they should possess their administrative powers. One of the issues where teachers should act as leaders concerns ICT ethical issues. Teachers should lead their students as their followers, their colleagues, families and school administrators on the issue of ICT ethical behavior.

The Educational Level of Pre-Service Teachers in Turkey in Terms of Computer Ethics

Education is an important tool in having people acquires ethical values. In fact, it was stated that computer ethics can be taught and that people can be made to acquire computer ethics values via education (Akbulut et al., 2008). This situation was also taken into consideration by the Higher Education Council in Turkey, and education of ethical computer use was included in the teaching curricula. However, it is observed that rather than offering an independent course in this regard, the subject of "Computer and Ethics" was included as a

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small part of the course entitled "Computer I-II" (YOK, 1998). Moreover, it seems that very few universities offer independent elective "Computer Ethics" courses in their education faculties at the undergraduate level (YOK, 1998).

Method

The sample, procedure, data analysis phases of ICTELS scale is given in this section.

Sample

The study group of the research consists of senior year students in the Department of Computer Teaching at the Faculty of Education in the 2008-2009 academic year. Validity and reliability studies were conducted on two different groups for construct validity and criterion validity in the process of developing Information and Communication Technologies Ethical Leadership Scale (ICTELS). The first study group that was formed for the construct validity of the scale consists of 305 students who were in their senior year in the departments of computer teaching in 9 universities from different geographical regions of Turkey. 55 of the students (18,0 %) received their education at Anadolu University, 26 (8,5 %) at Atatürk, 23 (7,5 %) at Dokuz Eylül, 36 (11,8 %) at Ege, 29 (9,5 %) at Gazi, 34 (11,1%) at İnönü, 44 (14,4 %) at Onsekiz Mart, 36 (11,8 %) at Sakarya and 22 (7,2 %) at Selcuk Universities. Moreover, 185 of the students (60,7 %) were male and 120 were female (39,3 %). The second study group was formed to ensure criterion related validity of the scale. The number of students in this group, which was composed of senior year students at Anadolu University Department of Computer Teaching, was 55. 64,5 % of the students were male (36) and 34,5 % (19) were female.

Procedure

The first stage of ICTELS Scale was the determination of item pool. For this purpose, views were taken of 6 doctorate students who received achievement certificate for the "Computer Ethics" course that was offered by "EUROPEAID Co-operation Office" within the scope of "ODISEAME Project" and were attending Computer Teaching Department at Anadolu University. The doctorate students were given ""The Qualities That An Ethical Leader Should Possess" proposed by Harvey (2004) and "Computer Ethics Issues" proposed by Mason (1986) as printed materials before the item writing process. Then, the students

were asked the question "What qualities do you think an individual who can be an information and communication technologies ethical leader should possess? Write them down in items". All the students listed the qualities that ICT ethical leaders should possess item by item. After that, a team of 6 came together, discussed all of the items one by one within the group and an item pool consisting of a total of 31 items was formed. For content validity, 31 items that were thus obtained were presented to the attention of eight academicians who were experts in the field, employed in the Computer Teaching Department, and engaged in studies concerning Computer Ethics. While 5 of the academicians found all of the 31 items relevant to the scale, 1 field expert suggested that a new item be added to the scale. The item in question was added to the scale after a discussion with the doctorate students. All the items in the scale were in the form of statements. The items in the scale concerned the students' perception of themselves as ethical leaders regarding ICT use.

The 32 items included in the ICTELS scale were stated in the form of 5-point Likert type as; "I totally agree - (5), I agree - (4), I am undecided - (3), I do not agree - (2), I totally disagree - (1)". The highest total score that can be obtained by a student from the whole of the scale is160, whereas the lowest score is 32. High total scores indicate that students consider themselves competent regarding information and communication technologies ethical leadership while low total scores mean that students think their ICT ethical leadership competence is low.

Data Analysis

The following procedures of analysis were performed during the process of development of ICTELS scale and SPSS 15.0 (Statistical Package for Social Sciences) was used in the analysis of data.

