Analysis the Students Perspective Regarding Social and Ethical Issues in Computing Toward A Reform Teaching Model for Computer Ethics

1. Abstract:

Computer ethics as a concept has been introduced during World War II as a mean to control machine based communication .The philosophical justification for the need of computer ethics as a discipline has been developed over a century, arguing that emerging computer technologies creates a "policy vacuum" cause confusing in understanding the law and polices and what they representing in such computer related issues. Meanwhile, teaching computer ethics has been evolved from being a part of a philosophy course to becoming an independent field of study. This discussion paper show the gap in the students' prior computer ethics knowledge with regards the recognition of the need for, and an ability to engage in, continuing professional development, and the ability to use current techniques, skills, and tools necessary for computing practice.

2. Introduction:

Taking into account of more than a decade of experience in teaching computer/professional ethics, it is safe to claim that the sense of importance of computer ethics and social responsibility already exists among computer students. However, their attitudes with regards to what we should do when we face an ethical dilemma, such as privacy breach incidents or Software piracy cases, are variable as some of them for example, suggest that they take a pragmatic decision that aligns with what the law or regulation has to say, others think that the ideal action probably does not exist and we should accept those problems, as an inevitable negative impact of living in the information age. Other have a notable lack of using ethical theories as they claim there are limited and even absence of logical justifications. Therefore, it appears that there is a need for further investigations understanding the perspective of young – undergraduate-

students regarding ethical and social issues in computing and how these perspective is shaped in order to improve computer ethics pedagogy.

3. The Development of Computer Ethics:

The concept of Computer Ethics can be traced to, last century, 1940s during the World War II when Norbert Wiener raised questions regarding *"the control and communication in the animal and machine*" in his book, Cybernethic [1] Since then number of scholars including Donn Parker, Joseph Weizenbaum, Walter Maner, Terrel Ward Baynum, Deborah Johnson, James Moor, Robert Hauptman, Simon Rogerson, Donald Gotterbarn, Krystyna Gorniak, Luciano Floridi and Bernd Shtal tackle the topic of Computer Ethics with further insight and establish number of means to support the Computer Ethics researchers [2].

Moor claims that the reason behind the rise in the need for computer ethics is the state of policy vacuum while using computer technology that impact on the ability to judge whether an action is right or wrong, which makes the question that computer ethics is trying to answer " What should we do in the cases of ethical dilemmas while using computer systems?" . Therefore, according to More, computer technology should be taken into account when applying ethical principal in computer related action [3,4,5]. Moreover David Wright proposes a framework for ethical impact assessment for new technology that encourage the engagement of all stakeholders including developer, users and policy maker in considering ethical implications for such technology [6]. In addition, specific computer related ethical issues, such as privacy threats has been studied by a number of researchers such as Helen Nissenbaum who argues that the nature of a situation or context of using such technology may determine whether an action is considered a privacy violation or not and therefore she proposes a model of informational privacy to help such decision. [7]

Alongside of the evolving of the Computer Ethics concept, the call for formal teaching of this concept to undergraduate students in the computer related programs has been raised. According to researchers, exposing computer ethics topics to computer students, as a part of the curriculum, tend to be more effective as an "in house" course rather than a general ethics course provided by philosophy department [8].

4. Teaching Computer Ethics:

Teaching computer ethics has been evolved during the last three decades, starting by being part of a philosophy department course as a "remedial moral education", into becoming a computing department course as "a field worthy of study in its own right" [9]. A number of researchers in computer science subfields such as Data Science and Artificial Intelligent promote teaching ethics and ethical theories such as utilitarian analysis, deontology and virtue ethics [10,11]. It has been argued that AI practitioners need to be equipped with the understudying of ethical theories in order to embed the accountability in designing, building and using their systems [11]

Currently, when teaching computer ethics courses, tutors starts by outlining the history of computing with an emphases on the speed of recent development in the communication computer technologies that associate with the "emergence of social and ethical problems in computing". Then, students are introduced to the ethical theories and their roles in analyzing computers' ethical dilemmas within computer ethical issues, such as privacy, intellectual property rights and computer crimes. Furthermore , students engage in case study analysis, ethical thinking and ethical decision making during the course. [9,10,11,12,13,14,15,16].

Studies show that students and in some cases, teachers, may confuse computer ethics with morality or religion, they also assume that computer ethics is merely knowing what is forbidden and what is allowed [17]. Computer Ethics pedagogy should focus on teaching

computer students how to use ethics as a "cognitive tool" that could be used to generate specific and case dependent responses that takes into consideration any computer related social problems. Consequently, ethical issues need to be constantly updated and revised to be able to handle the increase of emerging technology [17,18, 19, 20]. In addition, more novel approaches has been used to teach computer ethics, such as game based learning technique to present ethical dilemmas in computing for computer students as well as experts and help them examine different scenarios according to each selected decision [21,21]

Computer Science, Information Technology and Information System programs that accredited or planning to be accredited by ABET tend to adapt Students Outcomes (SOs) criteria that is suggested by ABET - CAC for analyzing the impact of technology on society and applying technology in professional development [23,24,25]. SOs include, SO1: the ability to analyze a problem, and identify and define the computing requirements appropriate to its solution,SO2 the ability to analyze the local and global impact of computing on individuals, organizations and society, SO3 the recognition of the need for, and an ability to engage in, continuing professional development, SO4 the ability to use current techniques, skills, and tools necessary for computing practice.

5. Research Methodology :

The objectives of this discussion paper are to study the perspective of undergraduate students toward Computer Ethics and social issues related to computer and assess the appreciation of undergraduate students for Computer Ethics topics. Around 100 students from Computer Ethics classes took place in Spring 2020 and Fall 2020 were asked six, face to face or online, questions in order to observe their current perception regarding the expected ABET-CAC students outcomes.

6. **Preliminary Results for the First round of interviews**

The result explain (%) of students who have been able, before the start of the course, to express their perception regarding computer Ethics. For each question of the survey, 1 would be recorded to each relevant answer and 0 for irrelevant answer, and then the percentage of relevant answer is recorded for each questions against each SO.

	Questions	SO 1	SO 2	SO 3	SO 4
1	As a computer systems and internet users what do you know about Computer ethics?	98 %			
2	In your opinion what are the computer ethics problems?		75 %		
3	In your opinion how could we solve the computer ethics problems?		75 %	50 %	
4	As a Computer Science/ IT student, what is Computer ethics topics you would study?		25 %	25 %	
5	In your opinion what are the computer ethics problems in Computer Informatics profession?		25 %	15 %	
6	In your opinion how could we solve the computer ethics problems in Computer Informatics profession?			5%	5%

7. **Future Works**

The interview and focus group would be continued on the students of Computer/ Professional Course during and after the course. A series of, face to face and online, semi-structure Interviews and focus groups designed by using the five step method. This guide

includes; identifying the fundamentals for using this method, using previous knowledge in the topic, designing the initial version of the semi-structured interview, and testing and finally, presenting the final version [26, 27].

In a parallel with the of semi-structure Interview and focus groups, the Computer/ Professional Ethics course file would be analyzed to evaluate the students' attain with regard to relevant students outcomes SOs, (b ,g ,h and i) [28]. Finally, a survey in a form of questionnaire would be conducted to analyze the students' perspective regarding ethical issue in general [29].

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