

ETHICAL DECISION-MAKING PROCESSES AMONG STUDENTS IN COMPUTING AND  
IMPLICATIONS FOR THEIR PROFESSIONAL DEVELOPMENT

BY

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DISSERTATION

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## **ABSTRACT**

Computing professionals influence modern societies significantly due to the prevalent usage of computer-based technologies. The impact of these technologies necessitates development of professionals in the field who are aware of the consequences of their practice and capable to make ethical decisions. Developing ethical decision-making skills among computing students can be informed by knowing how they make decisions when they face ethical challenges. This dissertation is a qualitative grounded theory research with the focus on ethical decision-making processes among computing students. The data consist of postings of 33 undergraduate computing majors (26 males and 7 females) in online discussion forums in response to three ethical scenarios and the comments they provided on their peers' responses, along with the follow up interviews with 19 of these students. The findings indicate that when students use real-world stories to build their reasoning, show care for end users, and recognize and avoid biases they make more desirable ethical decisions. On the other hand, falling for different biases and minimalistic view of professional responsibilities are identified as two of the main reasons for making less desirable ethical decisions. This study suggests computer ethics educators to teach students to recognize fallacies and biases in ethical reasoning. Moreover, using real-world stories as well as the introduction of ethics of care to students can help them in making more ethical decisions.

*Keywords:* computing ethics, ethical development, ethical decision making, professional ethics, human resource development

*To my mother and father, Mahin and Hossein who have devoted their lives to their children.*

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## **CHAPTER 1: INTRODUCTION**

Ethical aspects of computing as a profession can be seen everywhere, from the concerns regarding privacy in social media such as Facebook to the fears of developments in artificial intelligence (AI) and the possible threats to human beings as raised by individuals such as Bill Gates and Professor Stephen Hawking (Rawlinson, 2015). Moreover, due to the increasing role of information technology and its impact on and its integration into the lives of people in today's societies, ethical considerations of computing are of significant importance (Stahl et al., 2016). In terms of ethical responsibilities, a considerable proportion of the roles is played by computing professionals who design, develop, implement, and test these systems (Stahl et al., 2016). Computing professionals work in a complex environment which makes the handling of ethical problems very challenging. As stated by Johnson & Miller (2009), computing professionals include “programmers, system designers, database managers, software engineers, computer security specialists, researchers, system managers, documentation specialists, and network administrators” who work in a variety of settings including “small and large software and/or hardware companies; ... local, state, and federal government and other nonprofit organizations; and ... private consulting firms” (Johnson & Miller, 2009, p. 171). Ethical decisions made by all these computing professionals have important consequences for different stakeholders and for society.

At the same time, in today's societies, more and more responsibilities are assumed for higher education and organizations regarding promotion of ethics (Foote & Ruona, 2008). Ethics training programs, as stated by Craft (2010), need to be ongoing and interactive so that the organizations would adapt to the changing environment. A recent study by Leavitt, Reynolds,

Barnes, Schilpzand, and Hannah (2012) suggested that employees' moral judgments are influenced by their occupational identities. This implies that, as an example, there are differences between engineers and managers in their decisions when they face ethical problems. In addition, different professions are facing different kind of ethical problems based on the nature of their jobs and their professional responsibilities. Therefore, it seems necessary to take a customized approach to ethical development activities such as ethics training. Such approach is not currently prevalent in organizations and the ethics training programs are mostly unified attempts.

In terms of the research on ethical decision making, despite the importance of the processes involved in ethical decision making among adults, the research on the topic is limited in different ways (Tenbrunsel & Smith-Crowe, 2008). The analysis of ethical decision-making processes is important since it would help provide a better understanding of influential factors as well as identification of approaches which might improve the ethical decision making and can be used for professional development purposes.

In terms of research methodology, although ethical decision making has been studied by a broad range of researchers in fields such as psychology, education, business, etc. (Morales-Sa'nchez & Cabello-Median, 2013), the literature is dominated by quantitative studies which test the influence of predetermined variables on ethical decision making.

Regarding the subject, this manuscript is focused on computer ethics which has to do with "the role of IT [(information technology)] in constituting the moral world" (Johnson & Miller, 2009, p. 21). As computing technologies are integrated rapidly into different aspects of our daily life, the ethical aspects of computing have more implications (Stahl, Timmerman, & Mittelstadt, 2016). Stahl et al. (2016), in their review on literature on ethics of computing, showed an overall increase in publications on the topic and attributed this trend to the increasing

importance of the subject. Although the ethical practice is important in all professions, professionals who are dealing with new technologies are facing with specific kind of ethical dilemmas, since new technologies provide new possibilities which in turn raise ethical questions about these possibilities (Johnson & Miller, 2009). Moreover, a critical issue with the ethics of such professions is that, as described by Loui and Miller (2008), ethical obligations are beyond complying with laws which often lag behind technology advancements. According to Moor (1985), computers raise special ethical issues which are different from other technology and therefore needs to be treated differently. The distinction factor is ‘logical malleability’ which makes computers “to be shaped in endless ways” (p. 269). As he stated:

...computer ethics is a dynamic and complex field of study which considers the relationship among facts, conceptualizations, policies, and values with regards to constantly changing computer technology...Computer ethics require us to think anew about the nature of computer technology and our values. (Moor, 1985, p. 267-268)

### **Problem and Purpose Statement**

While a vast number of empirical studies on ethical decision making has been done, the theory and the literature on the topic is not yet saturated and the matter is not closed (Lehnert, Park, & Singh, 2015). The studies on work-related ethical decision making are mostly conducted among managers (e.g., Frisqe & Kolb, 2008; Weber & Wasioleski, 2001) and as stated by Weber and Wasioleski (2001), “more attention should be directed toward the context of dilemma, type of work, and industry membership” (p. 104). Moreover, most studies in the literature of ethical decision making are quantitative studies testing the effects and relationship of predetermined variables. Many of these studies can be found in two literature reviews on ethical decision



making by Craft (2013) and Lehnert, Park, and Singh (2015). In recent years, some research has used qualitative approaches for studying ethical decision making (e.g., Catacutan & Guzman, 2015; Heyler, Armenakis, Walker, & Collier, 2016). As stated earlier, the ethical issues for the disciplines such as computing seems to have specific attributes which needs to be further examined through qualitative inquiry. The findings would have important implications for ethical development of professionals in the field.

When it comes to improving ethical decision making among individuals and their professional development, human resource development professionals and educators in higher education have a key role. They need to know how people in different settings and situations make ethical decisions to be able to improve this process (Ferrell, Fraedrich, & Ferrell, 2011). As discussed by Bird and Sieber (2005), science involves values and professionals need to integrate these community values into their behavior. The literature, however, is dominated by studies which are not particularly attentive to the potential role of related communities (i.e., professions) in framing such judgment. Moreover, computing professionals' decision-making processes have not received sufficient attention.

Another concern is the need for revised approaches to teaching ethics because traditional approaches to teaching ethics does not attend to the unintentional but predictable cognitive patterns that leads to unethical behavior (Bazerman & Tenbrunsel, 2011).

The aim of this study is to contribute to the literature by addressing some of the current gaps. To better convey the problem and the purpose of this study, the gaps of current literature on the topic have been categorized into four main categories: (1) theory, (2) methodology, and (3) population and setting. Addressing these gaps is crucial in improvement of courses on ethics

and ethical development of computing professionals. Potential implications of findings for engineering ethics education is the motivation for the current study.

## **Theory**

As stated before, our knowledge on ethical decision-making process is limited (Tenbrunsel & Smith-Crowe, 2008) and it is mostly established on the assumptions originated from ethical decision-making stages introduced in the literature such as Rest's four stage model (Tenbrunsel & Smith-Crowe, 2008). Traditional approaches to ethical decision making assume the individuals' recognition of the dilemmas and also the intentionality of their responses. Moreover, Rest's model "directs our attention away from critical elements of decision making and judgment that lead to unethical behavior" (Bazerman & Tenbrunsel, 2011, p. 29).

Considering assumptions from cultural psychology, and socio-cognitive and sociocultural approaches to moral development would contribute to the empirical research on the topic. As argued by Bazerman and Tenbrunsel (2011), understanding unethical behavior needs identifying the subtle influencers on behavior and the impact they have on the way people think about ethical problems. As stated by Moore and Gino (2015), findings from research in cognitive neuroscience and moral psychology regarding how and why individuals make ethical decisions have not been considered in dominant models of workplace unethical behavior.

The literature also lacks studies with the focus on exploring ways individuals make decisions interactively when provided by an ethical problem. Most assignments in courses on computer ethics emphasize individuals' responses while professionals in their career would more than not make decisions by interacting with others. The influence of such interactions among professionals has not been discussed in literature.

## **Methodology**

The literature on ethical decision making is mostly dominated by quantitative studies and to be more specific survey and/ or experimental designs (Treviño et al., 2014). As discussed by Treviño et al. (2014), the current dominant approaches test models which have been theorized beforehand and there is a need for qualitative studies to close the gap. Moreover, the traditional self-report methodologies are not efficient in capturing the limited conscious processes which might include attitudes, stereotypes, assumptions, and motivations (Uhlmann, et al., 2012). Gathering data from individual's ethical decision making when they actually face moral dilemma would provide better insights about people's actual behavior (Bazerman & Tenbrunsel, 2011).

Therefore, this study would take a qualitative approach and would also include non-self-report components to explore the context and create insights and a deeper understanding of the complex process of ethical decision making. While there are some qualitative studies on examination of the processes of ethical decision making, to the author's knowledge, the online discussion boards have not been used in the past as a source to explore the ways individuals make ethical decisions interactively. This would contribute to the theory of interactive ethical decision making.

## **Population and setting**

The kind of ethical issues in computing profession, as stated earlier, is different from other professions. Moreover, professionals in a profession share a culture that has its unique characteristics and therefore it needs to be taken into account in studying moral development. This assumption comes from cultural psychology which assumes "that psychological functioning

always occurs in specific socio-cultural contexts” (Miller, 2006, p. 376). This lack of attention to specific conditions and context of computing profession is important since as Stahl et al. (2016) suggested:

If, as we believe, work on ethics and computing is to have practical relevance and influence technology research and design as well as policy and practice, then the field have to develop substantially. We believe that in addition to exploring and defining ethical issues, there should be more consistent attention to underlying ethical theory as well as practical implications, recommendations, or guidelines that help individuals deal with the ethical issues ... (p. 32)

Moreover, Giorgini et al. (2015), argued that research with the focus on the differences in ethical decision making among different fields is limited.

Through reviewing the gaps in literature in four categories listed above, one can see that despite the importance of the topic, and the increasing role of adult educators in promoting ethical decision making among individuals, the research on the topic is limited.

The aim of this research is to examine the process of ethical decision making among students pursuing careers in computing to provide some insights on the process and the underlying factors that contribute in this regard. Using grounded theory approach, an inductive model of ethical decision making among computing majors will be proposed. Implications for ethics educators and human resource development researchers and practitioners would be provided. The hope is that the result would expand the theory and practice of ethical decision making within the computing profession and related fields.

## **Research Questions**

This study is motivated by the identified gaps in current literature and the need for improvement of educational activities among professionals based on non-traditional views to ethical decision making. In this section, the specific research questions will be stated.

It is important to understand the informal values inherent among computing students. Creating such understanding is challenging and might disclose unpleasant truths but meaningful change cannot happen otherwise (Bazerman & Tenbrunsel, 2011). As stated by Bazerman and Tenbrunsel (2011), codes of ethics and ethics training as formal systems “won’t drive informal values; rather informal values need to drive which formal systems are warranted and how they are designed” (p. 163). As stated by Bazerman and Tenbrunsel (2011), through “understanding the reasons ethical fading occurs, employee can uncover the powerful and often dangerous informal values that influence their behaviors” (p. 16).

Another important goal for this study is to provide practical guidance for computer educators as well as human resource development professionals. This is rather important since as stated by Stahl et al. (2016), the percentage of articles with practical guidance in literature of ethics of computing is low while such studies are needed to address the gap between the theoretical considerations of philosophical ethics and the professional work of computing professionals.

Understanding the ways in which computing majors decide on ethical issues and identifying the factors that contributes to these decisions will help theory building in ethical decision-making. It will also help educators to develop courses and programs that can better address the ethical challenges that individuals face in the field.

The following research questions would inform the study:

- 1- How can ethical decision-making processes among computing students be described and explained?
- 2- How does participating in online asynchronous discussions influence ethical judgment processes among computing students?
- 3- What are some of the key biases and fallacies inherent in the discussions among the students in computing?

### **Significance of the Study**

The result of this study will increase our understanding of how individuals in computing respond to ethical issues which involve contradictory values and interests and how they make their ethical decisions. Such understanding would help educators, administrators, and policy makers to plan and develop programs in more efficient and effective manner in a complex and ever-changing environment. The larger issues that illustrate the importance of the subject and motivates this research with its particular design are as follows:

- The importance of moral decisions in today's computing environment considering the emergence of new technologies
- The importance of preparing computing professionals who are capable of making ethical decisions when facing ethical issues in organizations
- The increasing number of online courses and the popularity of online discussions as an instructional tool

- The need for improvement in training computer ethics based on evidence-based and behavioral ethics

### **Theoretical framework**

The current research can be categorized under descriptive ethics and is applied in nature. Descriptive ethics as stated by Stahl et al. (2016), "aims to describe and understand moral values, judgments, and practices" (p. 4). This is distinct from normative approaches to ethics where the goal is to build argument about what people should do (Tenbrunsel & Smith-Crowe, 2008). However, as discussed by Warren and Smith-Crowe (2009)

As social scientists, we are concerned with describing and predicting what people think, perceive, and do; generally, we are not in the business of telling people what they should do. The catch, however, is that while behavioral ethics is descriptive rather than prescriptive, good social science requires a thorough understanding and definition of one's constructs—researchers only want to predict and describe ethical behavior, but in doing so, they must define what is ethical, and, therefore, they must be in some sense prescriptive. (p. 84)

Bandura's (1986) social cognitive theory and its assumptions are the broad theoretical ground for this study. In this view, individuals "are neither driven by inner forces nor automatically shaped and controlled by external stimuli" (Bandura, 1986, p. 18). Social cognitive theory takes on an interactionist approach to morality, in which, "[m]oral actions are the products of the reciprocal interplay of personal and social influences" (Bandura, 1999, p. 207). Also, this theory "avoids a dualism between social structure and personal agency" meaning that unethical behavior is "the

product of a unique interplay of personal, behavioral and environmental influences” (Bandura, 1999, p. 207).

There is a debate in grounded theory literature on the approach to literature reviews. The approach taken in this manuscript is in line with what Martin (2006) suggested. In the first phase, which is called non-committal, the literature is used to examine “what theory exists in the area and how others may have addressed aspects of a research problem but does not then impose a framework on future data collection” (Urquhart, 2013, p. 30). In the second phase, and when the theory has been generated based on the data, the literature review will be extended and revised (Urquhart, 2013). Knowing this, although no specific theories informed directly the qualitative design of this study, the following relevant theories and models were reviewed before conducting the study:

- Rest’s (1986) model of moral decision making
- Treviño’s (1986) interactionist model of ethical decision making in organizations
- Jones’ (1991) issue-contingent model of ethical decision making in organizations
- Bandura’s (1986) selective activation of internal control and mechanisms of moral disengagement
- Heyler et al.’s (2016) proposed model of ethical decision-making process among leaders
- Kohlberg’s moral development theory
- Mumford et al.’s (2008) sensemaking model of ethical decision making
- Finelli’s et al.’s (2012) model of ethical development among college students

The main body of literature reviewed has to do with the following areas:



- Computing ethics, professional ethics education, and the role of human resource development
- Ethical decision making
- Teaching ethics to adults and moral development

After the data analysis, along with expanding on the previously stated areas (e.g., Bandura's disengagement theory), ethics of care and Sartre's notion of 'bad faith' were added to the literature section.

### **Potential Contributions**

This study has the following theoretical contributions:

- Exploring the ethical decision-making processes among adults without assuming the current stages of research on ethical decision-making process from literature. This is a major contribution, since as discussed by Tenbrunsel and Smith-Crowe (2008), many studies have attempted to test the currently accepted models without questioning them.
- Making connections from ethics of computing to ethical theory which has been identified as a gap in current literature of computer ethics (Stahl et al., 2016)
- Providing a framework for and theorizing the ethical decision-making process among adults in an online collaborative setting

This study has the following practical contributions:

- Providing suggestions for computing and engineering educators by identifying the ways in which computing students discuss ethical problems and the kind of biases and concerns present in their responses. This is important since as discussed by Bazerman and Tenbrunsel (2011), “the solutions that have been offered to reduce the undesirable outcomes of ... [unethical] decisions- including laws and ethics remediation and training- don’t take limitations [of human mind] into account” (p. 37). Moreover, as stated by Medeiros et al. (2014), focusing on identification of biases that might affect one’s decision making is an important component of ethics education. Furthermore, as argued by Drumwright, Prentice, and Biasucci (2015), “the philosophically based traditional approach to teaching business ethics should be significantly supplemented with the psychologically and sociologically based learning of behavioral ethics” (p. 433).
- Providing insights for ethical development in professional development which would be helpful for human resource development professionals dealing with ethical issues in organizations

This study has the following Methodological contributions:

- Providing insights and deeper understanding of the techniques for studying ethical decision-making processes and the way these decisions are shaped and re-shaped through interactions with others by using careful qualitative analysis
- Introducing a non-intrusive methodology to analyze individuals' decision-making processes in collaborative settings

## Research Method

I used grounded theory for conducting this research. As Stated by Creswell (2013), “the intention of a grounded theory study is to move beyond description and to generate or discover a theory” (p. 83). In other words, the aim of grounded theory is to provide a “unified theoretical explanation” (Corbin & Strauss, 2007, p. 107). Charmaz (2016) defined grounded theory as

... a systematic method of inquiry that begins with inductive data, moves back and forth between collecting and analyzing data, relies on comparative methods, builds checks into the research process, and aims to construct theory. (p. 47)

Glaser and Straus (1999) stated that grounded theory is “the discovery of theory from data” which provides “relevant predictions, explanations, interpretations, and applications” (p. 1). Corbin and Holt (2011) mentioned that Glaser and Strauss’ ideas, which are reflected in *the Discovery of Grounded Theory* (1967), go “against the ‘armchair’ theorizing and the ‘positivistic’ approaches to theory development” (p. 114). Knowing this and based on the purpose of this study, the use of grounded theory as the analysis method of the proposed study is justified. According to Charmaz (2016), “grounded theory provides explicit tools for identifying and analyzing processes” (p. 48). Moreover, as stated by Creswell (2013), in a grounded theory research, “the researcher focuses on a process or an action that has distinct steps or phases that occur over time” (p.85). Furthermore, it explicates” research participants’ implicit meanings and actions ... [which] enables us not only increase the theoretical significance of the study but also acknowledge the complexity of empirical world” (Charmaz, 2016, p. 49). The strength of grounded theory is in “cresting novel categories or concepts” (Charmaz, 2006, p. 24). Grounded theory strategies would enable us to “analyze our stories to define the conditions for enacting change” (Charmaz, 2016, p. 51). The approach to grounded theory in current research is

constructivist and follows the processes provided by Charmaz (2006). A detailed description of justification of methodological choices I made for current study will be presented in chapter 3.

### **Definition of Terms**

**Behavioral ethics:** “the study of systematic and predictable ways in which individuals make ethical decisions and judge the ethical decisions of others when these decisions are at odds with intuition and the benefits of the broader society” (Bazerman & Gino, 2012, p. 85). The main argument for the use of behavioral ethics as a new approach is that the situation matters. Good individuals with good character or skilled in moral reasoning are capable of making unethical decisions. Behavioral ethics is equivalent to descriptive or empirical ethics (Tenbrunsel & Smith-Crowe, 2008).

**Bias:** the cognitive errors that influence decision making (Medeiros et al., 2014).

**Bounded ethicality:** is unintentional and is related to making “decisions that harm others ...[while] that harm is inconsistent with ... decision makers’ conscious beliefs and preferences” (Bazerman & Tenbrunsel, 2011, p. 5). According to the authors, bounded ethicality “can make us unaware of the moral implications of our decisions” (p. 30). “At the base of bounded ethicality is decision makers’ lack of awareness that they are in fact making unethical decisions” (Tenbrunsel & Smith-Crowe, 2008, p. 581).

**Computer ethics:** “the analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of such technology” (Moor, 1975, p. 266). It “includes consideration of both personal and social policies for ethical use of computer technology” (p. 266). According to Moor (1985), “[a]lthough computer ethics is a field between science and ethics and depends on them, it is also a discipline in its own right which provides both conceptualizations for understanding and policies for using computer technology” (p. 268).

**Computing professionals:** Individuals with formal knowledge and skills of the field of computing including “programmers, hardware designers, software engineers, database administrators, network administrators, system analysts, computer security specialists, researchers, documentation specialists, and computer scientists” (Johnson & Miller, 2009; Loui & Miller, 2008, p. 1).

**Consequence-based ethics (consequentialism):** These theories “evaluate rightness or wrongness based exclusively on the consequences or effects of an act or acts.” (Powers, 2005a, p. 415).

**Deontology (the ethics of duty):** In this ethical theory, the right action is defined by duties and moral rules. “For deontologists, the end of moral action is the very performance of it” (Powers, 2005b, p. 496).

**Engineering ethics:** “(1) The study of moral issue and decisions confronting individuals and organizations engaged in engineering and (2) the study of related questions about the moral ideals, character, policies, and relationships of people and corporations involved in technological activity” (Martin & Schinzinger, 1996, p. 2-3 as cited in Barry & Herkert, 2014). Harris, Pritchard, and Rabins (2000), on the other hand, define the term from a more normative approach as being concerned of questions of what ethical standards should be and how these standards should apply in practice (Barry & Herkert, 2014).

**Ethical behavior:** According to Treviño, Weaver, and Reynolds (2006), three categories of behaviors have been discussed in the literature on ethical behavior: (1) unethical behaviors such as cheating, (2) behaviors which attain only the minimal moral standards, and (3) behaviors which go beyond the minimal moral standards. Covering all these categories, they define ethical behavior as: “individual behavior that is subject to or judged according to generally accepted moral norms of behavior.” (Treviño et al., 2006, p. 952). For the case of ethical behavior within a profession, ethical behavior should also be judged by special norms of a profession.

**Ethical (moral) decision:** "a decision that is both legal and morally acceptable to the larger community. Conversely, an unethical decision is either illegal or morally unacceptable to the larger community. " (Jones, 1991, p. 367).

**Ethical (moral) decision making:** “is a process constituted by all the stages an individual has to go through from the moment a moral problem arises until he or she engages in a given behavior” (Morales-Sánchez & Cabello-Medina, 2013).

**Ethical dilemmas:** are “perplexing and complex situations that necessitate ... [individuals] choosing among competing set of principles, values, beliefs or ideals” (Cranston, Ehrich, & Kimber, 2006, p. 107).

**Ethical justification:** “Ethical justification has the structure of a goal-directed sequence of practical reasoning used to back up some ethical claim” (Walton, 2003, p. 33).

**Ethics:** “...the academic study of morals, duties, values, and virtues, to find their theoretical links and relationships, and how they work together (or do not) in practice” (Newton, 2013, p. 6).

**Grounded theory:** “is a qualitative research design in which the inquirer generates a general explanation (a theory) of a process, an action, or an interaction shaped by the views of a large number of participants” (Creswell, 2013, p. 83).

**Morals (Morality):** “the [r]ules...and [d]uties that govern our behavior as persons to persons” (Newton, 2013, p.6).

**Moral disengagement:** “a process that allows us to selectively turn our usual ethical standards on and off at will... [and] behave contrary to our personal code of ethics while still maintaining the belief that we are ethical people” (Bazerman & Tenbrunsel, 2011, p.72).

**Moral (ethical) judgment:** the aim of moral judgment is to find just solutions for social conflicts (Bienengräber, 2014). Moral judgment as a competence “is the ability to decide whether a planned action is ‘good’ or ‘bad’ and therefore should be carried out or not, and it is based on a certain set of values or orientations which someone holds to be valid” (Bienengräber, 2014, p. 408).

**Moral agent:** “a moral agent is a person who makes a moral decision, even though he or she may not recognize that moral issues are at stake” (Jones, 1991, p. 367).

**Profession:** “[An] occupational group [owning a specific body of knowledge and makes] a pact with society, a pact that involves promises and commitments in exchange for special powers and protections. The group makes a commitment to practice in ways that are good for (or at least not harmful to) the society. In exchange, the society grants powers and privileges to the group” (Johnson & Miller, 2009, p. 167). According to Stahl et al. (2016), “[d]escribing computing as a profession is thus linked to the expectation that computing professionals will pay attention to ethics” (p. 23).

**Professional ethics:** “... particular code of rules and understandings worked out by the members of a profession to govern their own practice” (Newton, 2013, p.7).

**Public:** refers “to those persons whose lack of information, technical knowledge, or time for deliberation renders them more or less vulnerable to the powers an engineer wields on behalf of his client or employer” (Davis, 1991, p. 165).

**Unethical (immoral) behavior:** behaviors “that directly cause direct harm to another individual or that violate widely accepted moral norms in society” (Moore, Detert, Treviño, Baker, & Mayer, 2012, p. 2).

**Utilitarianism:** Based on this ethical theory, “an act is morally right if and only if that act maximizes the good, that is, if and only if the total amount of good for all minus the total amount of bad for all is greater than this net amount for any incompatible act available to the agent on that occasion” (Consequentialism, 2015).



## **CHAPTER 2: LITERATURE REVIEW**

### **Background and History of Ethics and Ethical Education for Professionals**

In this chapter a review of literature is presented. First, the terms such as profession and professional ethics will be defined, and the history of professional computer ethics will be briefly reviewed. This will be followed by a review of the main relevant theories of ethical decision making and ethical development.

#### **What is a Profession? Who are Computing Professionals?**

One can define profession as an occupational group with specific body of knowledge who commits “to practice in ways that are good for (or at least not harmful to) the society” (Johnson & Miller, 2009, p. 167). The society, in exchange, gives privileges to the group (Johnson & Miller, 2009).

The boundary between professions and non-professions can be blurry. Carr (2000) argued that while the goals of non-professional services are fixed, basic ends of professional occupations are highly contested and open for serious debates. That’s why he argued that there is a need for moral preparation for professional practice (Carr, 2000). As stated by Stahl et al. (2016), for computing to be counted as a profession, it should pay attention to ethics (Stahl et al., 2016). One important concern about professions is that since professions have specialized knowledge, clients cannot fully evaluate the quality of services received and the professional’s peers are those who can judge such quality effectively (Loui & Miller, 2008). Professionals have clients rather than customers and therefore, their goal should be to satisfy clients’ needs in a manner which is consistent with the welfare of both clients and public (loui & Miller, 2008).

This study is focused on computing professionals. Computing professionals include “programmers, hardware designers, software engineers, database administrators, network administrators, system analysts, computer security specialists, researchers, documentation specialists, and computer scientists” (Johnson & Miller, 2009; Loui & Miller, 2008, p. 1).

### **Professional Ethics and Computing Professional Ethics**

It is not enough to develop professionals who are skilled in technical activities of their profession. Professionals should be developed in a way that enables them to assess the consequences of their actions. They should become familiarized with morality and professional ethics. Morality in a profession, as described by Rest and Narvaez (1994), has to do with making decisions “between conflicting values, each value representing something good in itself” (p. ix).

Professional ethics is defined as “... particular code of rules and understandings worked out by the members of a profession to govern their own practice” (Newton, 2013, p.7). Tavani (2013) stated that while one can argue that “the same basic ethical rules apply to professionals as to ordinary individuals, ... many ethicists argue that some moral issues affecting professionals are sufficiently distinct and specialized to warrant a separate field of study. Some ethicists also argue that ... professionals have special moral obligations, which exceeds those of” other individuals (p. 103).

It is argued that the evolution of any profession has to do with the efforts to determine the expected behavior from its members that is considered ethical (Gellermann, Frankel, & Ladenson, 1990). Therefore, ethical development is at the core of professional development. As an example, and in the context of school teachers, Chang (1994) concluded that teachers’ moral reasoning greatly contributed to their teaching practice and therefore including ethics in teachers’

training programs is necessary. Programs on professional ethics should prepare professionals with the “knowledge of acceptable behaviors in a given [profession]” (Hatcher, 2002, p. 93).

