

TEACHING INFORMATION AND COMMUNICATION TECHNOLOGY ETHICS WITH CASE-BASED INSTRUCTION: EFFECTIVENESS AND PRESERVICE TEACHERS' PERSPECTIVES

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ABSTRACT

Non-ethical Information and Communication Technology (ICT) usage may be minimized by understanding ethical problems related to the ICT. In addition, successful implementation of ICT requires not only developing practical skills about ICT but also gain basic knowledge regarding ICT ethics. However, in Turkey, only few universities offer courses about ICT ethics. Thus, the rationale behind this study is to teach the basic of ICT ethics to preservice teachers with the aim of raising awareness on this underestimated issue. Accordingly, this instrumental case study aims to investigate prospective teachers' perspectives on ICT ethics and effectiveness of specifically designed course with a case-based instruction to teach the fundamentals of ICT ethics. The data was collected qualitatively before and after the course from 24 prospective teachers selected with convenience sampling. The data was analysed with inductive content analysis and findings indicated prospective teachers, though not having adequate knowledge and awareness, have gained the basics of ICT ethics thanks to the specifically designed course. They favoured the course due to its design and content. This study highlights a need to offer such courses or programs to teach ICT ethics.

Keywords: *ICT ethics, ethics, cybercrimes, computer ethics, case-based instruction*

INTRODUCTION

ICT has become an indispensable part of today's classroom. However, it also presents new challenges for its developers and users (Duquenoy, Martens, & Patrignani, 2010). For example, non-ethical use of ICT has been one of the main concerns. Due to the ICT use for both educational and leisure means, unethical behaviours such as plagiarism, privacy, phishing, cyber bullying, copyright, cybercrime have increased dramatically (Akçayır&Akçayır, 2017; Chen & Chen, 2015; Czerniewicz, 2016; Debatin, Lovejoy, Horn, & Hughes, 2009; Demarco, 2001; Holfeld& Graber, 2012; Jansson & Von Solms, 2013; Liang & Yan, 2005; Nordkvelle& Olson, 2005; Ramayah, Ahmad, Chin, & May-Chiun, 2009). Additionally, most of the students, families, teachers and administrators are uncertain when it comes to deciding what is ethical or is not (Baum, 2009). Therefore, non-ethical behavioural problems aroused from the maladaptive ICT use may be minimized by understanding the ethical principles

related to ICT use (Kim, Kim, & Lee, 2014). Yet, with only a few exceptions, most of the higher education institutions do not offer students selective or compulsory ICT ethics courses both in the most mainland European countries (Duquenoy et al., 2010) and in Turkey (Alakurt, Bardakçı, & Keser, 2012; Beycioglu, 2009; Namlu&Odabaşı, 2007). Furthermore, most of the in-service ICT teachers, who are regarded to play a vital role in teaching ethical use of ICT, did not have courses regarding ICT ethics in their pre-service education (Özer, Ugurlu, & Beycioglu, 2011). With this in mind, the aim of this study is to study is to explore the effectiveness of specifically designed ICT ethics course with a case-based instruction and teacher candidates' perspectives on ethical issues in the use of ICT.

ICT Ethics

The American Heritage Dictionary defines ethics as "a set of principles of right conduct", or "a theory or a system of moral values" (Ethics, n.d.). Ethics is a philosophical discipline dealing with what is good, bad, right or wrong (Barger, 2008). Ethics allow people to decide "what is appropriate" based on their attitudes and beliefs and once a decision is made, it requires taking full responsibilities of that decision, as mentioned by Langord (as cited in Namlu&Odabaşı, 2007).

ICT ethics was defined by Maner in the mid 70's as "computer ethics" to refer "ethical problems aggravated, transformed or created by computer technology" (Bynum, 2004, s. 18). ICT ethics is regarded to be a subdomain of the general ethics (Floridi, 2002) and it is believed to be a unique field, because ICT offers us new possibilities to act, which lead to the emergence of the new values (Moor, 1985). For example, developing a computer software brought us to the consideration of terms such as intellectual property and copyright alongside the value of them, which decades ago, were once not an issue (Moor, 1985). ICT brought new problems that cannot be evaluated through the classical moral framework (Floridi, 1999). Tavani (2002) discusses some real cases that can be limitedly explained by the traditional moral notions. On the other side, some believe that ICT ethics is not a new issue and does not contain anything new other than the general ethical issues (e.g., Johnson, 2001). According to this "traditionalists" point of view "privacy violations are privacy violations and that crime is crime, whether or not particular privacy violations or particular crimes happen to involve the presence or use of computers and information/communications technology (ICT)" (Tavani, 2002, s. 37). Nevertheless, whether ICT ethics is qualitatively different from the general ethics or not, most scholars admit and are aware of the certain legal, moral and social problems arise from the maladaptive operation of the ICT (Barger, 2008; Beycioglu, 2009) and refer to the necessity of the implementation of ICT ethics course into the curricula (Duquenoy et al., 2010). Students use ICT in their everyday lives both for academic and leisure means (Ben-Jacob, 2005). However, for students who do not know the basic principles of the ethics, such a use may lead to ICT related non-ethical behaviours. For example, one study reveals that students access learning resources both legally and illegally and they do not know the difference (Czerniewicz, 2016). Akbulut (2014) found that the existence of facilitating conditions increase people's unethical digital behaviour, whereas prosecution risk diminishes it. Therefore, policy makers are suggested to consider the current copyright regulations and educational institutions should implement ethics courses on the proper use of ICT to ensure that people abstain from these negative habits through their own will not by external punishing force (Akbulut, 2014). Plagiarism, copyright and intellectual property rights are other unethical ICT behaviours that need urgent consideration (Akçayır&Akçayır, 2017). "As more and more schools venture onto the internet, incidents of plagiarism and copyright infringement that were once limited to classrooms are reaching an international audience" was mentioned by Steube (as cited in Baum, 2009, p. 54). Accordingly, Association for Educational Communications Technology (AECT) has addressed the ethical use of media with respect to intellectual property and redefined the field of Educational Technology by considering the ethical practices within the field. Besides, ethics are not only regarded as solely "rules and expectations" but also basis for the practice (Molenda&Januszewski, 2008).

