INFORMATION SYSTEMS EDUCATION JOURNAL

In this issue:

INFORMATION SYSTEMS EDUCATION JOURNAL

Editors

Teaching Professionalism and Ethics in IT by Deliberative Dialogue

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Abstract

Cyberethics in IT remains a hot-button issue for higher education institutions and governments worldwide as high numbers of violations continue to surface globally. Since unethical behavior in IT knows no boundaries and college students are a growing portion of the population of cybercitizens studies in cyberethics is a necessity. By reinforcing professionalism and ethics as one of their main assessment criteria of the field, the globally recognized council, the Accreditation Board for Engineering and Technology (ABET) has already underscored the importance of professional and ethical responsibility. This study derived from the significance of these concerns and explored this very concept of professionalism and cyberethics in the field of Computer Science by means of using deliberative dialogue in a required Computer Science undergraduate core course. While using the dialogue method, the course adapted case-based learning together with ethical decision-making throughout the entire semester. Both numerical and textual data were collected from the students throughout the course. The findings revealed that students found more value in the dialogue forums than a traditional lecturing method resulting in gaining mastery in professionalism and theories of ethics as part of their course learning outcomes. The findings indicated that student self-esteem in the subject matter improved as well. In addition, critical thinking skills of students showed a significant improvement. While students felt that they became more receptive to diverse viewpoints, they also felt more confident in public speaking.

Keywords: ethics, professionalism, critical thinking skills, cyberethics, IT.

1. INTRODUCTION

The advent of information and communication technologies not only marked the beginning of an era of powerful developments with a myriad of added benefits, but also brought with it increasing concerns of multitude of threats. Cyberspace has been defined as a community built on top of the Internet where sometimes users confuse their lives with their cyberspace existence (Lessig, 2018). While there is no sharp line dividing cyberspace from the Internet, there are common areas of concerns such as regulations by codes, stakeholders, attitudes, privacy, and security all of which need to be tackled by the frontiers of protection by cybercitizens (Lessig, 2018; Reynolds, 2014).

Spinello (2017) identified two underlying assumptions of the era of cyberspace: "1) the directive and architectonic role of moral ideals and principles in determining responsible behavior in cyber space, and (2) the capacity of free and responsible human beings to exercise some control over the forces of technology (technological realism)" (p.2).

Cyberspace raises questions related to the status of information as public or private property and its potential for simultaneously strengthening democracy and enabling new forms of surveillance that threaten privacy (Fuchs, Bichler, & Raffl, 2009). Since unethical behavior in IT knows no boundaries and college students are a growing portion of the population of cybercitizens studies, cyberethics becomes a necessity. By reinforcing professional and ethical responsibility the Accreditation Board for Engineering and Technology (ABET) has already underscored the magnitude of the concerns and the significance of teaching professionalism and cyberethics (ABET, 2017a, 2017b).

This study was derived from the significance of these increasing concerns for cyberethics and explored the experiences of students related to mastering professionalism and ethics in a Computer Science course. The data were collected from an undergraduate core course, *Professionalism and Ethics,* as part of a public university Department of Computer Science curriculum. The course objective was to provide students with a platform to understand the professional and ethical issues they would encounter in the workplace and in assuming their responsibilities in the profession.

As part of a 14-week course deliberate dialogue was adapted for case-based learning. Critical-thinking Assessment Test (CAT) introduced by Tennessee Tech (2018) was used throughout the course to determine student improvement in the area of critical thinking skills. The CAT assessment was selected since the criteria ranging from "evaluating information" to "communication" were pertinent to the profession. In addition, during the 14 weeks two forms were used to evaluate the value of deliberate dialogue and to critique the deliberative dialogue method. While one form collected numerical data, the second form collected rich textual data.

The student experiences revealed that deliberate dialogue was valuable when it came to mastering the course content by promoting interactions among students. Additionally, the method was instrumental in adding a multitude of skills related to professionalism and ethics.

2. LITERATURE REVIEW

National Center for Education Statistics (National Center for Education Statistics [NCES], 2018a) data on the overall college enrollment rate for young adults (18- to 24-year-olds) indicated an increase of 35% from 2000 to 41% in 2016. During this period, the rate increased from 26% to 31% at four-year institutions but did not change measurably at two-year institutions. The immediate college enrollment rate for high school completers increased from 63% in 2000 to 70% in 2016 (NCES, 2018b). Enrollment in the U.S. institutions of higher education increased to 20.2 million in the fall of 2015, followed with declined enrollment of 17.8 million in the spring of 2018 (The National Science Foundation [NSF], 2018; National Student Clearinghouse [NSC] Research Center, 2018). Data on the international undergraduate student enrollment during the same period revealed that international undergraduate enrollment increased consistently from nearly 350,000 in the fall of 2012 to nearly 451,000 in the fall of 2016, but dropped to about 441,000 by fall 2017.