Internal construct validity

Exploratory factor analysis (EFA) was used in order to determine the construct validity of ICTELS scale and reveal its factor structures. However, first, appropriate of the factor data was checked for factor analysis. For this purpose, the results of Kaiser -Meyer-Olkin (KMO) and Bartlett's Test of Sphericity were considered (Field, 2005).

In order to determine all of the items included in the scale and to reveal the factor structure, Principal Component Analysis and Varimax rotation were run. In this process,

certain criteria were taken into consideration such as: the value of the item total correlation index should be over 0.3; the factor loadings should be 0.4 or above; and finally, the inter-factor loadings should be at least 0.1 (Hair et al., 1998; Namlu and Odabasi, 2007). While developing the ICTELS, the item total correlation index value for Varimax rotation was taken as 0.4 or above in order for the inter-factor discrimination to be more evident.

Internal consistency

To determine the degree of homogeneity among the ICTELS items, Cronbach's Alpha (α) coefficient was calculated. On the other hand, Pearson correlation coefficients for The Spearman Brown split-half reliability Coefficient were considered in order to determine reliability for the whole of the test.

Criterion-related validity

In order to determine criterion-related validity of ICTELS scale, the students were administered "Ethical Leadership Scale", which was developed by Yilmaz (2006) and consisted of 44 items to evaluate their head of department, and the Pearson's product–moment correlation coefficient between ICTELS scale and this scale was considered.

Scale and Item Discriminations

The significance of the difference between the item scores of the highest 27 % and the lowest 27 % was investigated according to their scores from the scale using t test in order to determine to what extent each item in the scale was able to discriminate the students in terms of computer and communication technologies ethical leadership. Moreover, item total correlations were considered in order to determine the item discrimination of each item in the scale.

Results and Discussions

Internal construct validity

In order to run the principal component analysis on the 32-item ICTELS, it is necessary to check whether the data were appropriate for the factor analysis. There are different ways to do this. One is to look at the result of Bartlett's Test of Sphericity (Stewart, 1981). In the present study, when the results of Bartlett's Test of Sphericity test were examined (χ^2= 3805.494; df = 276; p <.001), it is seen that the data are appropriate for the

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factor analysis. Similarly, the appropriateness of the research data for the factor analysis was checked with the value of Kaiser-Meyer-Olkin (KMO), which is another method for checking data appropriateness to factor analysis. These values help interpret the appropriateness of factor analysis. It was seen in the present study that the research data are appropriate for the factor analysis because the KMO value (0,942) meets Kaiser's (1974) requirement. Kaiser–Meyer–Olkin measure of sampling adequacy (KMO) was calculated for individual and multiple variables. Values above 0.9 were considered as excellent, and the percentage of non-redundant residuals with absolute values above .05 should be less than 50% (Field, 2005).

8 of the 32 scale items were removed as a result of the exploratory factor analysis (EFA) that was conducted for ICTELS scale and the scale took its final form with its 24 items. The factors that made up the scale accounted for 57.375 % of the total variance. Table 3 shows the variance that each factor has and the loading value that it has in total variance.

Table 3.
ICTELS Results of the factor analysis: total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.591	39.965	39.965	9.591	39.965	39.965	4.478	18.659	18.659
2	1.904	7.935	47.899	1.904	7.935	47.899	3.866	16.110	34.769
3	1.243	5.178	53.077	1.243	5.178	53.077	2.992	12.467	47.237
4	1.031	4.297	57.375	1.031	4.297	57.375	2.433	10.138	57.375

* Extraction method: principal component analysis.

28 items were subjected to the procedure of "Varimax Rotation" in order to determine what items the 4 factors that constituted the scale were composed of. The Varimax method is a method that can be used to determine what item is in what factor based on item loading values (Ferguson and Cox, 1993). Thus, items that formed the factors were determined. Moreover, each factor was given a name by examining the items that constituted the factors. Factors, names given to factors, items that formed the factors and descriptive statistics about these factors are given in Table 4.