"Phishing" is an activity where the phisher sends spam e-mail or pop-up messages to multiple addresses, disguising his/her identity as a legitimate entity (such as a bank) (Barger, 2008, s. 160). Fraudsters use various technologies and methods in order to cheat people and steal personal identities. For this reason, in cyberspace, it is important that people should learn how to secure

themselves (Jansson & Von Solms, 2013). Use of social networks brought new risks and phishing is one of them ranked on the top (Ramingwong&Ramingwong, 2017).

Plagiarism, either intentionally or unintentionally, is very common in universities all over the world (Ehrich, Howard, Mu, & Bokosmaty, 2016). Easy access to internet resources aggravates copy paste behaviour, using information without credits to copyright holder and making university students be more prone to the plagiarism. Studies on the antecedents of the plagiarism share the common finding that many students do not have the basic knowledge about which behaviours are regarded as plagiarism and how to get abstain from it (Chen & Chou, 2017). Another ethical issue is the violation of the privacy, which happens when personal data are misused (Jung, 2009). Social networking sites may pose threats to privacy, as phishing, data mining and abuse of private data are so common in those sites. Users sometimes upload a large amount of personal data in their social networking sites, although they are aware of the privacy issues. Young people should be informed regarding their risky online behaviours and the consequences of such behaviours in order to hinder the violation of privacy (Debatin et al., 2009). ICT pervasiveness has also brought forth new terms such as cybercrimes and cyberbullying. According to statistics, the ratio of people committing cybercrime is now at an alarming level, and although in our day, most of the younger people do not commit severe illegal acts such as robbery and assault too much, they do not give careful attention, when it comes to committing cybercrimes (Baum, 2009). Cyberbullying, which can be defined "as a form of aggression that occurs through personal computers (e.g., e-mail and instant messaging) or cell phones (e.g., text messaging)" (Wang, Iannotti, & Nansel, 2009, p. 369), is another type of the improper cyber behaviours. A study conducted by Eden, Heiman, and Olenik-Shemesh (2013) revealed that most of the teachers face cyberbullying problem in their schools. The research stressed the importance of taking necessary precautions such as making policies and enhancing teacher and parent awareness on how to cope with it.

Case Based Instruction on Teaching ICT Ethics

Case based instruction (CBI) is a commonly used method for teaching ICT ethics and many famous textbooks on this subject adopt this method (e.g. Barger, 2008). CBI is also adopted by ICT study programs that offer ICT ethics course across the globe. For example, Duquenoy et al. (2010) reported their educational approach for teaching ICT ethics to PhD students of engineering at the University of Politecnico di Torino. They use case analysis with a bottom-up approach. In this approach, students are first introduced a problem involving an ethical issue (e.g., creating a huge DNA database). Then, all stakeholders subjected to the problem are identified. In the next step, the ethical problems stem from the case are determined. Finally, they discussed the solutions to deal with the problems. It was reported that the students reacted to the method positively, as the method combined a technical issue with a non-technical social and ethical discipline.

Kert, Uz, and Gecü (2014) argue that ethical decision-making process is highly subjective, as it involves discussions based on the philosophy. One can argue proposing a practical solution to an ethical problem is more important than teaching merely theoretical concepts regarding the ethics. Giving this theorizing, they developed an Electronic Performance Support System (EPSS) to support ethical decision making of students by means of computer ethics scenarios. Results indicated that EPSS involving case-based examples contributed positively to the decision-making processes of the students.

Overall, CBI can be effectively adopted to the most instances for an in-depth examination of real-world applications of each topic though requiring much more time (Mayo, 2004). CBI promotes active, self-directed learning by engaging and energizing discussions leading to interactions (Perkins, 1991; Richardson, 1997).

The Current Study

Most of the studies on the utilization of the ICT in learning environments concentrated on the effective and efficient implementation of ICT. However, ICT ethics which is a crucial issue, remains an