Related to the field of Computer Science, similar enrollment growth was reported: "across the United States and Canada, universities and colleges are facing a significant increase in enrollment in both undergraduate computer science (CS) courses and programs" (Computing Research Association [CRA], 2017, p.1). As these numbers build up, it becomes an ethical and legal obligation for Computer Science programs to cultivate the right mindset for cyberethics. Including the challenges of economical impact, workforce demands, and immigration policy amendments, universities and colleges are saddled with bigger responsibilities not only in preparing their students for a globalized workforce, but also training them to make ethical decisions.

Professionalism
Professionalism is defined as communicating effectively and appropriately while finding ways to be productive and conducting oneself with responsibility, integrity, accountability and excellence (U. S. Code, 2018; The U.S. Department of Labor, 2018).

Kultgen (1988) reported that "sociologists have not found a scheme of classification that results in generalizations with any significant predictive power" (p.58). Various sociologist collected and

summarized many characteristics which are incorporated in more than one definition (Kultgen, 1988).

However, from the recent research, characteristics of professionalism is not just about possessing a college degree, title, certificate, and technical skill, but also includes a number of important characteristics applied to cyberspace and any type of business. Joseph (2018) listed 10 characteristics of professionalism as: appearance, demeanor, reliability, competence, ethics, poise, phone etiquette, written correspondence, organizational skills, and accountability. These characteristics comprise the needed basics for any professional entering into the 21st century workforce. The consensus is that students would be capable of earning these characteristics before students step into the workforce. This study took these views into account to analyze the IT experiences of students in their personal lives and working environments.

Cyberethics
In the real world, people live and work by obeying the laws of civil society, social perspective behaviors, and governmental regulations. Reynolds (2014) defined ethics as a set of beliefs about right and wrong behavior within a society. Whether it is doing the right thing or treating others the way one would like to be treated students need to be coached in ethical conduct in accordance with the standards of their profession.

In tackling the field of ethics, whether part of a science or a liberal arts curriculum, university programs reveal more similarities than dissimilarities. Thelin (2017) reported "one such mischaracterization is that "STEM" (science–technology–engineering–math) fields are apart from the liberal arts" (p. 54). This dis-engaged situation could impair the safety and welfare of students within a student culture since issues like sexual harassment, physical harm, and bodily injury along with the humiliation, exclusion, and rejection are the elements that cause alarm (Thelin, 2017).

Extending ethics to cyberspace, cyberethics is defined as four constraints which regulate users' behavior and include laws, norms, the market, and code (Lessig, 2018). In the regulation of cyberspace, the persons who play directive roles "should guide and direct the ways in which code, laws, the market, and social norms exercise their regulator power. The value of human flourishing is the ultimate constraint on our behavior in real space and in cyber space" (Spinello, 2017, p.7).

Since professionals in IT use tools which affect lives of others, all constituents are obliged "to minimize negative consequences of computing systems, including threats to health and safety" (Association for Computing Machinery [ACM], 2018, para. 1). It is a legal obligation for higher education programs to enforce these moral imperatives "when designing or implementing systems, computing professionals must attempt to ensure that the products of their efforts will be used in socially responsible ways, will meet social needs, and will avoid harmful effects to health and welfare" (ACM, para 1).

In addition to ACM moral imperatives, criteria for ABET set by ABET underscores the issue of cyberethics (ABET, 2017a, 2017b). These assessment criteria cover a wide variety of fields including Cybersecurity Engineering and Engineering programs; including, but not limited to, "Security," "Cybersecurity," "Computer Security," "Cyber Operations," "Information Assurance" or similar modifiers in titles related to "Information Security" (ABET, 2017a, p. 42).

ABET (2017a) reinforces professionalism and ethical behavior when developing curricula: "the curriculum must provide both breadth and depth across the range of engineering and computer science topics necessary for the: consideration of legal, regulatory, privacy, ethics, and human behavior topics as appropriate to the program" (p. 43). The importance of these steps demonstrates that teaching professionalism and ethics should be a priority as it is a moral imperative and a legal obligation for all higher education stakeholders.

Deliberative Dialogue
Deliberative dialogue is defined as "a face-to-face method of public interaction in which small groups of diverse individuals exchange and weigh ideas and opinions about a particular issue in which they share an interest" (American Institutes for Research [AIR], 2018, para. 2). In addition, deliberative dialogue provides a way for people of diverse views and experiences to seek a shared understanding of problems and to search for common ground for action (National Issues Forums [NIF], 2018). London (2018) explained that "deliberative dialogue differs from other forms of public discourse, such as debate, negotiation, brainstorming, consensus-building — because the objective is not so much to talk together as to think together, not so much to reach a conclusion as to discover where a conclusion might lie" (para.2).

There are increasing numbers of enterprises, institutions, and universities which apply dialogue to support company/campus development, and/or teaching strategies. For example, North Carolina Compact has used deliberative dialogue as a tool to build citizenship and community (Campus Compact, 2018). Wake Forest University (WFU) and West Kentucky University (WKU) utilize a deliberative dialogue program which has become central to the way in which the campus builds a community and engages in decision-making (WFU, 2018; WKU, 2018). Lone Star Community College in Texas also has many successful projects to motivate student learning in various courses using deliberative dialogue forums (Lone Star Community College, 2018). The college provides a way for community members of diverse views and experiences to seek a shared understanding of problem and search for common ground. Typical classroom setting dialogues are led by trained faculty, staff, and student moderators. Three or four broad approaches to a problem are expected to evolve from the discussion guideline. The students approach the issue by presenting the overall problem, examining what appeals to the team or what concerns them and what costs, consequences, and tradeoffs may be incurred in following that approach (Lone Star Community College).

