Ethics of Computing: A Suggested Course Model for GCC Countries

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ABSTRACT

This paper proposes a suggested "ethics of computing" course design and contents for higher education schools in GCC (Gulf Cooperation Council) countries. With being connected to the Web virtually anywhere anytime, and with the ease of use and wide spread of technology tools such as smart phones and social media, many ethical issues connected to the use of technology have come to the surface. Yet, there is almost no book has been published in the Arabic and Gulf regions that have good and well-defined contents that can be used as a textbook for such a course. The need and the reasons for proposing such a course in the higher education institutions are discussed at the beginning. The paper then reviews some existed good models that are taught around the world in order to come up with a fitted proposed plan and best practices for the suggested course. Course contents and evaluation tools are discussed along with some recommendations to best utilize the course.

KEYWORDS

Ethics, Computing Ethics, Social Media Ethical Issues, Course Model

1 INTRODUCTION

Ethics of computing has emerged as a new branch of ethics in last three decades. It has made rapid progress due to rapid development and changes in computing technologies (Floridi, 2005). It involves analysis of influence of computing technologies on society and its nature, and it formulates policies and their justification for ethical utilization of computing technologies (Ess, 2006; Johnson, 2001). Ethics cover both social and personal strategies and policies for ensuring efficient use of technology. In the 21st century, this new area of ethics has resulted in workshops, conferences, organizations, books, curriculum material, research centers and university courses. It is also claimed that computer ethics has quickly transformed into global information ethics due to widespread use of World Wide Web (Floridi, 2003).

Ethics of computing is an area of study that highly depends on fundamental theories of ethics and application of science. It can be described as the mix of two fields that allows conceptualization of ethical issues and helps formulating policies for efficient use of computer technology with responsibility (Cavalier, 2005). With the sudden spread of computer and its related technologies, and policy vacuum regarding ethical standards, many issues caused serious grievances for society (Dancy, 2004; Himma, 2004a). However, the debate on ethics of computing led to the formation of laws (i.e. national and international) and awareness of crimes and fraud through computing technologies was created (Capurro, 2007).

Computer ethics was founded by Professor Norbert Wiener in early 1950's but his work lay neglected till early 1970's (Bynum, 2006). The computer ethics was first defined by Maner in 1970 as the applied field of ethics that examined ethical problems transformed, created or aggravated by computer technology (Bynum, 2006). Johnson (2006) stated that computer ethics was the study of novel versions of moral problems and dilemmas, aggravated old problems and application of ordinary moral theories in novel realms. However, the most influential and wide-

ranging definition of computer ethics was proposed by Moor (1985). He believed that computer ethics was compatible with all approaches of ethical problem solving and it did not depend on only one or few philosopher's theories. According to Moor, the field of computer ethics has two components. The first component deals with the examination and understanding of nature and influence of computer technology. The second is concerned with the synthesis and justification of policies to ensure ethical use of computer technology. Computer technology encompasses computers as well as the related technologies including software, hardware, internet etc. (Bynum, 2004; Capurro, 2007).The aim of this study is to design and propose a course for ethics of computing for universities in GCC and Islamic countries. The need for this type of course is justified in the following lines.

2 JUSTIFICATION

As described, ethics of computing involves applied ethics to problems raised by use of computer technology and it becomes essential that the best moral judgment be applied to solve the issue. The development of a detailed course in ethics of computing is the need of the hour because our societies in the Arab world have rapidly evolved from an agricultural or industrial societies to present day information societies, where computers and related technology has radically changed the way people exchange information, make decisions and live their lives (Cavalier, 2005; Himma, 2004b). The establishment of computing and information society has resulted in opening of new doors for challenging ethical questions that were never faced by the societies in past (Bynum, 2001). Moreover, these questions continue to increase because of rapid development in technology.

Computing is more common than ever in Arab countries because of social media tools and smartphones. Computing is everywhere and plays significant role in industry, education, research, government and private organizations, medicine, entertainment, communication and many other fields in the society (Turilli, 2007). Keeping in view the extraordinary usage of computing, it is necessary that a code of ethics be developed for professionals who are involved in designing, developing, analyzing, certificating, maintaining and evaluating computer applications and for those who are involved in computing. It will ensure that computing professionals make it a respected and beneficial profession with the help of ethical usage of computing.

The purpose of suggesting and developing this course is not to preach virtue but to enhance the ability of professionals and common users to recognize their responsibilities and confront challenges raised by computing (Stahl, 2004; Tavani, 2002). The main purpose is to foster morality or moral autonomy and develop the skill of rational thinking when ethical issues arise.

The lack of awareness among the users has also been reported by several studies. Some of the unique dilemmas raised by computing including privacy, proprietary software, intellectual property, accountability, security, hacking, digital divide and viruses (Wiegel, van den Hoven and Lokhorst, 2005). In light of the above discussion, it is justified that computer professionals as well as ordinary users of computing technologies are introduced with the ethics of computing.