insufficiently researched area (Beycioglu, 2009). In order to gain successful ICT implementation, students should not only develop practical skills about using ICT, but also be aware of the basic skills and knowledge regarding coping with unethical behaviours in order not to harm other ICT users and themselves (Kim et al., 2014). However, it is evident that some ICT users have a lack of basic understandings of what is ethical and what is not (Baum, 2009; Chen & Chou, 2017; Czerniewicz, 2016; Kuzu, 2009), and some even do not pay necessary attention to ethics, although they are aware of it (Debatin et al., 2009). Clearly, there is a need to raise awareness of ethical issues within the schools (Atjonen, 2005; Ben-Jacob, 2005; Burnham & Kafai, 2001; Harris, Lang, Yates, & Kruck, 2011; Jung, 2009; Ki & Ahn, 2006; Namlu&Odabaşı, 2007). This can hardly be achieved considering the status of the ICT ethics course in the schools. As reported by Duquenoy et al. (2010), the importance and necessity of ICT ethics have recently started to be addressed by most of the curriculum programs across world. U.S. and U.K. have been known to be the leaders in this issue with ICT study programs involving at least one ICT ethics course. However, the mainland European countries are lacking in terms of having ICT ethics course in the program and it is a significant challenge to capture technical students' interest to such courses (Duquenoy et al., 2010). The situation in Turkey is not that different as most of their universities do not provide selective or compulsory courses about either general or ICT ethics (Akbulut, 2014; Beycioglu, 2009; Çelen&Seferoğlu, 2016; Namlu&Odabaşı, 2007). There is even a study which demonstrated that most ICT teachers did not have ICT ethics course during their higher education years (Özer et al., 2011). Graduates from ICT departments should especially be equipped with the knowledge and skills regarding the recognition of ethics (Beycioglu, 2009; Duquenoy et al., 2010; Namlu&Odabaşı, 2007; Özer et al., 2011) since they will playing a major role in teach students "ethical problems aggravated, transformed or created by computer technology" (Bynum, 2004, p. 18) and raise awareness regarding legal, moral and social consequences of the ethical and unethical use of ICT (Barger, 2008; Beycioglu, 2009). In this sense, this study seeks to examine teacher candidates' perspectives on ethical issues in the use of ICT and the effectiveness of specifically designed course with a case-based instruction.

RESEARCH OBJECTIVE

The study determined:

1. Teacher candidates' perspectives on ICT ethics before and after taking the specifically designed course.
2. Teacher candidates' opinions about the effectiveness of the specifically designed course.

RESEARCH QUESTIONS

The research questions that guide this study are the following.

1. What are teacher candidates' perspectives on ICT ethics before and after taking the specifically designed course?
2. What are teacher candidates' opinions about the effectiveness of the specifically designed course?

METHODOLOGY

The current study aims to investigate teacher candidates' perspectives on ethical issues in the use of ICT before and after taking the specifically designed course *Information and Communication Technology Ethics (ICT Ethics)* and also evaluate the effectiveness of this course, which was designed based on a case-based instruction with a bottom-up approach.

Research Design

In order to take teacher candidates' in-depth opinions and real-life experiences, this study was designed as a qualitative case study. According to Yin (2003), "a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 13). It is specifically a type

of instrumental case study in which the case itself is on the focus with a detailed description within its context or surroundings (Creswell, 2007).

Research Context

The research was conducted in a specifically designed course *Information and Communication Technology Ethics (ICT Ethics)* offered first time in the university that the current research was conducted. The course is not a common course offered by the universities, but only taught in few universities more recently. With an increase on unethical behaviours in using ICT, the course aims to teach the fundamentals of ICT ethics with sample cases to teacher candidates and in this way also aims to guide the future ICT teachers in their teaching profession since the topic has already been included in the curriculum of ICT teaching at K12 education level. So, this case study focuses on a group of people, ICT teacher candidates.

The course was designed specifically based on case-based instruction (CBI) for the current research with a bottom-up approach to bridge the gap between the theory and practice in such of vital importance topic *ethics*. Since actual case studies can be readily employed to illustrate how course content relates to real-life scenarios with collaboratively working on any problem. Therefore, designing a specific course for such a fuzzy but also vital and important concept *ethics* based on case-based instruction would allow better attainment of learning outcomes. In addition, it would teach ethics and ethical problems in ICT to teacher candidates in an effective way.

In the course, teacher candidates were first introduced with sample problematic cases about selected ethical problems faced in the field of ICT. Then, they were required to discuss the cases in three or four small groups. In the next step, the cases were then discussed with the whole class and the course instructor, who is one of the authors of the current study. In summary, students tried to define the actual problem, and find possible solutions to overcome the problem. At the end, with the course instructor; the problems that learners define, their possible solutions; and the actual problem and its solutions based on ethical paradigm in the field of ICT were discussed and finalized to teach and learn the issue in a detailed way.

ICT Ethics is an elective and four-credit course offered for ICT teacher candidates. It is conducted three hours per week throughout 14 weeks of course sessions. The course content includes the concept of *ethics*, ethical codes, teaching ethics, ethical concerns and problems in information and communication technology, ethical issues in teaching and ICT teaching as well as in depth investigation of sample cases including plagiarism, cyberbullying, phishing, unauthorized access, privacy, violation of personal rights, security, and professional teaching ethics. During the course sessions, all students tried to be active and engaged in the course and sample cases that were examined to teach the topics and attain better learning outcomes. With each aforementioned case, at least three sample cases were investigated in depth and then, class discussions were held. The instructor was in the role of facilitator in this phase. The assessment of learners' performance was conducted using both formative assessment methods (an exam placing 34% of overall course grade) and summative evaluation technique (class discussions 6%, learners' performances including both individual and group performances 24%, learners' portfolios 18%, and case evaluation reports 18%).

Subject Characteristics

The participants were selected with a convenience sampling method of non-probability sampling methods. At the beginning, 27 teacher candidates took the pre-test, whereas 31 took the post-test at the end of research. However, only the ones taking both pre-test and post-test were included for comparison and the remaining ones were excluded. Therefore, the actual and final sample comprised of 24 subjects (12 female, 12 male) who studied at the Department of Computer Education and Instructional Technology.