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Table 4.
Factors and items of ICTELS scale

	Items and factors	Mean	High-low 27% difference t test	Item total correlations	Component factor load	Varimax factor load
Factor 1. Mentorial ICT Ethical Leadership (α=0.881)						
1	I warn other teachers and administrators who I work with in the same institution about cooperating in order to increase ethical ICT use.	2.53	13.148	0.588	0.598	0.730
2	I tell people to pay attention to ethical principles while they are making decisions about an ICT-related procedure (building software, finding resources on the internet etc.).	2.58	12.677	0.594	0.642	0.688
3	I interfere in a problem that is experienced in an ethical issue concerning information and computer technologies.	2.48	9.162	0.453	0.493	0.631
10	I can explain to the people in the environment where I live the damages caused by the use of unethical use of ICT.	2.57	15.598	0.552	0.643	0.625
5	I tell people to behave ethically regarding the use of computer and communication technologies.	2.28	13.276	0.633	0.633	0.617
4	I warn people who act unethically on the subject of computer and internet use that they have legal obligations.	2.33	12.286	0.476	0.561	0.614
6	I can explain with examples to my colleagues and/or parents ways of unethical use in order to prevent my students' unethical ICT use.	2.18	11.943	0.565	0.639	0.607
11	I can explain to my students and stakeholders why they should behave ethically on the subject of ICT use.	2.94	16.625	0.517	0.579	0.605
9	I can resort to various different ways that will enable their ethical ICT use according to their views and reactions.	2.43	15.035	0.621	0.733	0.599
7	I can act as an expert to solve objectively and within a short time a dilemma that students will experience on the issue of an ethical ICT use.	2.49	12.384	0.459	0.626	0.520
Factor 2: Visionary ICT Ethical Leadership (α=0.862)						
17	I can determine ethical rules concerning the latest information and communication technologies.	1.91	9.855	0.611	0.628	0.721
16	I can investigate existing ICT ethical behavior standards and share this with people.	2.27	11.499	0.632	0.673	0.686
19	I can determine the steps that have to be taken to solve the ICT ethics problems that are being experienced and which people are inured to	2.15	12.555	0.627	0.716	0.675
21	I can make a list of ICT ethical rules that have to be obeyed.	2.16	13.306	0.588	0.678	0.664
23	I make an effort to spread ethical behavior to all areas of life as ICT also affects ethical behavior.	2.21	11.370	0.523	0.651	0.608
22	I myself endeavor to raise consciousness about exemplary ethical behavior and practices and ethical ICT use.	2.26	11.548	0.509	0.654	0.588

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Factor 3: Cultural ICT Ethical Leadership (α=0.804)						
28	I encourage rewarding of students who use information and communication technologies ethically in different ways.	2.52	10.119	0.543	0.538	0.686
26	I approve of the punishment of individuals who act unethically on the subject of ICT use.	2.36	10.725	0.600	0.660	0.661
27	I object to views that claim acting ethically on the subject of ICT use is a loss.	2.32	10.908	0.584	0.626	0.648
32	I support moral, social, religious etc. formations in order to promote ethical ICT use.	2.31	8.859	0.464	0.545	0.559
30	I advocate decisions and legal regulations that will help spread an awareness of ethical behavior on the subject of ethical ICT use.	2.43	13.246	0.563	0.691	0.538
Factor 4: Instructional ICT Ethical Leadership (α=0.801)						
14	I can give education to my students about ICT ethics.	2.65	12.630	0.743	0.628	0.785
13	I can direct my students to educational sources where they can learn ethical computer use.	2.58	14.364	0.715	0.671	0.732
15	I make an effort to include activities that will provide ICT usage skills while I plan teaching processes for different subjects.	2.70	11.062	0.610	0.592	0.682

* The reliability coefficient for the whole scale, (∝=.933).

As can be seen from Table 4, ICTELS scale consists of a 4-factor structure. These factors that were obtained in the scale express the leadership qualities proposed by Sergiovanni (2006) and Dimmock and Walker (2002). Of these factors, the first factor, which consisted of 10 items, was named "mentored ICT ethical leadership", the second factor, which consisted of 6 items was named "visionary ICT ethics leadership", the third factor, which consisted of 5 items, was named "cultural ICT ethical leadership " and the fourth factor, which consisted of 3 items was named "instructional ICT ethical leadership".