Case-Based Learning

Without taking-risk there is no incentive for the discovery of new ideas or ways of thinking for this new generation of students. Raley and McKay (2017) echoed the intellectual risks for students increased through accountability for their own learning as well as that of their classmates. Students have to engage in complex thought processes, analyze and weigh disparate competing ideas to form sound, logical arguments which they could then present and defend (Krochmal & Roth II, 2017).

The course used in this study emphasized case-based learning by adapting the ethical decision-making process throughout the entire semester. Students worked in groups on each case study. Current events together with theoretical and foundational readings were used to make up the case studies. Krochmal and Roth II (2017) suggested "case studies related to human or environmental health are deeply integrative, combining aspects of science, public policy, ethics, business, economics, and potentially countless other disciplines" (p.113).

The new ways to approach resolving issues and providing analysis could be the best practice for future workforce employees. Bellas (2017) reported that one of the best indicators of a student's success after college "is the level of empowerment they feel to navigate the world with a sense of agency" (p.79).

One example of empowerment is succeeding within the college culture which serves as a central topic of American tradition of memoirs and fiction. This genre is rich with examples of concerns which provide social and behavioral scientists with an array of sources for systematic scholarly research (Thelin, 2017). Concerns like risk-taking, conformity, creativity, exploration, confidence, timidity, working within forms, fear of failure, avoiding hard work, learning how to navigate bureaucracies, as well as acquiring facts merely hint at the variety and often conflicting array of mixed messages college curriculums convey (Thelin).

For instance, training officers in the U.S. Navy and Marine Corps is another example wherein ethical training is necessary. Midshipmen will face moral, ethical, social, and inter-personal challenges as soon as they join their first unit. Therefore, these issues should be tackled head-on in classroom discussion (Gibb II, 2017).

Likewise, failing to mentor science students in thorough and universal questioning, critical thinking, and objective analysis represents a serious failure of our higher education system (Krochmal & Roth II, 2017)

Decision-Making Process

As part of the course, students were involved in ethical decision-making processes. The course used the five-step ethical decision-making process (Reynolds, 2017) related to the IT fields as follows:

Step 1. Develop Problem Statement: Gather and analyze facts without making any assumption. Identify stakeholders affected by the decision.

Step 2. Identify Alternatives: Involve others including stakeholders while in brainstorming stage.

Step 3. Evaluate and Choose Alternatives: Evaluate what laws, guidelines, policies, and principles would apply to each alternative. Foresee any possible impact on the employees, the organization, and other stakeholders.

Step 4. Implement Decision: Develop and execute an implementation plan. Provide leadership to overcome resistance to change.

Step 5. Evaluate Results: Evaluate results against selected success criteria. Predict any unintended consequences.

Each group of five to seven students practiced the five steps of the decision-making process to provide their group alternatives for each case-study. Moreover, the ethical theories and approaches were required to be included in their discussion.

Critical Thinking Skills
The course reinforced critical thinking skills as ample resources prove high impact educational practices involving students in active learning can contribute to gains in critical thinking. However, there is still a disconnect between the skills faculty want to develop using these activities and the way students are assessed in those courses (Haynes, Lisic, Goltz, Stein, & Harris, 2016). Haynes et al.(2016) argued "the assessment of students' critical thinking skills using an "authentic" faculty driven assessment where faculty can see student responses and simultaneously providing faculty development support can motivate faculty to focus more on the improvement of students' critical thinking skills" (p.46).

This study used the CAT introduced by Tennessee Tech (2018) which was "developed with input from faculty across a wide range of institutions and disciplines, with guidance from colleagues in the cognitive/learning sciences and assessment and with support from the National Science Foundation (NSF)" (para 1).

The Tennessee Tech faculty group also examined the validity of the CAT by comparing student performance on the test with other measures of academic performance to reveal critical thinking skills (Stein & Haynes, 2011).

The CAT guidelines are based on the following criteria: (a) Evaluating Information, (b) Creative Thinking, (c) Learning and Problem Solving, and (d) Communication. For criteria (a) and (c), the key terms regarding professionalism and ethics were evaluated and students were awarded points to determine if each mentioned term was supported with solid references.

For criteria (b) and (d) the points were issued based on the creativity of each proposed alternative solution and how these ideas were evaluated by the students. The pre-CAT assessment grading points are listed in Appendix A, and the post-CAT assessment grading points are listed in Appendix B.