3 OBJECTIVES OF DEVELOPING THIS COURSE

It is essential that students have understanding of implications of computing and its wide ranging impacts on society. They should be aware of different fields that are affected by ethics of computing. Moreover, current principles of the field should be linked to Islamic teachings of ethics in Islamic countries. The context of the study also emphasized the significance of sensitivity for ethics of computing, introduction of tools and strategies and concept of ethical autonomy.

Main objectives of developing this course can be summarized as listed next.

- To provide students with the basic understanding of wide ranging impacts as well as implications of computing on society
- To introduce students with various issues related to different fields of computer ethics

- To connect computer ethics with Islamic teachings through studying some relevant verses of the Holy Quran and Hadiths of Prophet Mohammed
- To develop sensitivity among students regarding ethics of computing
- To introduce tools and strategies for analysis ethical issues
- To discuss realistic cases of ethical issues in computing with students
- To develop ethical autonomy among students
- To raise awareness and introduce local anti-cybercrime laws, computing ethical codes -if any exist-, and related sources and tools.

In Arab and Muslim countries, it is essential to study the background of ethics of computing with special focus on the ideology side, i.e., from an Islamic and cultural points of view in particular. This is explained more in the following sections.

4 BACKGROUND

Computer technology has made rapid development in the last decade. As reported by Spinello and Tavani (2001), use of computer at workplace and at homes has raised certain ethical issues related to safety and health of the users. Forester and Morrison (2002) further explained these concepts and stated that influence of computing should be considered when computing is done at workplace. They stated that there was a possibility that workers would feel frazzled while trying to keep pace with high speed computing. Same can be extended for the computing at home and home users. Ethics of computing is also justified by threats like viruses and spying by international hackers who affect the computing and networks while they are sitting thousands of miles away from the computer and other information technology devices (Weckert, 2002). Computer security necessitates the study of computer ethics according to Spafford (1992).

Moor (1985) stated that computers were logically malleable because they could be molded and structured to perform any type of operations and activities involving inputs, outputs through logical operations. Potential applications of computing seemed limitless, as logic was applicable in all fields. Now it has become a universal tool and the limits of computer same as the limits of human creativity. As computing technology is malleable, it enables humans to infinite number of new activities that were not possible a decade ago. Since these activities are new to human beings and have never been done, the question either one should perform these activities or not. In most of the cases, no standards, codes, laws or policies exist to control and govern these activities. Moor termed these situations as policy vacuums that gave birth to conceptual muddles. Moreover, the policies about use of computer technology are absent or vague (Moore, 2005). Computing technology has equipped users with novel capabilities and provided novel choices. However, there are no or inadequate policies to govern these activities. One of the major objectives of computer ethics proposed course is to enable students do decide what should be done in these situations (Himma, 2004b). It will also provide students with tools and analysis to come up with clear and coherent conceptual framework. A line of action or policy can be built based on this conceptual framework.

Major problem in computer security is logical security rather than its physical security from the threats like fire, theft and flood. Logical security of computers was classified into privacy, confidentiality, integrity, unimpaired services, consistency and controlling access to various resources by Spafford (1992). Integrity requires the users and professionals to assure that unauthorized persons did not modify data as well as programs.

Introna (1997) stated that anonymity and privacy were two essential requirements of users because both provided similar benefits. For instance, anonymity and privacy may be required by users if they are obtaining medical or some sort of psychological advice on internet. Users discussing sensitive issues like abortion, AIDS, political dissent or venereal diseases also need privacy and anonymity. Introna also suggested that anonymity afforded similar protection as is possible with privacy.

Another issue that has been raised by some of the researchers is related to intellectual property rights (Spinello and Tavani, 2001). However, it has been a controversial topic in ethics of computing. It is

related ownership of software and some advocates of free software availability argue that there should be no software ownership and all software should be free for use. The advocates of this point of view claim the freedom of information, availability of programs for copying, modifying and studying by any person who has the capacity to do so (Stallman, 1992). Conversely, the advocates of intellectual property rights argue for the ownership of each and every software developing in the computing technology. They are of the view that software developing companies and program developers will not invest funds as well as time for software development if they would not get the benefit of their investment in the form of revenue from sales and license fees (Johnson, 2001).

Another issue that emphasizes the need for a course in ethics of computing is the global laws and their application on the users of computers and internet. For instance, if a user of a computer and internet wants to use or protect their freedom of speech in the USA, whose law will apply? Users from nearly 200 countries use internet and they are interconnected one another (Stahl, 2005). Therefore, the constitution of any country is regarded as a global law on the internet and will not be applicable to other countries in the world. Similar is the case for the users on the Arab countries and the laws of these countries will not be applicable to internet users in other countries of the world. It is significant that issues like freedom of speech, invasion, privacy, intellectual property and control of pornography are discussed and awareness is created among users in these countries (Spinello and Tavani, 2001). These issues should be governed by local policies and regulations. These innovative and unique ethical challenges are posed by computing (Siponen, 2004).