The first factor, which had the highest number of items, was named "Mentored ICT Ethical Leadership" because of an investigation of its items and this factor accounts for 39.965 % of the total variance. Mentorship is explained as the act by people (such as teachers and advisors) who have knowledge and experiences of sharing information and experiences with those who are under their responsibility (such as students, colleagues and parents), guiding them and directing them (Rose, 2003; Ragins and Cotton, 1999). When the items that constitute the factor are examined, it is observed that they involve items which state that ICT ethical leaders can warn the individuals in the institution where they work such teachers and administrators, besides the students, explain why it is necessary to behave ethically and/or point out what may happen if they do not act ethically, intervene in the problems that are experienced, encourage followers to act ethically, warn those who do not

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so that they have legal obligations, explain what is non-ethical behavior, follow different courses on the issue of followers' ethical behavior and help solve the problem with their expertise when an ethical problem arises. Likewise, Rowley (1999) identified teachers' roles as good mentors as follows: effective interpersonal communication, modeling continuous learning, supporting teaching services, being able to empathize and adopting mentorship services. The factor that consists of the aforementioned items are named "Mentoral ICT Ethical Leadership".

On the other hand, "Visionary ICT Ethical Leadership", which is included in the scale and accounts for 7.935 % of the total variance, involves items such as determination of new ethical rules concerning ICT use, making a list of ethical rules that must be obeyed, making efforts to raise an awareness about ethical behavior, investigating existing ethical standards and sharing them with people, and making an effort to spread ethical behavior. In their study on visionary leadership, Stam et al. (2010) stated that visions that were created by leaders for visionary leadership turned into values for the followers that were determining, motivating and geared to high performance. Moreover, Westley and Mintzberg (1989) determined 5 fundamental qualities for visionary leadership, namely creator, proselytizer, idealist, bicolor and diviner. Based on its items, this factor was named "Visionary ICT Ethical Leadership".

Ethical leadership are classified into two titles in the literature: transactional and transformational leadership (Bass, 1998; Bycio et al., 1995). Transactional leadership is founded on contingent rewards and management by exception, motivates followers to achieve the goal, and focuses on bottom-line results (Eagly et al., 2003; Odom and Green, 2003). Odom and Green (2003) concur, suggesting that transactional leadership creates a climate where even good intentions are more likely to result in unethical behavior. On the other hand, transformational leadership is based on vision, trust-building, core values, continuous learning and long-term sustainability. Such leadership motivates followers to achieve a vision moored on objectives that include concern with all stakeholders, and acts as a leader (Torpman, 2004) to followers for moral development. From this perspective, it can be said that ICTELS ethical leadership scale bears qualities of transactional ethical leadership with the "mentored ICT ethical leadership factor", and transformational ethical leadership qualities with the "visionary ICT ethical leadership factor".

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"Cultural ICT Ethical Leadership", which is the third factor, accounts for 5.178 % of the total variance. Sergiovanni (2006) mentioned cultural leadership as one of the leadership powers. Sergiovanni (2006) defined cultural power as making enduring values, beliefs and cultural strands intelligible and reinforcing them in order to have followers of cultural power act ethically. It is observed that the items that constitute the relevant factor involve items such as rewarding of ICT ethical behavior, punishing unethical behavior, not considering ethical behavior a loss, supporting social formations and advocating legal regulations. Considering that the items were in conformity with the qualities of cultural ethical leadership proposed by Sergiovanni (2006), this factor was named "Cultural ICT Ethical Leadership".

The last factor had a variance value of 4.297 %, and it was observed that all the items were focused on education on ICT ethics (giving ICT ethics education, making reference to sources on this subject, including ethical ICT skills in the teaching of different subjects). Blase and Blase (1998) emphasize that instructional leadership must also be provided in order to achieve success on the subject of ethical leadership. Leithwood (2001) emphasized importance of ethical instruction as one of the leading dimensions of ethical leadership and named this quality "instruction", whereas Sergiovanni (2006) called this dimension as "educational" as one of the powers that ethical leaders should possess. However, this factor was named "Instructional ICT Ethical Leadership" as the relevant items in the ICTELS scale directly involve instructional activities.