3. METHODOLOGY

To deliver the concept of professionalism and cyberethics and increase the critical thinking skills for the undergraduate students the deliberative dialogue teaching method was used for a required Computer Science core course in the spring 2018 semester. The assessment instruments were designed to evaluate two areas. One was the individual learning growth in critical thinking skills assessed through completing four CAT exams throughout the semester. The second was two surveys regarding the deliberative dialogue format conducted at the end of the semester. The semester ending surveys included Form I, a quantitative questionnaire, and Form II, a qualitative discussion format.

The course initially had a total of 32 students with 31 students completing the course. Three were female and the remaining 28 were male. All students were seniors majoring in Computing Science, Computer Software Engineering Technology, or Digital and Cyber Forensic Engineering Technology under the Department of Computer Science.

Data Collection
The researchers collected both numerical and textual data by means of two sets of instruments throughout the course including the CAT Form I, and Form II to explore student experiences related to learning professionalism and ethics. This course adopted the textbook of *Ethics in IT* (5th Edition) by Reynolds, G. W.

A total of four CAT exams were distributed and required to be submitted through the learning management system, Blackboard. Pre-CAT and post-CAT exams were scheduled at the beginning and at the end of the semester respectively.

During the semester, two CAT exams covering five teaching topics were assessed. The students received the case study for CAT on a Thursday class and submitted their essays by the following Tuesday.

The principal researcher (who was also the instructor of the course) graded the CAT assessments collected from students according to the guidelines. After studying a given case, students submitted essays to illustrate their thinking process. The expected key words and concepts from the CAT included the ethical theories, approaches, and five steps of the decision-making process. The expected criteria were tallied to total their CAT scores.

Classroom Teaching Practices
The format of teaching pedagogy related to deliberative dialogue and CAT was designed in three phases:

1. Educate the students to be competent moderators in directing group discussions. Faculty members were trained before implementing this teaching strategy.
2. Select appropriate case studies for each learning module. Each separate study discussion was led by a different moderator.
3. Complete CAT assessment for one pre-CAT, one final CAT, and two CATs covering individual learning modules.

In addition, at the end of the semester two forms of survey were given to students. Form I collected data on the value of the deliberative dialogue forums, and Form II asked for constructive critique about the focus group, deliberative dialogue teaching method.

Form I was put up online at the beginning of the class. A total of 20 students submitted their input in the first five minutes of the class. Thirty minutes prior to class ending, every group of five students participated in the Form II survey. A total of 25 students presented and participated in the team discussions.

Form I
Form I was a quick online survey made up of five statements based on a five-point Likert-scale using Google Form. The students taking the course reviewed these statements and provided their scores based on their experiences concerning deliberative dialogue in learning professionalism and ethics in IT fields. The survey included the following instructions:

Form I: Please provide a score of 1 to 5 for each statement. 1 being the least value and 5 being the highest value.

1. *I appreciated the Deliberative Dialogue forums more than a traditional lecturing method.*
2. *I have gained a good learning experience in comprehending the ethic theories through the Deliberative Dialogue forums.*
3. *This Deliberative Dialogue forum improves my critical thinking skills.*
4. *I have learned to accept and understand diverse views and points.*
5. *I have gained self-confident in public speaking and improved self-esteem in the subject matter through the Deliberative Dialogue forums.*

Form II
Buck Institute for Education (2018) shared the findings in implementing the *project-based learning* (PBL) approach, also known as challenge-based learning which is to design, assess, and manage projects that engage and motivate students.

Learning in a collaborative manner has become a preeminent way of teaching and learning in the past decade. Therefore, an appropriate assessment method plays an important role of improving teaching and learning. One constructive criticism is to emphasize growth and encourage improvement by asking the participants to critique the contents with the statements starting with "I like that…; I wonder if…; and I suggest…" (Hernandez, 2016, para. 17). This course adapted the constructive criticism format in seeking feedback from the students.

Form II was designed to include focus group discussions. A total of five groups of five to seven members were formed. Each team decided on a group moderator and note-taker. Groups were allotted 20 minutes to provide their team input. Each group answered the short format of discussions followed by the project-learning based format, and provided a team summary. The team input was then quantified by the researchers to count the key-word frequencies used among teams. The focus group instructions and cues used in Form II were as follows:

Form II: Regarding to the deliberative dialogue forums for this course, please provide your team input using the following cues.
I like……
I wonder …….
I suggest …….

Reliability and Validity
This research adapted two sets of instruments to evaluate the student experiences which included a range data from mastery of professionalism and ethics to critical thinking skills.

One instrument, CAT, adapted from the NSF (2018), was designed to assess the students' critical thinking and reasoning skills by giving them case study scenarios. The instrument was provided by the NSF's CCLI (Course, Curriculum, and Laboratory Improvement). Based on the NSF report "all of the questions are derived from real world situations. Most of the questions require short answer essay responses, and a detailed

scoring guide helps ensure good scoring reliability" (para 2).

The other instrument the researchers used, Form II, adapted the project-based learning to the purpose of collecting the students' constructive critique regarding the deliberative dialogue forums.

This survey was an anonymous survey which protected the identification of the students who participated in this study.

4. FINDINGS

4.1. Value of Deliberative Dialogue Through Form I

This study investigated student experiences regarding the deliberative dialogue forums as a teaching strategy in learning professionalism and ethics for IT fields by means of Form I. At the end of this course, there were 20 participants who completed the online Form I survey individually.