Since the study aims at developing a course of ethics of computing in Arab and Islamic countries, it is vital that research in computer ethics is related to the findings and teachings of Islamic ethics. Al-A'ali (2008) demonstrated that teaching computer ethics in general and computer ethics from an Islamic point of view in particular, clearly contributes to ethical behavior of Muslims. Masum (2013) suggested that many of the basic principles of ethics in the West are consistent with Islamic ethics. Peslak (2006) confirmed that four basic ethical issues in computing (i.e. privacy, accuracy, property and access (PAPA)) remain valid in time and space. Two other areas of ethical concern including responsibility and motivation in computing were identified by Conger, Loch and Helft in 1995. Khanifer (2012) suggested large number of issues raised by information technology. These concerns included user's rationality, transparency, self-control and privacy. These concerns successfully penetrated information technology and were named as computer ethics, internet ethics or cyber ethics. The fundamental denominators of ethics included efficacy, responsibility, proficiency and accountability.

Review of literature suggested a lack of research regarding ethics of computing and their connection to Islamic teachings. It was suggested by Al-A'ali (2008) that association between ethics of computing and Islam attracted fewer researchers. Leonard and Cronan (2005) revealed that findings of the researcher about ethical use of computing was influenced by personal religious beliefs, uncertainty, moral judgments, personal norms and values due to lack of organizational code of ethics. Clark (1999) also reported the impact of religion and religiousness on ethical judgment. Khalil and Abu-Saad (2009) reported a significant influence of individualism scales and Islamic work ethics among college students in Arab countries. Moreover, impact of Islamic work ethics on individual's capacity to innovate was investigated by Kumar and Rose (2010) and a positive relationship was reported.

The explosion of information technology user activities and interactions in the region can justify the necessity of raising awareness about computing ethical issues. According to Arab Social Media Report (2013), social media experienced exponential grew in Arab countries since 2011 and this trend continued until 2014. According to this report, the number of Facebook users, for example, is continually growing in Arab countries though some GCC countries have shown slower growth. The penetration of Facebook.com in Arab and GCC countries since 2010 is depicted below (Fig. 1).
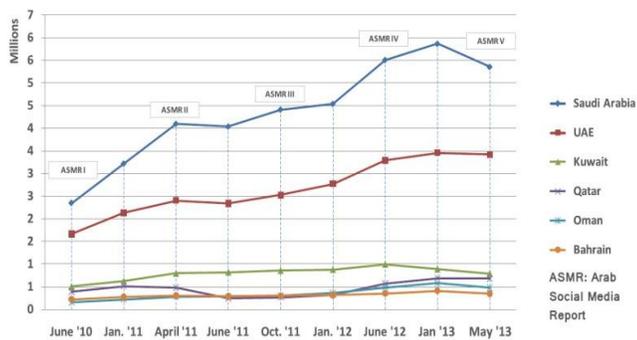
Figure 1. Trends of Facebook.com use in the GCC countries (2010-13) (Arab Social Media Report, 2013)

Likewise, Twitter has also shown exponential growth worldwide and has surpassed 500 million users as reported on March 2013. Out of these 500 million users, active users amount to 288 million. Compared to the number of Twitter users in Saudi Arabia, for example, between 2011 and 2012, the number of Twitter users in the country has skyrocketed to 3000%. That made Twitter penetration of internet users in Saudi Arabia the highest in the world with a percentage of 40% according to *The State of Social Media in Saudi Arabia 2013* report. These figures indicated an effect of technology on today's generation. This might be explained by the fact that 70% of Twitter access is done via smartphones due to high mobile phone penetration percentage according to the same report. Following figure depicts the number of active users of Twitter in the Arab world in the recent past (Fig. 2).
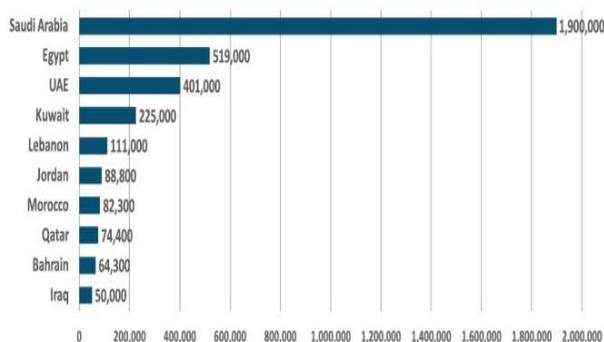

Figure 2. No. of Active Twitter Users in the Arab Region (Average number for March 2013) (Arab Social Media Report, 2013)

It is clear from the figures that activities and use of Facebook and Twitter is greater in Saudi Arabia then Egypt and the UAE. The 1.9 million Saudi

users alone, produced 158 million tweets which is almost half (47%) of all tweets in the Arab world. While Egypt and the UAE come second and third places respectively (ASMR, 2013).