Although professional ethics is not a new field, it is “the area about which the least is written” (White & Wooten, 1986, p. 68). Durkheim was one of the philosophers who thought professional ethics is distinct from other branches of ethics (White & Wooten, 1986). In 1920s, authors such as King (1922), Heermance (1924), and Taeusch (1926) paid attention to the naïve societies dealing with the growth of professions due to industrial developments. As an example, as quoted in White and Wooten (1986), King (1922) stated:

The complexities and the specializations of modern industrial life leave many individuals unable to judge whether or not a member of any profession has performed his services with due regard the interest of his client...the work of the physician must be judged by physicians and that of the lawyers, by lawyers, and so with each of the professions. The higher the skill, the greater the need for organized group effort toward maintaining a fine sense of obligations, not primarily to others in the same profession, but chiefly to the general wellbeing of all. (p. vii)

Later in 1950s and 1960s, authors attended to the changes to professions due to emergence of technological society (White & Wooten, 1986). In 1970s, several sociologists investigated occupations and professions and introduced models and the sequences of events in the process of professionalization. The components such as establishing associations, codes of ethics, and educational elements are some of common components of those models (White and Wooten, 1986). White and Wooten (1986) stated that professional ethics can be defined as the

interaction of values, norms, science, and laws within a field. Here we focus on professional ethics of computing.

Although the ethical concerns of computing technologies can be seen in early works of scholars such as Wiener (1948) and Parker (1968), ‘*Computer ethics*’ as a term was not coined until 1970s (Bynum, 2008). The start of elaborative efforts for the ethical aspects of computing, however, goes back to 1980s. In this period, for the first time, codes of ethics for computing were developed (e.g., ACM (Association for Computing Machinery) Code of Ethics and Professional Conduct, and Software Engineering Code of Ethics), courses on computing ethics were offered, and conferences and journals focusing on the topic (e.g., *Ethics and Information Technology*) were established (Stahl et al., 2016). Bynum (2008) argued that Moor’s ideas on computer ethics has had a significant influence on the field. Moor believed that computer-related technology creates the opportunity for “people to do a growing number of things that cannot be done before ... however ... just because we can do something new, this does not mean that we ought to do it, or it would be ethical to do it. Indeed, there may be no ‘policies’ in place ... to govern the new activity”, a phenomenon which Moor called ‘policy vacuum’ (Bynum, 2008, p. 20). As stated by Moor (1985), this vacuum is the basic issue in computer ethics.

Moor (1985) stated that while computing technology increases the efficiency and convenience, it makes individuals vulnerable. Moor (2008) provided three strategies for improving computing professional ethics: (1) continuous reassessment of the situation rather than leaving the ethics to catch up later, (2) better collaboration among technologists, ethicists, and social scientists, and (3) development of more sophisticated ethical analyses which go beyond monetary evaluations and are considerate to moral values.

In a recent endeavor, Stahl et al. (2016), conducted a literature review on ethics of computing to identify the investigated technologies, the relevant ethical issues to these technologies, the claims supported with research, and the respected conclusions and recommendations. As discussed by Stahl et al. (2016), computers are getting more and more integrated into the environment and this integration leads to modern ethical questions about matters such as privacy, autonomy, and ownership. Moreover, currently, issues such as consequences of the use of social media, the emergence of Big Data, intellectual property in digital age, and surveillance are all part of political and social debates in society (Stahl et al., 2016). Their literature review showed that privacy, autonomy, agency, and trust are the four most widely discussed topics in computer ethics.

Privacy in this context has been discussed in two distinct forms: (a) data privacy which has to do with "data about oneself" and (b) personal privacy which is related to the right of individuals "to be left alone" (Stahl et al., 2016, p. 22). The authors raise the issue of the difference between "users' expectations of privacy and the potential commercial value of the data for the operator" (p. 22).

Autonomy as a concept is related to freedom, independence and control (Stahl et al., 2016) and as defined by Brey (2005) "is the ability to construct ones' own goals and values, and to have the freedom to make one's own decisions and perform actions based on these decisions" (p. 160). Technologies are capable to enhance (e.g., increasing independence) or decrease (e.g., loss of control) the autonomy (Stahl et al., 2016, p. 24).

Agency is another issue which has to do with "being capable of doing something that counts as an act or action" (Himma, 2009, p. 19). Raising questions such as whether and to what

degree intelligent artifacts “can be considered agents... or moral agents that can be held accountable for their behavior” (p. 24) are discussed in the literature.

Trust, as stated by Stahl et al. (2016), is the “evaluation of the perceived credibility, motivation, transparency, and responsibility of a system, its designers, and operators” (p. 24). According to the authors, as computers are getting more and more involved in processing of personal data and making decisions, “identifying when and how trust can justifiably exist between users, systems, and operators is not a straightforward task” (p. 25).

Also, in terms of the technologies, Stahl et al. (2016) identified artificial intelligence, health-related technologies, robotics, and social media as the highly discussed topics in computer ethics literature (Stahl et al., 2016). As stated by these authors, against their expectations, the attention to particular technologies in details is not prevalent and technologies have been discussed rather broadly in the context of computer ethics.

### **Professional Codes of Ethics: Purpose and Issues**

It has been argued that having a code of ethics can distinguish a profession from a non-profession (Tavani, 2013). For regulating the behavior of professionals in different fields, codes of ethics have been developed. ACM Code of Ethics and Professional Conduct, and Software Engineering Code of Ethics and Professional Practice, which was developed jointly by ACM and IEEE Computer Society (IEEE-CS), are two of main codes of ethics developed in the field. While the ACM code is more complex, according to Tavani (2013), both of these codes include “general statements about what is expected, and in some cases is required, to be a member in good standing” (p. 106). According to Tavani (2013), while violating codes in medicine or law

would have consequences for professionals, the codes in computing (e.g., ACM) does not impose penalties for deviant behavior. The main objectives of codes of ethics in computing are inspiration, education, guidance, accountability, and enforcement (Bynum & Rogerson, 2004). Davis (1991) argued that the existence of professional codes of ethics is necessary since a profession should help members act towards others based upon certain ideals inherent in codes of ethics. Moreover, without a code of ethics, self-interest of engineers or the mere attention to the clients' desires might harm the public (Davis, 1991).

Despite the importance of professional codes of ethics, several issues about codes of ethics have been raised by critics (e.g., being self-serving, unrealistic, inconsistent, too vague, designed for novices, etc.). Fairweather (2004) argued that the codes of ethics for computing professionals have been based on the narrow range of four traditional ethical issues (i.e., privacy, accuracy, property, and accessibility) which can potentially lead to unethical behavior. Maybe the most important arguments in this regard are presented by Ladd (1995) which have been summarized by Tavani (2013): (1) ethics is complex and involves deliberation and argumentation that cannot be expected from a single code of ethics, and (2) the professional codes create a confusion which has to do with the issues related to micro-ethics (i.e., individual professional responsibilities) and macro-ethics (i.e., responsibilities of computing as a profession). As discussed by Stahl et al. (2016), while codes of ethics introduce the expectations of professionals in computing, these codes do not help much in presenting specific technologies, most relevant ethical issues, or ways ethical issue can be recognized and addressed in real practice.

In table 1, some of the strengths and weaknesses of professional codes as listed in Tavani (2013) are presented.

Table 1

*Strengths and Weaknesses of Professional Codes (Tavani, 2013)*

Strengths	Weaknesses
Inspiring ethical behavior	Too general or too vague directives
Guiding for ethical choices	The possibility of conflicts between two or more directives
Educating members about the professional obligations	Incomplete and non-exhaustive directives
Disciplining members in case of violation	Codes are ineffective in disciplinary matters
Informing the public about the nature of the profession	Inconsistent directives
Alerting members to ethical aspects	Lack of distinguish between micro-ethics and macro-ethics issues
Enhancing the profession in the eyes of the public	Can be self-serving for the profession

### **Ethical Education through Ethics Courses or Programs: Approaches and Critiques**

In 1980s, practitioners in engineering and computing fields started to pay more attention to social and ethical implications of their practice and professional codes of ethics were developed (Herkert, 2005). While professional codes of ethics have important and positive effects on a profession, as it was discussed in previous section, they have some weaknesses and shortcomings and therefore are not sufficient for assuring the ethical behavior of the professionals (Tavani, 2013, Ladd, 1995, Waples et al., 2009). As discussed by Loui and Miller (2008), different interpretation of the statements in a code and also the possibility of conflicting statements in a code are two of these limitations. Moreover, while codes of ethics include many ethical obligations, one cannot learn how to apply the codes by just reading the text (Huff & Furchert, 2014).



Besides codes of ethics, suggesting procedures for ethical decision making is another approach taken by some scholars in different professions (i.e., Maner, 2002). Though useful, as stated by Loui and Miller (2008):

No procedural ethics method should be interpreted as allowing complete objectivity or providing a mechanical algorithm for reaching a conclusion about an ethical problem, ... because all professional ethics issues of any complexity require subtle and subjective judgments (p. 7).

Preparing individuals as ethical professionals requires going beyond codes of ethics. Apart from designated courses on professional ethics at universities, providing ethics training programs and workshops in organizational settings are some other efforts to contribute to development of professional ethics.

According to Davis (2002), professional ethics can be seen as a special case for workplace ethics. In an attempt to respond the question: ‘can workplace ethics be taught’? Davis (2002) stated that “moral development is a continuing process” and ethics cannot be fully taught by parents at an early age. Moreover, using the evidence from a meta-analysis of 56 studies (Rest, 1986), Rest (1994) argued that college or professional school is not too late for moral education. Responding to the same question, Parks (1993) stated that individuals in their twenties and early thirties are in a life cycle that are well prepared for moral education and would be capable “for sharpening the norms and potential of the moral vision that would ground the ethical choices embedded in the[ir] daily decisions and actions” (p. 13).

In contrast, some others raised doubts on the possibility of teaching ethics due to the subjective nature of the topic. “Critics say that all ethical values are merely subjective and

therefore ... you cannot impose your ethical values or views on somebody else” (Walton, 2003, p. 34). As stated by Walton (2003), postmodernism “is often taken to deny the possibility of objective or neutral thought, suggesting that justification is always contextual [and therefore] ethical justification can vary with who is doing the justifying and with the purpose of the argument” (p. 35). However, citing work of Blatt and Kohlberg (1975), Davis (2002) stated that we have evidence that discussing moral problems in a classroom, particularly when these problems involve difficult choices, can change students’ moral judgments which in turn lead to change in moral behavior.

There has been an increasing attention to ethics among engineering societies and the importance of ethics education has been long emphasized in undergraduate curriculum (Finelli et al., 2012). Rest and Narvaez (1994) argued that offering ethics courses are reasonable only if the following three assumptions are in place:

Assumption 1: Some ethical judgments are more justifiable than others.

Assumption 2: There is some agreement among experts on moral judgments.

Assumption 3: Ethics courses affect students in some constructive ways. (p. 218)

These assumptions are important for any attempt on research and practice of ethical development.

If one accepts these assumptions, the next step is setting goals for such endeavors. Five goals have been introduced as goals of teaching ethics in higher education: “(1) stimulating the moral imagination, (2) recognizing ethical issues, (3) developing analytical skills, (4) eliciting a sense of moral obligation and personal responsibility, and (5) tolerating and resisting disagreement and ambiguity” (Hastings Center (1980) as cited in Bird & Sieber, 2005, p. 324).

Newberry (2004) categorized the objectives of teaching ethics to engineers into three categories: (1) emotional engagement which has to do with helping student want to make ethical decisions, (2) intellectual engagement which is about knowing how to make ethical decisions, and (3) particular knowledge which is the awareness of ethical guidelines and professional code of ethics. Newberry (2004) also introduced some of the systematic barriers, that in his view, hinder the effective ethics education among engineers. Lack of students' emotional engagement with materials, the nature of engineering faculty, and engineerization of ethics (i.e., looking at ethical issues as problems to be solved) are some of these barriers (Newberry, 2004).

In term of students' preparation, according to Finelli et al. (2012), graduates of colleges of engineering should not only be prepared to follow professional codes of ethics but also to handle complex ethical dilemmas. Many reports (e.g., National Academy of Engineering, 2004; Sheppard, Macatangay, Colby, & Sullivan, 2009) have highlighted the need for improvement of ethics education of engineers (Finelli et al., 2012). Finelli et al. (2012) also found that the level of ethical reasoning of engineering students were lower than the students in other fields. Therefore, developing ethical reasoning among engineering students is of significant importance and engineering educators are responsible in this regard (Zoltowski, Buzzanell, Oakes, & Kenny, 2013). Pritchard (1980) introduced some of the factors that limits ethical education in engineering: (1) the lack of technical knowledge among philosophers, (2) the lack of background on ethics among students and educators, and (3) the limited number of courses on ethics in engineering curricula. Moreover, Abraham, Knies, Kukral, and Willis (1997) stated that many engineering students (especially freshmen and sophomores) find issues related to ethics irrelevant and abstract.

In 1980s, computer ethics became recognized as an academic field in United States (Herkert, 2005). Courses on computer ethics has been traditionally using ethical theories and frameworks to discuss ethical decision making. Utilitarianism, deontology (Kantian), and in a less degree virtue ethics are the main three ethical frameworks which has been introduced to engineering majors. Utilitarianism emerged as the one which has been most prevalently used due to “its analytical nature and close relation with analytical methods such as cost-benefit or risk-benefit analysis” (Pantazidou & Nair, 1999, p. 206). Kantian ethics considers duty as the main focus of morality (Boss, 2013). According to Pantazidou and Nair (1999), these two theories are based on two main values: justice and fairness. While utilitarianism and deontology focus on right action, virtue ethics focuses on right being (Boss, 2013). Virtue is defined as “an admirable character trait ... in a manner that benefits ourselves and others” and includes characters such as “compassion, courage, generosity, loyalty, and honesty” (Boss, 2013, p. 38). Care ethics is one of the ethics that often is classified under virtue ethics (Boss, 2013). Nair (2005) defined ethics of care as a distinctive approach to moral theory that emphasizes the importance of responsibility, concern, and relationship over consequences (utilitarianism) or rules (deontology).

In ethics of care, “the moral agents are envisioned as related, interconnected, mutually dependent, and often unequal in power and resources—as opposed to the conventional portrayal of the agent as independent, equal and self-sufficient” (Pettersen, 2011, p.54). Comparing different ethical theories, Pettersen (2011) argued that in terms of core values, “the ethics of care highlights care; deontology accentuates rights; the theories of justice emphasize justice; and the utilitarian tradition values the society’s overall well-being” (p. 54). Although care ethics has been seen as part of virtue ethics, some believe in its distinction. For example, Pettersen (2011) stated that: ethics of care’s “strong focus on experiences and relationships” distinguishes it from

virtue ethics (p. 55). Moreover, ethics of care does not consider experiences and traditions as good by nature or immediately defensible and does not defend the status quo (Pettersen, 2011). According to Pettersen (2011), “care ethicists are well aware that care often takes place under oppressive conditions. Identifying and discussing the practices and values that ought to be preserved, nurtured, altered or rejected is an important task” (p. 55).

The discussion on possibility of the use of ethics of care in engineering might go back to the article published by Ladd (1982). He suggested a kind of moral responsibility that involved “concern, care, and foresight”, a kind that focuses on what might happen to individuals as the outcome of engineers’ behavior (Ladd, 1982, p.9). Later, in 1999, Pantazidou and Nair published a paper and addressed explicitly the use of ethics of care for teaching engineering ethics. They argued that there are aspects of care that can complement the existing set of values taught in engineering considering the characteristics of care that are compatible with the changing demands from engineering as a field (Pantazidou & Nair, 1999). According to them, for an engineer, “to be able to use his/ her expertise and at the same time be of service, the engineer has to have the technical competence, objectivity and confidence of the expert, and the empathy and consideration of a caregiver” (Pantazidou & Nair, 1999, p. 206).

Evaluations are initiated mostly based on the desired outcomes. Davis (1999) described four desired outcomes for engineering ethics education: (1) improved ethical sensitivity, (2) acquired knowledge of standards of conduct, (3) betterment of ethical judgment, and (4) betterment of ethical will-power. When it comes to evaluation, analyzing the effectiveness of courses and programs on professional ethics is not prevalent in literature and therefore one cannot strongly argue in favor or against the effectiveness of these initiatives. In this section some of the evaluative studies are reviewed.

In a meta-analysis of 25 business ethics program, Waples, Antes, Murphy, Connelly, & Mumford (2009) found that the studied programs had a minimal impact on ethical decision making, behavior, perception, or awareness. Discussing the moderator variables which influence ethical outcomes (i.e., characteristics of participants, quality of instruction, instructional content, program characteristics, and instructional methods), Waples et al. (2009) suggested that the theoretical basis used in business ethics instruction (which is based either on reasoning theory or decision-making theory) is not complete and the combination of reasoning theory and general decision making might be a viable solution. Moreover, the authors concluded that ethical guidelines and codes of conduct are not sufficient. Waples et al. (2009) suggested the instructors to apply a cognitive approach which focuses on the strategies that one might apply for solving ethical issues in a given situation. According to their results, current business ethics programs are more beneficial for older professionals and therefore revising the programs for younger students is necessary (Waples et al., 2009). Moreover, covering potential pitfalls and workarounds in decision making is more important than covering basic principles. Furthermore, shorter programs result in better outcomes and case-based learning is the most effective approach to instruction (Waples et al., 2009). In another research, citing reports such as King (2008), Besterfield-Sacre, Cox, Borrego, Beddoes, and Zhu (2014) referred to “adoption of active learning and student-centered pedagogies, inclusion of authentic problems in coursework..., and enrichment of ethics and sustainability” as some of the recommended and needed changes in engineering education (p. 194).

Byrne and Staehr (2004) evaluated the computer ethics component of an undergraduate course on social, ethical, and legal issues in information technology. During the four-week period of the ethics component, a number of ethical dilemmas were discussed since it is believed

to improve students' ethical judgments. The researchers also exposed the students to Kohlberg's theory during this period. Using defining issue test (DIT) and applying a repeated measure experimental design, they studied 35 students' responses (20 students as experimental group and 15 as control) and concluded that the course was able to increase the moral reasoning scores of participants.

Intergenerational dialogue was used by Berne (2003) as a learning strategy for discussing the ethical issues related to development of new technologies. Berne (2003) concluded that the experience of dialogue among engineering students and senior citizens "provided a way to go deeper and beyond what is normally possible in the engineering ethics classroom" (p.93). As Berne (2003) Stated:

Alone, the young engineers can fantasize and debate over what might be real but do not have the breadth of experience, the depth of wisdom, or the near-to-death perspective to truly understand. Alone, the senior citizens can reflect, discuss, and lament over what their grandchildren's lives may bring. But they have no sense of influence, creative ability, or skills to help direct the path of technology...Only together could both groups fully explore the ethical implications of our technological destiny (p. 94).

Loui (2005) studied the effects of a course on ethics on the students' identity development. He found that taking the course helped students "become more confident about their moral reasoning skills, and ... develop a more sophisticated understanding of professional responsibility that includes awareness of social consequences" (p. 383). The students reported that case studies and hearing their peers' perspectives were two most beneficial components of the course (Loui, 2005). In another study, Hashemian and Loui (2010), studied the influence of such a course on students' feelings regarding "both responsibility and confidence in responding

to moral problems” (p. 203). They used interviews for conducting their study and concluded that the students who successfully completed the course, compared to other students, were able to fully recognize the central ethical issues, consider plans to take actions, and act consistently and confidently (Hashemian & Loui, 2010).

Evaluating a course on software engineering ethics, Oriogun, Ogunleye-Johnson, Mukhtar, and Tobby (2012), suggested that there is a need for better integration of ethical theories and code of ethics in teaching software engineering ethics since students find ethical theories more insightful than the professional codes in approaching the ethical dilemmas. In another effort and through a conceptual piece, Connolly (2011) critiqued the approach of teaching ethics to computing majors. According to her, most courses and textbooks on computer ethics use similar approach to the topic in which students are introduced to a number of ethical theories (mostly two: utilitarianism and Kantian deontology) and they are expected to apply these theories “to correct or prevent the wrongs caused by a particular technology” (p. 229). Connolly (2011) attributed the favorability of this approach for computer science faculty who teach 84% of computer ethics courses (Spradling, Soh, & Ansorge, 2008) to the algorithmic and clear-cut nature of the approach. The limitation of such approach has to do with “naïve technological determinism” which refers to the belief that technology as a tool would achieve its exact promises (Connolly, 2011, p. 229). This approach neglects the “complex agency issues in the relationship between technology and society “, and also does not appreciate the uncertainty which is natural for ethical issues (Connolly, 2011, p. 230). Connolly (2011) proposed the use of social constructivism approach by providing students with the cases from different societies and describing how the contextual differences would lead to different adaptation and therefore different effects of technology (historical society course rather than philosophic ethics course).



The argument is that this approach allows learners “to achieve a level of critical awareness that weaves some ethical analysis into a richer understanding of the complex nature of socio-technological change” (Connolly, 2011, p. 231). Connolly (2011) concluded that appreciation of the social context of computing should be considered as equally important as its ethical evaluation and therefore there is a need to familiarize the students with “the complexities of socio-technological change” (p. 231). While Connolly’s claims are appealing, they need to be further investigated through research.

Brey (2000) critiqued the mainstream practice of teaching computer ethics (i.e., standard model of applied ethics) claiming that the current approach is only attentive to the current morally controversial issues and is not focusing on potentially morally controversial issues. Moreover, in current approach, the focus is often on the use of the technology and technology itself is seen as a neutral tool. The argument is that in many cases technology can play an active role independent of the ways it is being used (Brey, 2000). Brey (2000) suggested the approach called disclosive computer ethics which “uncovers and morally evaluates the values and norms embedded in the design and application of computer systems” (p. 13). The four values to be considered in this analysis, as suggested by Brey (2000), are freedom, justice, democracy, and privacy.

The literature on ethics education in general, and engineering ethics education in specific, does not sufficiently engage with understanding the complexities of teaching ethics. For example, the effectiveness of the popular approaches in teaching engineering ethics (e.g., the use of ethical theories) has not been examined. Moreover, the evaluative studies are limited and does not provide sufficient evidence for or against the positive impact of the ethics courses and programs.

I would like to conclude this section by McBride's (2012) suggestions on ethical development of software engineers. According to McBride (2012), considering the developing nature of the field, there is a need for "not a revision of an ailing code but a revolution in ethical thinking that acknowledges the purpose and practice of software engineering" (p. 39).

Arguing that the rules, the virtues, and skill-based approach are helpful but not sufficient, McBride (2012) stated that:

We must look inward, outward, and all around. Inward reflection on who we are, what drives us, what we consider important, will help us become aware of the social and ethical assumptions we make and take for granted. What we consider good and bad behavior will affect how we respond to social situations and ethical dilemmas. (p. 41)

### **HRD and Moral Development of Professionals**

HRD and ethics are related in at least two ways. First, HRD as a profession has its own ethical obligations. This realm of work can be the focus of researchers (e.g., Mclean, 2001; Fisher, 2005) and practitioners in the field. Second, HRD as a development function can help professionals, organizations, and societies in developing the morality of their members. If HRD wants to truly involve with the development of individuals, organizations, and societies it should consider the moral development as one of its main goals. The current manuscript has to do with the second relationship between HRD and ethics. The main argument is that ethical development is necessary for a comprehensive professional development and ethical practice of individuals in their positions should be considered as an important aspect of their growth.

Large organizations often provide compliance training or ethics training to their employees for several reasons including adhering to regulatory standards, enhancing employees' ethical decision making, or achieving long-term organizational goals (Weber, 2015). Despite the

prevalence of ethics training programs, their assessment has not been conducted with well-developed and proven measures (Morris & Wood, 2011; Weber, 2015). As a study conducted by Weber (2015) suggested, only 30 % of participants of the study (i.e., members of the Ethics and Compliance Officer Association) stated that they measure the impact of the ethics programs in their organizations. This lack of attention to careful assessment of ethics programs call for more involvement of human resource development professionals in the process of design, implementation, and evaluation of ethics training programs.

Preparing professionals who act ethically should be aimed by HRD researchers and practitioners. As Frisque and Kolbe (2008) stated: “[t]oday’s climate of ethical scandals and wrongdoings poses a significant challenge, and an opportunity, for HRD professionals to positively influence ethical decision making in organizations”. However, it is not an easy task. "Keeping ethical action a vibrant aspect of organizational culture is a challenging task for training and development departments” (Sekerka, 2009, p. 77).

Despite the increasing expectations from human resource professionals for promotion of ethics (Foote & Ruona, 2008; Garavan & McGuire, 2010), human resource development as a field have not contributed significantly in promotion of ethics (Foote & Ruona, 2008). According to Foote and Ruona (2008), a very limited number of studies have focused on ethical development of individuals and the role of human resource development in this regard. In this section, some of these publications will be reviewed.

Foote and Ruona (2008) argued that human resource development professionals possess specific skills that can be used to promote ethics in organizations. Skills such as ethical assessment skills, process skills, and interpersonal skills are the relevant skills to ethics which

“mirror HRD professionals’ expertise and skills ... such as (a) the ability to facilitate formal and informal meetings, (b) the ability to build consensus, (c) the ability to provide educational experiences and training, and (d) the ability to listen and communicate well” (p. 306).

Garavan and McGuire (2010) argued a significant role for HRD “in helping organization achieve corporate social responsibility (CSR), sustainability, and ethical goals” since “there is strong alignment between the goals of HRD” and these three goals (p. 489). Lee (2010) suggested that HRD can play a different role considering the conflicts and change in today’s environment by going beyond the traditional training and development (i.e., performing a mediating role). Lee (2010) concluded that the need for changes in HRD is inevitable as people and organizations change due to global changes and proposed the necessity of the mutual work of education sector and professional communities to assure a proactive change. A critical point made by Lee (2010) is the importance of attending to professions for preparing individuals. According to Lee (2010):

... [in today’s environment], people are increasingly turning to their professional bodies to enhance their sense of identity at work...[A]n individual is likely to be a member of one or more professional bodies all their working life but may only be with a single organization for a few years...Professional bodies can act as mediator, between the organization, the individual and the state. (p. 532)

Ardichvili and Jondle (2009) stated that “ethical business culture emerges as a result of the interaction between individual moral development, situational factors, ... tools, and various stakeholders” (p. 239). This calls for an engagement in well-coordinated activities to achieve sustainable results (Ardichvili & Jondle, 2009). These activities should mainly focus on culture change and needs to be supported by activities such as ethical education for employees in all

organizational levels, leadership development, improving ethical decision-making skills, and mentoring and career development.

Ke and Wang (2014), arguing the rise of ethical dilemmas in China due to globalization and working in uncertainty, developed a framework for involvement of HRD in the process of creating an ethical culture is three levels of national, organizational, and individual. As suggested by the authors, at the Individual level, HRD interventions may focused on “(1) designing and implementing ethics leadership programs ... to influence employees’ ethical perceptions and decision-making reasoning when facing ethical dilemmas and (2) understanding different personal values and beliefs for individual development by incorporating their perspectives” (Ke & Wang, 2014, p. 86).

### **Ethical Decision Making and Ethical Development Theories**

In this section, two categories of theories and models will be briefly introduced and reviewed: (1) ethical decision-making theories and (2) ethical development theories. Ethical decision making is the main component of moral behavior and has been vastly discussed in the literature. Having a clear understanding of ethical decision-making processes is necessary for understanding ethical development. In addition, Waples and Antes (2011) stated that each ethical framework proposes “a unique perspective on ethics and results in a unique basis for ethics instruction” (p. 17). Therefore, in this section, some of the related theories to ethical decision making will be presented. Next, some of ethical development theories will be introduced and reviewed.