The online survey used a scale of 1 to 5 and yielded the following data for each statement:

Statement 1 of the survey: *I appreciated the Deliberative Dialogue forums more than a traditional lecturing method.*

Of all the students who filled out the survey, 75% of the respondents had scores of 4 or 5. The average score of all respondents was 3.9. One implication is that the group who issued lower scores could serve as valuable feedback to faculty regarding improving the deliberative dialogue forums in a more effective manner. This would entail encouraging students who have less appreciation for the method to understand the value of the method and how it might serve them.

Statement 2 of the survey: *I have gained a good learning experience in comprehending the ethic theories through the Deliberative Dialogue forums.*

Of all the students who filled out the survey, 80% of the students responded with scores of 4 or 5. The average score of all respondents was 4.15. These responses firmly recognize that the deliberative dialogue forum was worthy for the faculty to prepare for many current case studies in order to achieve the learning outcomes of the course.

Statement 3 of the survey: *This Deliberative Dialogue forum improves my critical thinking skills.*

Of all the students who filled out the survey, 80% of the students responded with score of 4 or 5. The average score of all respondents was 4.25. These responses also explained the positive outcomes received from the students' final CAT results.

Statement 4 of the survey*: I have learned to accept and understand diverse views and points.*

Of all the students who filled out the survey, 80% of the students responded with score of 4 or 5. The average score of all respondents was 4.45. This response encourages higher education institutions and faculty to use the deliberative dialogue forums to encourage more students to accept diverse perspectives and viewpoints.

Statement 5 of the survey: *I have gained self-confident in public speaking and improved self-esteem in the subject matters through the Deliberative Dialogue forums.*

Of all the students who filled out the survey, 75% of the students responded with score of 4 or 5. The average score of all respondents was 4.10. This response provided a positive feedback regarding introducing students to the professional and ethical issues they will face when they leave the relatively free and open collegiate environment to enter the workforce where ethical issues and professional etiquette are a daily concern.

4.2. Evaluation of Deliberative Dialogue Through Form II

For Form II, the students formed into five groups made up of five to seven members per group. A total of 25 students participated in discussing and completing the following cues and providing critique regarding the dialogue forums.

Form II: Regarding the Deliberative Dialogue forums for this course, please provide your team input for the following items.
I like……
I wonder …….
I suggest …….

4.2.1. Forum II- Cue: *I Like*

Regarding the Deliberative Dialogue forums for this course, please provide your team input for the following items.
I like……

The key words from the team input regarding "I like….." were quantified based on the categories including *Group Interaction* (N=7), *Diversity Acceptance* (N=2), *Out of Comfort Zone* (N=4),

Class Format (N=4), and *Engaging Learners* (N=4).

The findings for each category are listed as follows:

Group Interaction
The students expressed that they liked working as a group to review and analyze the case studies. The students had opportunities to interact with different teammates. Since students kept their name tags on for an entire semester, they were able to get to know and interact with newer members every class. Moreover, through group interactions, the students improved their teamwork skills.

Diversity Acceptance
The students learned how to hear opposing viewpoints and understand different people's perspectives related to real life problems.

Out of Comfort Zone
The students liked to be challenged in practicing their public speaking skills which forced them to interact with others, and pushed them out of their comfort zones.

Class Format
The students liked the overall format of the entire course as it offered flexible arrangements for case-study reporting timelines and homework. In addition, the students mentioned that they liked that the instructor tried this new format of learning professionalism and ethics.

Engaging Learners
The students expressed their appreciation in engaging more by applying real world cases on ethics, and indicated that they learned a lot of new ideas from others.

Based on the instructor's observation, all of the aforementioned categories indicated that students were able to achieve their learning outcomes and master professionalism and ethics.

4.2.2. Forum II- Cue: *I Wonder*
The key words from the team input of "I wonder….." were quantified based on the categories of *Other Classes* (N=3), *Case Studies* (N=1), *Lecture Format* (N=1), and *Real Life* (N=1).

The findings for each category are listed as follows:

Other Classes
The students were inquisitive regarding how other classes tackled the deliberative dialogue forums. Students also wondered whether the students in other classes would be more accepting of this method when it came to learning course content.

Case Studies
The students also wondered whether they could have more of a variety in the case studies used. The students indicated that they could learn more about other cases from different teams when they reported the team solutions. The instructor deemed it would only be applicable if there were well-formed databases including real-life case studies covering various topics on professionalism and ethics.

Lecture Format
The students also wondered what this class would be like in a lecture format. The interactions included comments related to how easy it would be to imagine the outcomes of a typical lecturing format covering ethics theories, social responsibilities, regulations, and other theory-based topics. The comments included realistic views on how most computer science students would function in a typical lecture setting on ethics. Most agreed it would lend many to have their heads down working on their laptops or cell phones.

Real Life
The students wondered whether this course actually prepared them for real world/life after college. A follow-up with a phenomenological design covering the period a few years after the students' graduation would offer meaningful results regarding this category.