As far as growth of social media is concerned in Arab world, its growth has been very strong in these countries. For instance, the number of Facebook.com users has doubled. Moreover, the number of social media users in UAE and Saudi Arabia has grown up to 50 % (Arab Social Media Report, 2013). Other major social media sites such as Google+ has also attained 500 million plus users with 240 million active users on day-to-day basis who share more than 1 billion items daily. It has shown nearly 200% increase in its users during last two years. The most significant increase has been observed in the number of users of Youtube.com in Arab countries. As far as Youtube.com is concerned, Saudi Arabia is the leader in Arab countries with maximum playbacks among the 285 million videos viewed every day. More than 50% of the Saudi users view Youtube.com videos from smart phone devices which explains the +90 million views per day in the kingdom according to *The State of Social Media in Saudi Arabia 2013* report. Similarly, more than 40% social media users in the UAE play videos from mobile devices. In Saudi Arabia, home to 28 million people, mobile phone penetration levels exceeded 200%. This fact might go some way to explaining why half the YouTube consumption in Saudi Arabia is done via a mobile (Radcliffe, 2013). In 2012, it has been noted that 47.5% of the Saudi populations, equivalent to 13.6 million users, are engaged in the internet (Alkhalifah, 2013).

The continuous increase in computing through mobile devices such as smart phones is accompanied by the continuous increase in cybercrimes. Cybercrimes are those where computing devices are used as tools, targets or incidentals (Nissenbaum, 2005; Moore, 2005). Cybercrimes include hacking, cracking, denial of services, virus dissemination, software piracy, pornography, IRC (Internet Relay Chat) crimes, credit card frauds, net extortion, phishing, spoofing, cyber stalking, cyber defamation, threatening, and salami attacks. These sorts of crimes and social issues stimulated different

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organizations, societies and educational institutions to take actions. Some examples include introducing computer ethics courses in some higher education institutes such as King Saud University, University of North Carolina, the UAE University, Stanford University and College of the Holy Cross etc. All these courses are based on the basic ethical models and theories that were applied in medical and social ethics. However, the uniqueness theory is specific to computer ethics that is because computing affords unique situation for application of ethical models. The focus of these courses is the introduction of different situations that demand the use of ethical approach in computing. The influence of computer and information technology on the society and ethical issues raised by widespread use of information technology devices like computer, internet networks, mobile phones etc. (Johnson, 2006).

If the basic values and norms were not reinforced during intellectual development and training of students, it was more likely that the false play would flow dominate their professional environment (Underwood and Szabo, 2003). It has been noted that awareness among professionals about organizational policies and ethical utilization of new technologies was slow as compared to the rate of advancement of these technologies. It is common that professionals have to confront innovative ethical dilemmas linked with computer technology.

5 METHOD

This section entails the methodology that was followed to propose a course of computer ethics. One of the methods to develop a course is to survey and analyze existing courses on the subject or related subjects. The development of the course was also based on objectives and background. Some of the well-established and effective course models were surveyed and their basic features were identified to structure a new course according to the needs of Arab countries, namely GCC. Studied course models were taken from different schools such as North Carolina famous 'Ethics of Computing' course, some Arabic schools and universities including King Saud University, UAE University, many Bahraini

universities and a few other models. All the models and courses were subjected to thematic analysis and major aspects of the courses were identified. The analysis also aimed at locating differences and similarities based on the social norms and religious beliefs. Current cybercrimes legislations in Arab countries were also studied and analyzed to identify major issues to be included in the suggested course model. Moreover, the special issues in relation to the Arab and Islamic society were also studied to identify major ethical issues that affected the Arab world. The results obtained through this methodology are discussed in the following section.

6 RESULTS

In light of the methods discussed above, the study was carried out and a course in ethics of computing was formed.

7 BRIEF COURSE DESIGN

The suggested course will examine core issues raised by rapidly increasing use of computers and smart devices and will highlight the responsibilities of professionals working with computing devices and information technology. It also highlights the same issues to the ordinary general end users of computing devices and computer science professionals as well. This course stresses different aspects where computing has challenged the traditional ethical theories and concepts of philosophy and will enable students to analyze old issues in innovative manner. The students will be suggested readings and it is expected that students understand the ideas in the given readings, explain them, analyze innovative ethical issues via diverse perspectives. The course dramatically reflects the fast expansion of computing technologies, social challenges and ethical dilemmas that emerged as a result of this expansion. The contents of this course (i.e. given in next section) revolve around certain issues that require immediate attention.

These issues include threats to anonymity and privacy of users due to massive database maintained by websites, high-speed and extensively large networks, electronic theft, hacking, breach of intellectual property rights (e.g.

music, film, text or video), data mining, surveillance at workplace and computer – related catastrophic accidents e.g. shutdown of nuclear power plants and crashes of airplanes.

8 SUGGESTED COURSE ELEMENTS

In light of the research carried out, the following elements are suggested for the course of ethics of computing in Arab countries.