#### **Theories and Models of Ethical Decision-Making**

Research on ethical decision-making “has developed from a niche area to a burgeoning stand-alone field” (Tenbrunsel & Smith-Crowe, 2008, p. 545). Kizza (2016) described ethical decision-making process:

The process of decision making resembles mapping with input parameters and an output decision. The input parameters in the decision-making process are premises. To each premise a value is attached. The mapping uses these values along with the premises to create an output, which is the decision. (p. 52)

In this section, some of the relevant ethical decision-making theories and models are briefly reviewed:

**Rest’s four-component model.** James Rest proposed a four-component model for ethical behavior. These four processes are as follows: (1) moral sensitivity, (2) moral judgment, (3) moral motivation, and (4) moral character (Rest, Narvaez, Bebeau, & Thoma, 1999). Moral sensitivity has to do with awareness of the existence of moral issue and imagining how chains of events would affect different parties. Moral judgment is the process of selection of the action that one finds the most justifiable. Moral motivation is related to feeling responsible for taking the moral action. Finally, Moral character is having the courage to take the moral action by overcoming temptations (Rest et al., 1999). This model acknowledges ethical judgment as one of components of ethical behavior and ethical decision making while recognizes the importance of the other three components as well (Rest et al., 1999). Rest et al. (1999) argued that the overall progress in the larger enterprise of moral psychology can be viewed in terms of how well research progresses in all four inner psychological components ...leads to moral behavior” (p. 102).

### **Treviño 's (1986) interactionist model of ethical decision-making in organizations.**

Reviewing the literature and heavily building on Kohlberg's moral development model, Treviño introduced a model for ethical decision making and suggested several propositions for future research. Her model is based on the argument that while "individual's cognitive moral development stage determines how an individual thinks about ethical dilemmas, ... [a]dditional individual and situational variables interact with the cognitive component to determine how an individual is likely to behave in response to an ethical dilemma" (Treviño, 1986, p. 602).

This model considers two groups of variables to moderate the effect of cognitive moral development on ethical behavior: (1) individual variables and (2) situational variables. Ego strength (strength of self-regulating skills), field dependence (i.e., the degree one depends on external referent to guide one's behavior), and locus of control (i.e., the degree one perceives one has control on one's life events) are the three individual variables. Situational variables are then categorized under three main categories: (1) characteristics of the work, (2) organizational culture, and (3) immediate job context.

Based on this model, except for the highly developed individuals in ethics, the combination of cognitive and behavioral approaches results in more ethical behavior than either of them by themselves (Treviño, 1986). Moreover, as argued by Treviño (1986), since most individuals seek outside themselves for finding guidance in time of ethical dilemmas, organizations and educators possess important roles in growth of individuals and creating environments conducive to ethical behavior.

### **Jones' (1991) issue-contingent model of ethical decision making in organizations.**

Previous ethical decision-making models did not attend to the nature of the moral issues. Jones (1991) criticized this ignorance and the assumption that individuals behave similarly in dealing

with different issues. Jones (1991) argued that since moral issues have different moral intensity, an issue-contingent model for ethical decision making can provide significant insight for understanding ethical decision-making processes. It should be mentioned that the model is a conceptual model and Jones has provided propositions to be tested in future research.

**Mumford et al.'s (2008) sensemaking model of ethical decision making.** Mumford et al. (2008) proposed a model of ethical decision making which was based upon the concept of sensemaking. Citing previous works such as Weick (1995), Mumford et al. (2008) defined sensemaking as “a form of complex cognition that occurs when people are presented with ambiguous, high-stake events ...which allow a variety of mental models to be applied in understanding the situation in hand.” (p. 317). According to Mumford et al. (2008), this selection or creation of mental models provides the foundation for decision making. Based on this definition they provided the sensemaking model.

This model assumes that the factors such as professional codes of ethics, perceived cause of the situation, personal and professional goals, and what is perceived to be required to achieve those goals are factors that affect individual's initial assessment of situation. In the next step, individuals need to recognize the exact nature of the problem and frame it. If the problem is framed as an ethical issue, emotions regarding the ethical problem would be raised which would influence the ethical decision making. At this stage, individuals start to seek for prior experiences or known cases which might help them with the situation. Based on these experiences or cases, mental models would be constructed or selected. The mental models, in turn, will be used to predict possible outcomes of different actions.

Based on this model, Mumford et al. (2008) designed and studied “a cooperative learning, case-based approach to ethics training” (p. 319). They argued that along with the cases,



learners should be provided with the strategies to work with these cases, and also become familiarized with the reasons why individuals might become emotionally uncomfortable about making particular decisions.

**Heyler et al.'s (2016) proposed model of ethical decision-making process among leaders.** In contrast to most models of ethical decision making which are generic and based on deduction, Heyler et al. (2016) used an inductive approach for developing their model for a specific context (i.e., military leaders). In this recent attempt and by using grounded theory, they built on Bandura's social learning theory and proposed their model with components related to both ethical decision making and ethical development.

Similar to some other models (e.g., Rest's four-component model), moral awareness is "the foundational element of the model" (p. 9). Based on their data, Heyler et al. (2016), identified five sub-themes for moral awareness: (1) prior experience, (2) officer training, (3) family, (4) faith, and (5) precedent. Prior experience as the most frequent theme "introduces the value in learning from making ethical and unethical decisions" (p. 5).

According to this model, moral efficacy which is "the confidence one has in his/her capabilities to make a moral decision", is the source of moral awareness (p. 10). Moral efficacy, also, contributes to routine ethical decisions made by leaders. Another component of the model is moral intensity which has been seen as a moderator which influences the relationship between moral ownership and decision-making routine. Moral intensity was seen in two forms Magnitude of consequences and proximity. Moral ownership is defined as "the individual's sense of responsibility for a situation with a moral component". The individuals with higher level of moral ownership "are less likely to practice moral disengagement" (p. 6). The final component, moral courage, is "the ability to overcome threats or fears in order to act morally" (p. 7).

According to Heyler et al. (2016), moral efficacy, moral ownership, and moral courage are three components of a concept called moral potency. Moral potency is defined as

a psychological state marked by an experienced sense of ownership over the moral aspects of one's environment, reinforced by efficacy beliefs in the capabilities to act to achieve moral purpose in the domain, and the courage to perform ethically in the face of adversity and persevere through challenges. (Hannah & Avolio, 2010, p. 291-2)

Emotions were one of other themes in their study. Conscience, regret/guilt, being uncomfortable, and frustration were the sub-themes found by the authors in this regard. Colleagues' input in terms of support network, superior pressure, peer pressure, and bad advice were the sub-themes identified in this category.

Heyler et al. (2016) concluded that by focusing on a unique sample they were able to create new insights. By exploring and identifying themes in ethical decision-making process of the selected sample, they were able to introduce a social learning process model to demonstrate how the relevant factors to "ethical decision-making domain are sequentially related to each other and require time to execute" (p. 12). Moreover, their model proposed a complicated rather than a simple linear model for ethical decision making (p. 12).

**Moral agency theory and disengagement mechanisms.** Bandura (1999) argued that "[t]he regulation of humane conduct is much more than moral reasoning. A complete theory of moral agency must link moral knowledge and reasoning to moral action" (p. 193). "In social cognitive theory..., moral reasoning is translated into actions through self-regulatory mechanisms rooted in moral standards and self-sanctions by which moral agency is exercised" (Bandura, p. 193). However, as stated by Bandura (1999), "[s]elective activation and

disengagement of personal control permit different types of conduct by persons with the same moral standards under different circumstances” (p. 194). The disengagement mechanisms are as follows: (a) moral justification, (b) euphemistic labeling, (c) advantageous comparison, (d) displacement of responsibility, (e) diffusion of responsibility, (f) disregard or distortion of consequences, (g) dehumanization, and (h) attribution of blame.

Moral justification has to do with the tendency of individuals to justify “to themselves the morality of their actions” before engaging in harmful behavior (Bandura, 1999, p. 194).

Euphemistic labeling is related to the way the action is phrased and is referred to use a kind of language which decreases the harshness of an activity or removes the responsibility of the actor.

Advantageous comparison is an attempt to color how the action has been perceived by making comparisons. These three mechanisms (i.e., moral justification, euphemistic labeling, and advantageous comparison) are grouped under “cognitive restructuring of harmful conduct” and has been counted as the most powerful mechanism for moral disengagement (p. 196). The second group of disengagement mechanisms has to do with minimizing the role one plays in the harm that he/ she causes (i.e., displacement of responsibility, diffusion of responsibility, and distortion of consequences). Displacement of responsibility happens when the agent does not feel responsible for his/ her actions since these actions are dictated by the authorities. Diffusion of responsibility has to do with less responsibility one might feel due to division of labor or group decision making. Disregard or distortion of consequences has to do with “weakening moral control ... by disregarding or distorting the effects of one’s actions” (Bandura, 1999, p. 199). And finally, there are two issues related to the victims on whom the harm has been imposed (i.e., dehumanization which has to do with not viewing victims as human beings with feelings and other qualities and attribution of blame when victims are being blamed for putting themselves in

suffering situation). It is important to know that as raised by Bandura (1999), moral disengagement has a gradual nature and intensifies each time an actor engages in certain immoral behavior. More importantly, it should be mentioned that moral agency is not completely intrapsychic but “socially situated and exercised in particularized ways depending on the life conditions” of individuals (Bandura, 1999, p. 207). The author concluded that “[c]ivilized life requires, in addition to humane personal codes, effective social safeguards against the misuse of power for exploitive and destructive purposes” (Bandura, 1999, p. 207). Bandura (1986) stated that: “a theory of moral reasoning should ...be concerned ...with how cognitive processes can make the immoral inconsequential or even moral” (p. 492).

There are several studies in literature studying the role of moral disengagement in ethical decision making. For example, Moore et al. (2012) conducted a research to study the relationship between moral disengagement and ethical behavior in organizations. They developed and applied a 24-item scale named ‘Property to Morally Disengage Scale’ to measure moral disengagement. Their findings indicated that moral disengagement can be a strong predictor for unethical behavior in organizations. In another study conducted by Detert, Treviño, and Sweitzer (2008), the researchers found a positive relationship between moral disengagement and unethical decision making among 307 business and education undergraduate students. They partially provided support for their hypothesis regarding the mediating role of moral disengagement between individual differences (e.g., empathy and moral identity) and unethical behavior.

**Behavioral ethics.** A new realm of ethics called behavioral ethics has been emerged (Prentice, 2014) and can potentially affect research and practice of professional education in positive ways. Behavioral ethics is “the study of systematic and predictable ways in which

individuals make ethical decisions and judge the ethical decisions of others when these decisions are at odds with intuition and the benefits of the broader society” (Bazerman & Gino, 2012, p. 85).

Prentice (2014) stated that traditional approaches to teaching ethics generally emphasize on ethical philosophy or character building. The main argument for the use of behavioral ethics as a new approach is that the situation matters, and we can always see individuals with good character or skilled in moral reasoning who end up making unethical decisions. The environment might limit individuals’ ability to consider the ethical dimensions of decisions, which is called ethical fading (Bazerman & Tenbrunsel, 2011). Bazerman and Tenbrunsel (2011) stated that “goals, rewards, compliance systems, and informal pressures” are some of the aspects of work life that leads to ethical fading which increases the likelihood of unethical behavior: “...many ethical infractions are rooted in intricacies of human psychology rather than integrity” (Bazerman & Tenbrunsel, 2011, p. 21). In this view, the lack of awareness of “psychological processes that bias our decisions” and not recognizing our decisions as biased are the main reasons of ethical failures (p. 21).

### **Theories and models of ethical development**

Moral development is a topic that has long been the focus of researchers and philosophers. In this section, a brief review of moral development theories will be presented.

**Kohlberg’s theory.** Kohlberg adopted Piaget’s cognitive development approach in mid-1950s (Rest, 1994; Rest et al., 1999). Against the mainstream of beliefs at the time, Kohlberg argued that “it is individual who determines right and wrong” and not society (Rest, 1994). He was interested in studying “how it is that individuals arrive at moral judgments” and focused respectively on moral judgment as “the most interesting process of moral development” (Rest,

1994, p. 3). Like Piaget, Kohlberg assumed that there are stages (staircase) in the organization of moral judgment and he tried to describe these stages. Moreover, similar to Piaget, Kohlberg used interviews and posed moral dilemmas to participants of different age (e.g., young children, older children, adults) and asked for their justification and analyzed the data (Rest, 1994). As cited in Bandura (1986), “Kohlberg (1969, 1976) postulates a six-stage sequential typology beginning with punishment-based obedience, evolving through instrumental hedonism, approval seeking conformity, respect for authority, contractual legalistic observance, and culminating in principled morality based on standards of justice” (p. 488).

In 1975, McCuen adapted Kohlberg’s theory for engineering ethics (professional ethics) and introduced the professional conduct development stages. The model has three levels: (1) preprofessional level, (2) fundamental professional level, and (3) principled professional level. In preprofessional level, individuals act only based on overall consequences to themselves rather than “the consequences to the firm, the profession, or society” (Pritchard, 1980, p. 7). In second level, the needs of firm and profession comes before needs of individual. And finally, in principled professional level as the highest level of professional ethics, the benefit of human welfare is the criteria for measuring the proper professional conduct (Pritchard, 1980). It should be mentioned that each level consists of two stages parallel to stages introduced by Kohlberg.

After discussing McCuen’s (1975) model and applying it to a few case studies, Pritchard stated that there was doubt whether McCuen’s/ Kohleng’s stages could adequately describe and evaluate different situations and help in reasoning. However, Pritchard (1980) suggested that professional ethics stages can be used in engineering ethics courses by students to evaluate their own ethical perspectives after responding to case studies. As Pritchard (1980) stated:

One of the more valuable things that quickly emerges from examination of Kohlberg's theory is that students find it difficult to deny that they do have the capacity to reflectively consider and perhaps modify the beliefs that they may previously have accepted uncritically. (p. 5)

Despite the popularity of Kohlberg's theory and the attention of researchers to build on this theory, many critiques have been raised. For example, Bandura (1986) stated that:

“developmental trends obviously exist in moral reasoning and judgment, ... but the conditions of social learning are much too varied to produce uniform moral types” (p. 493). Kohlberg, Levine, and Hower (1983) stated that: “Kohlberg's stages are stages of justice reasoning, not of emotions, aspirations, or action” (p. 17). As Bandura (1986) cites Peters (1966), although justice is necessary, it is not sufficient for a moral system as individuals can be just but act brutal.

**Bandura's social learning theory.** While human behavior had been traditionally explained either through internal determinants (e.g., cognitivism) or environmental stimuli (e.g., behaviorism), Bandura's social learning theory focuses on both directions which is called, 'reciprocal determinism' (Bandura, 1971). Reciprocal determinism is “a basic principle for analyzing psychosocial phenomena at different levels of intrapersonal development, interpersonal behavior, or “the interactive functioning of organizational and societal systems” (p. 356). While in environment determinism, the environment is believed to be “the autonomous source that automatically shapes, orchestrates, and controls behavior”, those such as “[h]umanists and existentialists, who stress the human capacity for conscious judgment and intentional action, contend that individuals determine what they become by their own free choices” (p.344).

According to Bandura (1978):

In social learning theory, people play an active role in creating information-generating experiences as well as in processing and transforming informative stimuli that happen to impinge upon them. This involves reciprocal transactions between thought, behavior, and environmental events ... People are not only perceivers, knowers, and actors. They are also self-reactors with capacities for reflective self-awareness that are generally neglected in information-processing theories based on computer models of human functioning. (p. 356)

Another important argument rooted in Bandura's social learning theory has to do with the capacity of human beings in engaging in reflective thought: individuals can create and plan taking actions in thought without having to take those actions and suffer the corresponding consequences (Bandura, 1971).

**Finelli's model of ethical development among college students.** Finelli et al. (2012) introduced a conceptual framework for students' ethical development in college. In this framework, students' characteristics (e.g., demographics and previous experiences) are considered as input. College experience can be considered as the environment and consists of both institutional culture (e.g., policies and values held by administration and faculty) and peer environment. Individual student experiences are placed within the peer environment and can be further categorized under curricular and co-curricular experiences.

**Wells' model of ethical development.** Wells and Schminke (2001) argued that in spite of the popularity of codes of ethics and ethics training programs, the results are not satisfying. They referred to several studies that showed a significant percentage of employees had seen different unethical behaviors in their work environment or had felt pressures to participate in unethical behaviors (Wells & Schminke, 2001). Wells and Schminke (2001) attributed these



unsatisfying results to the ad hoc nature of the ethics programs and argued the need for the programs which are guided by theory. Wells and Schminke (2001) proposed a framework for ethical development by integrating the literature on ethics (i.e., Kohlberg's cognitive moral development) and training.

The authors identified four themes in the literature of training: (1) trainee characteristics, (2) training design, (3) transfer of trained skills, and (4) evaluation issues. They provided suggestions for HR managers to improve ethics based on these themes. According to them for ethics training programs to be effective, systems (i.e., attention to needs, trainee characteristics, pedagogy, and changes in attitudes or behavior) rather than sessions need to be in place (Wells & Schminke, 2001).

### **Non-traditional Influential Factors**

**Bounded ethicality and rationalization.** Bazerman and Tenbrunsel (2011) defined 'motivated blindness' as: "the common failure of people to notice others' unethical behavior when seeing that behavior would harm the observer" (p. 81). Financial gains, potential future job opportunities, fear, organizational loyalty, and organizational culture are some of the reasons for such blindness (Bazerman & Tenbrunsel, 2011). Another related term discussed by them is 'indirect blindness' that is the tendency for overlooking the ethicality of actions when they have been taken through indirect parties. Another concept, called 'unethical behavior on a slippery slope', has to do with the tendency of individuals to be less attending to others' decision making errors when it happens in small increments and not suddenly (Bazerman & Tenbrunsel, 2011, p. 91). Finally, the outcome bias has to do with "the tendency to takes results into account, in a manner that is not logically justified, when evaluating the quality of the decision process that a

decision maker used” (Bazerman & Tenbrunsel, 2011, p. 95). According to Bazerman and Tenbrunsel (2011), “judging decisions based on their outcomes means that we often wait too long to condemn unethical behavior” (p. 97). Ordinary prejudice (e.g., in-group favoritism), overclaiming due to egocentrism, and overly discounting the future are some of the forms of bounded ethicality (Bazerman & Tenbrunsel, 2011).

**The influence of biases.** While the role of biases in decision making has been studied in the literature, the biases regarding with ethical decision making has not received enough attention (Medeiros et al., 2014). In their study, Medeiros and his colleagues (2014) first introduced a taxonomy of biases (a total of 18 biases) and then examined these biases among faculty through interviews. Based on their findings they categorized the most common biases (nine biases) under three categories which all has to do with the lack of responsibility. These nine categories are listed in table 2.

Table 2

*The categorization of ethical biases among faculty (Medeiros et al., 2014)*

The categories of biases among faculty	
<b>Refusing to take responsibility</b>	<p><b>Self-justification:</b> happens when a person’s behavior is against his/her beliefs and the person tries to justify his behavior</p> <p><b>Self-handicapping:</b> trying to draw attention to obstacles to protect oneself from failure</p> <p><b>Moral insensitivity:</b> inability to recognize the moral aspects and moral implications of a decision or a situation</p>
<b>Relinquishing responsibility</b>	<p><b>Abdication of responsibility:</b> inability to take responsibility for an ethical problem</p> <p><b>Diffusion of responsibility:</b> trying to share the problem with others so that the blame can be also shared</p> <p><b>Inadequate role balancing:</b> unequal recognition of person’s roles and responsibilities</p>
<b>Lack of awareness of responsibility</b>	<p><b>Naïveté:</b> not being able to recognize the limitations of one’s knowledge in a given situation</p> <p><b>Misapplication of principles:</b> Lack of knowledge of principles or failure to apply them</p> <p><b>Framing:</b> inappropriate definition of the scope of a situation (too narrow or too broad)</p>

They found that misapplication of principles was the most prevalent bias in their participants' responses. Based on this finding they argued that individuals do not possess a firm grasp on ways to properly apply guidelines when they face ethical problems. They suggested that the appropriate use of ethical guidelines in different ethical dilemmas rather than merely explaining them should be emphasized in ethics education. Moreover, they suggested the followings as topics to pursue in future research: (1) how these identified biases influence the ethical decisions, (2) how these biases operate in combination with each other, (3) how these biases and the strategies to alleviate them can best be taught, and finally, (4) how different populations might be compared in terms of the biases.

One can understand the significance of the influence of the biases on unethical decision making by knowing that, as discussed by Anand, Ashforth, and Joshi (2004), the scandals in business environment in past years were not the result of unethical behavior of one or few individuals but the cooperation among many employees who were nothing like traditional image of criminals. Anand et al. (2004) attributed this phenomenon to the rationalization strategies used by these individuals: (a) denial of responsibility, (b) denial of injury, (c) denial of victim, (d) social weighting, (e) appeal to higher loyalties, and (f) metaphor of the ledger. It seems that these strategies are comparable to the notion of self-justification as one of biases identified by Medeiros et al. (2014). According to Anand et al. (2004), "rationalization and socialization practices allow the perpetrators of unethical activities to believe that they are moral and ethical individuals, thereby allowing them to continue engaging in these practices" (p. 40). Denial of responsibility happens when individuals believe they do not have any other choice. This is in line with the term, 'bad faith' in Sartrean conception of human and freedom which refers to not recognizing one's freedom and ability to make decision and therefore rejecting one's

responsibility (Kleist, 2013). Claiming to be a descriptive rather than prescriptive term by Sartre, 'bad faith' is "a conscious misapprehension of one's freedom" (Heter, 2006, p. 63). According to Heter (2006),

In Sartre's vocabulary, humans have two dimensions: 'transcendence' (subjectivity, future) and 'facticity' (objectivity, past). 'Bad faith' consists in a denial of either of these dimensions. (p. 64)

In other words, according to Sartre, people tell themselves that they do not have the freedom to make choices for their future and they need to act in certain ways to fulfill what society expects from them in their specific position (i.e., subjectivity). On the other hand, people might believe that what happened in the past was only in the past and there are no consequences of and implications for past events in current situation of individuals (i.e., objectivity). Sartre condemns both.

Denial of injury is related to convincing oneself that nobody is injured by the action taken by one (Anand et al., 2004). Denial of victim has to do with the tendency to blame the victims arguing they deserved what came to them. Social weighting refers to two practices: (a) condemning the condemner by questioning the legitimacy of those who identify the unethical behavior, and (b) selective social comparisons which has to do with the tendency to compare with even worse behaviors conducted by others. Appeal to higher loyalties is used when an individual believes that an ethical norm has been violated for addressing a more important concern. Metaphor of the ledger is the practice to use one's credit to offset unethical behavior (e.g., organization credit, one's time and effort).

Anand et al. (2004) referred to the creation of 'social cocoon' as the result of rationalization and socialization. Social cocoon is defined as "a micro culture created within a

group where the norms maybe very different from those valued by society or even the wider organization” (Anand et al., 2004, p. 46). According to them, “[s]ocial cocoons emerge when groups develop idiosyncratic solutions to the problems they face and actively seek to compartmentalize themselves from external influences”. (p. 46)

Anand et al. (2004) suggested that employees should be trained to understand the rationalization, socialization practices, and social cocoons “to at least periodically think about a prospective action or decision from the perspective of customers, shareholders, and other constituents” (p. 48).

Another important source of bias is related to group work in organizations. As stated by Bazerman and Tenbrunsel (2011), “[o]rganizations often segment decisions within particular groups or disperse different aspects of a decision to different parts of the organization. As a result, the typical ethical problem tends to be viewed as an engineering, marketing, or financial problem, even when the ethical relevance is obvious to other groups” (Bazerman & Tenbrunsel, 2011, p. 15-16).

Rationalization strategies are another influential factor. Citing Arand, Ashforth, and Joshi (2004) and their list of rationalization strategies, Prentice (2014) suggested that knowing these strategies might help individuals avoid failure in ethical decision making in future. While this suggestion seems reasonable, it is based on his experience in teaching ethics and further research is needed. Prentice (2014) also stated that the power of one should be considered. This has to do with the fact that even one or few people can save organizations from ethical mistakes by speaking up when unethical decisions are about to be made (Prentice, 2014).

Bazerman and Tenbrunsel (2011) stated that: “[m]ost of us behave ethically most of the time. At other times, we are aware when we behave unethically” (p. 22). However, as they

mentioned, their work “focuses on more dangerous situations: the times when we unwittingly behave unethically” (p. 22). They argued that “[t]raining in business ethics tend to be largely based on the approaches ... [which emphasizes] the moral components of the decisions” to encourage the selection of moral path (Bazerman & Tenbrunsel, 2011, p. 30). However, as stated by the Bazerman and Tenbrunsel (2011), “In many situations, decision makers do not recognize the need to apply the type of ethical judgment they may have learned in ethics training courses to their decision-making process” (p.30).

Prentice (2014), in his courses on business ethics tried to help students realize they were not as ethical as they think they were. Prentice (2014), based on the Kahneman’s work, also conveyed to his students that in contrast to what people think about the process of reasoning to make a choice, they usually only rationalize the choice they have already made based on their intuition. Prentice (2014) provided several examples. According to him, obedience to authority makes people to “suspend their own ethical standards in order to please the authority... [due to] conscious self-interest” (p. 341). Advancing one’s careers can be one of the reasons for such behavior (Prentice, 2014). Conformity bias is another factor raised by Prentice (2014) which has to do with the tendency of individuals “to take their cues for behavior from those around them” (p. 342). In other words, social norms of the group with which an individual identifies has a significant role in his/her behavior. Also, framing which would lead to ethical aspects of a decision fade away is another bias. The tangible and the abstract is another factor which has to do with the tendency of individuals to make decisions based on tangible factors rather than those which are removed (Prentice, 2014). And finally, self-serving bias which refers to the tendency of individuals to make decisions based on what benefits them rather than what is fair in an unconscious manner (Prentice, 2014). This bias can “cause well-meaning people to make

unethical decisions [by] ... not clearly seeing the ethical issues involved in the decision (ethical fading or moral myopia) or unconsciously distance themselves from the unethical implications of a choice (moral disengagement)” (p. 352).

Kligyte et al. (2008) stated that despite the importance of the content in teaching ethical decision making, individuals’ different traits and biases should be into account. According to Kligyte et al. (2008):

... programs where the trainee population involves highly confident and potentially self-deceptive individuals should emphasize potential personal biases that exist within all individuals, and how these biases may be overcome to make well-informed ethical decisions. (p. 273)

**Emotion and ethical decision making.** The notion of feelings in ethical decision making has been reflected in works of philosopher David Hume who believed morality has to do with sentiment or feeling rather than reason or fact. In other words, morality from this perspective is not intrinsic in an action but is related to the feelings one associate with an action. As he states:

Since morals, therefore, have an influence on the actions and affections, it follows, that they cannot be derived from reason; and that because reason alone, as we have already proved, can never have any such influence. Morals excite passions and produce or prevent actions. Reason of itself is utterly impotent in this particular. The rules of morality, therefore, are not conclusions of our reason. (Hume, 1739, p.457)

In addition to philosophical notions, empirical research supports the influence of emotions on ethical decision making. Greene, Sommerville, Nystrom, Darley, and Cohen (2001) found that the parts of brain which are associated with feelings were activated when participants

encountered dilemmas with high level of personal involvement while the parts of the brain associated with thinking were activated when it came to scenarios which involved simple reasoning. In another study, Connelly, Helton-Faut, and Mumford (2004), found that in hypothetical scenarios in which interpersonal issues were involved, emotions (measured by Discrete Emotion Trait Scale) could explain 29% of the variance in choosing ethical choices while the scenarios with organizational issues showed no significant correlation between emotions and ethical choices.

Building on the work of Connelly et al. (2004) and Greene et al. (2001), Dunbar (2005) argued that professional ethics archetypes are models which are very useful for pedagogical purposes. Finding these archetypes, as the author stated, “requires the determination of what emotions are engaged in problems of professional ethics, how the emotional engagement may change over time, and how these emotions affect decision-making” (Dunbar, 2005, p. 549).

**The influence of time.** It seems that individuals think differently at the time of prediction of behavior than the time of making actual decisions. This can be attributed to the difference in our motivations at different times and also ethical fading due to the preoccupation of other aspects of the decision (e.g., business or legal decision) (Bazerman & Tenbrunsel, 2011, p. 69).

After making an unethical decision, individuals tend to spin this behavior by rationalizing their role, changing their “definition of what’s ethical, or casting unethical actions in a more positive light” (Bazerman & Tenbrunsel, 2011, p. 74). As Bazerman and Tenbrunsel (2011, p.74-75) mentioned, blaming other individuals or systems is another strategy (e.g., “I am just following the law.”, “I’m just doing my job”, “I just follow orders”). According to them, another approach is “Everybody’s doing it.” (p. 75). Finally, if one cannot manage to spin the ethical



behavior to his advantage, the change of ethical standards is probable (Bazerman & Tenbrunsel, 2011).