4.2.3. Forum II- Cue: *I suggest*
The key words from the team input of "I suggest….." were quantified based on the categories of *Time* (N=5), *Case* (N=3), and *Assignments* (N=4).

Time
The students suggested more time for discussions, finding resources, interviewing, and presenting. A 90 minute-class time included a class format comprised of a 30-minute lecture, a 40- minute discussion, and a 20 minute-presentation. Some groups suggested having one class time covering lectures, and one class time conducting deliberative forums.

Case
The students suggested that the case studies could be expanded for more discussions and presentations. Also, more diverse topics and relevant case studies were suggested as part of group discussions and presentations.

Assignments
The students suggested specific key words for discussions and the CAT assessments. One group even suggested omitting CAT assessments. However, due to the pre-and post- comparison, the CAT assessments proved to be valuable in assessing student critical thinking skill growth.

4.3. Critical-Thinking Skills Assessment
The CAT was administered throughout the semester. Two additional CAT assessments based on the teaching topics and learning objectives of the course were designed in a similar way of pre-CAT and post-CAT assessments.

Pre-CAT
The pre-CAT scoring is designed to analyze the following categories (See Appendix A).

1. Were Nokia's leaders acting ethically when they moved their facilities from Germany to Romania and from Romania to Asia which was based on a business decision to reduce costs and improve profits? What ethical theories could apply to this case? Agree or disagree, please explain the reason/s and related theories. (0 - 2 points)

Scoring Point 0: No confirmation stating "agree" or "disagree."
Scoring Point 1: Apply one reason with one related theory.
Scoring Point 2: Apply more than 2 reasons with related theories.

2. What kind of responsibilities does the Nokia's leaders have regarding to the issues in the past years? (0 - 5 points)

Scoring Point 0: None of corporate social responsibilities (CSR) were introduced.
Scoring Point 1: Apply one CSR with applied approaches/theories.
Scoring Point 2: Apply two CSR with applied approaches/theories.
Scoring Point 3: Apply three CSR with applied approaches/theories.
Scoring Point 4: Apply four CSR with applied approaches/theories.
Scoring Point 5: Apply five CSR with applied approaches/theories.
3. Can the organization leaders correct their business pattern of not focusing on customers'

needs? How difficult is it to ensure ethical decision making in a business that is organized as a "network of equals"? How does this impact accountability? Provide the ethical considerations in decision-making. Appropriate ethical framework should be included.

Step 1. Develop Problem Statement (0 - 1 point)
Score Point 0: Missing well-defined problem statement.
Score Point 1: Well-defined problem statement.

Step 2. Identify Alternatives (0 - 3 points)
Score Point 0: No alternative was presented.
Score Point 1: One alternative was presented.
Score Point 2: Two alternatives were presented.
Score Point 3: More than two alternatives were presented.

Step 3. Evaluate and Choose an Alternative (0- 3 points)
Score Point 0: No alternative with evaluation was presented.
Score Point 1: One alternative with detailed evaluation was presented.
Score Point 2: Two alternatives with detailed evaluation were presented.
Score Point 3: More than two alternatives with detailed evaluation were presented.

Step 4. Implement Decision (0 - 2 points)
Score Point 0: No recommended implementation procedure was presented.
Score Point 1: The implement plan was presented, but without introducing the procedure.
Score Point 2: The implement plan and procedure were presented.

Step 5. Evaluation Results (Provide the possible outcomes from your analysis.) (0-2 points)
Score Point 0: No predicted results and evaluation for the implementation was presented.
Score Point 1: The predicted result(s) was/were presented, but missing the evaluation for the implementation.
Score Point 2: The predicted results and evaluation for the implementation were presented.

Post-CAT
The post-CAT scoring is designed to analyze the following categories (See Appendix B).

Disregarding how many awards and praises Tribeka Ltd. received in the past, as a project manager, please use the 5 steps of ethics decision-making process to list the possible catastrophes and propose an alternative of overcoming the identified catastrophes.

Critical Thinking Skill (Scoring Sheet)
1. Agree or disagree with the company's future direction, please explain the reason(s) and related theories. (0 - 2 points)

The scoring point system used was the same as the Pre-CAT scoring mentioned above.

2. What kind of responsibilities do company leaders have regarding possible catastrophes? (0 - 5 points)

The scoring point system used was the same as the Pre-CAT scoring mentioned above.

3.   Provide the ethical considerations in decision-making. Appropriate ethical framework should be included.
I.   Develop Problem Statement (0 - 1 point)
II.   Identify Alternatives (0 - 3 points)
III.   Evaluate and Choose An Alternative (0- 3 points)
IV.   Implement Decision (0 - 2 points)
V.   Evaluation Results (Provide the possible outcomes from your analysis.) (0-2 points)

The scoring point system used was the same as the Pre-CAT scoring mentioned above.

The original CAT assessment point system was converted to a 100-point scale. The students' average CAT assessment grades improved from 67.03 to 74.34. These assessment scores indicated that there was a significant improvement regarding students gradually grasping the importance of applying knowledge from what they have discussed in the deliberative dialogue forums into their decision-making process.