8.1 Issues with Abuse

The students will be introduced with the abuse of computing technologies and their influence on the society. Abuse of computing technologies constitutes wide-ranging implications for society. Some examples of abuse of computing include using information technology infrastructure to harm others, illegal access to other computers, networks and mobiles, illegal interception of private data, interference into data by deleting, damaging, altering or deteriorating it, unauthorized interference with computer systems, misuse of mobile devices, electronic fraud and forgery (i.e. ID theft). Denial of service (DoS) attacks is the most common example of abuse of computing. It prevents a network or an information technology application from being used by others. Types of DoS attacks, causes and ethical implications will be included in the suggested course of ethics of computing.

8.2 Basic Ethics and Social Code

Basic ethic theories and social codes will be introduced to the students. Basic code ethics are divided into two types including short and long codes of ethics. This course will include long code of ethics because they are more specific and help professionals to understand the true nature of ethical theories in relation to issues raised by information technologies. On the other hand, short codes can be taught to students other than the computer science students because they are more concise and allow personal interpretation as well as application to ensure that end users apply these codes in variety of situations raised due to computing technologies.

8.3 Commerce Related Issues

The suggested course will also cover commerce related issues such as unauthorized access to data of a business organization, internet fraud, ID theft, unauthorized access to credit cards and other fraudulent activities. Business organization maintain large databases and use intranet or extranet to communicate. The protection of this data and networks from intruders, viruses and Trojans is the main objective of the business organizations. Commerce related issues include antitrust laws, databases, online auctions, fraud, gambling, online payments, taxation and online term papers.

8.4 Intellectual Property Rights Issues

Intellectual properties are one the most controversial issues when it comes to ethics of computing. Issues such as software piracy, development and licensing of software, MP3, CD and DVD rights and plagiarism will be introduced in the suggested course. The debate about controversy will be discussed, case studies will be presented and insight will be taken from the students. The issues of software piracy, electronic copyrights and patent and copyright law are the major elements of the suggested course. It will also educate students about different types of software proprieties such as open source software, shared software and commercial software.

8.5 Privacy and Anonymity Issues

An important element of the suggested course is that it deals with privacy and anonymity issues. Privacy is the most primitive ethical issue that was raised with the introduction of the computer technology. Users want to protect their ID, personal information, emails, location, E-passports, financial information etc. The use of e-passports, e – commerce and biometrics has increased the threats for anonymity of the end users. Certain technologies developed to protect the privacy of end users include encryption and decryption technologies. Thus, the suggested course ensures that privacy issues are discussed in light of the ethical codes and theories.

8.6 Cybercrime

As discussed in the background section, cybercrimes are the abuse of most innovative technologies. Therefore, the suggested course will introduce students with the cybercrime and their types. Computer crimes include all activities in which computing is used as a tool, incidental or target. Different types of cybercrimes including hacking, DoS attacks, virus, pornography, net encryption, phishing, spoofing, threatening etc. will be included in the suggested course. It will enable the students to be acquainted to various forms of cybercrimes and avoid these activities. They will also be introduced to different tools and methods that can prevent cybercrimes so that they may save them from cybercrimes.

8.7 Risks

Different risks raised due to computing technologies include licensure, software reliability, computer models, network security, artificial intelligence and software safety. The suggested course includes all risks as its fundamental elements. It will provide adequate knowledge to students about these risks. There are certain advancements in computing technology that can pose risk to human existence. For instance, the robots are used in industry for performing different actions. These robots are provided artificial intelligence through information technology tools and software. The reliability of software is not hundred percent because they can malfunction or altered by intruders. The networks used by organizations are not secure and total reliance on software also entails risks. All these and other relevant issues are essential component of the suggested course. The course will introduce students with various risks associated with computing.

8.8 Social Justice Issues

The computing technologies have also raised some social justice issues. The suggested course will include major social justice issues like un-equality of access to information technology, workplace issues and negative impacts of computing on society. The discussion of these issues will enable students to understand the impact of computing on society and creating inequality among different social classes. Some computing devices are costly; the speed of networks is different with different bandwidths. Moreover, the availability of technology is also different in different areas.

8.9 Speech Issues

Computing and networking has provided many platforms of speech to the end users. There are blogs, chain letters, discussion groups and porn sites allowing unlimited access to end users. The results of these technologies are hate-speeches, internet filters, video game violence, defamation and censorship in different countries. In addition, the issues of moderation and netiquettes are also vital elements of the suggested course.

8.10 Medical and Safety Issues

The computer hardware and information technology devices are used in homes and workplace. The continuous use of these devices may result in stress to workers or home users. Therefore, the suggested source will also introduce students to various medical and safety issues associated with computing technologies.

8.11 Saudi and UAE Anti-Cybercrime regulations

There are certain laws in Saudi Arab and UAE that govern the use of computing technologies. It is vital that the computer professionals and end users are aware of these laws to ensure that they do not make illegal use of computing devices. The Shoura, legislating body of Saudi Arab, approved first legislation to control and deal with the increasing rate of cybercrimes. The laws deal with offences including cybercrimes and using networking technologies for defamation or terrorism. They also specify to the social media users the boarders of accepted expressions and practices that can be treated as exercise of their freedom of speech. In addition, they cover online defamation, data theft, illegal access to networks and illegal possession of e–documents. These laws

are also main elements of the suggested course for ethics of computing.