The students’ participation was completely voluntarily. Students were treated ethically during the whole study. They were not deceived nor received any harm or disgusting actions during the entire research process. Finally, teacher candidates were informed before the research that their information would be kept confidential. In order to prevent participants from avoiding sharing some private details of their life experiences in sample cases or their responses to the questions that they were asked, a sufficient level of trust was built as required in collecting in-depth qualitative data (Creswell, 2012).

Data Collection Instrument and Procedure

The data were collected as a paper-based format in a face-to-face setting at the beginning as pre-test and at the as post-test during the fall semester in the academic year of 2017-2018. In order to compare the teacher candidates’ pre and post-tests, all students marked their response papers, namely data collection instrument with any names or etiquettes both at the beginning and end of the course.

The data were collected with a self-developed instrument that included open-ended questions about the course topics and cases taught to the teacher candidates. In detail, the instrument includes 14-item open-ended questions in addition to 4-item demographics and other questions for an overall evaluation of the aforementioned course.

Data Analysis and Trustworthiness

The data were analysed with qualitative content analysis. The data were analysed inductively. In order to provide objectivity in coding transcribed data, all the generated themes, codes and sub-codes were decided by two authors together. Then, the coding process was conducted solely by one of them. In the analysis of coded data, under one main theme, five themes, 20 codes, four sub-codes were generated. The details about generated themes, codes, and sub-codes are presented in next section.

RESULTS

The findings are presented in two sections in accordance with the two research questions examined. In order to investigate prospective teachers’ perspectives on ICT ethics before and after taking the specifically designed course, which is the first research question, twelve open-ended question were asked to the participants. Concerning the second research question, two multiple-choice and two open-ended questions were asked to determine the effectiveness of specifically designed course *ICT Ethics*. The analysis of qualitative data through inductive content analysis generated four main themes: a concept of ICT ethics, issues of ICT ethics, fight against computer (cyber) crimes, and other issues. Under these four main themes, a total of 13 codes and 11 sub-codes were generated. Table 1 shows the coding schema generated from 24 teacher candidates’ responses.

Table 1
Coding Schema

Themes	Codes	Sub-codes
1. A Concept of ICT Ethics	1.1. Meaning and interpretation	
	1.2. Dimensions	
	1.3. Theoretical framework	
2. Issues of ICT Ethics	2.1. Privacy and security	2.1.1. Opinions
		2.1.2. Offered solutions
	2.2. Plagiarism	2.2.1. Reaction toward plagiarism

		2.2.2. Offered solutions
		2.3.1. Creative commons
	2.3. Copyright	2.3.2. Opinions
		2.3.3. Offered solutions
	2.4. Intellectual property rights	2.4.1. Reaction toward violation of (intellectual property rights)
		2.5.1. Opinions
	2.5. Cybercrime and cyberbullying	2.5.2. Offered solutions
		2.6.1. Offered solutions
	2.6. Phishing	
	3.1. National law and regulations (Turkish Criminal Law)	
3. Fight against computer (cyber) crimes	3.2. National precautions and/or solutions	
	3.3. Individual solutions and/or suggestions	
4. Other issues	4.1. Effect of social media	

Research Question 1: Perspectives of Teacher Candidates on ICT Ethics

The first research question was investigated under four sub-questions to reveal the teacher candidates’ perspectives on ICT ethics. This includes the concept of ICT ethics, issues of ICT ethics, fight against ICT ethics, and other issues in parallel to the findings which yielded generated themes from teacher candidates’ responses.

For the first theme, *a concept of ICT ethics*, three sub-codes were also generated, namely *meaning and interpretation of the concept*, *dimensions*, and *theoretical framework*. In terms of the first sub-code *meaning and interpretation of the concept*, the pre-test results indicated only 6 (25%) of 24 teacher candidates knew about the concept of *ICT ethics* and had information in their mind to cover the concept meaning. From the remaining ones, 12 (50%) of them had a bit of information to explain its meaning to some degree, whereas 6 (25%) of them did not know at all at the beginning of the specifically designed course *ICT Ethics*. As for the findings of the post-test, which was conducted after taking the course during 14 weeks course sessions, all of them explained the concept and its meaning in a detailed manner. Therefore, teacher candidates learned what ICT ethics mean after taking the course.

Following Mason’s (1986) statement as the second sub-code *dimensions* of ICT ethics, pre-test results indicated that only two (8%) of 24 teacher candidates knew about those dimensions, and both of them did not answer completely. After taking the course, findings retrieved from post-test showed that except 4 prospective teachers, the majority (n=20, 83%) explained the dimensions of ICT ethics based on Mason’s statement, and half of them provided in-depth clarification for those dimensions.

Regarding with the third sub-code *theoretical framework*, pre-test indicated that none of participants knew anything about the theory or theoretical framework related with ethics and/or ICT ethics. Post-test results showed that one-third of them (n=8) responded completely and correctly for the theory or theoretical frameworks related with ethics and/or ICT ethics very well. 6 (25%) of them responded but not answered completely. The remaining 10 (42%) teacher candidates, on the contrary, declared they did not remember this issue. Some of them stated the reasons behind such responses as not remembering. For instance, one of them stated that:

Actually, I learned the theories and principles related with ethics and ICT ethics, its pioneers and the principles of them. However, I did not remember about them for now. Generally, I have a difficulty for memorizing or remembering any facts or pure information. (TC7)

Concerning the second theme *issues of ICT ethics*, 6 codes and 11 sub-codes were generated. The generated codes are *privacy and security, plagiarism, copyright, intellectual property rights, cybercrimes and cyberbullying, and phishing*. For the first code *privacy and security*, 2 sub-codes, namely *opinions and offered solutions* were generated. The findings of pre-test indicated most prospective teachers (n=20, 83%) thought that *privacy and security* is so important that information should be safely recorded. However, they just declared its importance, could not explain more details. Half of them also suggested some possible solutions including using stronger passwords and changing them periodically (n=6, 25%), using firewall (n=5, 21%), surfing on secure websites (n=4, 17%), not sharing much of the private information with others and on online platforms (n=4, 17%), using antivirus software (n=3, 13%), and encryption (n=1, 4%). A sample statement is the following.