In addition, the findings related to pre-CAT and post-CAT comparison results were as follows. The pre-CAT exam average score was 12.83 (N=27) from a possible score of 18 points. Overall, the students were not able to communicate their creative alternatives with references and support. Moreover, the key terms of professionalism and ethics were not presented, although the exam was a take-home online research exam. At the end of this course, the post-CAT exam average score was 15.61 (N=29) from a possible 18 points. The results showed that more students applied knowledge of social responsibilities and theories of ethics to practice on the professional decision-making process. The chart below showed that the number of students who earned less than seven points dropped from eight to five. More students earned 11, 12, and 14 points from the post-CAT results (see Figure 1).
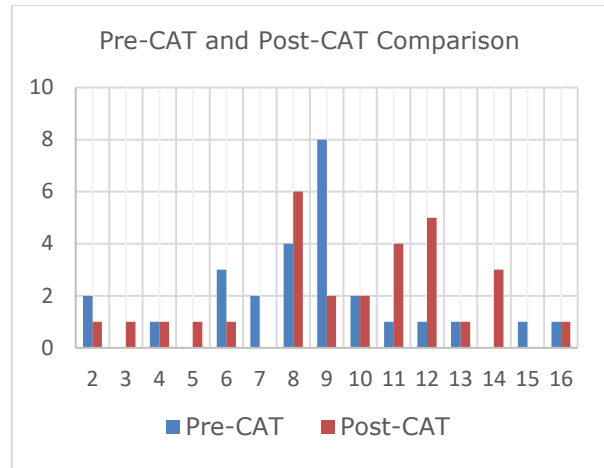

Figure 1. Pre- and Post-CAT Comparison

5. CONCLUSIONS

This research showed that 75% to 80% of the Computer Science senior students in their *Professionalism and Ethics* course evaluations (five-point system) provided high points concerning the implementation of deliberative dialogue forums.

In addition, critical thinking skills of students were improved significantly through the practices of case-study and deliberative dialogue forums.

This research was based on 32 enrolled students in a 58-seat classroom. When the class began, the noise level of group participation was high. Each group was engaged in sharing their input. The vibrant discussions, the focus of the students' eye contact, and friendly approaches were observed during the deliberative dialogue time. If this teaching format were applied to a larger class, a bigger classroom would be needed to allow the instructor to walk around the groups and have enough space as to prevent the noise from disrupting neighboring groups.

Based on the size of the class, each student (moderator) had three rotations to lead the small group. Each rotation was designed to have the moderator present the group discussion in different format, such as a written report, verbal presentation, and digital presentation through various technology. The moderator's verbal and digital presentations were graded by peers. But the written report was graded by the instructor.

The main value of this moderating rotation was that the group members were required to participate in the dialogue and follow up with reference support. Therefore, each member fulfilled their duties to support the designated

moderator role. This format also promoted sportsmanship of within the group.

The findings revealed that the students valued the deliberative dialogue forums much more than a traditional lecturing method. Students showed significant improvements in comprehending the ethics theories, in using their critical thinking skills, and in being more receptive to diverse viewpoints. Moreover, this pedagogy increased the students' self-confidence in public-speaking and self-esteem in their subject matters.

However, there are some challenges faculty might consider overcoming when considering using this method. Supporting an innovative teaching method to increase student engagement might affect faculty assessment and evaluation. Deliberative dialogue forums require substantial faculty preparation time prior to each lesson. The students who are skeptical of being exposed to a new approach might resist this method as it requires them to take responsibility for their learning. This challenge is backed up by Thelin (2017) who stated that "college often is characterized as a time and place where students are given both the latitude and obligation to explore and make choices (and mistakes)" (p.86).

Future study would be to continue the research by exploring how a course such as this one could prepare students for the real workforce and life with their improved critical thinking skills and cyber ethical value.

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APPENDIX A

Pre-CAT: Ethical and Business Setbacks for Nokia (Adapted from Renolds, 2017, p. 32)

I.   On the morning of September 5, 2012, Nokia staged a press conference in New York City to announce the official launch of its new Windows 8 smartphones, the Lumia 920 and 820. The event focused heavily on the phone's PureView camera technology. Videos played at the press conference and online emphasized the phone's stabilizing technology. One advertisement in particular extolled the steadiness of the smartphone's camera with a video showing a woman bicycling by a riverbank in Helsinki, supposedly shot on a Lumia 920 by a young man bicycling beside the woman. However, the online tech magazine The Verge decided to take a closer look at the video, and while examining it, a researcher for the magazine noticed a reflection in a window of a trailer behind the woman on the bike. The reflection showed a young man not on a bicycle, but rather in a van – holding a large camera. Further investigation revealed that the shot was taken by a Steadicam, a professional motion picture camera, held by a cameraman in the van. By 4:30 pm. Eastern time, the word was out. And by 8:00 p.m. the same day, Nokia had updated the video with a disclaimer and issued a formal apology.