Reviewing the literature, one can see the diverse set of variables and theories that attempts to explain and describe the ethical decision-making process. However, the process is contextual and deeply rooted in the social-cultural environment of the practice. As mentioned in the first chapter, the current study is an effort to describe and explain the decision-making processes among computing majors.

## CHAPTER 3: METHODS

This chapter introduces the matters related to the research methodology that I chose for conducting the research based on the proposed research questions. I used grounded theory to conduct this research and address the research questions. Here are the main research questions of this research:

- 1- How can ethical decision-making processes among computing students be described and explained?
- 2- How does participating in online asynchronous discussions influence judgment processes among students in computing?
- 3- What are some of the key biases inherent in the discussions among the students in computing?

As one can see the research questions imply an exploratory qualitative design. Moreover, since the research questions are focused on the process of ethical decision making, grounded theory is selected as the qualitative approach. As described by Creswell (2013), in grounded theory, “[t]he researcher focuses on a process or an action that has distinct steps and phases” (p. 85). Grounded theory goes beyond description and is intended to generate a theoretical explanation (Creswell, 2013). Grounded theory takes an inductive approach and in contrast to traditional types of inquiry in social sciences, “held that theories should be ‘grounded’ in data from the field, especially in the actions, interactions, and social processes of people” (Creswell, 2013, p. 84).

In this chapter, first, I will describe the participants, the course, and processes related to data collection. The approach to data analysis for current research will follow. Moreover, the

details related to grounded theory and the justification of choices I made for conducting this research will be discussed.

### **Participants**

The students of an undergraduate level course on computing ethics in Spring 2017 on the campus of a Midwestern University were the target participants of the study. The specific course was taken by Sophomore, junior, and senior students who had completed some course work in computing and mostly had some experience in programming. In a grounded theory study, a homogenous sample of individuals needs to be initially selected. This group of participants were selected by the judgment of the researcher for two reasons. First, they had completed some coursework on their subject matter as computing professionals, and second, they frequently had pre-professional internships which prepared them for discussion on ethical aspects of computing.

The total number of enrolment in the course was 164. These students, by registration, were grouped in 6 sections which was mapped to their face-to-face discussion section. When I approached them for the study, 104 students agreed that their postings be analyzed as part of this research. Among them 80 people agreed for participating in interviews. In order to make sure the data will be collected from a diverse group of students (i.e., in particular to include females and the individuals with a first language other than English), and based on having the number of students who were willing to participate in interviews, two of the six sections were selected as the focus of the study (33 students). Such inclusion provided an opportunity for giving voice to minorities since the majority of the participants of the course were English speaking males. Moreover, this inclusion is in line with Levitt's et al. (2015) suggestion on recruiting a more

diverse sample in future research on ethical reasoning. Only the data from the discussions of these two groups of students were collected for analysis.

### **The Course Background**

The 16-week course was offered in Spring 2017 and reviewed topics including philosophical ethics, logical argumentation, privacy, crime and the law, intellectual property, inequality and social justice, professional ethics, digital speech and commerce, security and risk, data science ethics, social media, and emerging topics. The course emphasized on three ethical theories: consequence-based, duty-based, and virtue-based ethics.

The Essays were the main assignments of the course. The students were provided with a rubric for assessment that included four main aspects: (1) the use and understanding of terminology and concepts discussed in course, (2) understanding and responding to the prompt questions, (3) logic of arguments and claims, and (4) writing including appropriate introduction and conclusion, and smooth reading experience. There was a total of 12 Essays with 3000-5000 characters long limitation on topics including spyware, mobile applications and privacy, data breach, internet of things and privacy, intellectual property, diversity in computer science, viral deception, cybersecurity, and discrimination. Each essay provided a real-world case, had specific instructions, and asked students to use certain models, ethical theories, or class materials in their essays. Specifically, for each essay each student was assigned with an ethical theory by the instructor (e.g., deontology or virtue-based) and they were only allowed to use that theory to build their reasoning. Moreover, the students were asked to respond to all provided prompt questions as they write their essays. These questions were informed by the class materials in the corresponding weeks.

In addition to essays, students were asked to identify an ethical issue related to an emerging technology of their choice and prepare a four-minute presentation in front of their classmates. They were asked to use one of the models provided in the course (i.e., Tavani's strategy) to analyze the technology and come up with a position about the topic. They were also needed to provide a strong argument supporting their position. Their presentations were assessed based on a provided rubric and also their peers' evaluation.

To sum up, course assignments (i.e., essays and presentations) were highly structured in terms of instructions, expectations, and assessment. In contrast to online discussions, they were all individual assignments with a somehow limited opportunity of peer assessment. The course weekly schedule and the time points of data collection can be seen in table 3. As one can see, the students had had a chance to familiarize themselves with ethical theories and they had also applied them in a few essays before the data collection started.

Table 3

*The weekly schedule of the course*

Weeks	Topic covered	Course assignment	Data collection
1	Introduction	Essay 1	
2	Philosophical ethics	Essay 2	
3	Logical argumentation	Essay 3	
4	Privacy	Essay 4	
5	Crime and the law	Essay 5	
6	Intellectual property	Essay 6	First week of online discussion
7	Midterm		Second week of online discussion

Table 3 (Cont'd)

<b>Weeks</b>	<b>Topic covered</b>	<b>Course assignment</b>	<b>Data collection</b>
<b>8</b>	Inequality and social justice	Essay 7	Third week of online discussion
<b>9</b>	Spring Break		
<b>10</b>	Professional ethics	Essay 8	Fourth week of online discussion
<b>11</b>	Digital speech and commerce	Essay 9	Fifth Week of online discussion
<b>12</b>	Security and risk	Essay 10	Sixth week of online discussion
<b>13</b>	Data science ethics	Essay 11	Seventh week of online discussion
<b>14</b>	Social media	Presentations	Eighth week of online discussion
<b>15</b>	Emerging topics	Presentations	Ninth week of online discussion
<b>16</b>	Final Exam		Interviews

### **Data Collection**

As stated earlier, a sample of 33 students registered in a course on computer professional ethics on campus of a Midwestern university was selected for data collection. This course was selected in particular since it provided an opportunity for gathering well-thought responses of students as they were involved with learning about the ethics of their profession. The selection of the site was due to two main concerns. First, it was a convenient site to which the researcher had access. Second, as an accredited and large program with graduates who traditionally have been hired in large well-known technology companies, the findings would be relatively representative for the future workforce.

In terms of the process of data collection, I developed a short questionnaire to capture basic demographic characteristics of the participants (e.g., gender, major, work experience, etc.). This questionnaire can be seen in Appendix B. The students were asked to respond to the questionnaire in the beginning of the semester.

Three ethical scenarios related to computing were designed. I posted the scenarios and questions for students to respond. During a 3-week period for each of these scenarios, students were asked to participate in asynchronous online discussions as part of their course assignments. The participation was graded only for completion. During the period of nine weeks, participation for each individual consisted of one original response to the scenario questions in first week, a minimum of two responses to the peers' postings, and finally a second response as their final stance to the initial questions to reflect upon their first stance. One could maintain the first stance in the third week or could change the decision based on the happenings during the three-week period for each scenario. After initial analysis of the discussions, interviews were conducted. These interviews allowed me to access rich data about reasoning process of individuals as they deal with problem solving tasks (Fonteyn, Kuipers, & Grobe, 1993).

### **Interview Process**

The individual face-to-face interviews were conducted on the campus of a Midwestern university in the last week of the semester. Each of these semi-structured interviews took around 20 - 30 minutes. Students were offered extra course credit for participating in interviews. Therefore, to make sure getting the extra credit for the interviews is available to all students and not only to the two selected subgroups, I interviewed with all students who showed interest in the extra credit and also took part in interviews (59 students). 19 of these students were among the

students in the two subgroups I had selected as the focus of my research and therefore included in this research. This number was a satisfactory number since, according to Charmaz (2006), having 12 interviews or more is a good number for most qualitative studies.

The interview guide was designed in a way to help the processes of triangulation. A list of initial questions for the interview is listed in Appendix D. These questions were informed by the interview questions used by Medeiros et al. (2014), and also the sample of grounded theory interview questions suggested by Charmaz (2000). The first two questions were designed to engage the interviewees in the interview process and are aimed to provide basic information about their general opinion about their profession and professional ethics. The questions 3-7 were more focused on the thought processes of individuals as they were asked to provide answers to the scenarios. Questions 8-9 involved some contextual information which helped interpreting the findings as they add the opinions of the individuals on the reviewed cases and also the perception of students of future ethical challenges as computing professionals. And finally, question 10 and 11 were a chance for interviewees to communicate their concerns and questions with the researcher. These questions revealed some of the issues that had not been anticipated and therefore helped increasing the understanding on the topic. Interviews were conducted in English and on the campus of a large Midwestern University. Interviews were recorded upon the consent of participants. The recordings transcribed verbatim. During the interviews, whenever appropriate I asked follow-up and probing questions.

## **The Scenarios**

Based on the literature and the trends in the industry, some of the ethical issues in computing were selected for developing scenarios: privacy in social media, viral deception,



safety in application development, and unethical tasks assigned to programmers. The scenarios can be seen in Appendix C.

The designed scenarios covered a range of different issues in Computer Science. They were also selected intentionally with different degrees of intensity of moral problems. In each of these scenarios, at least one potential source of bias was inherent. For example, in the first scenario which I designed myself, one potential source of bias is ethical insensitivity. In the second case, which was based on one of the cases used in a course on computer ethics taught by Dr. Keith Miller in University of Illinois, one potential bias is the unquestioning deference to authority or managerialism. The third scenario, which is rephrased and based on a real case (Sourour, 2016), can raise some biases including relinquishing responsibility. Although in each case only one potential bias is included here, one can imagine that more biases would reveal in the process of the research. The consideration of these three initial biases would help me examine whether and in what ways computing students would include such biases in their ethical reasoning process.

In designing these scenarios, I tried to follow the common characteristics of effective cases introduced by Davis (1999). Davis suggested that cases should encourage students to express their ethical opinions, to find ethical issues, to make and to justify their decisions. Moreover, it should nurture a sense of practical context among students (Davis, 1999).

It should be mentioned that except the second part of the first scenario which focused on the trending news and was related to one of the essays' topics (i.e., viral deception), the rest of the scenarios were not explicitly discussed in other assignments or activities of the course.

### **Data Analysis**

Data analysis in qualitative inquiry is intended to make “sense out of the data ... [through] consolidating, reducing, and interpreting what people have said and what researcher has seen or read” (Merriam, 2009, p. 175-6). As stated by Merriam (2009), identification of segments in data set that are responsive to research questions is the first step in data analysis. For the purpose of my study, the collection of postings by each individual is considered as the unit of analysis. This unit of analysis would allow the researcher to examine the process an individual takes to come to his/her final decision dealing with an ethical issue.

For analyzing the data, I used grounded theory which involved a hierarchy of coding in different levels. Coding, as defined by Charmaz (2016), is “getting to the core of the data, defining their foundations, and immersing oneself in these data...[which] gives us an initial step into theorizing” (p. 49). In other words, coding is the process of attaching “labels to segments of data that depict what each segment is about” (Charmaz, 2006, p. 3). According to Charmaz (2006), “coding distills data, sorts them, and gives us a handle for making comparisons with other segments of data” (p. 3).

Coding started with initial coding in which researcher “remain[s] open to exploring whatever theoretical possibilities” he/ she can identify in the text (Charmaz, 2006, p. 47). In this stage, codes needed to be close to the data and actions rather than topics (Charmaz, 2006) and line-by-line coding suggested by Charmaz (2006) as a strategy for avoiding preconceived notion was applied. Moreover, when appropriate, ‘in vivo’ codes were used. These codes are the special terms which participants might use and are “symbolic markers of participants’ speech and meanings” (p. 55).

After the first phase of coding (i.e., open coding), I started the focused coding. Focused coding refers to the use of “the most significant and/or frequent earlier codes to sift through large

amounts of data ... [and] requires decisions about which initial codes make the most analytic sense to categorize ... [the] data incisively and completely” (Charmaz, 2006, p. 57). Creswell (2013) suggested that researchers should come up with a small number of categories and slowly reduce it to around 30 categories which then can be combined in the key themes.

In the next step, axial coding was used to “specify the properties and dimensions” of the categories and to connect them to subcategories (Charmaz, 2006, p. 60).

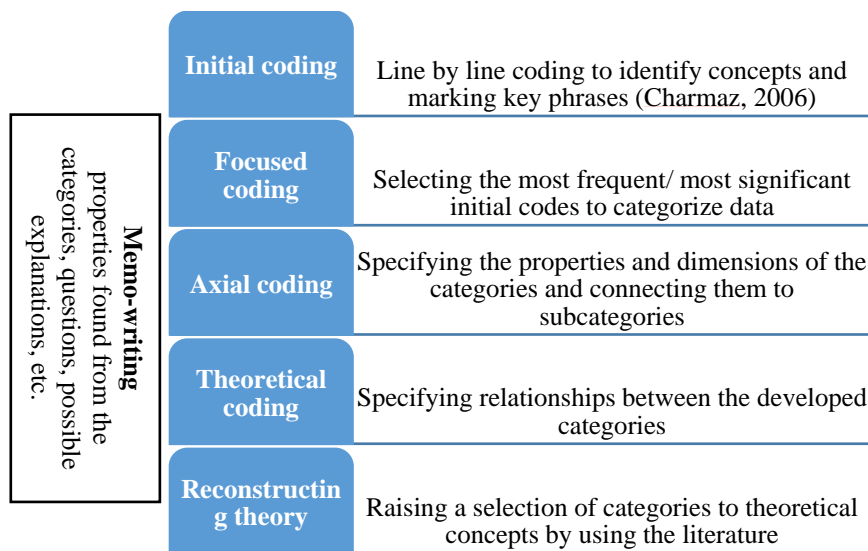
The final step in coding was theoretical coding which specifies “possible relationships between categories... [which] have [been] developed in ... focused coding” (Charmaz, 2006, p. 63). According to Charmaz (2006), theoretical codes move the “analytical story in a theoretical direction” (p. 63).

Memo-writing was used during the analysis process. Memos are very important since they help the researchers organize their thoughts, “capture the comparisons and connections”, and also develop questions to address and directions to pursue (Charmaz, 2006, p. 72). Memos can be used for different purposes as these functions are listed in Charmaz (2006). In current study, memos were used to (1) define codes, (2) make comparisons between data and data, data and codes, codes and codes, codes and categories, and categories and categories, and (3) ask questions and find issues in analysis (Charmaz, 2006).

And finally, reconstructing theory completed the process. The process involved raising a selection of categories (i.e. those “that render the data most effectively”) to theoretical concepts, “subjecting them to further analytic refinement ... and showing their relationships to other concepts” (Charmaz, 2006, p. 139). A critical issue to be handled in this stage was the attention to negative cases. According to Holt, the negative cases might be exceptions that help in proving

the rule or have the potential to expand, modify, or raise doubt about it (Corbin & Holt, 2011).

Figure 1 illustrates the steps I took in analyzing the data.



*Figure 1.* Data analysis process based on Charmaz (2006)

## Validation Strategies

Creswell (2013) introduced eight strategies that one might use to ensure the validity of a qualitative study. Here I will describe those strategies that I followed in this research. During the semester in which I collected the data, I tried to become involved in the course, so I could build trust with students as it was needed for in-depth and informative interviews. Triangulation in terms of the use of different data collection methods (forum discussions and interviews) was used. The ethical scenarios were reviewed by the instructor of the course and some other faculty and experts in the field and was revised to satisfy clarity and relevance. I was attentive to my biases and I articulated and reflected on my past experiences that might influence the research (See next section). Using thick descriptions were another approach that I took in reporting the findings. This would help transferability of the results (Creswell, 2013). As I conducted the study, I examined the competing explanations as suggested by Maxwell (2013). Moreover, I kept

journal of my experiences and challenges I encountered during the process. As suggested by Corbin and Holt (2011), this would help in putting “final interpretations into context and explain why this particular researcher arrived at one theoretical explanation and not another” (p. 117). Moreover, While I went through the process as described in this chapter for analyzing the data, I had in mind some of the challenges of conducting grounded theory (as described by Holt in Corbin & Holt, 2011) with the hope to be able to avoid them. One of the challenges Holt experienced had to do with not being able to recognize a theory from the concepts, categories, and subcategories developed in his first attempts. He suggested that the intention of developing theory should be present in every step of the analysis process and should not fully postponed to the final stage (Corbin & Holt, 2011). In other words, with merely focusing on the linear process of grounded theory, the development of an explanatory theory is not guaranteed. This suggestion helped me during the study. Finally, in the process of the proposed grounded theory research, I tried to proceed as suggested by Corbin and Holt (2011): “the lesson is to anticipate as many problems as possible while remaining flexible, reflexive, and responsive to difficult decisions as they arise” (p. 119).

As I mentioned earlier, Creswell (2013) introduced the self-disclosure of the researcher’s stance as one of evaluation criteria for grounded theory. In next section, I will discuss that.

### **The Researcher’s Background and Position**

The current study is an exploratory qualitative study of the processes of ethical decision making among students in computing. As it has been usually said, in a qualitative research, the researcher is the instrument, so it is important that his/ her background, epistemological position, and experiences are articulated. “[R]esearchers conceptualize differently and ... [they] might put

different emphasis on data depending upon their professional backgrounds and underlying philosophical perspectives” (Corbin & Holt, 2011, p. 116). Therefore, here I will describe my background and philosophical position briefly with the focus on aspects that I think were more influential in current study.

I first encountered computing ethics as a course in my undergraduate studies in Computer Engineering. Having that background, I served as a teaching assistant for the same course during my master studies in Business Administration. Later, as an international PhD student, I had a chance to serve as a teaching assistant in a similar course in computer science department. Also, due to my interest in professional ethics, I studied the codes of ethics in large Iranian companies as my master thesis. All these experiences and the self-readings have influenced my perceptions on the topic.

In terms of philosophical perspective, I believe in constructivist paradigm. Constructivism “assumes a relativist ontology (there are multiple realities), a subjectivist epistemology (knower and respondent cocreate understandings), and a naturalistic (in the natural world) set of methodological procedures” (Denzin & Lincoln, 2005, p. 24).

### **Justification of Research Methodology**

In this section, I provide justifications for choices I made in terms of research design, data collection method, and my approach to data analysis. I argue that grounded theory was a good fit for my research. As stated by Creswell (2013),

Grounded theory is a good design to use when a theory is not available to understand or explain a process. The literature may have models available, but they were developed and

tested on samples and populations other than those of interest to the qualitative researcher. (p. 88)

As stated in introduction chapter, the literature on ethical decision making is dominated with conceptual models which have been tested with quantitative approaches, therefore, there was a deficiency in theoretical contributions which are rooted in the field data. Moreover, the specific setting of the current study had not been sufficiently examined in the literature. Therefore, the use of grounded theory for current study was justified. Grounded theory was the best design for addressing the aim and research questions of the proposed study since the outcome of grounded theory is a framework that “explains how and why persons...experience and respond to events, challenges, or problematic situations” (Corbin & Holt, 2011, p. 113).

From a theoretical perspective, the use of asynchronous online discussions for data collection purposes, is in line with the core assumption of socio-cultural perspectives towards moral development which has to do with the central role of “words, language, and forms of discourse” in the process (Tappan, 2006, p. 355). From an instructional perspective, the discussions on ethical problems in scenarios related to computing has been proposed since this approach would help alleviating some of the difficulties such as time limitations, and the lack of practicality of involving with real projects in classrooms.

And finally, the purpose of conducting interviews is twofold: (1) expanding the initial findings from the process of analyzing forum discussions and creating a better and deeper understanding of ethical decision-making processes among students, and (2) triangulating the findings from forum discussion texts and the conducted interviews.

## CHAPTER 4: FINDINGS

In this section, I present the findings of the study. The purpose is to provide an understanding of the processes and the factors that are involved in ethical decisions making among computing majors. This understanding is based on the analysis of data gathered from 33 undergraduate students in Computer Science. Six students were seniors, 13 students were juniors, and 14 others were sophomores. Table 4 provides a summary of the participants and their background information.

Table 4

*Participants of the study*

	<b>Pseudonym</b>	<b>Gender</b>	<b>Undergraduate level</b>	<b>First Language</b>	<b>Work experience (Months)</b>	<b>Perceived importance of professional ethics</b>
1	Sue	Female	Sophomore	English	3	Very important
2	Laura	Female	Junior	Indonesian	10	Very important
3	Eaton	Male	Junior	Indonesian	4	Very important
4	Michael	Male	Sophomore	English	12	Neutral
5	Shin	Male	Junior	Japanese	7	Very important
6	Simon	Male	Sophomore	English	7	Slightly important
7	Oliver	Male	Senior	Chinese	6	Moderately important
8	Sarah	Female	Junior	English	37	Very important
9	Anne	Female	Sophomore	English	0	Extremely important
10	Reese	Female	Sophomore	English	5	Very important
11	Mikel	Male	Sophomore	English	0	Moderately important
12	Fai	Male	Junior	Chinese	3	Neutral
13	Ryan	Male	Junior	English	3	Extremely important
14	Blake	Male	Senior	English	-	Extremely important



Table 4 (Cont'd)

	<b>Pseudonym</b>	<b>Gender</b>	<b>Undergraduate level</b>	<b>First Language</b>	<b>Work experience (Months)</b>	<b>Perceived importance of professional ethics</b>
15	Edward	Male	Junior	Chinese	6	Extremely important
16	Alex	Male	Senior	English	0	Moderately important
17	Edwin	Male	Junior	English	6	Extremely important
18	Adam	Male	Sophomore	-	0	-
19	Sebastian	Male	Sophomore	English	0	Moderately important
20	Tom	Male	Sophomore	Russian	6	Very important
21	Nicholas	Male	Senior	Chinese	5	Moderately important
22	Xing	Male	Senior	Chinese	6	Very important
23	Quan	Male	Junior	Chinese	-	-
24	Shan	Male	Senior	Chinese	6	Moderately important
25	Emma	Female	Junior	English	8	Extremely important
26	Ethan	Male	Sophomore	English	7	Very important
27	Luke	Male	Sophomore	English	0	Very important
28	Carl	Male	Junior	English	20	Very important
29	Ilan	Male	Sophomore	Japanese	3	Very important
30	Ian	Male	Junior	English	24	Extremely important
31	Austin	Male	Sophomore	English	10	Extremely important
32	Sophia	Female	Sophomore	English	3	Extremely important
33	Cooper	Male	Junior	English	12	Moderately important

This section is organized as follows: First, students' perceptions towards ethics, computer professional ethics, and the course will be discussed. Second, students' responses to three ethical scenarios will be briefly reviewed. Third, the ways in which the participation in online discussion

influenced the decisions of the students will be discussed. Fourth, the identified factors that are involved in making ethical decisions will be presented. Fifth, the identified fallacies and biases inherent in the students' responses will be discussed. Finally, the students' perceptions regarding the barriers to and enhancers of their ethical decisions in their future career will be reviewed.

### **Students' Perceptions Towards Ethics, Computer Professional Ethics, and the Course**

For understanding students' ethical decision-making processes, it is better to start with their perceptions on ethics, professional ethics, and the course they took on computing ethics. In this section, these perceptions will be discussed.

#### **Students' perceptions towards ethics**

Although students were not asked specifically to talk about the ethics in its generic sense, some of them included some arguments that directly related to the broader concept of ethics. Adam believed that some of people just "have a stronger moral compass than others. It is very hard for people to improve their psychology, that is something that you are born with... you need to work on them hard...". Some other students treated ethics as laws and rules or compared ethics and rules. For example, Oliver stated that ethics is about acting based on rules and laws. Anne considered ethical as ideal situation vs. legal as real-world. According to her:

Professor talked about how ethics and legal consequences shouldn't go together and how you shouldn't think of legal parts of it, but I think maybe ... talking about it a little bit would help broaden the scope of the class and help you put everything in terms of real-world better.

The fact that some students related ethical issues to the ideal situations, but legal issues to real-world problems needs to be scrutinized. Also, there were some students who believed there were two types of responses: Right answers and real ‘personish’ answers. An example can best illustrate this. Anne, in response to my question about her strategy in responding to scenarios stated that:

When I read the scenario, I would have my first instinct, not using class materials using my values and then my next would be what we’ve learned in lecture about ethics ... How should I be thinking vs. how am I thinking and then I usually when I tried to respond I brought them together because a lot of things we learned in class are the most idealistic perfect way to do things and I tried to bring that together with my natural instinct for how I would respond to have answers that are ethical but also real, real ‘personish’ and not text book ethical answers.

Shim referred to the similar issue and stated that: “Most of the time it was aligned but there was one that what I said was different from what I thought was the right answer”. Adam, in response to my interview question on what helped him in responding to the scenarios, stated that: “Maybe not so much class, because class there is a right answer ...”. Contrasting this response to what Alex told me would help in understanding the situation: “Sometimes my initial though was different from what is ethically right. Wait. We learned that ... Some scenarios you need to be careful about it. Class affected me a lot”.

It seems the differences between these two excerpts in terms of the influence of the class can be attributed to the mindset of the students and their perceptions towards ethics. While Adam believed that ethics is something that one born with it, Alex definitely had a different mindset.

### **Students’ perception towards computer professional ethics**

Based on the analysis of the interview transcripts, students’ perceptions towards the concept of professional ethics can be categorized under two broad categories: (1) detailed and

field-specific knowledge of importance and need, and (2) broad and generic knowledge of ethics or its importance. Students with responses in the first category, used specific examples from Computer Science or its impact on society to describe professional ethics. As an example, Sebastian provided examples such as self-driving cars and extension of the use of technology in the medical field as some of the aspects that makes it necessary to consider professional ethics. Similarly, Ryan referred to the story of Apple and privacy of its users as what he knew about professional ethics before taking the course. Anne stated that professional ethics “is something that you have to be thinking about it all the time and it impacts all your work”.

In contrast, there were responses which were more towards broad and generic description of professional ethics. For example, Blake said that it is about what people should do and what they should not. Adam provided examples of generic scandals in organizations. Eaton talked about the prevalence of fraud. Two of students stated that professional ethics needs to be taken into consideration in whatever project one works on it (i.e., Mikel and Fai). Some students also provided very simplistic descriptions. For example, Alex told: “you have to watch what you are doing”. Simon had a systematic approach to the professional ethics. He said: “it is about how to apply moral principles to solve ethical dilemma at work”.

**Critiquing the practices in Computer Science.** Some of the students discussed the issues that are prevalent in the practice of Computer Science and critiqued these issues as they believed these could possibly lead to unethical behaviors. Some others used these practices as excuses for the decisions they made. In this section, I have listed these practices. It is worth mentioning that the list is not comprehensive but illustrates a range of critiques against prevalent practices in Computer Science that is based on students’ responses.

- Asking for excessive and unnecessary permissions: In response to the scenario of privacy in social media, Sebastian stated that: “They ask for all these permissions even though they won’t need it”.
- Unrealistic ship dates: In response to the app development scenario, Sebastian stated that: “In the world of computer science, the ship dates are long before the actual day when it is done”.
- The tendency of some of the professionals to see Computer Science as a field which is more important than other fields and act based on pride and arrogance which is practiced in Silicon Valley and as Edwin suggested contributes to unethical behaviors.
- Updates: You can always fix things by sending updates without looking at the implications
- The use of a technology only because one is an expert in that or is interested rather than thoroughly examining the situation (e.g., use of algorithms)
- Lengthy and ambiguous terms and conditions documents: As stated by Shin, they can be long and vague, and it is necessary to use an informed consent rather than consent.

### **Students’ perceptions towards the course**

The way students looked at the course can be categorized under three main categories: (1) a required course about what is right and what is wrong: For example, Shin mentioned that: “I know it is important, but it has a lot of writings... it is a lot more work to do for a 2-credit hour course”, (2) an eye-opening experience: Ryan and Edwin told me that the course opened their eyes to how many issues there are, and (3) a course that is different from other courses in

Computer Science: For example, one of the students provided an interesting view towards the course. As she stated:

I think this course is different from most the other ones and I think that a lot of people either likes it a lot or they don't like it at all. Because there is no coding. It is more thinking about the implication of what you are doing and what you are building not actually how to build things.