Internal consistency and reliability

Cronbach's alpha values were calculated in order to determine internal consistency of ICTELS scale items and found to be $\alpha=0.933$ for the whole of the scale (Table 4). Moreover, internal consistency coefficients were calculated to be $\alpha=0.881$ for the 1st factor, $\alpha=0.862$ for the 2nd factor, $\alpha=0.804$ for the 3rd factor and $\alpha=0.801$ for the last factor. In order to evaluate internal consistency of a scale, the calculated cronbach's alpha value needs to be above 0.70 (Eskiler, Sarı and Soyer, 2011; Namlu and Odabaşı, 2007). In this context, it can be said that both the whole of the scale and all of the items that constitute the scale are reliable.

On the other hand, Pearson correlation coefficient belonging to The Spearman Brown split-half reliability Coefficient was calculated and found to be $r=0.820$. If Spearman Brown correlation coefficient is 0.70 and above, it demonstrates that reliability has been provided

for the whole of the test (Gravetter and Forzano, 2009). Therefore, it was observed that ICTELS scale was reliable for both the whole of the scale and for internal consistency.

Criterion-related validity

"Ethical Leadership Scale", which consisted of 44 items and was developed by Yilmaz (2006), was administered to 55 students in order to determine criterion-related validity of ICTELS Scale. A positive and significant relationship ($r = 0.67$, $p < 0.01$) was found between the scores of ICTELS scale and "Ethical Leadership Scale".

Scale and item discriminations

High-low 27 per-cent group method was used in order to determine item discrimination of ICTELS scale and reveal to what extent the items predicted the total score. In other words, whether the scores that the high 27 % group who got the highest score for each item according to the scale scores (82 people), and the low 27 % group (82 people) who got the lowest scores from the score were significant or not was analyzed using the t test (Table 4). It was observed that t values concerning the significance of difference between item score averages varied between 8.859 ($p<.001$) and 16.625 ($p<.001$).

In order to determine item discrimination of the 24 items in the ICTELS scale, item total correlations were also investigated. Item total correlations of the items varied between 0.453 and 0.743 (Table 4). The items of the scale were found to be discriminating because it is accepted that if item total correlation is 0.30 and above, then items are considered qualified enough to discriminate the quality to be measured (Field, 2005; Popham, 2000).

Discussion and Suggestions

A scale (ICTELS) was developed within the scope of this study in order to measure the ethical leadership levels of pre-service students concerning the use of information and communication technologies. Reliability and validity of the scale that was developed were calculated. The EFA analysis, which was made in order to explain factor structures, indicated that there was a four-factor structure in the 24-item scale. These factors were named mentored, visionary, decision-making and instructional ICT ethical leadership.

Cronbach's alpha and Spearman Brown Split-half Reliability Coefficient were calculated for the internal consistency and reliability of the scale and they were found to be $\alpha=0.933$ and $r=0.820$ respectively. It was concluded that the scale both met the condition of

internal consistency and was reliable. In order to determine the reliability of the scale, "Ethical Leadership Scale", which was developed by Yilmaz (2006) and tested for reliability and validity, and the criterion-related validity of the ICTELS scale, were considered. ICTELS scale was found reliable based on this criterion.

The high-low 27 % group method and item-total correlation of the items were considered in order to determine item discrimination of the scale. Both the results of the t test obtained from the high-low 27 % groups and the item-total correlation values of the items demonstrated that items of the scale were able to discriminate the ICT ethical leadership levels of the pre-service teachers who participated in the study.

Cultural adaptation of the ICTELS scale can be suggested within the scope of the study. Education given in different countries/cultures on the subject of ICT and legal regulations of countries concerning ICT may reveal new dimensions and factors for teachers' ICT ethical leadership. Avolio and Bass (2002) stated that the impact that emerged on the subject of ethical leadership might vary from country to country. Moreover, it can be included in projects (NETS, CARET, NECC etc.) organized by organizations such as International Society for Technology in Education (ISTE), which are of American origin but receive international recognition in many countries like Turkey, using the ICTELS scale or scales with international dimension that will be developed. Large-scale applications of this type will enable teacher-training programs of countries to become more sensitive on the subject of ICT ethics problems and help solve ICT ethics problems through education.

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