        Five days after the Lumia advertisement fiasco, Nokia announced that it would conduct an ethics review of the incident. "What we understand to date is that it was nobody's intention to mislead, but there was poor judgment in the decision not to use a disclaimer." Nokia spokesperson Susan Sheehan said. She refused to identify the company responsible for producing the advertisement and stated that Nokia would conduct its investigation "quickly, fairly, and privately." The company quickly concluded its investigation, but has not revealed the results of its investigation, other than to acknowledge that "poor judgment" was used. Nor has Nokia not made public any ethics initiative or punitive measures taken as a result of the false advertisement.

II.   Nokia announced in 2007 that it was moving production from its facility in Bochum, Germany, to the relatively low-wage environment of Romania. A consumer backlash ensured. The company was eventually required to pay 60 million Euros ($93 million) back to the German state for subsides paid to the company for locating its facilities in Germany. In addition, a boycott was organized by German trade unions, and several cabinet ministers publicly changed to other brands of cell phones. Nokia saw its share of the German smartphone market drop from 70 percent to 50 percent between the factory closure announcements. At the end of 2009, ironically, Nokia's 2011 decision to close the Romanian facility and move manufacturing to Asia met with similar reactions in Romania.

III.   In 2008, Nokia Siemens Networks, a joint venture between Nokia and Siemens AG, reportedly provided Iran's monopoly telecom company with technology that allowed it to intercept the Internet communications of its citizens to an unprecedented degree. The technology enables the Iranian government to monitor voice calls, text messaging, instant messages, and Web traffic. Nokia officials insisted that the system constituted "a standard architecture that the world's governments use for lawful intercept" and added that the company had refused to sell the technology to the governments of Burma and China. However, in June 2009, the emerging pro-democracy movement in Iran organized a boycott of Nokia devices and messaging services. Finally, on June 2, 2010, Nokia Siemens Networks held a press conference to apologize for the role its technology played in the brutal crackdown on Iranian demonstrators the year before. In late 2011, Nokia-Siemens Networks announced that it would begin to reduce its business commitments in Iran and would no longer take on any new business with Iranian customers.

        The last several years have also been a time of unprecedented financial upheaval for Nokia. Since 2009, Nokia has lost over a third of its revenues, downsized its workforce by about 25 percent, and seen its market capitalization drop by over $100 billion. While the Lumia line of smartphones continues to be the market leader in Europe, Nokia's share of the U.S. market has dropped to less than one percent. The public's response to Nokia's poor ethical decisions has cost the company heavily. The question remains whether Nokia will learn

from its current troubles and adapt quickly enough to satisfy its customers, shareholders, and other stakeholders.

Critical Thinking Skill (Scoring Sheet)
1.   Were Nokia's leaders acting ethically when they moved their facilities from Germany to Romania and from Romania to Asia which was based on a business decision to reduce costs and improve profits? What ethical theories could apply to this case?
Agree or disagree, please explain the reason/s and related theories. (0 - 2 points)

2.   What kind of responsibilities does the Nokia's leaders have regarding to the issues in the past years? (0 - 5 points)

3.   Can the organization leaders correct their business pattern of not focusing on customers' needs? How difficult is it to ensure ethical decision making in a business that is organized as a "network of equals"? How does this impact accountability?
Provide the ethical considerations in decision-making. Appropriate ethical framework should be included.

I.   Develop Problem Statement (0 - 1 point)
II.   Identify Alternatives (0 - 3 points)
III.   Evaluate and Choose an Alternative (0- 3 points)
IV.   Implement Decision (0 - 2 points)
V.   Evaluation Results (Provide the possible outcomes from your analysis.) (0-2 points)

APPENDIX B

Post-CAT (Adapted from online resource)
ttp://www.wipo.int/ipadvantage/en/details.jsp?id=905

The mission of the World Intellectual Property Organization is to promote innovation and creativity for the economic, social, and cultural development of all countries, through a balanced and effective international intellectual property system. You just received a promotion to be the project manager of risk-prevention from any catastrophe in the future. Review the case study below; be familiar with the regulations among intellectual property in the U.S. and internationally; and then propose a plan to prevent any disaster occurred.

Revolutionizing Digital Content Distribution using Patented Technology
http://www.wipo.int/ipadvantage/en/details.jsp?id=905

Disregarding how many awards and praises Tribeka Ltd. received in the past, as a project manager, please use the 5 steps of ethics decision-making process to list the possible catastrophes, and propose an alternative of overcoming the identified catastrophes.

Critical Thinking Skill (Scoring Sheet)
1.   Agree or disagree with the company's future direction, please explain the reason/s and related theories. (0 - 2 points)
2.   What kind of responsibilities does the company leaders have regarding to the possible catastrophes? (0 - 5 points)
3.   Provide the ethical considerations in decision-making. Appropriate ethical framework should be included.

I.   Develop Problem Statement (0 - 1 point)
II.   Identify Alternatives (0 - 3 points)
III.   Evaluate and Choose an Alternative (0- 3 points)
IV.   Implement Decision (0 - 2 points)
V.   Evaluation Results (provide the possible outcomes from your analysis.) (0-2 points)