We can come up with malwares or some people try to steal our personal information. With our private information, they may do or support illegal affairs or terrorists, get swindled via online banking, etc. For this reason, we should be careful at all the time while online. We should use more secure passwords, surf on secure websites, not share our personal information with others, use firewall and antivirus software, etc. (TC18)

Post-test results indicated that all of them learned the basics of *privacy and security* besides gaining much more awareness. The solutions they offered were the same, but they gained the basics and raised their awareness.

In terms of the second code *plagiarism*, again two sub-codes, namely "reaction toward plagiarism" and "offered solutions" were generated. In the pre-test students were asked to report their reaction towards plagiarism, when they face with it, most of them (n=15, 63%) could not respond at all three of them (13%) stated they complaint about the document or the person who plagiarize. Two of them stated that they took a legal action (n=2, 8%), whereas the remaining four (17%) said they did not take any actions but enjoy it for their documents used by someone.

After the course, in the post-test, all of them became conscious for plagiarism and stated their strict reaction toward it. Here, one of them stated that:

I was not aware of the importance of copyright issues, and recognized that I sometimes cheat from online documents, when I have no enough time to complete assignments, or had some difficulty, unfortunately...I'm sorry, I am shy...Thanks to this course, I recognized my mistake, and after now; I will never do plagiarize. I always care of citing sources, not cheating or plagiarize. I also appreciated plagiarism detection software...And after this time, if I recognized someone cheat from my own documents, then I will take some action toward it. I will teach to my students its importance when I start to my teaching profession. (TC10)

In order to overcome this problem of cheating or plagiarizing, the solutions they offered include strict punishment (disciplinary punishment, failure from course, being kicked out of the school) (n=15, 63%), educating all students (n=12, 50%), using plagiarism detection software compulsorily by all educational institutions (n=7, 29%), and taking a legal action (n=7, 29%).

The fourth code of issues of ICT ethics is "copyright" and its sub-codes, which are *creative commons, opinions, and offered solutions*. For the first sub-code *creative commons*, pre-test findings indicated that only half of them responded and have some knowledge in this issue, whereas after taking the course, all of them learned creative commons, except one, who did not respond. In terms of their *opinions* as the second sub-code, of 24 teacher candidates, six (25%) did not respond to the pre-test.

On the other hand, results indicated that the respondents (n=18) had a bit of knowledge before the course. In the post-test, all of them explained their opinions and knowledge they gained. Regarding with the third sub-code *offered solutions*, they offered some solutions to overcome the problem of copyright infringement including severe punishment (n=15, 63%), educating and raising awareness (n=12, 50%), being careful in sharing any document on any platform (n=7, 29%), and taking a legal action (n=7, 29%).

The fifth code is "intellectual property rights", and the sub-code is *reaction toward violation of intellectual property rights*. One (4%) participant did not respond, but all the other respondents (n=23, 96%) knew something about the issue. Their reaction when a violation occurred in the pre-test included taking legal actions toward violation (n=12, 50%), warning (n=6, 25%), taking copyrights or securing by patent (n=5, 20%), using encrypting (n=2, 8%), not sharing on any platform or sharing as not being copied or stolen (n=2, 8%), no reaction and being happy to offer profit for anyone (n=4, 17%), and no idea about what can be done in these circumstances (n=3, 13%). In the post-test, all of them, except one non-respondent, explained intellectual property rights in detail. Their reaction toward violation included taking legal actions toward violation (n=16, 67%), taking copyrights or securing by patent (n=6, 25%), warning (n=7, 29%), taking security precautions (n=4, 17%), not sharing on any platform or sharing as not being copied or stolen (n=2, 8%), and no reaction (n=1, 4%).

The sixth code is "cybercrime and cyberbullying", and its sub-codes: *opinions* and *offered solutions* to overcome with these problems. Of 24 prospective teachers, 16 (67%) responded to the pre-test. Although they did not explain what exactly cybercrime and cyberbullying mean, they had a bit of knowledge on the issue and knew its basics from their daily life usage of the Internet. Based on their daily life experience, they offered some solutions including raising awareness of Internet users (n=4, 17%), taking more security precautions (n=4, 17%), implementing severe sanctions (n=6, 25%), divulging criminals on TV channels much more (n=3, 13%), and using more secure antivirus software (n=1, 4%). The results of post-test indicated all of 24 teacher candidates gained much more knowledge about cybercrimes and cyberbullying after taking the course. They explained the scope and content of those two in details. They, except two, also recommended some solutions to overcome these problems, similar but much more than the pre-test. Their offered solutions were raising awareness by organizing much more seminars, conferences, etc. (n=8, 33%), taking all precautions for security and safety on the web (n=8, 33%), controlling footprints of children on the web in any case (n=7, 29%), divulging criminals and not staying quiet (n=6, 25%), implementing severe sanctions (n=6, 25%), educating especially families and children at small ages (n=6, 25%) and also late adopters of ICT (n=4, 17%), not sharing private information with others or on online platforms such as social media or online games (n=4, 17%), more public service announcements (n=4, 17%), integrating its education into the curriculum of primary school for all of us (n=3, 13%), using secure web platforms (n=3, 13%), and increasing a number and associations of fighter associations (n=3, 13%).