Alex stated similar idea about the different nature of the course but in a different way: "The class is not technical. It feels like I am not improving my skills, but it makes sense... Computer Science is so prevalent...It is easy not to consider the ethics of something or just do the work".

### **Students' Responses to Three Ethical Scenarios**

As I stated before, the ethical scenarios covered a range of different issues with different degrees of intensity of moral issues. Alex compared the three scenarios in an interesting way which can better illustrate the range of these scenarios:

I think [the first two scenarios] are not as ethically as black and white as the last one and more like of engineering decision. [for the first scenario], everyone is in seek of more data, that one is more of a decision of there is a potential for risk and you might want to minimize that potential whereas in the quality control the risk is identifiably there...and the very last one, ... it is not the risk, something bad basically may happen. Are you still want to do it?

The question is what contributed to the responses of the students in different scenarios? Is the reasoning of the students who made more ethical decisions in each scenario different from those who come up with less desired ethical solutions? In following sections, I am planning to answer these questions.

### **Students' Responses to the Scenario on Privacy in Social Media**

The responses of students regarding the solutions for the proposed situation of privacy can be categorized under six solutions: (1) the lowest privacy level as the default but inform the users (i.e., Simon, Fai, Quan), (2) the lowest privacy level (i.e., Blake, Nicholas, Carl, Cooper), (3) the highest privacy level as the default (i.e., Anne, Laura, Alex, Mikel, Sebastian, Michael, Reese, Sarah, Edward, Edwin, Tom, Ethan, Austin, Sophia, Luke, Ilan, Ian), (4) the medium privacy level as the default, (5) either is fine (i.e., Sue), and (6) allowing the user to pick the privacy in the first use (i.e., Adam, Oliver, Ryan, Xing, and Emma). From these solutions, the second and fifth solutions seem to be the least ethically desirable.

### **Students' Responses to the Scenario on Trending News**

Students' responses to the scenario of trending news fell into four categories: (1) abandoning the news (i.e., Sebastian, Simon, Sue, Sophia, Ilan), (2) Using a group of experts (i.e., Alex, Michael, Ryan, Edwin, Tom, Luke, and Cooper), (3) using algorithms (i.e., Adam and Austin), and (4) using combination of algorithms and team of experts (i.e., Anne, Laura, Mikel, Fai, Sarah, Sue, Shin, Oliver, Blake, Eaton, Edward, Nicholas, Ethan, Xing, Carl, Quan, Emma, and Ian). From these solutions, the third solution is not ethically desirable.

### **Students' Responses to Scenario on the App Development**

The responses of students to this scenario is categorized under six different categories: (1) Signing off if the software is not safety critical (i.e., Sarah, Sue, Blake, Ethan, Xing, Quan, Ilan, Ian), (2) signing off as the managers want (i.e., Anne, Michael, Nicholas, Sophia), (3) signing off but let the client know (i.e., Sebastian and Adam), (4) asking for more time if needed (i.e., Simon), (5) not signing off before proper testing (i.e., Laura, Alex, Fai, Reese, Shin, Oliver, Eaton, Edward, Tom, Shan, Luke, Carl, Emma, and Cooper), and (6) not sign off if one can find

another job (i.e., Ryan). From these solutions, the second and sixth solutions are not desirable. The most ethically desirable solutions are the fourth and fifth solutions.

### **Students' Responses to Jim's scenario**

Jim's scenario was a unique scenario that involved an explicit ethical issue. Jim knowingly has coded a quiz that is deceiving and there is a chance that a big consequence such as a death has happened due to his action. A glance at the ACM code of ethics shows that Jim has acted against several imperatives listed under the section 1 of this document:

An essential aim of computing professionals is to minimize negative consequences of computing systems, including threats to health and safety. (under 1.1 Contribute to society and human well-being, Acm.org, 2018)

... it is often necessary to assess the social consequences of systems to project the likelihood of any serious harm to others. If system features are misrepresented to users, coworkers, or supervisors, the individual computing professional is responsible for any resulting injury. (under 1.2 Avoid harm to others, Acm.org, 2018)

12 out of 33 students believed that Jim did nothing wrong in this scenario. Moreover, 22 of students believed that Jim is not responsible for the death of the girl. In other words, only a third of students believed that Jim is responsible for what has happened. Here, responsibility

It seems that there is no direct relationship between the students' perception of the importance of professional ethics and their responses to this scenario. However, surprisingly, the number of students who believed that the professional ethics was moderately important is significantly higher among those who thought Jim did something wrong.

When it comes to gender, there seems to be a difference between males and females in responding to this scenario. Six female students out of seven believed that Jim did something wrong and only one of female students did not think that way (in total 6 out of 21 students who



believed this way were females). Despite this, when it comes to the question whether Jim is responsible for the death of the girl, there seems to be no significant differences between the genders (two out of 10 students who thought Jim was responsible were females).

### **The Influence of Online Discussion on Ethical Decision Making**

Online discussions influenced students in diverse ways. In this section, these influences will be discussed. Moreover, the perceptions of students and their opinions on these discussions will be reviewed.

#### **Identification of the Differences in Ideas with the Peers**

During interviews, some students compared their responses to others and mentioned that their responses were different from those of others in class. A few examples can better illustrate the nature of these comparisons:

... a lot of kids said that ‘no privacy’ should be the default... which I thought it was completely different from my way of thinking and from where I am from. (Sebastian)

I think my answer was vastly different from many others’. I was surprised that people said it wasn’t his fault. Because I thought the reason of the course was, doesn’t matter what your boss says, doesn’t matter what you have been told to do. (Sebastian)

#### **Modifying One’s Responses Based on Reading Others’ Postings**

Most students stated that they did not change their perspectives based on their peers’ postings in week 2 of discussions in each of the scenarios. One possibility is that they had already been influenced by reading their peers’ postings prior submitting their first response as many students believed this was the case for many of their peers. What Edwin stated in the interview when I asked if he changed his response in the reflection piece, supports this argument:

“I would take a look at their stuff beforehand and it might inform me a little bit but then when I responded it was generally more in favor of what I already had”.

The point about the prevalence of reading others’ posting before submitting one’s own response was raised as the most prominent complain of students about online discussions. However, most students did not believe that this was the case for themselves. In their view, this tendency of their peers to read others’ posting priors submitting their responses, contributed to the lack of sufficient arguments in the discussions. Some students even suggested that, in future, it would be better to only allow students to read their peers’ initial responses after submitting theirs. As an example, Michael told me:

It seemed that most people shared the same opinion. There maybe were only maximum two or three different opinions for the discussions. It might have been helpful to hide the discussion responses until you have submitted yours because a lot of people just read whatever everyone else was saying and did along the same lines.

Similarly, Oliver told me that: “The responses were very similar to each other. After reading two or three, I started losing interest for reading because similar words kept coming up... I tried to have some argument there.”

As another example, Simon stated that:

... many of kids were very unfrontational in their responses, they don’t want to be ‘Oh you are wrong, you are not looking at this right’. In situation like that it is hard to say. They were like: ‘I thought the good point was x, y, and z’. Then I am like: ‘Thanks!’. That is not gonna influence you too much because [it] is not certainly challenging you much. But I do remember one time that someone pointed out a mistake in my logic or something like that and I was like that was a good point”.

In support of this opinion, there is some more evidence from the data. Anne stated that when she responded to the Jim’s scenario, she posted whatever her thought was and then she noticed that most students did not agree with her. She continued that she was surprised because she believed that the engineer is to blame, and she felt that the response was super natural and an

obvious response. She felt that some of other students may read what others had to say first, which according to her, would obviously change what they actually thought which led them to have similar thoughts. She also stated that whenever she did not look at others, her responses were more unique and more different. The question is if this is the case, how one can resist against such pressures. In other words, what factors might be helpful in this regard.

When I asked Anne whether she changed her opinion in the reflection piece at the third week of the discussions for each scenario, she stated that: “Usually what happened was when I read the responses, I was able to ... quickly [find flaws] with their arguments: ‘[Your argument] is the opposite [of] what professor said’. Their arguments didn’t really convince me. So, I stuck with my opinion”.

Sarah believed that at some point in the discussions, students started echoing the same thing. She compared that to a Facebook thread and stated that “people who had different opinions were ... afraid of expressing those because they were afraid that someone would respond that ‘no you are wrong’”. She suggested that a moderator would be able to address this issue.

Although it is not possible to know what exactly the influences of reading the peers’ original responses prior to one’s response might be, it seems reasonable to try to provide a better picture of the issue by presenting and analyzing the existing evidence from the data. In the next section, I will discuss some of the findings on the influence of reading one’s peers’ postings before posting one’s own posting.

It seems even for some of those students who changed their minds on the scenarios, they did not see the degree of the changes in their responses no matter how dramatic it might have been. For example, Xing in his final stance in the third week of the discussion on scenario three

stated that:

I believe that my stance on the situation changed slightly after viewing replies from my peers. I think that Jim was morally wrong on that he continued to work on the web project after knowing that the website was biased on his clients' drugs. He did nothing to make a suggestion or persuade his clients to change their unethical doings.

Although this student felt that his stance has only changed slightly, when one looks back at his previous responses to two of his peers, one can notice a big shift in his response as he clearly did not believe Jim was doing anything wrong in his previous responses:

“I think if Jim's client was a big pharmaceutical company, the products it would be selling should be able to cover a wide range of diseases.”

“It should be the patient's responsibility for knowing about the possible side effects before taking it. Jim was only a programmer and presumably had no knowledge in how the drugs would work.”

The reason he changed his mind is not clear since no one responded to his original post and both of his responses to his peers involved his original arguments. He didn't agree to be interviewed, so I was not able to get more information.

### **The Reasons for Reading Others before Submitting One's Response**

I asked students who read other students' responses before sending theirs why they did that and there were a variety of responses. Edward and Michael told me that they wanted to see the other students' reasoning and to know whether they matched with what they had in mind or not. Sue and Reese wanted to see if people disagreed with them how they had justified. Oliver mentioned that he liked to compare his responses with other students' responses in terms of length and complexity. Reese also mentioned that she wanted to see how others feel when she was not sure about her response. Edwin and Reese used the previous postings to identify the

points that they might have missed. Mikel was interested to see how they perceived the problem. For Ryan, it was more of the question of curiosity: “you are curious [laugh], their response is right there”.

In response to my question whether he read other students’ responses before posting his own in online discussion, Adam stated that: “... it is a class. You don’t want to be the odd mad man. You don’t want to give the response that is questionable. If there are nine yeses, you don’t want to be the one with different response”.

This student also mentioned that in one of the scenarios he has changed his view based on the fact that most students had an opinion different from him. Similarly, Laura stated: “... I skimmed some other responses, I usually looked at their response to the question ethical or operational... just wanted to see how many people agree and how many disagree with what I say”.

When I asked Laura whether she was going to state her opinion if most people think otherwise, she replied: “... although I have all these responses disagreeing with mine but [if] there are some people who agree with mine, [even] though it is a small number, I don’t think it will affect me unless everybody disagrees with me [laugh]”.

She confirmed that it didn’t happen in the discussions.

In addition, Sarah stated that she tried not to read others’ responses prior to submitting her response but the fact that the responses were public led her to read them as she didn’t want to be the odd one in case she did not agree with them.

In contrast, there were also a few students who mentioned that they won’t change their

responses based on what others might have posted in forum. As an example, Oliver stated:

I try to look at others' responses to see what kind of response exists so that my answer is not too short, too long, or too simple. I will read others' postings, but I am not afraid of telling my mind if I am not persuaded with what others have said.

As another example, in response to my question in the interview whether he changed his opinion or not, Mikel stated that: "It was clear to me which side to take".

Although there were occasions that students changed their perspective and I will discuss it later, most students did not change their perspectives based on reading their peers in the second week of discussions. This finding was evident in both the reflection piece written by students in the third week of discussions for each scenario and the follow up interviews. The reason can be summarized nicely by what Laura said when I asked her whether she had changed her perspective based on others' postings:

I think it changes a little, not much because when I answer first I have this strong belief that this is the right thing to do and then I see others' perspectives. I think it changes the way I answer it, I add to my answer instead of changing it.

However, some students modified their responses based on the discussions in the second week. As an example, on adding rather changing the perspective, Shin stated that one of his classmates' responses led him to add some points to his response. According to him, this student has suggested that: "we should actually document the things that happened: The interactions between you and your boss. So, you are not liable if they force the application. I thought it was a good idea and I added".

As an example of explicit changes in responses, Sue mentioned in the interview that originally, she thought it was fine to go with either of full or lowest privacy but reading others convinced her to reconsider her response. In her reflection piece for the third week of discussion

on the first scenario, she wrote that although the situation was still operational, the action to take was to make the full privacy the default option. It is worth mentioning that in the second week of online discussions, she responded to her classmate: "... after reading your response, I can see why choosing to not go the route of highest security could be harmful".

Sue also changed her view on the application development scenario. In her reflection piece, she stated that reading one of the classmates' response influenced this decision. She found the following point made by Ryan which had to do with virtue-based ethics convincing: "...giving someone something short of what they were promised and pretending that it's the complete product is not ethical, regardless of whether the app deals with sensitive information or not."

Simon stated in the interview that in one of the scenarios, he changed his mind when he found that someone had a good point in responding to him. It might be helpful to take a closer look to this situation to understand what the source of the change was. In his first response to the first scenario he stated that:

In this situation I think that there would be nothing wrong with having the default be the lowest setting of privacy. Users should have no expectation of privacy when they are using a social media site that is intended to connect people.

Sarah was the student who influenced Simon. She responded to Simon's post:

...I think that when social media is used, users have an expectation of privacy and a right to it. If all Facebook data was suddenly made public with no privacy settings, a lot of people would feel that their privacy is being violated.

As we can see providing a relatable story changed Simon's decision. In his final stance he stated that he had changed his decision.

## **Considering Online Discussion as a Good Experience**

Many students found the online discussions helpful and had an overall good experience with it. Eaton and Mikel mentioned that they were able to learn what others think. Eaton also mentioned that it helped him understand the reasons behind the views which were different from him. Laura emphasized the familiarity what other aspects of a situation: “It helped me to be more open. I have to consider this part of the perspective too, so I have to open myself to my own and ... others’ perspectives”. Fai found the peer response as the most educational portion of the discussion assignments. According to him, although the students might disagree with him, but this does not make him feel bad. He stated that he might stick with his own idea but at least he looks at other people’s too which in his view can expand his knowledge.

Some of students including Michael, Anne, Reese, and Fai mentioned that other students in online discussions pointed out things that they had not considered before. For instance, Michael provided this example for an aspect that he had not considered until one of his peers mentioned it: “For the social [media] one, even if there are [privacy] options, they might be unclear or hidden and it was something that I didn’t have thought about it”. Some students find the experience of conversations as a unique experience. For example, Simon told me that being able to read others’ postings was a unique experience as it was not similar to the type of the conversations that student might had every day. Mikel also discussed this uniqueness:

I don’t think I had... gotten the chance to see what others’ views are on the topics. You don’t get it from the lectures, you only build your own perspective of that. But in [online] discussions ..., you can see that. Okay, this person agrees, and this person disagrees, and these are some concrete evidence why they disagree or agree.

## **Critiques against Online Discussions**



Not all experiences of student with online discussions was positive. As stated before, the main concern was the lack of confrontation which was raised by several students. Ryan stated that:

...the main problem I had was that everybody was saying the same thing. Because of two reasons. A: The scenarios were a little bit super straightforward. B: people might even just say what others had said the same thing, I didn't do that. Another problem was that if you want to discuss the differences in opinions if we are saying the same thing it would be just a lot of I agrees. Especially responding two times, it was all the same. Maybe, if you manage to respond without seeing the others.

Another concern raised was the lack of receiving thoughtful comments. Reese stated that she wondered how her peers would have responded if the discussion was anonymous. She also mentioned that there are times that one won't get any comments. Also, she believed that some of the comments she received were restatement of the opinions of those who commented rather than talking about her posting.

### **Comparing the Online Discussions with Essays**

Many of students compared the online discussions with essays. Edwin told me that: "It felt a little more alive than [essay] assignment because you had a chance to see your writing and others' and compare conclusions". He argued that this might be because of more action-oriented nature of the scenarios in online discussions:

it was less like evaluating the decisions as the writing assignments were and more evaluating courses of action and what you should do as an individual in this situation... I think that aspect helped me to port these ideas over real world.

Sue stated that while students could only see the ideas of two others in essays through the peer review process, they were able to see many of others' perspectives in online discussions.

Some students believed that the discussions were more open-ended comparing to essays.

According to one of these students:

[students] write down their thoughts and saying it is unethical and I can see actually what they are thinking and why they are thinking that way. In essays, I really felt like they are pushing you to say it is unethical. I think online discussions were a lot freer. (Shin)

Anne's opinion was in line with Shin's opinion. She mentioned that she felt the pressure to respond that it is unethical in essays because she knew that others will be going to grade her, and she felt that the unethical is the answer of the majority of students for all the scenarios. As she stated in online discussions:

I found it is a lot easier to just be more honest and actually put down my thoughts instead of just trying to be the perfect ethical student because you knew there would be no consequences for disagreeing with others.

Shin was critical about the fact that the students had to respond to certain questions asked in the essays about the theories which according to him was not relevant to the main issue of the cases. As he stated:

I really don't want to answer that question and I feel I am wasting my [limited] characters in answering that. While I think in online discussion I went straight to the point and gave you enough details...

Simon felt that the cases in essays were clearer and less ambiguous compared to the online discussions: "... in the writing assignments, it was clearer that it is unethical, and most kids responded that it is unethical versus in these discussions which were a lot more ambiguous".

Fai believed that online discussions were more effective compared to essays even with the peer review process. He stated that the process of feedback was better in discussions. According to him, the students did not have the patience to read ... [essays of 600 to 700 words] and they would give simplistic feedback such as: 'it was good'.

## **Considerations and Influential Factor in Ethical Decision Making**

### **Issue-related Factors**

Some of the students built their judgments about scenarios based on the significance of the core issues. For example, in response to the scenario on privacy in social media, these students reasoned and built their arguments based on the fact that the privacy is an important and issue (e.g., Ryan, Laura, Sebastian, Shin, Simon, and Reese). For example, Ryan stated that: “we should make the full privacy as the default because it is very important”. The recognition of the importance of an issue such as privacy, in most cases, helped students in suggesting the desired ethical solutions. However, one of the students, despite recognizing the importance of privacy, stated that: “the privacy level should be the lowest because they are here to network”. Another example which is related to the privacy is the consent. This concept and its importance has introduced to the students as part of the course. Two of the students used the importance of the issue of consent for supporting their reasoning. For example, Shin stated that: “It is an ethical decision... The reason is that it has to do with consent.”. Oliver used the importance of the issue to support his argument why the answer depends on whether the user is well-informed or not. When I asked him about what contributed to his response, he stated that: “The class material was the most [helpful] because of the informed consent... if the client is well-informed it is not an ethical issue”.

It is important to have in mind that in terms of solution he had stated that the users should be asked what level of privacy they want, and the developer should not just assume what privacy they want.

Another example of arguments based on the importance of issues is the following argument provided in response to the trending news scenario: “presenting news in a fair and accurate manner is extremely necessary” due to its influence on people’s opinion.” (Sophia). Here fairness in delivery of news is the important issue.

In response to the scenario on app development, some students built their responses around the nature of the application. If one investigates it deeply, one will notice that it can be tracked down to the importance of the issue of safety. Engineering students attended to this and therefore many of them stated that their solution would be based on the nature of the mobile app. For example, Ryan stated that:

... it depends on the app. If it is a game and it has a few bugs it is not an ethical issue. Worst case scenario, the people would say the game is bad. If it has a lot of bugs, it is cheating because people have paid for that. If the application is a medical app, it is an ethical issue because software that control medical equipment should not be buggy.

As one can see although attention to the importance of an issue can improve ethical decision making but it will not necessarily lead to the highest desired ethical responses. For example, here, the existence of bugs regardless of the nature of the application might reduce the trust of the users in software and competence of the developers.

### **User-related Factors**

The findings suggest that the way students think about the users in different situations and the assumptions they make about the users is a critical component of ethical decision making among computing majors.

**The care for user.** A number of students used terms that showed care for users. For example, Sebastian stated that: “If the company says that we have your privacy first, it looks like they care”. Here some other examples for each scenario will be reviewed.

In response to the scenario on privacy on social media, Anne stated that the full privacy should be the default option “to protect users in case they don’t know how to change it. It makes more sense to have the most protection initially”. Similarly, Shin stated that: “There is not guarantee that user knows. It is difference between informed consent and user consent, you kind of know user consented. I think things are a lot more than what users read through terms and conditions.”

It is important to notice that often, as one can see in these examples, the care involves going beyond one’s obvious responsibility in a situation. On the similar line, we can see similar arguments in others’ responses: For example, Edward stated that: “We should not take advantage of the ignorance of the users... the protection of users is first”. Another example was Sarah who mentioned that: “...if the users do not understand the settings they should still have their privacy”. And finally, according to Michael: “It is safer to make full privacy the default option because even if they make that option clear, there are so many people who do not understand”.

In response to the privacy scenario, Sophia raised a point that can argue against those students’ responses who believed as long as the users can change it later, there is not any ethical issue involved: “I think the highest privacy options should always be the default because you can choose to share previous items with others, but you can't take back stuff people have seen before you turned on the privacy settings.”

This special attention to the end users can also be seen in other scenarios, however, in a less degree. In response to the news on social media section of the first scenario, Anne mentioned that the issue is ethical because we should avoid fake news as most people get their news from social media. Also, Laura stated that one should not “send any false information because a lot of people consume the information”. It was similar to what Sarah told me: “what you present to people, it influences how they view the world”.

In response to the second scenario, Sarah argued that the bug can cause somebody harm. Eaton stated that: “... if the program has a lot of bugs when the customer receives it, this will be disadvantage for them”.

In response to the third scenario, some of the students based their arguments upon caring for user. Anne stated in the interview that the developer should think about how the product is going to be used and also about the interactions with different people. She stated that: “Engineers should think broader and not just focus on the actual task or what they build”. In her response, we can clearly see the elements of ethics of care as she stated that the product should provide honest results especially when it comes to drugs. According to her, that is “because people are trusting you and are putting their faith in results that you are giving”. She acknowledged that she personally did not believe in the online quizzes which people took but she thought there are many people who did.

Here are some other examples of students using ethics of care in their responses for the third scenario.

The point of these drugs is to help people, and they should be prescribed by doctors to be in the best interest of the patient. It's unethical to sell things which a person doesn't necessarily need to take, especially when they can do pretty nasty damage in terms of

side effects. (Tom)

I don't take BuzzFeed quizzes seriously ... but some might really consider them as truth fact and might influence their decision. (Sarah)

... Jim has the obligation to make sure the information he posted is accurate and really helps the user instead of advertising specific products from some particular company. (Edward)

Maybe Edwin's arguments can best sum up this type of caring and mindfulness towards users:

...it is narrow minded ... to expect everyone is going to pay much attention to privacy settings as computer science students will. So, when you are designing an application and you construct the default options you have to assume that everyone who does not understand the necessity of privacy which probably in your field and your circle and developers of application it is a very low percentage of people, but in terms of users that is gonna be very high.

One can notice how this attention to the comparison of computer scientists and users in terms of their full understanding of implications of decisions on privacy can help more ethical decisions. As he continues:

If you explain to everyone how the privacy settings work would as many people choose the default, choose the lowest privacy setting as the number of people who just leave it as the default? The answer is almost certainly no. On the side of protection for ethicality You should ... [think about] people who do not really understand the factors in play, you should try to protect them as much as possible.

**Using past experience as a user in a closely related situation and applying the care that one wants to receive.** When I asked Sebastian about the underlying reason for the answer he provided, he told me that:

I use social media, and the social media that least likely to use most of the times is twitter because usually it is public everyone can see it. I like my Facebook behind the wall where you have to be my friend. That probably influenced me because it is how I feel about myself which is why I think [full] privacy should be the default.

Eaton on the same line stated: “I want to make my social media private only to my friends and family”. As another example, Laura told a detailed story of her experience with Facebook. She mentioned that she doesn’t want people to disrespect others’ privacy because privacy is important, and everyone should have it. Sarah mentioned that the full privacy as the default is what would make her safest as a social media user. Reese was another student who stated that she thought of the situation as an ethical one. Reese argued that: “I ... use social media a lot. I keep everything super private. So, that’s why I want to [have the full privacy]”.

In respond to trending news scenario, Michael talked about his experience with sharing articles in Facebook:

Just knowing it from first-hand experience how people share articles on Facebook that agree with their own viewpoint even though they are real they are completely different, it is not really an honest discussion between the two ideas.

In response to the app development scenario, Mikel mentioned about his experience as a user of game apps and the bugs in these applications when they are released. Although his response was not the completely desired response due to his statement that the manager is the person who decides but he considered the nature of the application as an important factor in this scenario.

**Making minimalist assumptions about the users.** In response to the privacy issue in social media, Simon stated that: “it is a social media for professionals, they are here to network so maybe having the setting as the lowest but notifying them, so you are not unfairly revealing their information”. Similarly, Fai mentioned that: “because it is a social platform and people



using [that] to share, there is no reason for privacy to be high as default”. Edward responded to these ideas:

Although we are creating a social media platform which aims to give users' opportunities to share their information with their friends, we should only share their information with their permission. If we set the lower privacy as the default, I am sure that we will be criticized pretty soon. (Edward)

Similarly, Oliver recognized this tendency and stated that: “you can’t just assume what privacy users want”. Based on that he said that he would take a banner view and let the users decide.

It is important to consider how strong the belief in these unwarranted assumptions about users sometimes might be. In response to my question in the interview on the experience of students with online discussion, Fai provided an example of an idea that did not come to his mind before participating in the discussions. However, as it can be seen it did not influence his decision:

someone disagreed with me and thought the default privacy should be the highest at first and thought it is the safest way maybe if you set at lowest some users might be harm but if you set at highest nobody will be harmed which is the most conservative way. It is a good point, but I don’t agree with it.

**Generalizing one’s way of using technology to all the users.** There were occasions that students expect the users to approach the situations as they do or as they find it should be approached. As an example, Nathan told me:

... as a user of social media to some extent, I ignore most of the "news" I see under the presumption that it is trending and could be misleading news meant to accrue attention for distributors to profit. While my personal take on news may be wrong, I still have ways of getting news from other online sources without doing intense digging, and news articles true/false can still be talking points or conversation starters in places when there might be nothing to see if users are not talkative, so abandoning the feature could leave the product more bland.

## Relating to a Real-World Story

Having a real-world story in mind is an important help in understanding the situation, recognizing the ethical issue, becoming aware of consequences, and selecting the right decision. Both positive and negative examples from stories in different tech companies or in the history of computing helped students make ethical decisions. In this section, a few examples are reviewed:

In response to the first scenario, Oliver used the story of Facebook for explaining the consent process.

For example, Facebook conducts questionable research with user data that default to 'public' and nest their privacy options deep within the menu, so the average user cannot find it. Thus, I feel as though the decision we make here is a privacy decision, should we take a conservative approach and assume our users do not want to spend the configuring their options, or should we allow ourselves the opportunity to conduct borderline ethical research as Facebook does?

Sebastian, who believed it is better to abandon the idea of having the news in social media, in response to the interview questions about the scenario on trending news, stated that: "...from all of the fake news that running around, it probably influenced me. I have seen so many things that I think not doing it is the best idea because people are gonna lash out on legitimized news sources."

In another example, Emma used the story of an occasion which happened in Facebook and how this might create significant issues. To argue for the need for human intervention She stated that:

It [seems] reasonable that some sort of human filter would be necessary to ensure that articles shown are not untruthful and to filter out insensitive content. For example, a couple of months ago, a young girl committed suicide over [F]acebook live, and this became one of the trending events on the news sidebar. In cases like this, it seems clear that people ought to agree that it is insensitive to spread this information across the whole network.

Tom mentioned that a team of experts would be the best way to get trending news. He reasoned that “algorithms are too imprecise and are susceptible to being gamed by bad actors, a human touch is needed”. He referred to the Fake news and stated that:

This is an ethical dilemma because of how important information has become. Fake news ..., stories with literally no basis in fact, is a danger to our society and the people. We are morally obligated to fact-check the news and make sure that stories are being presented in an honest way, spin and bias is inevitable, but lies are not.