Introducing students to protection and reporting tools can be an essential part of the course. Authorities and involved agencies have some tools that can be used by any individual or party to report any kind of abusive or cybercriminal activity. The discussion and active use of these tools can be practiced as a part of this course, and it will be very helpful for learners' real life experience.

8.12 Commandments of Computer Ethics

The suggested course will also include the Ten Commandments of computer ethics that constitute the first ever set of ethics applied to use of computing technology. These commandments were proposed by Computer Ethics Institute in 1992 with a purpose to set guidelines for ethical computing. They are simple, straight forward, strong and inclusive of all other technology-related codes of ethics. The discussion of these commandments will enable students, especially the end users, to make sensible and responsible use of computing technologies.

8.13 Connecting computer ethics to Islamic teachings and Arabic culture

This course will examine the major computer ethical principles discussed above from an Islamic point of view through studying some relevant verses of The Holy Quran and Hadiths of Prophet Mohammed. It will contribute to the ethical behavior of Muslim students, especially IT professionals, in utilizing computing technologies and issues relevant to software development (Al-A'ali, 2008). The current courses on ethics of computing separate religion from ethical issues and treat these issues as philosophical issues as explored by Suad (2012). Since the targeted audience for the proposed course is majoring in technology-related track, or at least is a general audience, the philosophical background about the topic of ethics will not be covered in such a course.

9 EVALUATION TOOLS FOR SUGGESTED COURSE

The following tools can be used to evaluate students learning of the suggested course. These evaluation tools are proposed on the basis of best practices currently being used by some of the surveyed schools. They are also suggested to make the learning of this course' concepts more active and constructed by the learners' experiences. The effectiveness of the course can be evaluated by taking pre and post course tests. The students can, also, be given real life case studies and asked to present solutions in light of their understanding of ethics of computing. In addition, students can be assigned various topics to evaluate their ability and understanding of the principles of ethics of computing through case studies. Teachers can assign group tasks to analyze cases, laws, and topics taught in class then lead a discussion to get an idea about the learning of students. The evaluation can also be done through quizzes, tests, papers, and presentations. Ethics of computing-related data gathering about cases, laws, books, websites and similar activities can be conducted as a form of active learning activities.

10 DISCUSSION

The major aim of this paper was to suggest a course for ethics of computing for the GCC and Arab countries. The study has achieved this aim through review of literature and surveying recent issues about the challenges and ethical issues posed by computing technologies. In light of the challenges identified, the study proposed major elements of the suggested course. The description of the suggested course is also provided in the results section. This section discusses how the suggested course and its elements are helpful in achieving the goals of this study. The first objective of the study was to enable students that they acquire wider perspective on the ethical and societal impacts and implications of computing technologies. The first element of the suggested course is aimed at fulfilling this objective. The study also suggests that pre and post – tests at initial and final stage will be used for evaluation of the effectiveness of the course in achieving its aims. From the major elements of the suggested

course, it is obvious that major theories of ethics and main ethical issues caused by computing technologies will be taught to students so that they can understand the influence of widespread use of computing technologies. The professionals in computer science and software engineering must be well equipped with the basics of code of ethics in engineering and abuse of computing technologies. This course includes introduction and explanation of abuse of or by computer technology and smart devices, social-justice issues, commerce related issues and intellectual property rights. It will enable the professionals to assess the ethical value of their decisions while developing and using software. Computing technologies are the future of human beings. With the passage of time, the computing devices and networks are pre-dominantly used throughout the world. The financial activities have shifted online and the concept of electronic money has gain popularity throughout the world. In this scenario, people are managing their commerce and business activities through computer networks and mobile phones. Therefore, it is critical that users and professionals are aware of the risks associated with the online commerce and business activities.