The seventh code is "phishing" and sub-code is *offered solutions*. At the beginning, pre-test results yielded that almost all of them (except two) experienced and knowledgeable in phishing and reported taking some precautions against it. They mentioned about an increasing number of news on TV channels and newspapers. They (n=15, 63%) also added sometimes they received some informative messages from the police and/or gendarmerie on mobile phones to be careful against phishing and favour of it. They mostly (n=17, 71%) highlighted the need for raising awareness much more and favoured the role of media, especially news and newspapers about phishing to raise awareness of all people. Although they know and experienced in this issue, the findings of post-test indicated all of them particularly learned much more and detailed information and precautions against phishing.

The third theme is the fighting against computer (cyber) crimes which consists of three codes: *national law and regulations (Turkish Criminal Law)*, *national precautions and/or solutions*, and *individual solutions and/or suggestions*. The first code under this theme is national law and regulation which refers to Turkish Criminal Law. In the pre-test, only two prospective teachers responded, but

their responses are solely about possible situations which requires a punishment in accordance with national law and regulations. They did not know about the law and regulations. After the course, the post-test results indicated that half of them (n=12, 50%) were able to explain about the national law and regulations, which behaviours violate the national law and regulations, and under which conditions their behaviours are punished. Half of the remaining teacher candidates (n=6, 25%) stated although they learned and know, they did not remember the details about the laws, but they can differentiate the behaviours and events which violate national laws and regulates or not. For instance, one of them stated:

I didn't remember the dam in the Turkish Criminal Law, however I know, for instance, people who did unauthorized access and listening are received imprisonment during 6 months at least and more besides judicial fine...I mean I learned about the details of unethical behaviours and the details about them in the national law, but I am sorry I did not say the exact dam in Turkish Criminal Law. (TC13)

The others (n=6, 25%) stated that they did not know. Teacher candidates were also asked about their knowledge before and after the course regarding national precautions and/or solutions against computer crimes, in addition to the law and regulation. Here, in terms of second codes named national precautions and/or solutions, pre-test results indicated that the majority of teacher candidates (n=17, 71%) did not know about national precautions and/or solutions against cybercrimes. The remaining 7 explained that they know about it to some degree. For example, one of them stated that:

As I know, there is a department in General Directorate of Security about computer crimes. They try to detect IP addresses of criminal cases, for example. In addition, there are some institutions of which one is Cyber Crime Fighter Association. Or sometimes I come up with some seminars for people to raise their awareness about cybercrime, organized by different institutions, government units, or people. (TC5)

After taking the specifically designed course, on the responses to post-test, findings indicated that, except three teacher candidates, all the others (n=21, 88%) were aware of and learned about national precautions and/or solutions against cybercrimes. For example, one of them stated:

Actually, there are many options for us to be aware of computer crimes. Our government organize some seminars to raise our awareness periodically, either at schools, universities, or cities to access people at different ages. Public service announcements are prepared and published on television channels. There are many institutions to fight against computer crimes such as Cyber Crime Fighter Association. In General Directorate of Security, there are some related units again and they also increase the capacity of these units recently. Families are continually educated in this issue, especially for their children safe in the online environments and protect their children from inappropriate content on the web. People are sent sometimes short messages to their mobile phones against phishing and being careful. As for the law, more recently the national law and regulations are expanded, etc. ... (TC9)

In relation to third theme *fighting against computer (cyber) crimes*, the third and last code generated is individual solutions and/or suggestions at a general and broader level. In the pre-test, only half of the participants (n=12, 50%) responded while the other half (n=12, 50%) did not respond at all. Of the respondents, the offered individual solutions and/or suggestions for fighting against computer crimes included implementing severe sanctions (n=3, 13%), raising awareness (n=4, 17%), increasing quality of education programs both in the schools and in the families (n=4, 17%), organizing much more seminars and conferences for the people, families and basically for all Internet and computer users (n=2, 8%), and increasing security precautions by the government through following each users' footprints during online (n=1, 4%). For example, one of the participants said:

It is very difficult, I know, but, like a citizen number and e-government account, an account to use Internet and surf were set and each users' footprints on the Web were recorded and followed strictly and constantly by the General Directorate of Security, then I think ethical problems on the Web would decrease reasonably. However, may be it may a strict decision or solution for many people and could be argued by many of them. (TC1)

After taking the course, in the post-test, the recommendations and solutions that teacher candidates offered include raising awareness (n=8, 33%), implementing severe sanctions (n=7, 29%), organizing much more seminars, conferences and any other public service announcements (n=5, 21%), a specific education program for all citizens and/or ICT users (n=4, 17%), opening new programs and/or courses about this issue at any level of education (n=2, 8%), increasing the number, capacity and investment on related department both at government and private firms (n=2, 8%), and a specific software which includes features of protecting users from any types of cybercrime and prevent all possible unethical behaviours on the use of ICT (n=1, 4%). A sample statement from the participants about severe sanctions is as follow.