Emma was able to understand the main dilemma in Jim’s scenario and come up with a solution by referring to one of the websites she knew. This can be seen as using a story as a good example for addressing an issue:

When [B]uzzfeed has quizzes that are sponsored by a brand, that is marked, regardless of whether the quiz actually returns a result telling people to buy that brand's product. I think that marking that ... the quiz was made by a company is a critical way to remind people that there is likely a strong bias or advertising purpose in the results.

Alex, in response to my interview question about the privacy issue in social media, provided the example of Yahoo data breach and continued that “there have been so much damages caused by losing data, people misusing data and I think the data should be protected as a baseline”. Similarly, Mikel stated that events such as data leaks, breach of people’s privacy, or people stocking on Facebook influenced his response to the scenario on privacy in social media. He also talked about the fake news and the debates on its influence on people’s decision as an influencing factor on his response to the trending news scenario.

In response to the scenario on app development, Fai mentioned the story of Samsung and the issue with batteries to show how the release of a product without proper testing might be dangerous.

A story that significantly helped the students make the right decision was some of the stories of World War II which were covered in the lecture. Through these stories, the students were taught how professionals including programmers who worked for Nazis played a role in killing innocent people (i.e., case such as Action T4, Dehomag, etc.). For example, Sue told me that her response to Jim's scenario was based on the story of World War II which was discussed during the first lecture. She mentioned that the same scenario can be applied to this situation: "... going back to the first lecture and how we learned about World War II and how a lot of people who were working for Nazis did not question what they were told."

Michael is another student who benefited from the story of World War II from the lecture. The interesting point is that he originally believed that Jim was not doing anything wrong when he responded to the scenario in the discussions which happened in the beginning of the course but in the interview, he changed his view. As he stated:

The lecture was very helpful. The one on Holocaust and programmers who worked on machines and in some way aided the Holocaust... even if it is your job, it can still be unethical... It was something that I have never thought about that before. [I always thought] it was my job and it is their decision whether it is ethical or not, but that is something that I started thinking about and definitely influenced these scenarios as well.

While having the story for most students lead to making the more desirable response, there was an exception. Adam responded to the scenario on trending news that he thought the algorithm is the best way. This was despite the fact that he was aware of the stories of fake news. For example, he pointed to an example of the fake news which was announcing a tornado that had scared people. The question is why he was not able to select a more desirable response. It seems that it has to do with his over confidence or over reliance on algorithms or technology. It seems that Adam does not realize that algorithms can have biases too. As he stated:

...humans will always be biased towards any particular news. It is very hard not to be biased as a human being... Even though in first few years but over time, it would be developing the algorithm to get rid of fake news.

As this case was the only case that the use of stories did not positively affect the responses, further scrutiny is required. It seems that what Adam told me in response to the question about the factors that contributed to his responses can help in understanding the reason.

Adam stated that:

I know a lot of ethical issues especially financial things such as ... I have read a lot of stories over the years. I like to read Wall Street Journal. In terms of computer ethics, I can't tell you that much but in terms of financial I can tell you many companies ... internal trading scandals ... The process is still the same, in terms of who is responsible, who is not responsible.

It seems that his attention in reading the stories is more towards the legal aspects and not ethical parts. It means that if the stories want to be effective, they need to be looked at from an ethical point of view.

Here is another example which shows the importance of the relevance of the story. If you relate the story to someone else's responsibility, it does not help. Similar to the case of Adam, Blake was very aware and conscious about the possibility of unethical decisions in the heat of moment in favor of one's own interest, but he was not able to make ethical decisions in two of the scenarios. When I asked him how he thinks about making ethical decisions in future, he told me:

It is very important for people to understand that they have obligation to make the right decision. Instead of only focus on their interest out of the decision. Specially on the management. It is very important for them to consider the ethical part of the problem. The reason why is that there have been so many scandals because at time of the decision, they did not think of ethical part of the decision. A lot of scandals of Uber is because of that.

## **Developer Related Factors**

Some of the students, in responding to scenarios, used arguments that were related to developers. There were three main categories for the attention to developers in these arguments: (1) recognizing the responsibility for what one creates, (2) Putting oneself in the position of the developer, and (3) the knowledge and the skill that the developer in a certain area possess.

**Recognizing the responsibility for what one creates.** Some of students emphasized on the responsibility of developers for what they create. For example, Laura mentioned that: “I should do the right thing for what I am creating”. Another example is what Fai stated about the responsibility of developers: “the responsibility not to release a product which is not fully tested”. Similarly, Anne believed that “when you are building something, you have to think about what you are doing”. It seems that recognition of the responsibility of what one creates in a scenario helps him/ her make more ethical decisions. As Ian mentioned: “You should always think about what you're doing when you're working and should question what you're doing. Being mindless and doing anything that's asked of you can be dangerous for many parties involved.”

This attention to one’s responsibility might seem to have some overlap with duty-based ethics but as it was directly connected to the tasks of computing majors as developer and how they recognized it, I decided to cover it specifically here.

**Putting oneself in the position of the developer.** When I asked about the strategies of students in responding to the scenarios, some of them revealed that they would imagine themselves in the situation. Most of the times, this included some sort of empathy for the developer. For example, Eaton told me: “I usually think what I would do in the scenario. For

example, if I was Jim, I won't feel guilty because it is not my job to learn the drug because the drug is not a clearly dangerous product".

Sebastian, regarding the scenario on app development, told me that it reminded him of his projects in high school and college and how it is hard when one has such a district deadline from someone above him or her and one need to do as best as one can. He continued: "It is not my fault in that scenario that the app could be buggy... it is just because you rush on it".

As one can see for those who positioned themselves in the position of the developer and empathized with them, they were not able to recognize their ethical responsibility. Another example is from Michael who in response to the scenario on app development, stated that: "I have been in a similar situation, you have to decide when something is done or not."

In response to the third scenario, one of students mentioned that:

Being a programmer, Jim's job doesn't involve evaluating why he must develop the code that he is requested. After knowing the end result, it may be easy to blame Jim and say that he should have detected a safety concern, but it is hard to justify that with only the knowledge that the website gave a singular output.

**The knowledge and experience that the developer in a certain subject area possess.**

Those who built their argument based on the technical knowledge and skills that they possessed were able to decide better in facing ethical scenarios. As an example, Shin stated that:

I have the knowledge of machine learning and I know how important people's privacy is. I know what kind of things you can do if you ignore privacy completely... If privacy was not an issue at all and it tends to be that way for Facebook unfortunately, ... there would be so many things that could go wrong.

Alex stated that: "we take a decent amount of data mining, machine learning [courses], you learn how data can be used". Here is another example from students' responses to the

scenario of privacy in social media.

Since you're dealing with people's personal information, as computer scientists having the knowledge of how vulnerable a low privacy setting would make users yet setting that to default would bring questions as... why we would do such a thing knowing the consequences. It's our duty to protect users. (Ian)

As an example of using experiences in a specific area, Sarah stated that: “I have worked in advertising technology and I think [knowing] how much data social media companies have on people made me more prone to have the full privacy option”.

When I asked Oliver of the influential factor on his response to the trending news, he referred to his knowledge on algorithms: “I look into the knowledge I gained ... I know what the algorithm process actually means”. It is worth mentioning that Oliver also mentioned the experience he gained in a course on software development: “I had the course on software development managing the process... I will be questioned if I [do] something incorrect ... I am not comfortable to release something that is not fully tested”.

When I asked Fai, what has contributed to his response to the scenarios, he stated that:

For app development, last summer I did team project with teammates and at the end of the semester my teammates suggest[ed] that to put it on Apple Store so the public can use it, but the application [was] not fully tested and there [were] still bugs and I disagreed and told them maybe we should test the project before releasing it.

Nicholas was able to use his knowledge about algorithms to recognize and address the false tendency of believing that the algorithms are bias-free and therefore to make an ethical decision in response to the scenario on trending news:

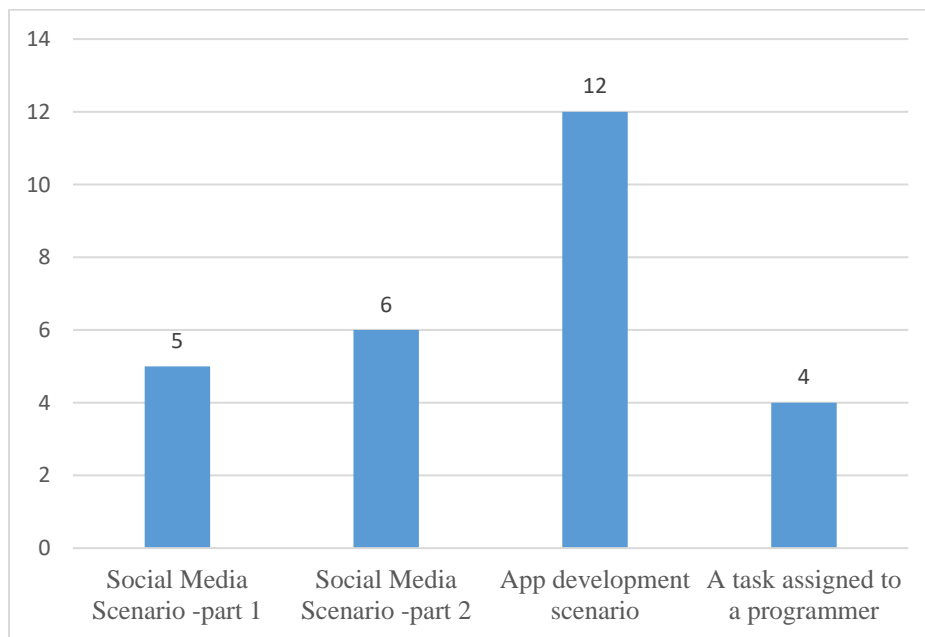
I don't think automatic algorithms will yield less bias than human experts. Machine learning frequently fails because the learner is overfitting to some bias. And there [have] been cases where the learnt hypothesis was found out to be racist. Given that machines aren't guaranteed to eliminate biases and that machines are more error prone to fake news



than humans, I think it's better to use a team of carefully chosen human experts to choose trending news.

### Perceived Relevance of the Scenarios

In responding to my question on the scenario with the highest relevance to the future career of the students, most students selected the scenario of application development. The frequency of relevance of each scenario can be seen in figure 2. It should be mentioned that some students identified more than one scenario as relevant scenarios.



*Figure 2.* The frequency of students who selected each scenario as the most relevant scenario

The reasons the students provided for their choices for the app development scenario were different but mostly can be categorized under two main reasons: (1) the high probability of the time pressures from deadlines, and (2) the prevalence of bugs in software development.

For those who picked the social media scenario, it was usually because of the future career interests or previous experiences in related subjects such as algorithms. For example, Sarah stated that: "...because I want to work in technology security and a lot of my job is going to be taking into account what kind of privacy setting should be used for applications".

For those who picked the scenario of the task assigned to the programmer, the students referred to the chance they will work for others in near future and might end up in that situation. An important finding is that the scenario with the least perceived relevance to future career (the task assigned to a programmer), is the scenario with the highest undesired responses even though it has the highest negative consequences among the all.

### **Use of Ethical Theories**

While most responses of students did not explicitly involve any of three ethical theories taught to students (i.e., consequence-based, virtue ethics, and duty-based), there were still students who responded to the scenarios by explicit or implicit use of these ethical theories. In this section, I will review the ways in which the students used ethical theories in their responses.

**Consequence-based.** Not many students explicitly stated that they use consequence-based ethics in their arguments. One of these students was Nicholas. He explicitly used consequence-based ethics to argue for the first scenario. However, the use of consequence-based ethics in the way he approached the privacy did not help in making the desired decision. As he stated: "...there is no consequence about choosing the default level because the user can always change it."

This is in line with the argument made before. If the student cannot see the full picture,

the use of ethical theories (specifically consequence-based) will not help. It won't help more than giving a term to prematurely argue for or against something. While Nicholas was not able to make the right decision using the consequence-based ethics about the privacy issue, he was able to do so for the trending news: "But here, [for the trending news], choosing a bad option could end up sending users fake news. From a consequence-based standpoint, I think it's unethical to allow fake news, so the decision is an ethical issue".

One probable reason can be that while he has a fresh memory of the stories around fake news, he does not have such stories that can help him seeing the consequences of the issue of privacy in social media.

In responding to the application development, Anne stated that the dilemma was whether the risk of harm to people from the potential bug "outweigh by the responsibilities of your job and the pressure from manager".

Blake is another case to be further scrutinized. When I asked Blake, what contributed to his responses to the scenarios, he told me:

I think I consider the consequences of each scenario a lot. If the consequence is very severe like costing life of others, it is definitely ethical, and I can make an easy decision, if the consequence is trivial then the issue should be operational.

While his argument here is in line with what he did in responding to the scenario on app development, his response to the third scenario is in complete contradiction to this claim. Two reasons can explain this. First, in responding to the third scenario, the disengagement mechanism as described by Bandura (1999) might have hindered him from making the desired decision. Second, in the app development scenario unlike the third scenario, he can see the direct connection between his action and the possible outcome. In other words, he knows the

implications of his technical duties in the second scenario, but he does not see the link of his actions to the outcome in the third scenario. This can also be seen in comparing his responses to privacy in social media and the scenario on trending news. While he is able to make the ethical decision in the case of trending news by recalling the story of fake news, he cannot see the consequences of the lack of privacy in social media since he does not have examples or stories to help him see the consequences of setting the default as the lowest. It illustrates that the use of consequence-based ethics without being familiar with the context and the implications of ones' actions does not help in making ethical decisions.

In response to the third scenario, Quan was able to make an ethical decision by using the consequence-based ethics. As he stated: "... he [Jim] should show more care about what the consequences his quiz would bring, instead of thinking it as simply a job."

The use of consequence-based was mostly informal. When I asked what influenced your responses, Edwin told me that:

... I mostly went from within the prompt. Try to see how I would feel about what happened. What I would feel as my obligation and I looked a little bit from ... consequences of actions, from utilitarian perspective maybe, it was probably less formal.

**Duty-based.** In response to the app development scenario and Jim's dilemma, Laura used duty-based ethics. In response to the second scenario, she stated: "If I am quality control, it means I am controlling the quality. I want to ... have full responsibility to what I am doing..."

Simon is another student who used the duty-based arguments in responding to this scenario: "you have some sort of obligation for good work". Similarly, Reese stated that: "It was more duty-based to me. As a quality control officer, you need to make sure what you expect. I know that your manager says something else, but you have a duty overall".

One can see how the use of duty-based ethics helped her to avoid the fallacy of managerialism. Oliver looked at the case from a more job-oriented view and stated that: “The right action is not to sign it because my job is at risk. My job is to sign off after that the sufficient test has been conducted not prematurely. It is my task”.

Edward also took a duty-based approach in responding to the second scenario and said:

“Since as part of my job, I have the duty to make sure that the product is safe and stable. But if my supervisor forces me not to fully check the product, this is an ethical issue”.

Emma is the only person in class who ever used codes of conduct for supporting her point. She used ACM code of ethics to conclude that honoring one’s assigned responsibility is one’s duty:

By the ACM code of ethics, it is your duty as a professional to honor your assigned responsibilities, which as a quality control officer, entails ensuring that the product is adequately tested. Further, it is your duty to provide an accurate analysis of the risks a piece of software has, which you are not doing by signing off on an untested product.

Most students who used duty-based ethics, used this ethical theory in response to the second scenario which seems reasonable due to the context of this scenario. Their response to the first scenario was not directly related to duty-based ethics but as some of them mentioned the privacy as an important issue, with possible interpretation of privacy as a right, therefore it can be argued that some students used duty-based ethics for building their arguments in the first scenario. There were some examples of using the duty-based ethics in responding to the third scenario. For example, Nicholas explicitly used the duty-based ethics to address the third scenario:

Jim’s behavior is unethical from a deontological standpoint, because he didn't check basic facts about the drug in question. Drugs often have side effects. The behavior of creating a

recommendation system without checking or publishing the drug's side effects is a bad behavior regardless of what outcome Jim wants to achieve.

Cooper was another student who used duty-based ethics in scenario three:

Jim has a moral duty to the users of this website, and he should have expressed his concerns while building it. Had Jim communicated his concerns, the client company might have moved on its position or advertised the drug differently (possibly pointing out the side effects).

As one can see, students mostly thought of duty-based ethics as doing one's job to its best or as Simon called it "obligation of good work". Some others broadly referred to overall ethical duty of individuals. None of the students used categorical imperative as a critical component of Kantian ethics, despite it was introduced to students in lecture.

**Virtue ethics.** The use of virtue ethics was less frequently compared to two other theories we discussed. Reese, in response to the trending news scenario, stated that:

I think it is more important that people get real news even though I know they will be accused some sort of bias, but I think it is more important for a website to be honest with users. For me, it is more priority than bias. I think they [(users)] will be able to find unbiased views but telling if something is fake it is a little harder.

Fai is one of the students who explicitly used the term 'virtue-based ethics' in his response to the scenario on application development:

This issue can be best analyzed by virtue-based theory. Signing on a contract when the product is incomplete violated the honesty virtue. Thus, as a quality control officer, he should be loyal toward the responsibility of his title and try his best to persuade the boss and delay the release date until the product is fully tested.

It is worth mentioning that he also used other types of ethical theories in his response on the app development scenario: "... as for the consequence-based theory, releas[ing] a mobile application to the public without [being] fully tested may lead to big disasters such as tons of users' cell phone become dead or battery explosion."

Shin stated that we need to combine the two approaches (i.e., a group of experts and algorithms) in response to the trending news scenario to be “as honest as possible”.

Sue is another student who used the virtue ethics to respond to the scenario of trending news. She stated that: “...[it] seems like an ethical issue since presenting news inherently brings in potential for bias, and therefore also increases the possibility of being dishonest towards the users.”

There were also students who used two or more ethical theories at the same time in responding to scenarios. For example, Sue used all the three ethical theories in her arguments responding scenario three. She stated that:

From all three ethical perspectives we have examined thus far (virtue-based, duty-based, and consequence-based), it is evident that Jim should've taken action early on to avoid the outcome that occurred. For the virtue-based perspective, Jim knew that the results of the quiz were dishonest. In regard to the duty-based perspective, it is Jim's duty as an employee of this marketing firm to provide accurate information to the public. Finally, from the consequence-based perspective it is obvious from the outcome that Jim's actions were unethical.

Carl used both duty-based and virtue ethics implicitly in responding to the second scenario: “This is an ethical issue, as you're being told to not do your job correctly, as well as lie to the client.” (Carl).

The main finding in regard with the use of ethical theories is that many students did not choose to use ethical theories explicitly in their arguments. Moreover, different scenarios motivated students to choose different ethical theories to argue for their ethical choice. For example, for those who chose ethical theories to respond to the app development scenario, they usually used duty-based ethics, or the trending news issue was usually responded by virtue ethics.

Another important finding is that the use of ethical theories did not necessarily help students choose the ethical answer. For example, some students used the duty-based ethics to justify that Jim did nothing wrong. This is important as Oliver, in response to my interview questions on the barriers to his future ethical decisions, stated that:

... ethical standards can be used as different excuses to justify whatever I want to do. [I] want to do this way, I can justify, I want to do the other way, I can still justify it. So, there is no way to just feeding the scenario and pop up the right action. It is still complicated.

Finally, although ethics of care was not taught in the course, as we discussed many of students' arguments intuitively fall in that category of ethical theory.

### **Fallacies and Biases in Students' Arguments**

There were a number of fallacies in students' responses to the scenarios. Each scenario triggered some of these fallacies more than others. Some of the fallacies were very common and some others had less frequency. In this section, I review the identified fallacies. These fallacies are presented in Table 5.



Table 5

*The identified fallacies in students' arguments*

<b>Fallacy</b>	<b>Previous theories</b>	<b>Examples</b>
Bad faith	Sartre's notion of bad faith (Published in 1943, 2012)	"Here I am just an engineer...kind of what I have to do." (Anne)
Moral justification	Bandura's (1999) disengagement mechanisms: Cognitive restructuring of harmful conduct	"... for Jim I guess trying to complete his tasks, his duties for me I say he didn't do anything wrong." (Shim)
Displacement of responsibility	Bandura's (1999) disengagement mechanisms: Minimizing the role one plays in the harm he/she causes	"... if the client incorrectly showed the same drug however, it is the client's responsibility." (Simon)
Distortion of responsibility	Bandura's (1999) disengagement mechanisms: Minimizing the role one plays in the harm he/she causes	"The drug was not correct for that particular individual." (Adam)
Attribution of blame	Bandura's (1999) disengagement mechanisms: Related to the victim	"One cannot take medical advice from a website." (Adam)
Questionable assumptions		"The fact that this is a mobile app that the company greatly relies on revenue from, I'm sure they take the quality of the product very seriously. I think they would have allowed the 2 more days if there wasn't a pressing reason to ship at the date." (Sophia)

Table 5 (Cont'd)

<b>Fallacy</b>	<b>Previous theories</b>	<b>Examples</b>
Reducing ethics to the rules to follow for the favor of practicality		“It is not very practical to exercise to the highest ethical standard... just using the law...people need to compromise somewhere all the time for the team to work”. (Oliver)
No knowledge, no responsibility		“Even though there was someone hurt by a product Jim made, his lack of knowledge of potential effects spares him from responsibility”. (Nathan)
No ethics is involved unless proved otherwise		“Since there seems to be nothing that would indicate that unethical behavior is occurring...I think it is an operational issue”. (Ethan)
Using technology to avoid the blame		“you can’t blame the people. You say oh the computer did it”. (Sebastian)
The sufficiency of disclaimer/disclosure for addressing an ethical issue		“Nowadays on website[s] they say that you need to seek doctors’ advice”. (Adam)

## **Sartre's Notion of Bad Faith**

This fallacy has to do with finding oneself not capable of acting based on one's values by disowning one's freedom under external pressure and therefore, rejecting one's responsibility. For example, in app development scenario, Anne stated that she would have to ship the application despite the fact that she had mentioned that the scenario involved an ethical issue: "Here I am just an engineer...kind of what I have to do".

One of students in response to the third scenario, stated that: "[Jim] had no choice I guess. He could not change the content" (Edward). Although this student believed that Jim was wrong and partially responsible for the death of the woman, but he mentioned this at the end of his response. Similarly, Ethan stated that: "Since making the product was part of Jim's job and refusing to do such a project would be pointless".

Surprisingly, Ethan identified the way Jim could have addressed the issue, but he thought of that approach as something beyond the requirements of Jim's position. It shows the need for further attention of courses on ethics to broaden the view of students of the domain of their responsibilities:

what he could have done is raise concerns about how ethical or misleading this product is to his manager and let the management consult with the client on the issue but that would have been far past what he needs to do in his position.

In his last stance in the third week of discussions, he iterated this point and emphasized on the possibility of raising concerns knowing the issue but concluded that: "This does not mean he did anything wrong, just that in this scenario that would have been the morally right and above the call of duty action".

Again, here we can see the gap between what students perceive as ethical vs. practical which needs to be addressed.

The process of bad faith can also be seen in Luke's arguments as he stated: "As a programmer, his job involves receiving a request for a product and creating it. He does not have the authority in his position to evaluate the morality of the products he is asked to create."

Here are some other examples. As one can see this was a prevalent fallacy.

It is very tragic... you think in your mind I coded the quiz and she took the drug...but it is very hard for me to have a say as a software developer... I can't tell pharmaceutical companies that you need to test your drugs...(Adam)

It all depends on what company you are working. Your boss can make you... you have to sign off on your project. (Ryan)

As one can see, Ryan particularly referred to the power of a boss over an employee. This fallacy can also be categorized under 'obedience to authority' which has to do with acting against one's moral due to the orders of an authority figure (Hoyk & Hersey, 2008).

It seems that previous bad experiences can contribute to the bad faith. As an example, Shin attributed his response to the Jim's scenario to the unpleasant experience he had in high school and his sympathy towards Jim's situation:

I had a pretty rough high school. I was kind of shut aside. it is depressing but it is what happened and had to deal with sometimes you can't help there is nothing that you did wrong necessarily in order to receive an outcome, you didn't deserve it. It just happened to happen. Maybe because I had the experience, I feel a bit of sympathy towards Jim. It's the idea that isn't really his fault as it was not my fault that is my biggest bias towards ... he can't help it therefore it is not his fault.

Anne stated in explaining her response to the app development scenario in the interview:

I have been a waitress for a long time and the pressure that the manager puts on you. In that situation you think you can say something but when you are in the situation, the nature of them having authority on you for some reason, you can't oppose them. You have to do what they say.

Here, although her past experience was not in Computer Science but the dynamics of the work under the pressure of an authoritative figure affected her decision making. She is totally aware of the situation as she mentioned: "I know this is not the right answer ethically. I am thinking as a person what I would do".

In this particular example, one can also see how the conflict the student sees between real life practice and the ethics is hindering her from making the desired decision. Another student's response seems to be related to this issue. In the interview and in responding to reasons why Jim didn't do anything wrong, Oliver stated that: "...practically speaking in real life, you cannot just reject this work request because of seeming benign and this is not the profession of Jim to tell what ... the possible issue with the drug [would be]".

### **Moral Justification**

Moral justification, as described by Bandura (1999), has to do with the tendency of individuals to deviate from what is ethically desirable by presenting their decision as if it serves a moral purpose. For example, Shin, in the interview, used 'completing one's tasks' as a moral purpose to justify the lack of Jim's involvement in further actions. He told me that: "... for Jim I guess trying to complete his tasks... his duties for me I say he didn't do anything wrong". (Shin)

Similarly, Adam stated that Jim didn't do anything wrong as he was doing the job to which he was assigned. Here is another example which involves both bad faith and moral justification:

“Jim is only an employee who just finished his job and followed what company wanted him to do”. (Fai)

### **Displacement of Responsibility**

In the third scenario, some students believed that others were responsible for what happened, and the programmer was not at fault:

If anyone could have stepped in to prevent the situation, it would have had to have been the project manager or another one of Jim's supervisors. (Luke)

This one was probably the most straight-forward of all. Jim is the programmer...did what he had been told. He does everything what the hierarchy told him. He did not do anything wrong. (Ryan)

Jim did not do anything wrong. He is not the one who is making decision here. He is more like of a worker. He received whatever command they need to do. It is like a soldier [laugh]. Not all the soldiers want to go to the battle field. Sometimes they don't want so the general and the president of the country should be in charge of the costs of the war...Are you offering that those soldiers should not go to the battlefield, and should not listen to their commander? That is not. (Blake)

### **Distortion of Responsibility**

Students who fell for the fallacy of diminishing of responsibility by distortion of consequences, argued by making assumptions to remove the actual relation between Jim's action and the subsequent harm. For example, Sarah stated that: “The girl could have preexisting mental conditions”. The following example can better illustrate how this fallacy can lead to making an undesired ethical decision:

Consumers when consuming a drug should talk to their doctor first and do research to make sure that the product is a good fit for them. Whatever happened later after taking the drug, has nothing to do with a website programmer. (Fai)

Reese believed that the programmer cannot have much influence as she stated: “I don’t think anyone can be really responsible for somebody else’s death. I think you can have an effect, so Jim should have spoken up”.

As we can see although she did not find Jim responsible for the death, she believed that what Jim did was wrong. According to her, Jim had felt something was wrong, but he ignored that feeling.

### **Attribution of blame**

Some of the students argued that in the third scenario, the girl is who is responsible for what happened. Here are some of the examples:

...it is in some sense subjecting people to a substance that can affect them without their informed consent. However, it is still up to the consumer whether or not they obey the recommendation versus seeing a clinician or doctor, so the survey does not necessarily force consumers to do anything. (Nathan)

The girl is already an adult, so she should take responsibility of her own action and before taking the drug she should always contact her doctor but obviously she did not do, so and she just received the consequence of that. (Fai)

### **Questionable Assumptions**

Some students used assumptions in their arguments that were questionable. For example, in response to my question in interview about the scenario on app development, Michael stated that: “the concerns are probably minor...”. He also had posted on the discussion forum that: “There's no indication that any of the bugs could have been major and cause any harm to their users”. These assumptions are not valid as no information from the prompt and the scenario support such claims.