Another significant issue is the freedom of speech that is included in the suggested course. The laws regarding freedom of speech are different in different countries but the internet is an international network and international laws are required to control the abuse of freedom of speech through computing technologies. It has been observed that blogs, websites, discussion groups and social media pages are abused for defamation of governments, organizations, personalities etc. Therefore, the inclusion of ethical issues related to speech in the suggested course is justified and should be developed with the passage of time. The defamation by end users and professionals are two different issues and this course will be useful for students to make ethical decisions with the usage of computing technologies. It has been reported that intellectual property rights have been violated due to software piracy and violation of patent and copyright law. The use of social media is also spreading in Arab countries and the social media sites are being used to share videos violating the copyright laws, as an example. There is an apparent policy vacuum related to ethical issues of computing technologies in the Arab countries that is aiding to increase in these issues. The suggested course will help students to understand the concepts of privacy and anonymity. It is well documented that websites use encryption for the safety of data of their customers but they also maintain databases of the total information. The hackers and computer abusers may intrude into the networks of companies and the privacy of the customers may be compromised. Moreover, the interception of the data is also done by the hackers when data is being transferred from the customer to the company or vice versa. In this scenario, this course promise to provide knowledge of encryption, decryption and their ethical use to ensure that privacy and anonymity of the users of computing technologies are maintained. The software developers as well as end users of software should be aware of the international and national laws that regulate the use of computing technologies in their country. The suggested course includes introduction to two of the well-defined and clear national anti-cybercrime laws in Arab countries and will effectively meet the need of the hour to educate students about ethical use of computing and its legal issues. In addition to all the issues discussed above, it is interesting to note that the suggested course also includes the basic ethical theories. This course will develop with the passage of time and new issues and models may be included to make it effective and enable to achieve the required goals. It is also suggested that the basic Islamic ethics of commerce, speech, communication, and privacy and property rights are also included in the course and integrated with the ethical issues regarding computing technologies.

The study has also proposed effective tools for evaluation of course. Pre and post – course tests are the most commonly used evaluation methods. These tests will help to evaluate and compare the understanding of ethics of computing among students on the start and end of the course. Other evaluation tools including quizzes, tests and presentations will also allow students to show the skills acquired through this course.

11 RECOMMENDATIONS

The following recommendations are formulated to make effective use of the suggested course in ethics of computing:

1. Effective and active teaching and learning strategies should be utilized by the teachers to achieve the goals of the suggested course. For example, case studies, group discussions, data collections, review of sources, etc.
2. The ethics of computing should be linked with the Islamic ethics to strengthen the application of ethics while decision making.
3. The evaluation tools should be used and aided with novel ideas of evaluation.
4. The course elements may be re-arranged for the computer science students and students of other majors as a separate course or part of computer science courses.
5. Developing a code of ethics for GCC states, schools, and institutions and apply it in computer science curriculum and computer laboratories, networks and devices.
6. Tracking software should be used and their practical application should be demonstrated to students.
7. The tools and methods of preventing abuse of computers should be promoted. The application of these tools must be demonstrated and practical use of these tools should be encouraged.

For future studies, it is essential to extend the study to cover some related aspects such as the extent to which Islamic ethics can be incorporated into existing standards of ethics of computing. Future studies should also measure the impact of incorporation of Islamic ethics into the ethics of computing on the utilization of computing among professional and ordinary users.

12 LIMITATIONS

This study is limited to Arab and Muslim countries. The target was GCC states; however, the same concepts can be applied and used anywhere. Moreover, the proposed course contents and recommendations are also relevant to the GCC states but different institutes in Muslim countries may use the recommendations and course contents, which are most appropriate according to the Anti-cybercrime laws of their respective states.

13 REFERENCES

1. Al-A'ali, M. (2008).Computer ethics for the computer professional from an Islamic point of view. *Journal of Information, Communication and Ethics in Society*, *6*(1), 28-45.
2. Al-Khalifa, H. S., & Garcia, R. A. (2013). The State of Social Media in Saudi Arabia's Higher Education. *International Journal of Technology and Educational Marketing (IJTEM), 3(1),* 65-76. doi:10.4018/ijtem.2013010105
3. Arab Social Media Report (2013). *Transforming Education in the Arab World: Breaking Barriers in the Age of Social Learning.* Retrieved from: http://www.arabsocialmediareport.com/UserManagement/PDF/ASMR_5_Report_Final.pdf
4. Bynum, T. (2001). Computer ethics: basic concepts and historical overview. In: Edward, N.Z. (Ed.), *The Stanford Encyclopedia of Philosophy.* http://plato.stanford.edu/entries/ethicscomputer.
5. Bynum, T. W. (2004). Ethical challenges to citizens of the "automatic age": Norbert Wiener on the information society. *Journal of Information, Communication and Ethics in Society*, *2*(2), 65–74.
6. Bynum, T.W. (2006). Flourishing ethics. *Ethics and Information Technology*, 8(4), 157-173.
7. Capurro, R. (2007). Information ethics for and from Africa. *International Review of Information Ethics*, *7*, 2-10.
8. Cavalier, R.J. (2005). *The Impact of the Internet on Our Moral Lives*. Albany, NY: State University of New York Press.
9. Clark, R. (1999). Internet privacy concerns confirm the case for intervention. *Communications of the ACM, 42*(2), 60-67.
10. Conger, S., Loch, K. D., &Helft, B. L. (1995). Ethics and information technology use: A factor analysis of attitudes to computer use. *Information Systems Journal*, *5*(2), 161-184.
11. Dancy, J. (2004).*Ethics without Principles*. Oxford, UK: Oxford University Press.
12. Ess, C. (2006).Ethical pluralism and global information ethics. *Ethics and Information Technology*, *8*(4), 215-226.
13. Floridi, L. (2005). The ontological interpretation of informational privacy. *Ethics and Information Technology*, *7*(4), 185–200.
14. Floridi, L. (2003). On the intrinsic value of information objects and the infosphere. *Ethics and Information Technology*, *4*(4), 287-304.
15. Himma, K. E. (2004a). There's something about Mary: the moral value of things qua information objects. *Ethics and Information Technology*, *6*(3), pp.145-159.
16. Himma, K.E. (2004b). The moral significance of the interest in information: reflections on a fundamental right to information. *Journal of Information, Communication, and Ethics in Society*, *2*(4), 191-202.