... Security forces should tighten the security level in addition to severe sanctions. Much more severe sanctions are absolutely prevent people committing an illegal act and also from any cybercrimes. For instance, a guilty person with a cybercrime were punished with a long time of imprisonment, then he/she would never behave similarly in the future after getting out of prison. (TC10)

About organizing much more seminars and conferences to educate and raise awareness of people, a prospective teacher suggested:

I am sure, if people were much more knowledgeable and aware of behaving ethically during using Internet, the ratio of cybercrimes would decrease. After taking this course, I recognized that sometimes I behaved not ethically on the Internet in the past, but now I learned and changed my use style of surfing and Internet. Now, I am much more careful during online. I mean, many of us did not know about ICT ethics, rules, principles, and its importance. Therefore, all Internet users and the folk should be taught with ICT ethics with much more courses, seminars, conferences, etc. Families should absolutely be educated with seminars and conferences by the government or private institutions for our safety on the Web. (TC15)

The fourth and last theme is called "other issues" which includes only a code named: *effect of social media*. Teacher candidates' responses to one open-ended question about social networking services, their probability in leading to ethical problems related with ICT, the ethical issues in these platforms and possible reasons of the ethical problems lived in were examined upon. They were also asked about their viewpoints about these platforms on the issue of whether having an effect on their ethical behaviours or not, and if exists, in which way. Pre-test results showed that out of 24 prospective teachers, one of them stated non-use of any social networking services and therefore her response is not applicable for this task. From the 23 respondents, the majority of them (n=14, 61%) stated that these platforms are generally triggering unethical behaviours. Of the remaining 9 teacher candidates, 6 of them (26%) declared that those tools absolutely violate ethical issues and principles in their uses or features, while 2 of them (9%) are at the opposite side and stated the reason is not the tool itself or its features, since they have their own privacy issues and principles to protect the users from against any unethical behaviours or conditions, but people themselves or their conscious or unconscious preferences are the actual reason of the unethical situations, problems or behaviours. For instance, one of them stated that:

Social media platforms are absolutely appropriate in the issue of obeying ethical issues of principles of computing and surfing. They protect our personal information, we can set the privacy of our personal data how we prefer and as not being seen or stolen by anyone on the platform. We can choose a strong or very strong password and set higher

level of security like using location-based visit or mobile-phone approval for the visits, for instance. Stealing any personal information, bandy about terrible fake news as real, piracy, or phishing, sexual abuse, or being an addictive to these platforms are all users' faults either conscious or unconscious. Benefitting from these media and tools obeying with ICT ethics depends on completely ourselves. (TC22)

After taking the course and analysing the sample cases during course sessions, the findings retrieved from the post-test indicated that the opinions of teacher candidates have changed to some degree. Out of 23 teacher candidates using social networking services, about one-third of them (n=8, 35%) declared that these platforms obey and follow ethical issues and principles, but people's use of these platforms, or their preferences and privacy features settings cause unethical behaviours, issues, or problems. These platforms themselves are not the actual reason or triggering the ethical problems according to their ideas. Similar to pre-test, most prospective teachers (n=15, 65%) stated that with their features, fake accounts, or easiness to violation of intellectual property rights and privacy issues, these platforms unfortunately facilitate violation of ICT ethics. For example, one of the participants stated that:

I believe many of social media platforms are triggering or cause unethical behaviours. Some of them allow stealing of our personal data without our permission, hacking, copying the personal data and misuse of the data, etc. Whatever we complain about such situations, these tools cannot guarantee and protect ourselves. Some of them share our personal data with third-party companies without our permission. Some people with fake accounts make sexual abuse for children easily in using these tools, or send a gift or invitation and then steal their identical information or request money or photo for some inconvenience. We, after some time can easily and unconsciously become an addictive to these platforms, unfortunately. Even some people can commit suicide because of these media and tools. I believe they absolutely trigger in violation of ICT ethics. (TC17)

Research Question 2: Effectiveness of the Specifically Designed Course

For the second research question, two multiple-choice questions and two open-ended questions were asked to teacher candidates. They were first asked about their opinions about the course and their further comments and explanations. Then, they were also asked about their behaviours before and after taking the aforementioned course to make a comparison about the effectiveness of the course. To this part, all 24 prospective teachers, except one declared that the course was very well and effective for them, only one said partially effective for her and added that this is because since she is already knowledgeable in this issue and aware of its importance. Moreover, the majority of them (n=21, 88%) declared that their behaviours on the Web were against the ethical usage of ICT, except for three participants. Regarding the effectiveness of the course, one of them stated that:

At the beginning of the course, although I had diverse opinions and insisting on those ideas in discussions during class hours, this course made me aware of the importance of ICT ethics thanks to the course in which we examined sample cases and course instructors' kind of language, interest, explanations and convincing us with striking cases. I am so grateful to her because I am now learn ICT ethics and corrected my mistakes. (TC8)

Similarly, another teacher candidate declared that:

You (course instructor) are so interested with us (teacher candidates) both in- and out of class. We investigated a lot of real-life cases about unethical use of ICT which provided us to understand problematic use of ICT and unethical behaviours in using ICT, and aware of its importance which we ignored up to now. With this effective course, I learned so important issues about ICT ethics and after that, I will care of all these issues and I absolutely teach to my students. Thank you my teacher for all your efforts and such an effective course. (TC24)

The findings indicated that teacher candidates found the specifically designed course to be working very well and effective. They favoured the course structure and sample cases investigated in the course. They also added they learned very well and recognized the importance of ICT ethics with the help of this effective course.