Here is another example of using questionable assumptions in students’ responses:

I still believe that both of the issues [privacy in social media and trending news] are more of an operational issue rather than an ethical issue, because the companies did consider all the possible consequences of decisions and they did not want to cause anything

uncomfortable for the public. (Xing)

As one can see, the assumption that companies did consider all the consequences and they don't want cause harm to public is not verifiable from the information provided in scenarios.

The fact that this is a mobile app that the company greatly relies on revenue from, I'm sure they take the quality of the product very seriously. I think they would have allowed the 2 more days if there wasn't a pressing reason to ship at the date. (Sophia)

The assumption that the company necessarily takes the quality of the product very seriously is not verifiable.

Even though the survey was not entirely honest in providing a real recommendation and was more like an ad for the drug, Jim followed instructions as asked because there would be no harm if the drug is harmless. For example, if the survey was actually about favorite snacks and recommended a brand of chips, it would not cause any harm that could change the course of someone's health or life circumstance. While drugs and food are different, this illustrates how Jim cannot be faulted for proceeding in implementing a survey that was really an ad for something he thought would be harmless. (Nathan)

Here, two assumptions are questionable. The first assumption is that the physical harm is the only type of harm to users and deception has not been a harm. Moreover, the assumption that the drug and food are comparable is under serious question. The main difference is that one expects professional advice for medicine, the advice that in this case pretended to be provided by the website.

### **Reducing Ethics to the Rules to Follow**

Reducing ethics to rules and laws can be another source of bias. From this view, as long as one did not do anything against the rules, there is nothing wrong about what he/she has done. One of the students stated that the benefit of acting ethically is avoiding being sentenced to jail (Fai). As another example, Oliver stated that:



It is not very practical to exercise to the highest ethical standard... just using the law...people need to compromise somewhere all the time for the team to work. If everything up to here is based on the rules, I don't think much we need to do for everyday company scenario.

These two students who reduced ethics to legal rules were not able to identify any wrongdoing in Jim's behavior.

### **No Knowledge, No Responsibility**

Some of students justified their responses by referring to lack of knowledge. For example, Eaton in response to the third scenario, stated that: "He only designed the website. He didn't know anything about the drug and whether it has side effects or not."

Here is another example. Nathan stated that: "Even though there was someone who was hurt by a product Jim made, his lack of knowledge of potential effects spares him from responsibility".

### **No Ethics is Involved Unless It is Proved Otherwise**

Some of the students believed that if there is not an indication of actual unethical behavior in a situation, no ethics is involved. For example, in response to the scenario of app development, Ethan stated that: "Since there seems to be nothing that would indicate that unethical behavior is occurring (though this scenario is somewhat vague on the exact details of the contract), I believe this is just an operational issue."

In response to this scenario, some students stated that the issue is operational only because the nature of application is not revealed and therefore the quality control officer should do what his/her boss says. For example, one of the students mentioned that "you should ship the

product but inform the client that you had to rush it and there is a chance for existing bugs, so your reputation won't get damaged if the application is faulty" (Sebastian). It is important to know Sebastian is very sensitive to ethical issues in general as we can see his responses to other scenarios. The question is why he answered differently? One possibility is that his prior experience in working under the deadlines have showed him that the deadlines are always there, and one has to do his/her best under the situation and hopes for the best. The other possibility is that he felt the pressure to pick one side and he decided to pick the operational one. Interestingly, in online discussion, he had stated that it was an ethical issue. Even in reflection piece he mentioned that it is an ethical issue, however, he mentioned:

If I were actually in the situation though I do wonder what I would do. When doing these we discuss mainly from an ethical stand point and nothing else really matter. But if my livelihood was at the stake what action would I take? I would like to image I would do the right thing and not sign off on the project, but one never knows until they are put into position.

However, there were students who explicitly mentioned that if the situation is ambiguous, one should assume that the situation is ethical unless it is proved otherwise. As an example, Anne in response to the second scenario and the lack of knowledge on the nature of the application, stated that: "... because it is not mentioned, we should assume that [it is an ethical issue]. It is more likely than not there will be some ethics associated to the product regardless of the nature of it".

### **Using Technology to Avoid the Blame**

Some of the students believed that the use of algorithm in responding to the scenario on trending news is a good idea because it removes the developers from being blamed. Nathan stated that:

I think the right action to take would be to have an algorithm based on an objective measurement ... and then allows users to decide which sources they want to filter out. When the decision could result in blame placed on the company for either suppressing a user's voice or making it too visible, I think the right option is to then move the power closer to the user and give them the opportunity to take greater responsibility for their actions... By creating a formula that learns from users' interaction with news, you cater towards what users want, so any complaints would contradict their own behavior.

Sebastian stated that some of his peers were able to convince him that using algorithms is a good strategy because by using an algorithm “you can’t blame the people. You say oh the computer did it”. However, he mentioned that this would remove the bias but there might be accuracy problems.

### **The Sufficiency of Disclaimer/ Disclosure for Addressing Ethical Issues**

It seems that for some of the students, disclosure or adding a disclaimer is sufficient in fulfilling one’s ethical obligations. Adam stated that he couldn’t say whether Jim is responsible or not because he didn’t know whether on the website page they have a disclaimer message or not. As he stated: “Nowadays on websites they say that you need to seek doctors’ advice”.

While disclosure and using disclaimers can help in these situations, they do not completely remove the ethical obligations of the developers. For example, the same student, in response to the second scenario on application development, stated: “As long as the client is informed that there are bugs, everything is ethically good”. We know that in this particular scenario, the client is not necessarily the end user as it has its own users. What about them? How they will be notified of the probable issues?

Despite this, there were students who saw the disclaimer just as the least thing to do in the right direction to solve the problem rather than what would resolve the ethical problem completely. For example, Michael suggested that: “at a very least, Jim should put a disclaimer ‘to make sure to talk with doctor’”.

## **Recognition of Fallacies in Others' Arguments**

Maybe one of the most important outcomes of using online discussions was the identification of fallacies in peers' arguments. Here we will discuss some of the occasions in which students were able to identify the fallacies in their peers' argumentations and argue against them. For example, Sebastian in response to the third scenario stated that: "People argued that he is just a computer scientist and he didn't know about it... but he knew that all the answers he coded was for the one product. The quiz was false".

This can be seen as recognition of the fallacy, 'no knowledge, no responsibility'. He raised some interesting points in his final stance on why he thinks those with different responses decide differently and concluded with a general assertion:

I think people responded the way they did to the question because they don't want to be morally responsible for their own code if it might be unethical. Computer scientist[s] sometimes don't see themselves as people who could have profound impact on the lives of ... people like a doctor or lawyer. In reality, they can have just as much.

Simon recognized the fallacy of 'no knowledge, no responsibility' and addressed that in his response to one of his peers in online discussions:

I feel like you can't simply claim ignorance for all of your actions. Maybe he didn't see any immediate danger, and maybe he doesn't have direct medical knowledge of the product, but I don't think that can alleviate him from any potential problems that this website could cause. Maybe he needs to do some research. I guess it's a hard standard to define

When I asked Simon about this scenario, he told me that: "you do want to educate yourself to some extent, so you can make the best-informed decision possible".

In response to his peer, Shan stated that:

The point is that no matter Jim knows the side effect or not, his actions has partially introduced the result and he assisted the fraud to happen. As programmers ourselves, I

think the lesson this discussion is trying to teach us is to always bear ethical consideration with us when coding.

Cooper was another student who recognized one of the fallacies in his peers' responses to the third scenario: "... just because the client wants something doesn't mean it is right to do it. Jim should have expressed his concern with his project manager and/or the client."

Emma recognized the attribution of blame in one of his peers' responses to the third scenario:

Although I agree that ... people should know to consult a doctor before starting any medicine, I don't think that this entirely excuses the faults of the quiz... A company shouldn't build a website to deliberately mislead people but excuse it as being okay because people should know better than to trust it.

Similarly, Tom stated that: "I don't think it's appropriate to victim blame a suicide victim, especially a minor, as opposed to the economic forces and individuals that made her suicide possible."

Tom, in his final stance on the Jim's scenario, in response to the points his classmates raised regarding why Jim was not responsible and did not do anything wrong stated that:

My stance hasn't changed, even though others have pointed out that Jim might need to behave this way to keep his job and others could have done the same thing. Firstly, I think both Jim and the users are responsible for checking the side effect, so Jim should have fulfilled his share of the responsibility. Secondly, as a response to opposing viewpoints, I want to say it's wrong to argue something is ethical just because other people do it -- it's a naturalistic fallacy.

Simon was able to recognize the fallacy of 'no ethics is involved unless proved otherwise' in one of his classmates' posting. He responded in forum to this student:

Just because we're lacking in information doesn't mean that it's necessarily an operational decision. In fact, I feel like the less information we have the more of an ethical decision it is, because it increases the potential for extremely negative consequences.

Some of the students noticed the tendency of some of their peers to use the algorithm and

transferring the blame to it. Sebastian told that: “people mostly were thinking of using algorithm... because an algorithm you cannot blame the people, you say oh the computer did it”.

Although Edwin was not directly responding to his peers, but he identified and addressed such arguments in favor of impartiality of algorithms:

That’s the danger with using an algorithm especially which is not the action that I would advise. I advise the use of a team of experts because an algorithm is still going to have carried some of the implicit biases of the people who are using, who trained it.

It is important to know that some of the students including Simon stated that the algorithms are designed by humans and they will implicitly have some sort of bias.

He responded to one of his peers in online discussions who suggested the use of algorithm as a way to stop being blamed stated that: “I feel that just because you're using an algorithm doesn't stop you from being criticized. You still make key decisions in the design of the algorithm, so you are still responsible for that.”

Quan, by using the story of the World War II, was able to recognize a fallacy in one of his peers’ responses who believed that what happened was the responsibility of client or manager (displacement of responsibility):

It reminded me the example from our first lecture. Do you think Nazi soldiers should take responsibility for following the order? They are just following the order. If you say that Jim did nothing wrong because he is just following the order too, then he is no different than the Nazi soldiers.

Although participation in online discussions was helpful to some students to identify and recognize some of the fallacies in the arguments of their peers, there were few cases that some of these fallacies conveyed to others and negatively influenced their ethical decision making. As an example, Sarah stated that:

I was initially going to blame Jim completely but I then skimming the responses to see if

I am on track with them and there were a lot of them saying that he was not responsible, and I took into consideration that the girl might have had health issues and pre-existing conditions.

### **Barriers and Enhancers of Ethical Decision-making in Future**

To this point, the focus of this research was on ethical decision making in responding to ethical scenarios. However, it is important to know how students think about their decision making in future and in real practice. Therefore, in this section, the findings on the perceived barriers to and enhancers of ethical decision making among the students will be discussed.

Towards the end of the interviews, I asked the students to think about future and the possible sources that might influence their ethical decision making in both negative and positive ways in their future career. I asked the question in a way to include factors regarding both ethical decision and ethical behavior. My goal was to understand fully their hopes and fears in the possibility of behaving ethically on the job. The overall finding was that, surprisingly, all the students had a reasonable and realistic sense of the complexities of ethical decision making and ethical behavior in their future practice. In this section, findings from their responses will be presented and discussed.

#### **Barriers to ethical decision making**

In terms of the barriers, the following categories were identified: (1) the pressures from management or peers, and (2) conflict of competing goods. In this section, I will discuss these categories.

**The pressures from management or peers.** Many students identified the pressures one receives from a variety of sources as sources that might lead them to make an undesirable ethical

decision. As Edward told me in interview, “pressure will make you make the wrong decisions: pressure from family, friends, supervisor, from economy”

Managers or supervisors were one of the most prevalent sources of pressure identified by the participants. Five students among 19 (i.e., Blake, Anne, Edward, Eaton, and Alex) stated this pressure as the source or one of the sources of pressure. For example, Eaton stated that: “Request from the boss that is against my will ... If I don’t do the job, my boss will fire me but if I do it, it is against my ethical ...”.

Peers are another source of pressure (Alex, Sarah, Michael, Reese, Edwin, and Sue). Some students felt that it would not be easy to express their opinion if it is against what most of their peers would think:

...what happens if I don’t agree with the rest of the crowd. (Sarah)

That’ll be hard to be the one voice that says differently. Even if you may think something is unethical, if everyone around you are going along with that, it is hard to speak up about that. (Michael)

If you don’t have the most popular opinion. If I read the online discussion and I didn’t have the opinion that people had I feel bad... when you write essay it is very singular, and no one knows that it is you who has that opinion but in real-world you have to be more accountable so that changes. (Reese)

On a similar line, some students stated that an environment that doesn’t value ethics would hinder them from making ethical decisions. For example:

I think that definitely a company environment that doesn’t value ethics, which is most companies don’t value these, and everyone is pretty much complicit in wrongful action could definitely hinder my ethical decisions hopefully not pass the point that doing something about it. (Edwin)

Being around people who don’t really care about the [ethical] issues. (Sue)



**Conflict of competing goods.** Conflict of competing goods is another category of barriers that was identified. Some students provided the situations that they must decide whether to act ethically or pursue other possible motivations. For example, Laura stated that sometimes professional work would be in conflict with personal life. Another example was Sebastian who talked about possible personal negative consequences as the punishment of ethical behavior. It seems that students who identified the conflict of competing goods as the main possible barrier to their ethical decision making in future, saw the temptation of promotion and/or money as the main factor regarding this conflict:

It is always about you cheat a little, the money is tempting, the promotion is tempting. Sometimes it is very hard to do the right thing when you need slip off a little bit. You can improve, you get promoted ... Sometimes it is you vs. ethics and sometimes ethics loses. (Adam)

Another student, raised an interesting point about the conflict of financial benefits of an organization and its ethical decision making, and described it under the prisoners' dilemma:

Ethical decision-making is kind of prisoners' dilemma [laugh]. You have a company. It costs extra money and extra resources to make ethical decisions within your product, yet you don't know what others would do... in ideal situation everyone follows... it seems that everyone tends towards the equilibrium which is don't care about ethical decision and do whatever makes profit. (Shim)

Similarly, and in the individual level, Fai argued on the dilemma of short-term money gain and feeling guilty in future vs. acting morally and long-term happiness. He stated that the benefits of acting ethically is that it prevents one to be sentenced to jail. As one can see, this is a minimalistic view of ethics and in some ways, reduces it to legal rules.

Finally, there were some other points raised by students as barriers to their ethical decision making in future: the complexity of situations (Ryan), not thinking about the

consequences (Mikel), and pride and arrogance (Simon). Simon stated that, in the second scenario as an example, one does not want to say he has a bad code.

Maybe the most interesting barrier was raised by Oliver as it was directly related to what has been taught in the course. He mentioned the possibility of misusing the ethical standards to make excuses for the choice one has made.

... ethical standards can be used as different excuses to justify whatever I want to do. You want to do this way, I can justify, I want to do the other way, I can still justify it. So, there is no way to just feeding the scenario and pop up the right action. It is still complicated.

In his final thoughts in the interview, Edwin added an interesting and important point that can be categorized under the pride and arrogance. He stated that:

You can see your work as work for the future and everything else is waiting to become obsolete which is a lousy worldview to take ... it does show up in lot of recent directions Silicon Valley is gone in which to me it is extremely objectionable which needs to be addressed there is nothing inherently special about computer science or being computer scientist. A big reason that you got here is more privilege than exceptional worth above everyone else which we did address some in lecture and discussions which was nice but what I think it is the biggest thing that leads to reckless or dangerous behavior. It feels like personal exceptionalism.

### **Enhancers of Ethical Decision Making**

When I asked students to think about factors that might help them make ethical decisions in future, they provided different answers. These answers can be categorized under one of the following categories: (1) the ethical culture of organization and coworkers who value ethics, (2) the course on professional ethics, (3) gathering information and developing knowledge, and (4) having a set of moral principles or the existence of rules. I will discuss them briefly in this section.

**The ethical culture of organization and coworkers who value ethics.** Many students believed that organization culture and coworkers are the main possible sources of support for ethical decision making in their career in future. For example, Ryan mentioned that joining a company with good values would help him to make ethical decisions. Sue stated that the culture of caring people at work would be helpful in the decision making: “Having a culture of people who have conscious how their decisions affect other people would help it”.

Similarly, Laura thought that working in a company with people who support the right thing is a great help in making ethical decisions. Another student referred to the importance of the coworkers who consider ethics as a help against the fear of being the only one who does think about ethics (i.e., Blake).

On the similar line, Anne raised the influence of the help of reliable coworkers who realize the ethical implications:

[if there is] the potential for something to be wrong, the best way [is] to ask ... from the peers and hopefully you are surrounded with people who are also moral human beings who realize the ethical implications, so they can direct you.

**The course on professional ethics.** There were a number of students who believed that the course on professional ethics that they took would help them to make ethical decision. These students stated that the course materials in general (i.e., Ryan, Reese, and Michael) and/ or the ethical decision-making models or ethical guidelines introduced in the class (i.e., Shin, Oliver, and Simon) specifically would be helpful for decision making in future. Michael believed that the course material would be helpful in identifying blatantly unethical issues. Oliver mentioned that using the ethics standards and models introduced in class would help him as he looked at standards as something on which to rely. According to him, “ethics standards rather than

intuitive thinking” would help him respond when he encounters ethical problems. As an example, he referred to whistle blowing. Simon was another student who believed that the guidelines provided in the course would help him make ethical decision in future, however, as he stated: “you can’t just go to a book to get the answer, it is more nuance than that, but they do definitely give guidelines”.

Sebastian added that the passion that the instructor had towards the ethics would be an inspirational source for acting ethical in future.

**Gathering information and developing knowledge.** Two students mentioned about the importance of preparation in terms of knowledge before making decisions. One with more long term and generic sense of knowledge and the other with more specific and problem-oriented mindset. Edward suggested that reading in general would help him. He provided the example of reading history. He believed that: “The more you see, you have more thoughts about things”. Alex, on the other hand were more focused on the problem at hand and suggested to learn as much as possible before making a decision to have a better picture of the situation at hand.

**Having a set of moral principles or the existence of clear rules.** Eaton stated that existence of clear rules on how to behave will be helpful to him. There were also two students who raised the importance of having a set of moral principles (i.e., Adam and Mikel). Mikel believed that it is important for him to remind himself of his responsibility towards wellbeing of people:

I think what helps is ... keep reminding myself that I have a responsibility as a computer [professional] ... for other people. That I am not only partially responsible for the computer program, but also for wellbeing of people who I am making my apps for.

## **Towards Building a Model of Ethical Decision Making for Computing Majors**

After reviewing the process of ethical decision making among computing majors, here I present the conceptual framework of the factors that I found would positively or negatively influence ethical decision making based on the inductive process that I took in this research. Figure 3 illustrates the factors involved in making ethical decisions among computing majors. Six factors were identified to have positive influence on ethical decision making. Recalling and using stories are the most important factor that helped individuals make ethical decisions. Another important factor is the care one feels and shows towards the end users. This was a very powerful source in directing ethical decisions. Recognition of fallacies, is another element that played an undeniable role in ethical decision making. Developer-related reasoning is helpful in making ethical decisions when it is about understanding the responsibility of one who creates something and also when one uses his specific technical knowledge and experience in the arguments. Students who reasoned based on acknowledging the importance of the issues such as privacy were more likely to make better ethical decisions. Finally, the external environment factors including existing clear rules, ethical organization culture, and ethical coworkers were identified by students as some of factors that might enhance their future ethical decision making.

As one can see in figure 3, each factor has different heights. The height of each factor shows the degree of influence of that factor on the ethical outcome. This degree of influence is based on my judgements on the prevalence of each factor in the process of ethical decision making as well as the effectiveness of the factor in shaping ethical decisions.

In terms of factors with negative effect on ethical decision making, fallacies are an important source. Another factor is the minimalistic views of professional responsibility. When a student had a narrowly defined sense of professional responsibility and its scope, that student had

difficulty recognizing the ethical implications of his/ her actions and making ethically desired decisions. Another factor was related to their emotions towards the developer. When students felt empathy for the developer, it was harder for them to make the right decision although in many cases, they had recognized that the right action contradicted what they decided to do.

Another important factor was the generalization of what one felt or expected in a specific situation to all users and making decision without considering the situation of users that might think or operate differently. This factor could be seen as part of fallacies but because it was directly related to the relationship with end users, it was separately categorized. One can also argue that the attention to ethics of care would help in minimizing of such effect. These are some connections among the factors that can be further analyzed in future research.

Finally, students identified the pressures from various sources as barriers to making ethical decisions. These pressures included pressures from managers and peers and also conflicts of competing goods in terms of promotion and financial incentives.

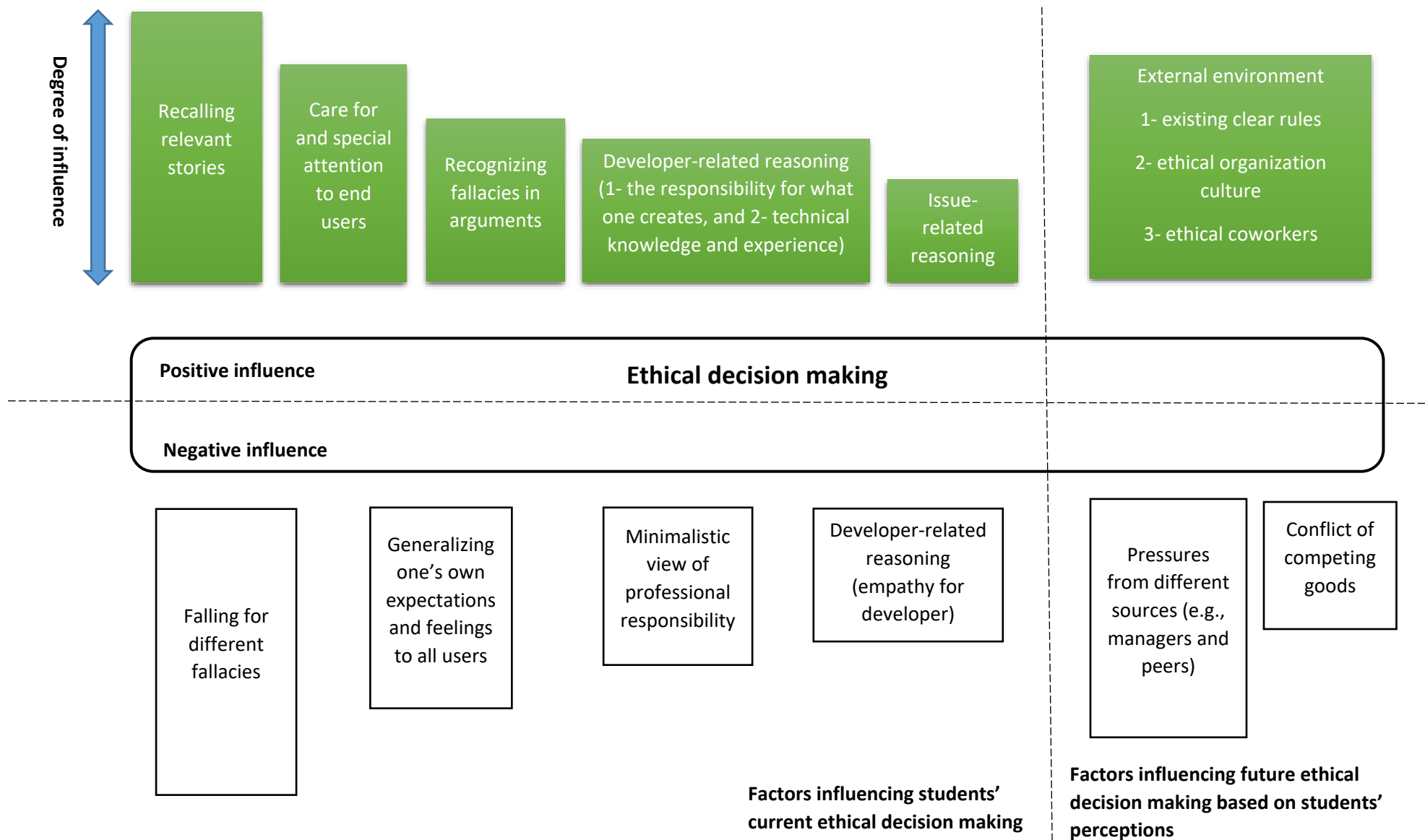


Figure 3. Factors influencing ethical decision-making among computing majors

## CHAPTER 5: DISCUSSION

The results show that although there is a lot of emphasis on ethical theories and frameworks in teaching courses in Engineering, most students do not explicitly use these theories. This is in line with what Bazerman and Tenbrunsel (2011) stated. Moreover, the use of the ethical theories in its own will not necessarily lead to ethical decisions. The issue with applying ethical theories can be better understood when we look at the case of one of the students (i.e., Oliver) who is a Senior in Computer Science. He identified ethical standards as the source which might help or hinder ethical decision making. While he believed that the use of ethical frameworks helped him to avoid intuitive thinking, he stated that you can justify your selected choice with using ethical frameworks one way or another. This complication needs to be further studied. It seems that to the extent that the students think critically, attend to the details, and ask questions, they have a better chance of making an ethical decision.

An important finding is that the situation is very influential on ethical decision making. For example, in response to the app development scenario, Sebastian responded that one should do what one's boss says which is in contrast with his response to the Jim's scenario:

"I was surprised that people said it wasn't his fault. Because I thought the reason of the course was, doesn't matter what your boss says, doesn't matter what you have been told to do".

Not considering the ethical implications of the decision in app development scenario might be related to the past experiences of this student. As he had the experience of being in similar position of the quality control officer in terms of the deadline and rushing the project but not in the other position. Or it can also be attributed to the fact that in the app development scenario, there is a chance that there is no bug but the ethical issue in the Jim's scenario is more



obvious. In any case, the situation matters in identifying the possible biases and in general in making ethical decisions. This finding supports the theories such as Jones' (1991) ethical decision making in organizations from the literature that consider the characteristics of moral issue. However, the characteristics of moral issues do not necessarily play similar roles for different individuals. For example, while for some individuals in this research, the magnitude of consequences in the third scenario was helpful to make the ethical decisions, for others it created a force to further justify the unethical action. The finding from my research suggests that an interaction of individual's characteristics and characteristics of moral issues affect the decisions of individuals. This further supports the overall argument of the ethical decision model provided by Trevino (1986). According to Trevino's (1986) model, individual and situational variables interact with the cognitive component to determine how an individual is likely to behave in response to an ethical problem.

Another finding indicates that stories are very important in ethical decision making of students in different levels. Some students knew about the professional ethics before taking the course just by hearing about the news or stories in this regard. Take the example of the student who remembered the case of Apple and privacy of the customers. All these news and stories can increase awareness of students about the importance of professional ethics.

In a different level, stories were useful for finding ethical solutions. Almost every student made a responsible decision towards the news on social media. Most of them mentioned that they would combine the algorithm by the team of experts to make sure there would be no fake news. The influence of the recent stories of the fake news on the users were the reason behind their responses. Although stories are very helpful in making ethical decisions, we should know that the more the stories are relevant to the situation and the field of the students, the better the

outcome of the ethical decisions is. In other words, generic ethical stories will not influence positively the decisions as much as the stories that are highly related to the situation.

Stories were also very helpful in recognizing the fallacies in other students' arguments. Take the example of Jim's dilemma. Those students who remembered the story of World War II which was mentioned in one of the class lectures, not only responded more responsibly but also were able to identify the fallacy in others' arguments regarding rationalizations such as doing one's job, etc.

The difference between positioning in the scenarios as a user or as a developer seems to make a big difference in computing majors' ethical decision making. As one can see, in the first scenario, Eaton stated that the privacy shouldn't be the lowest because "I want to make my social media private for my friends and family", but when it comes to the Jim's scenario, he stated that it is not his fault. The question is what makes one to place himself or herself in different positions in different scenarios? What are the implications? It is important to remember that for the application development scenario, when I asked about the factors behind his responses, Eaton stated that he did not have any experience in that regard. In that scenario, he did not position himself in the scenario as a developer. Instead he took the side of the user and stated that if there are bugs the customers will be disadvantaged. This might be related to the positionality in scenarios. It seems that participants tend to position themselves with the role that is closer to them. For example, Eaton's experiences with social media has been so far as a user but he cannot imagine himself as the patient and user of the website he is coding for. Here, he can see himself more of a coder doing his job and feel empathy for the coder. This concept can be called the familiarity of the experience. This can be further supported when we know that he found the first and the third scenarios more relevant when he was asked in the interviews because he was more

interested in creating websites. Another possible explanation is the tendency to avoid the undesired situations such as Jim's scenario.