17. Introna, L. D. (1997). Privacy and the computer: why we need privacy in the information society. *Metaphilosophy*, *28*(3), 259-275.

18. Johnson, D. G. (2001).*Computer Ethics.* NJ: Upper Saddle River.

19. Johnson, D. G. (2006). Computer systems: moral entities but not moral agents. *Ethics and Information Technology*, *8*(4), 195-204.

20. Khalil, M., &Saad, A. S. (2009).Islamic work ethic among Arab college students in Israel. *Cross Cultural Management: An International Journal*, *16*(4), 333-346.

21. Kumar, N., & Rose, R. C. (2010).Examining the link between Islamic work ethic and innovation capability. *Journal of Management Development*, *29*(1), 79-93.

22. Leonard, L. N., &Cronan, T. P. (2005). Attitude toward ethical behavior in computer use: A shifting model. Indus. *Management Data System*, *105*(9), 1150-1171.

23. Masum, A. K. (2013). Ethical Issues in Computer use: A Study from Islamic Perspective. *Global Journal of Computer Science and Technology Interdisciplinary*, *13*(2), 13-15.

24. Moor, J. H. (1985).What Is Computer Ethics? In: Bynum, Terrell Ward, ed. (1985) *Computers and Ethics,* Blackwell, 266-275.

25. Moore, A. D. (2005). I*nformation Ethics: Privacy, Property, and Power*. London, Seattle, Washington: University of Washington Press.

26. Morrison, A. (2002). *Researching ICTs in Context.* Retrieved from: http://www.intermedia.uio.no/konferanser/skikt-02/docs/Researching_ICTs_in_context- Ch3-Bromseth.pdf.

27. Nissenbaum, H. (2005). Where computer security meets national security. *Ethics and Information Technology*, *7*(2), 61-73.

28. Peslak, A. (2006). PAPA revisited: A current empirical study of the Mason framework. *Journal of Computer Information Systems*, *46*(3), 117-123.

29. Peterson, D. (2002). Computer ethics: The influence of guidelines and universal moral beliefs. *Information Technology & People*, *15*(4), 346-361.

30. Radcliffe, Damian (2013, August, 1). *Twitter takes off in Saudi – and other news of social media in the Arab world*. retrieved 31 December 2013, from BBC Web Site: http://bbc.in/1428IAm

31. Siponen, M. (2004).A pragmatic evaluation of the theory of information ethics. *Ethics and Information Technology*, *6*(4), 279-290.

32. Spafford, E. (1992). Are computer hacker break-ins ethical? *Journal of Systems Software*, *17*(1), 41-48.

33. Spinello, R.A., & Tavani, H.T. (2001). The Internet, ethical values, and conceptual frameworks: an introduction to cyberethics. *Computers and Society*, *31*(2), 5-7.

34. Stahl, B. C. (2005). The ethical problem of framing e-government in terms of e-commerce. *Electronic Journal of E-Government*, *3*(2), 77–86.

35. Stahl, B.C. (2004). Information, ethics and computers: the problem of autonomous moral agents. *Minds and Machines*, *14*(1), 67-83.

36. Stallman, R. (1992). *Why Software Should Be Free.* Retrieved from: http://www.gnu.org/philosophy/shouldbefree.html

37. Suad, A. (2012). *Towards a Pedagogy for Teaching Computer Ethics in Universities in Bahrain.* Retrieved from: https://www.dora.dmu.ac.uk/handle/2086/8804

38. Tavani, H. T. (2002). The uniqueness debate in computer ethics: what exactly is at issue, and why does it matter? *Ethics and Information Technology*, *4*(1), 37-54.

39. The Social Clinic (2014, January, 6). *The State of Social Media in Saudi Arabia 2013*. retrieved February 13 2014, from The Social Clinic Web Site: http://bit.ly/1d7rlJh

40. Turilli, M. (2007). Ethical protocols design. *Ethics and Information Technology*, *9*(1), 49-62.

41. Underwood, J., & Szabo, A. (2003). Academic offences and e-learning: individual propensities in cheating. *British Journal of Educational Technology*, *34*(4), 467-477.

42. Weckert, J. (2002). Lilliputian computer ethics. *Metaphilosophy*, *33*(3), 366–375.

43. Wiegel, V., van den Hoven, J., &Lokhorst, G. (2005).Privacy, deontic epistemic action logic and software agents. *Ethics and Information Technology*, *7*(4), 251–264.