DISCUSSION

This instrumental case study investigated prospective teachers' (N=24) perspectives on ICT ethics and evaluated the effectiveness of specifically designed course *ICT ethics* with case-based instruction to teach the fundamentals of ICT ethics to them. The data was collected qualitatively before and after the course during 15 weeks in 2016-2017 academic year, spring semester. The data was analysed with inductive qualitative content analysis method. Trustworthiness of generated 4 themes, 11 codes, and 3 sub-codes was provided credibility and objectivity with generating and deciding all of them by two rates together. The findings indicated teacher candidates did not know adequately about fundamentals of ICT ethics at the beginning. This result is in line with the studies, which found that students generally underestimated the ethical use of ICT resources, because of having insufficient knowledge regarding ICT ethics (Beycioglu, 2009; Ehrich et al., 2016). The results of the current study also corroborate with the findings of Özer et al. (2011) and Alakurt et al. (2012), which found that ICT teacher candidates are likely to undermine ethical use of computers. Thanks to the aforementioned specific course, ICT teacher candidates have gained and learned all the basics about ethics, ethical and unethical use of ICT, existed and possible future solutions for those problems, and more. At the beginning, they only know some unethical problems including some types of computer crimes, cyberbullying and phishing to which they come up with in their daily life, or from televisions and newspapers. In addition, they were not aware of how to benefit from any online documents without disobeying ethical rules and principles. They did not know the issues of copyright, plagiarism, intellectual property rights, etc. More importantly, what is critical was that they were not aware of which of their behaviours were regarded as plagiarism (Chen & Chou, 2017). For this reason, regardless of whether committing intentionally or unintentionally, cheating and/or plagiarism is very common among universities all over the world (Ehrich et al., 2016). The participants stated they have just learned about plagiarism detection software and how to benefit from it, thanks to this course.

The findings also indicated that after the course, the participants have learned all types of unethical behaviours and misuse of ICT very well, since they have examined and discussed a variety of sample cases. They have raised awareness and declared an urgent need of raising awareness and educating other people, particularly for families and children at small ages. They favoured the specifically designed course and benefitted from it very much to gain basic skills and knowledge about ICT ethics. They also added their favour of content, structure, design and organization of the course, and instructional method applied. All these results point out the reality that case-based instruction can be a very powerful method to teach ICT ethics (Barger, 2008; Kert et al., 2014). In addition, issues related to ethical use of ICT would be very sensitive in some circumstances as participants would believe that disclosing private information regarding the sensitive topic "ICT ethics" may lead to adverse social effects (Blau&Eshet-Alkalai, 2017). In the current study, real-life scenarios through case-based instruction method were used, which were very helpful for students to state their ethical behavioural intentions indirectly.

Although ICT ethics has recently been added in the curriculum of ICT course at primary and secondary schools of our country, it is still not covered at the university level at all. Considering the fact that ICT ethics cognition (Kim et al., 2014) and ICT ethics attitude (Harncharnchai&Inplao, 2015) are the most two important factors affecting ethical behavioural intention, this study highlights an urgent need for incorporating ICT ethics course into the curricula. With only a few exceptions, most education institutions still do not offer neither compulsory nor selective course to teach fundamentals of ICT ethics as in the most mainland European countries (Duquenoy et al., 2010) and in Turkey (Alakurt et al., 2012; Beycioglu, 2009; Namlu&Odabaşı, 2007; Özer et al., 2011). In addition to adding to the curriculum of ICT related disciplines, it is highly recommended to be added in all disciplines due to living in an information society. Not only ICT ethics, but even ethics is of vital importance on its

own. Therefore, teaching ethics as well as ICT ethics can be regarded as one of the keystones of education at any level. Similarly, Chowdhury (2018) proposed a rationale to teach ethics and morals in science education and suggested some ways to teach ethics in science course. This study, in the same way highlights the importance of ethical issues on the use of ICT, by indicating how to teach ethics in ICT in an effective way.

CONCLUSION

Being aware of ethical issues on not only for the use of ICT tools, but also in any part of our life is critical. In order to be able to build a good character, our students should handle ethical issues in the society as Chowdhury (2018) declared. At this point, the importance of teaching ethics can be addressed clearly. In an information society with rapid technological advancements, ethics for the use of ICT is still a dilemma. In order to teach preservice teachers ethical use of ICT effectively, this study designed a specific course and evaluate its effectiveness and benefits to them. Rather than traditional methods and strategies, using case-based instruction, teaching ICT ethics was favoured in this current study. Regarding the importance of knowing ethical use of ICT, it is urgently recommended to incorporate ICT ethics into curriculum.

In addition, a top-down policy by the government can be formed for our safety on and ethical use of the Internet. Similarly, an educational policy can be taken into consideration at all levels to educate all the people. Moreover, ICT ethics could be included and taught in the scope of digital literacy and computer literacy programs, as those students, who will graduate from these departments will be primarily responsible to raise awareness regarding legal, moral and social consequences of the ethical and unethical use of ICT (Beycioglu, 2009; Duquenoy et al., 2010; Namlu&Odabaşı, 2007; Özer et al., 2011). More seminars and conferences to raise awareness of people could be overemphasized and recommended by this current study. Alternatively, both the number and capacity of public and private associations to fight against computer crimes could be increased.

Regarding to limitations, a few points may be regarded as the limitations of this study. Firstly, the generalizability of the findings. Due to a small research sample, the results may not be so reasonable; however, it still may direct and guide further research and policy makers. Secondly, if teacher candidates were requested to write a self-reflection or evaluation reports for sample cases; their issues in their mind, interpretation, and knowledge for each specific type of ethical problems on the use of ICT could be understood in much more detail. All of these recommendations and limitations could be examined in further research.

DECLARATION

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