As it was evident in the comments of students as they compared online discussions with essay assignments, the use of essays in teaching ethics has certain weaknesses which needs to be taken into account for designing more effective courses. Maybe the most important concern is the fact that the students felt pressure to respond to scenarios in a certain way. Although the most ethical responses should be desired, it should also be taken into account that if the responses are not genuine, the students won't be in the right direction towards professional ethics development. This is in line with what Noddigs (2013) suggested for moral education. According to her, teachers should avoid forcing students "to respond in specified ways" as what the students will make their own and apply effectively is what they find significant for their own life (p. 176).

Ethics of care was one of the underlying philosophies that was implicitly used by some of the students from both genders but mostly by female students. Tronto (2005) introduced the ethical elements of ethics of care: (1) attentiveness: the recognition of a need to be cared about, (2) responsibility: the recognition of the need for caring, (3) competence: the willingness to provide the needed care, and (4) responsiveness: being alert of the possibility of abuse and consider other's position as he/ she expresses it. Attention to ethics of care is important as it combines some of the elements of other ethical framework including consequence-based ethics but removes some of the fallacies one can identify in individual's thinking and reasoning. For example, the absence of attentiveness led to the "atrocities committed during World War II" (Tronto, 2005, p. 252). Or consider the responsibility as the second element which according to Tronto (2005), is about going beyond and sometimes against your obligations or rules (e.g., the responsibility to rescue humans from Nazis). As another example, Competence, as described by

Tronto (2005) avoids the ‘bad faith’ of taking care of something rather than being willing to provide care. And finally, responsiveness “suggests that we consider the other’s position as that other expresses it” rather than “putting ourselves in their position” (Tronto, 2005).

The notion of putting oneself in other’s position or situation needs further scrutiny. As the findings suggest and it was reflected in previous section, there were students who put themselves in the position of the users in the scenario on social media and used their experiences to argue and as stated they were able to make more ethical decisions. It might seem to be contradictory to what responsiveness as the fourth elements of ethics of care suggests. However, one possible explanation is that most of those students who put themselves in the position of the users in the scenario on social media, did this voluntarily rather than using a guideline and it came naturally from their own sufficient experience as the users of such applications, therefore they were completely or relatively familiar with the situation. This can be understood better if we look at the kind of arguments provided by Anne in the interview in response to the Jim’s scenario. She stated that she was not one of the people who believed in online quizzes, but she acknowledged that there are many who do. If she had tried to put herself in the situation of the users here, she would have failed to recognize the ethical aspect of the situation as some others did when for example they stated that one should get information from legitimate sources as they put themselves in the position of the users. This can be very well understood by the way Tronto (2005) described the mechanism of reciprocity in rational moral theory:

“It would seem that by putting oneself in the other’s situation, [the] distance can be overcome. But, ... there is no way to guarantee that, in taking the place of the other, ... the moral actor will recognize all of the relevant dimensions of the other’s situation” (p. 257).

This, once again, raises the importance of the attention to the context. According to Tronto (2005), Aristotle stated that: “virtue lies in a mean that depends upon context”. As stated by Held (2006), “ethics of care advocates attention to particulars, appreciation of context, narrative understanding, and communication and dialogue in moral deliberation” (p. 158).

One of the important considerations of ethics of care is that not all individuals “are equally able, at all times, to take care of themselves” (Tronto, p. 258). The findings from this research supports this statement. For example, some of the students in response to the scenario on social media privacy, suggested the highest privacy because the users are not all fully aware of the issues of privacy in social media. Moral theories, in general, are not designed to notice inequalities of power and here the strength of ethics of care can be seen.

In a philosophical level, some believes that ethics of care is a moral practice which is incompatible with universalistic moral reasoning (e.g., Herbert et al., 1990). In this view, care is related to Aristotelian metaethics in contrast with justice which is based on deontological or utilitarian metaethics. Similarly, Held (2006) argued that sensitivity, responsiveness, and empathy often offer better guidelines for making ethical choices compared to universal principles or abstract rules. Noddings (2013) argued that ‘the principles of universifiability’ depends on a concept of ‘sameness’ introduced by Nietzsche (1967). According to Noddings (2013), in order to evaluate the situation, we need to abstract away from the situation some qualities in order to maintain sufficient sameness which will lead to losing the factors that might be the core of the ethical problem at hand.

Ethics of care appreciates the emotions in understanding what morality suggest (Held, 2006). However, it does not mean that the cognition is not relevant or important. There is a need

to attend to both cognition and affect in ethical development. If we exclude cognition, we fall into pathetic sentimentality, and if we exclude affect we might fall into self-serving or unfeeling rationalization (Noddings, 2013). Our findings from the responses of those students who believed that Jim did not do anything wrong and the comparison with the responses of those who thought differently supports this claim empirically.

The findings of this study also support the recent research on the influence of empathy in engineering ethics education (e.g., Hess, Strobel, & Brightman, 2017; Walther, Miller, & Sochacka, 2017). Hess, Strobel, and Brightman (2017), identified the importance of engineering students' care about the stakeholders and designed their research to study the empathic perspective-taking to understand what influence its enhancement. Enhanced perspective-taking, in their view, would help engineers in making socially appropriate decisions which respects the stakeholder impact (Hess, Strobel, & Brightman, 2017). In another research, Walther, Miller, and Sochacka introduced a model of empathy for engineering drawing from psychology, social work, and neurobiology. Particularly, they draw from the literature on engineering ethics for one of the main components of their model called "an empathic way of being an engineer" (p. 137). This component has three aspects: (1) service to society, which has to do with consideration for "all human and non-human stakeholders impacted by engineers", (2) dignity and worth of all stakeholders, which involves the genuine belief of value of both people and environment, and (3) engineers as whole professionals, which speaks to the need for developing empathy and combining personal values with professional activities (Walther, Miller, & Sochacka, 2017, p.138).

As it was mentioned previously, ethics of care is not prevalently taught in engineering ethics courses. In one of the exceptions in the use of ethics of care in an engineering ethics

course, Bielefeldt (2015) introduced the concept of ethics of care for the first time in her course on engineering ethics. Bielefeldt (2015) found that students in her sample preferred ethics of care (28%) over the other four main ethical frameworks (i.e., deontology, rights ethics, utilitarianism, and virtue ethics). Moreover, there was a difference between male and female students. While 39% of female students prioritized ethics of care, 23% of male students selected ethics of care as their first ethical framework preference. Deontology was the most popular preference among the male students (26%). Ethics of care was also the dominant preference for Hispanic students (57%). This study also found that students who preferred ethics of care or rights ethics showed more attention to the importance of socio-cultural considerations in engineering process. My finding supports her assertions.

In terms of recognizing the possible barriers to and enhancers of ethical decision making in future, Students provided answers that showed they all had a reasonable sense of ethical behavior in their future career. The findings of the perceived barriers to future ethical decision-making in this study, is in line with motivational blindness introduced by Bazerman and Tenbrunsel (2011). According to them, financial gains, potential future job opportunities, fear, organizational loyalty, and organizational culture are some of the reasons for such blindness and all except organizational loyalty were raised in students' responses.

Based on the students' responses regarding the influential factors in ethical decision making in future (i.e., both barriers and enhancers), organizational environment is perceived to have an important influence. This emphasizes the importance of the activities that aim at the improvement of ethical organization culture. The open communication and discussions on ethics might help individuals feel they are supported and are not forced to make decisions against their will only because of the pressures they might feel.

In terms of biases and their influence on ethical decision making, the findings support the previous research. For example, after making the decision, some participants tended to spin this behavior by rationalizing their role or by blaming other individuals or systems (Bazerman & Tenbrunsel, 2011). Moreover, the notions of denial of responsibility, denial of injury, and denial of victim raised by Anand et al. (2004) was evident in students' arguments.

To conclude this section, it seems that the findings of this study are in line with Drumwright et al. (2015). According to them, the research focusing on ways individuals make ethical decisions (i.e., behavioral ethics) should be integrated in ethics education since "there is no strong evidence that training students to be moral philosophers... or to work to enhance their character improves ... [students'] ethical actions" (p. 433). Also, as Bazerman and Tenbrunsel (2011) stated:

If, like most people, you routinely fail to recognize the ethical components of decisions, succumb to common cognitive biases, and think you behave more ...ethically than you actually do, then being taught which ethical judgment you should make is unlikely to improve your ethicality. (p. 37)

### **Implications**

Current practice of teaching ethics to engineers is limited in various ways. The findings of this research have important implications for teaching ethics to engineers and specifically to computer scientists. These implications are as follows:

#### **The Emphasis on Relevant Stories**



Stories that are closely related to the field of students should be more emphasized in the curriculum. These stories should be communicated through multiple channels so that students become familiar with them and recall them at the time of decision. Based on the findings of this research, reminding students about relevant stories from the past seems to have the highest potential for improving ethical decision making. This might be attributed to the ways stories influence on individuals since stories provide context, increase awareness, transfer meaning in a contextual and detailed manner, broaden the view of students on ethical issues, show the relation between acts and consequences, and are easier to be recalled at the moment of decision making. The data from this research supports the strengths of the stories in making ethical decisions.

### **Addressing the Fallacies and Possible Sources of Bias**

The fallacies and biases can unknowingly influence one's decisions. The findings of this research showed how influential the role of these biases is. Knowing their importance, I suggest instructors to consider the identified fallacies from this research in designing their courses if they find them relevant and appropriate. It is obvious that certain situations trigger some biases more than others and therefore the identified fallacies are not comprehensive. The analysis of the students' assignments early in the course can help instructors to tailor their courses based on the actual biases among the specific group of students. This is in line with what Medeiros et al. (2014) emphasized regarding the identification of biases that might affect one's decision making as an important component of ethics education. Moreover, it supports the suggestion provided by Anand et al. (2004). According to Anand et al. (2004), employees should be trained to understand the rationalization, socialization practices, and social cocoons "to at least periodically think about a prospective action or decision from the perspective of customers, shareholders, and other constituents" (p. 48). As stated by Gentile (2009), if we make ourselves familiar with

responses that counter the common rationalizations in advance, there is a better chance to be able to use them when needed. The current study can be seen as a guide to identify such biases.

### **Preparing Students for the Difficulties of Ethical Behavior in Organizations**

The findings indicated that students had a relatively good understanding of the nature of ethical issues in their future career. They were able to draw a reasonable and practical picture of what might help them in or hinder them from making the right decision or taking the right action in future. This suggests the possibility of integrating content in the courses on ethics which are more focused towards future and the ways in which students can prepare themselves for the situations with which they seem to be already familiar. The findings of current research would be specifically significant in providing instructors with situations and factors that are recognized by students as barriers to or enhancers of the ethical conduct and help them to prepare for future accordingly. This would also help students to see the connections of the course to the practical situations. Finally, there is a possibility for customization of ethics training. There is a need for understanding the contextual and specific factors and address them in classrooms. Allowing the students share their fears and hopes for making ethical decisions in their future career can help both students and instructors in addressing the issue. For example, improving the confidence of students to speak up when it comes to unethical behavior and discuss possible ways to do so is a specific implication in this regard from the current research. As I showed in previous sections, many students shared their experiences and thoughts on their fears of acting based on their standards in certain circumstances. An effective program or course on engineering ethics should go beyond the ethical judgment by considering the difficulties and implications of ethical behavior in real world and providing students with required tools. The effectiveness of this

approach needs to be further scrutinized with empirical data but based on the findings of current research, it seems to be feasible and promising. In her book, Gentile (2009) provided suggestions for implementing such approach in teaching ethics. According to her, by preparing ourselves through reflections on our tendencies and personality traits in advance, “rather than accepting the challenge as is it put before us, we can take an active role in reshaping it” (Gentile, 2009, p. 16). The findings of this study also support the suggestions provided by Prentice (2014). He suggested educators to help students predict the ethical issues they might encounter in future and reflect on them, and also create a list of things that they won’t do to advance their careers.

### **Attention to the Critiques of Current Practices in the Field**

The findings of the research revealed several practices in the field that might put individuals in positions to make unethical decisions or make it harder for them to make more desired decisions (e.g., unrealistic ship dates). These practices also will make it easier for professionals to rationalize their choices by claiming that everybody is doing it. For example, leaving most and many of the applications’ issues to be resolved through future updates or requesting for all unnecessary permissions to access users’ data might create issues that will not be easily fixed afterwards. The practices identified in this research, in addition to those who instructors might find in their specific disciplines, will help designing courses that go beyond the walls of the classroom and help individuals in their future actual actions.

### **Attention to the Indirect Effects of Practice**

Courses on engineering ethics can benefit from introducing students to the scenarios that the engineers’ decisions indirectly harm individuals in addition to the direct and more obvious influences which have been traditionally covered. For example, in the case of Jim’s scenario,

many of students were not able to recognize the responsibility of the programmer since there was nothing wrong with his coding per se.

### **Concerns Related to Approach to Application of Moral Theories and Frameworks**

Along with introducing the concepts and frameworks, it is also important to develop critical thinking among students. Students should become familiar with the ways in which theoretical framework can be best used in addressing ethical problems. This is in line with what Medeiros et al. (2014) suggested. It is important for students to learn that the use of an ethical framework or ethical standards would not necessarily and in its own lead to an ethical decision. The importance of considering different aspects of a situation in mind while applying an ethical theory needs to be conveyed to students. For example, if consequence-based ethics is going to be used in the scenario of social media, students should be able to recognize the possible sources of harms to users. If one cannot see a broad picture of the situation, the application of theory in itself will not resolve the issue. Moreover, the possible ways one might use these frameworks as an excuse to justify his/her stance needs to be taken into account and discussed. Helping students to feel more comfortable with the ambiguities of the ethical problems and encouraging them to be aware of different aspects of a situation seems promising. The introduction of the frameworks and models should not be in a sense that students think that the use of one model or framework and applying it to a situation would automatically remove all the complexities. As it was recognized and stated in an interview:

“There is no way to just feeding the scenario [with ethical standards] and pop up the right action. It is still complicated. But with all the information I have I can compare pros and cons to make a better decision”. (Oliver)

## **Clarifying the Importance of Engineering Professional Ethics for Students**

Showing the importance of the engineering professional ethics and comparing it to other professions with established and known professional ethics among public is very important. As one of the students mentioned:

“Computer scientist[s] sometimes don't see themselves as people who could have profound impact on the lives of different people like a doctor or lawyer. In reality, they can have just as much ” (Sebastian)

Moreover, although there was not a one-on-one connection between the perception of students regarding professional ethics and their actual ethical decisions, those students who knew the importance of professional ethics and provided their views with certain amount of details, were able to make better decisions compared to those who looked at the course only as a required course or only have generic ideas on the importance of professional ethics or the course. One cannot expect that the importance of professional ethics will be communicated effectively by taking only one course. Therefore, the institutions should be planning on conveying the importance of ethical issues throughout the whole program.

## **Attention to Ethics of Care**

Ethics of care has not given enough attention in teaching professional ethics and specifically in engineering education as the main focus of engineering ethics courses has been on consequence-based ethics, deontology, and rights as the main ethical frameworks (Bielefeldt, 2015). This is despite the identification of the promises of this approach in teaching ethics to engineers (Bielefeldt, 2015; Campbell, Yasuhara, & Wilson, 2012; Pantazidou & Nair, 1999).

The lack of attention to ethics of care might have several reasons. We might be able to understand some of the reasons by looking at how Tronto (2005) described ethics of care.

According to her:

Ethics of care is complex. It requires some specific moral qualities. It poses a different range of moral dilemmas than does current moral thinking. It involves both particular acts of caring and a general habit of mind to care that should inform all aspects of a practitioner's moral life. (p. 252)

### **Developing Students' Perceptions of Computing Ethics**

Students' perceptions towards ethics seem to have important implications for teaching ethics. Addressing the gaps identified in this section is very important. If students feel that what they learn in class is not what they are going to use in future and if they answer the questions in a way that they feel is different from what they will actually do in future, the course cannot be effective. We need to help students understand that although ethics is different from other courses, the difference is not in the relevance and usability of what they learn in class. They need to be prepared in a way to be open to learn from mistakes rather than thinking of these mistakes as differences in opinion. Focusing on avoiding the legal issues should not be the only concern of the students. Emphasizing solely on individual essays or providing rigid frameworks and rubrics cannot help students in developing their ethical decision making genuinely. Having more open discussions, showing the biases and fallacies in students' arguments, and helping students reflect on their initial thoughts are potentially more effective activities in developing ethics among students.

Sophia in her final stance in response to the social media scenario after reading her peers' different opinions stated that:

“I do think there is no right answer and everyone's opinion is completely based on a part of our personalities that are inherently different and unique, so we shouldn't be deciding a universal right course of action, just a path that makes sense morally or operationally to us.”

Here, the important concern which needs to be communicated to the students is that although there is no universal right answer to ethical issues, but in each situation, there are solutions that are better than others and also there are solutions that are not acceptable. This, as I mentioned previously in literature section, is one of the basic assumptions that makes the teaching of ethics meaningful.

### **Attention to Building Students' Confidence**

One of the most prevalent biases among the students was ‘bad faith’. This issue might be related to the lack of confidence among students. This can be a topic to be further scrutinized and discussed in classrooms. Helping students to build up their confidence to speak up and make their voices heard. Also trying to address the gap students feel between real life and ethical considerations is of great importance as it seems to be the other source of the ‘bad faith’.

To conclude this section, I want to further emphasize the suggestions made by Wells and Schminke (2001). According to them, for ethics training programs to be effective, it is important to consider the needs, trainee characteristics, pedagogy, and changes in attitudes or behavior. As one can see, the provided implications for teaching ethics in this section address these suggestions. What Noddings (2013) stated about ethics of care can very well conclude the implications of this research:

“[when we accept constraints on our ethical ideals,] we know better what we must work toward, what we must prevent... Instead of hiding from our natural impulses..., we accept what is there - all of it- and use what we have already assessed as good to control that which is not good” (p. 100).

## **Limitations and Future Research**

The research described here is limited in different ways. First, the participants were students who were taking a course on ethics and responding to the scenarios as part of their class activities. While this helped in gathering more in-depth and rich responses, it limited the transferability of the results. Second, since the data for each scenario was gathered in a relatively short period of three weeks, one cannot expect much changes in students' perspectives since ethical development is believed to happen over time. However, I believe that the research benefited from getting richer data by exposing the students to their peers' comments and perspectives which would further clarify their stances. The current approach in some extent revealed whether and in what ways the dynamics of a professional discussion among peers might influence the ethical decisions of individuals. Third, the students might have not fully revealed their stances due to social desirability in asynchronous discussions. However, since similar condition can be expected in real practice of professionals, this would alleviate this limitation in some way. Fourth, the concept of responsibility might have different interpretations in minds of the participants. The focus here was on professional responsibility rather than legal or causal responsibility. Based on the interviews, I believe that most students responded to the scenarios by having the professional sense of responsibility in mind. However, it does not completely remove the possibility of different interpretations which might have influenced the results. Another limitation of this study was in the design of online discussion as students were able to see their peers' postings before posting their own. Although this design decision was made deliberately to make the results more comparable to the real situation of ethical decision making and influence of the peers, their responses has certainly been influenced by the dynamics of the



discussion. Finally, the sample consisted of full-time traditional aged students and cannot be representative of all computer professionals.

Future research can focus on testing the provided model of ethical decision making among computing majors in other situations and with different scenarios. This will help in improving and modifying the theory. Moreover, replicating this study with individuals from other fields of study can create a better understanding of the influences of professions in ethical decision making. Finally, future studies can focus on the effectiveness of the courses on ethics with interventions that will be informed or designed by considering the findings from this research.

## **CONCLUSION**

It is important for HRD scholars and professionals to consider ethical development as an area of focus for both research and practice. Talent development is at the heart of human resource development and ethical development should be considered as a critical component of talent development. Based on the definition provided by Hedayati Mehdiabadi and Li (2016), talent development aims at “improving all willing and capable individuals for the mutual benefit of individuals, host organizations, and society as a whole” (p. 25). The current research was inspired and built upon such definition of talent development which can be specifically called ‘developing ethical talents’. In doing so, the contextual elements should be carefully taken into account and therefore the current research was aimed at providing understanding and insights for ethical development of professionals in computing.

The emphasis of this research was on the identification of factors and conditions that help computing majors to or hinder them from making the ethical decision. The hope is that the

implications of this study help improve courses on engineering ethics and specifically ethics of computer science, and also trigger more research for explanation and exploration of the ideas raised in this study.

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## **APPENDIX A: IRB LETTER**

### **IRB EXEMPT APPROVAL**

**RPI Name: Jessica Li**

**Project Title: Investigating ethical decision making processes among engineering students and the influence of different learning strategies**

**IRB #: 17251**

**Approval Date: October 20, 2016**

Thank you for submitting the completed IRB application form and related materials. Your application was reviewed by the UIUC Office for the Protection of Research Subjects (OPRS). OPRS has determined that the research activities described in this application meet the criteria for exemption at 45CFR46.101(b)(1). This message serves to supply OPRS approval for your IRB application. Please contact OPRS if you plan to modify your project (change procedures, populations, consent letters, etc.). Otherwise you may conduct the human subjects research as approved for a period of five years. Exempt protocols will be closed and archived at the time of expiration. Researchers will be required to contact our office if the study will continue beyond five years.

Copies of the attached, date-stamped consent form(s) are to be used when obtaining informed consent.

We appreciate your conscientious adherence to the requirements of human subjects research. If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me at OPRS, or visit our website at <http://oprs.research.illinois.edu>

Sincerely,



Michelle Lore

Human Subjects Research Specialist, Office for the Protection of Research Subjects

Attachment(s): Recruitment letters, Written Consent Document

c: Amir Hedayati Mehdiabadi

## Recruitment letter

Dear Student

As a student in Ethical and Professional Issues course (CS 210) during Spring 2017, you are invited to participate in a research project that aims to study the processes of ethical decision making among students and the influences of different instructional strategies in this regard. The findings of the study will inform the design and delivery of courses and training programs on professional ethics.

Upon agreeing to participate in the study,

- You will agree to participate in this study by giving permission to the researchers to have access to and use your online discussions for research-related purposes
- You may be asked to have a one-on-one, face-to-face interview (approximately one hour long) with the researchers.

All collected data will be used for academic presentations and publications only. No personal information will be disclosed during the dissemination process. Your instructor will not have access to the data from the interview.

In general, we will not tell anyone any information about you. When this research is discussed or published, no one will know that you were in the study. However, laws and university rules might require us to disclose information about you. For example, if required by laws or University Policy, study information which identifies you and the consent form signed by you may be seen or copied by the following people or groups: a) The university committee and office that reviews and approves research studies, the Institutional Review Board (IRB) and Office for the Protection of Research Subjects, or b) University and state auditors, and Departments of the university responsible for oversight of research

Your participation in this project is completely voluntary. In addition, you can withdraw your participation at any time and for any reason without penalty. Your choice whether to participate or not will not impact your standing in the course.

If you have any questions regarding this research, please feel free to contact Amir Hedayati at 217-7214804 or [hedayat2@illinois.edu](mailto:hedayat2@illinois.edu) or the RPI (Jessica Li at 217-3330807 or [jli2011@illinois.edu](mailto:jli2011@illinois.edu)). If you feel you have been injured or harmed by this research or if you have any questions about your rights as a participant in this study, please contact the University of Illinois Institutional Review Board at 217-333-2670 or via email at [irb@illinois.edu](mailto:irb@illinois.edu).

You will be offered a copy of this form to keep for your records.

Sincerely,

University of Illinois at Urbana-Champaign  
Institutional Review Board

Approved: 10-20-16  
IRB #: 17251

## **APPENDIX B: DEMOGRAPHIC QUESTIONNAIRE**

1. ID:
2. Gender:
3. Age:
4. Major:
5. College level: Freshman   Sophomore   Junior   Senior   other
6. Years (Months) of work experience
7. First Language:
8. How important is ethics in computing as a profession?

Not at all important  
Low importance  
Slightly important  
Neutral  
Moderately important  
Very important  
Extremely important

## **APPENDIX C: SCENARIOS**

please respond to the following scenario. Feel free to respond to this scenario by drawing references from your experiences as well as the course materials or any other sources you find relevant. You are also encouraged to elaborate on your ideas and thoughts whenever you can. Please limit your time in responding the scenario to 15-20 minutes.

Be aware that your responses are not anonymous.

### **Scenario 1: Social Media**

You and a few other students from the college have created a new social media platform that enables the professionals in computing to connect, socialize, share interests and seek solutions. As the time for releasing the platform approaches, you are in a meeting to discuss whether you should make full privacy the default option or set the lowest privacy as the default option; users would be allowed to increase their privacy level according to their wishes.

- Is this decision an ethical decision or an operational decision? Why? What is the right action to take? For what reasons?

Next topic to discuss in the meeting is the decision for presenting trending news on technology. Two options are available: (1) using a team of experts to choose the trending news, and (2) using an algorithm that automates the process. You know that in first approach, your company might be accused of having a biased view on the trends. In second approach, however, there is a chance for presenting false or misleading news. Tom, one of your team members

believe that the feature should be abandoned altogether because both options might damage the reputation of your platform.

- In your view, is the decision on presenting news an ethical issue or an operational issue? Why? What is the right action to take? Please justify.

### **Scenario 2: App Development**

You are the quality control officer in a small company. You and your colleagues have been working for months on a particular mobile application for a large company on which your company depends heavily for its revenue. Two weeks ago, you were confident about the application, having run extensive tests. However, at that point, your client announced a significant upgrade to their phone operating system, and they insisted that your company could have only three weeks to make the necessary changes.

Working long hours in the period of three weeks, you and your teammates complete the changes. On the day before the new ship date, you tell your manager that you are not convinced that the application has been sufficiently tested. You estimate that you will need two more days to complete testing for some complicated errors. As the quality control officer on this contract, you have to sign off on before the application can legally be shipped.

Your manager and her boss discuss the issue and make their final decision: "You are to keep testing overnight. If no significant bugs are discovered, you are to sign off on the project in the morning, so it can be shipped on time."

- Does this scenario involve an ethical or an operational issue? Why? What is the right action to take? For what reasons?

### **Scenario 3: A Task Assigned to a Programmer**

As his first full-time job, Jim started a coding job with a marketing firm. The firm's clients are large pharmaceutical companies. Jim is assigned to a project that involves a drug website that is targeted at young women. One feature of this website is a quiz that ask girls a number of questions and provides recommendation of a type of drug. This website is not clearly an advertisement for any particular product but poses as a general information site.

Jim receives the questions for the quiz, along with multiple choice answers for each question, and proceeds to code up the quiz. Before submitting the website to the client, Jim's project manager tries the quiz and notices that no matter what she does, the quiz recommends the client's drug as the best possible treatment. Jim explains that this outcome is what the client has requested. The project manager is reassured.

A few days later, the client invites Jim and his colleagues to a fancy steak dinner to show appreciation for their work. On the day of the dinner, right before leaving the office, a colleague sends Jim a link to a news story. It is about a young girl who had taken the drug for which Jim has built the website: she has killed herself.

It turns out that severe depression and suicidal thoughts are some of the main side effects of that drug.

- Did Jim do anything wrong in this scenario? Please justify your answer. What should he do now?

## **APPENDIX D: INTERVIEW QUESTIONS**

### **Interview questions**

1. Tell me about your experience as a student in your field.
2. When was the first time you heard about professional ethics? What did you think about it then? What do you think about it now?
3. What do you think about each of the scenarios in online discussions? Please guide me through the process behind your answers.
4. Did you read others' postings prior posting yours? How did it influence you?
5. Could you describe the events that contributed to your decision on each of these scenarios?
6. Could you describe the events that contributed to your second decision? What contributed to your decision? Did you change your mind? Why?
7. What do you think has been the most helpful to you during the decision making on the scenarios?
8. In your opinion, which of the three scenarios were more relevant to your profession? Why?
9. How do you feel about ethical decision making in future as a computing professional? What are the things that helps you or hinder you in this regard?
10. Is there anything else that you think I should know to be able to understand ethical decision making among professionals better?
11. Is there anything that you would like to ask?