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An Ethical Assessment of Computer Ethics Using Scenario Approach*

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ABSTRACT

Ethics refers to a set of rules that define right and wrong behavior, used for moral decision making. In this case, computer ethics is one of the major issues in information technology (IT) and information system (IS). The ethical behaviour of IT students and professionals need to be studied in an attempt to reduce many unethical practices such as software piracy, hacking, and software intellectual property violations. This paper attempts to address computer-related scenarios that can be used to examine the computer ethics. The computer-related scenario consists of a short description of an ethical situation whereby the subject of the study such as IT professionals or students, then rate the ethics of the scenario, namely attempt to identify the ethical issues involved. This paper also reviews several measures of computer ethics in different setting. The perceptions of various dimensions of ethical behaviour in IT that are related to the circumstances of the ethical scenario are also presented.

Keywords: Computer-related Scenario, Ethical Assessment, Computer Ethics

1. INTRODUCTION

Advances of information technology (IT) have given people more power than ever before. Today, most jobs involve using computers, with computer technology having penetrated all areas of education, business, and industry. Nevertheless, IT advancements

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without integrity and ethics are pushing people towards wane (i.e. gradually lose power or importance), and at the same time the chance for unethical use increases. Computer misuse and abuse are expected to continue in the future. These unethical activities will cause harm to many individuals and society. Examples of negative uses of technology include hacking, spam, denial of service attacks, identity theft, and unauthorized duplication of software.

Researchers have employed several techniques to assess the ethical use of computers or IT. The most popular technique is called the ethical scenario. Scenarios related to the field of computing were first illustrated by John Parker [1], who conducted a workshop attended by computer scientists, psychologists, sociologists, and lawyers. The workshop's aim was to develop the concepts of unethical practices that prevail in the computer science and technology fields. The results could then be used to develop proper codes of ethics.

Several studies have gauged the ethics of computer use using the scenario method [2-6]. According to Ellis and Griffith [6], the scenario method which is borrowed from the ethics case approach, comprises a short description of an ethical situation. An experimental subject will rate the ethics of the scenario using a single scale item with 2-to-7 point responses with endpoints of ethical and unethical. Kreie and Cronan [7] used the scenario method to study gender differences in evaluating ethical dilemmas. Thong and Yap [8] used a single scenario to study ethical decision-making associated with making illegal copies of copyrighted software. Ellis and Griffifth [6] utilized a multidimensional scale ethics measure to seven IT related scenarios developed by Guthrie [9]. The purpose of this study, therefore, is to provide appropriate computer-related scenarios that can be used to examine the computer ethics in the Malaysian context.

The structure of this paper is as follows. A review of computer ethics is provided, followed by computer-related scenarios. The ethical circumstances and other measures of computer ethics are then described. The paper closes with a conclusion.

2. COMPUTER ETHICS

Computer ethics is defined as ethics regarding use of the computer and IT. Studies on computer ethics have been primarily carried out in the developed countries; there appears to be a lack of studies in developing countries. Today, however, increased use of information technology (IT) has a great impact on people, organizations, and society in both developed and developing countries.

Computer ethics is a major issue that emerged with an increase in computer and information technology. It can be defined as a category of professional ethics similar to medical, legal, teaching, and accounting ethics. For computer ethics, however, the primary "good" is information. According to Langford [10], ethics motivate individuals to think through their attitudes and beliefs and thus decide in advance whether their opinions are appropriate or not. Once this is decided, individuals should then be prepared to fully accept responsibility for their actions and conducts. The full range covered by computer ethics studies can be characterized as: (1) the central core of academic computer ethics research and academic philosophy, and (2) less philosophically-inclined material.

Computer ethics is a complex field to address because it is not based on solid rules that can be monitored. Al-A'ali [3] argued that the main ethical issues related to IT are associated with hacking, privacy, software piracy and IT personnel work ethics. Further, he asserted that the ethics and IT involve additional issues, including:

- Computer professionals' responsibilities towards their employers and their clients.
- Proper documentation of software by designers and developers.
- Proper testing of software by designers and developers.
- Handing over of systems to clients.
- Designers and developers leaving a computer project before it is complete.
- Providing maximum software security of software to clients.
- Computer professionals honoring the proprietary issues relating to the algorithms, procedures and data.
- Computer professionals working towards accurate systems with the aim of complete data integrity.
- Computer professionals' involvement in developing systems aimed at unethical ends.

Computer ethics is also involved in proactive disclosing the moral properties embedded in computer systems that later lead to ethical issues and dilemmas [11]. Existing moral theory needs to be modified, therefore, the new moral theory developed. Existing moral theory is insufficient in light of new demands generated by new and persistent IT practices.

3. COMPUTER-RELATED SCENARIO

In general, an "ethical scenario," and sometimes called a case study is a short narrative of events that involve one or more ethical issues. In the current situation, many codes of ethics are either a very general statement that is difficult for employees to translate into individual situations. Also, in some cases employees view ethical statements with a certain denial of responsibility [12]. According to Lorents, Maris, Morgan and Neal [13], acquiring understanding of ethical issues is best accomplished through the use of scenarios. A scenario is a description of a situation and a resulting action [14]. The scenarios must be specific and engage the participant. The intent is that a person (either a student or an employee) reading such a scenario is expected to analyze the participants' action and arrive at a judgment concerning their ethical nature [15].

In this paper, the term "computer-related" scenario is used interchangeably with "IT-related" scenario. A seven of IT-related scenarios as shown in Table 1, as developed by Guthrie [4] is presented and discussed below.

The seven scenarios as listed in Table 1 will be used to test this study's hypotheses related to the ethical circumstances discussed in the next section.

A study conducted by Lorents et al. [13] used computer-related scenarios developed by Paradice [16] to examine how perceived motivation affected student ethical evaluations. The computer-related scenarios described unauthorized access to computer systems or using computers to illegally copy or distribute copyrighted materials. Alternative scenarios created the focus on intent. The type of access or copying was identical, but the individual's motivation and how the unauthorized access occurred or illegal copies made varied. The varied motivations included:

- Intellectual curiosity
- Malicious use of resources
- Obtaining resources for personal use
- Illegal copying to support non-profit activities
- Obtaining resources for profit

Paradice [16] defined three motivations for unethical behavior: obligation, opportunity, and intent. Three scenarios related to "opportunity" are given in Table 2.

Table 1. IT-related Scenario

No.	Scenario	Scale Used
1.	A bright graduate student developed a tool that would contact corporate sites, scan their networks, and find flaws in their security system. He made the software available to everyone, including hackers and cyber-criminals, over the Internet. Corporations felt he was assisting criminals. He felt he was providing a tool for network managers to troubleshoot their security systems.	Multidimensional (Multiple item ethics scale)
2.	A popular Internet service provider offers on-line registration. Any user with a modem can dial the Homelink Network and register for Internet service from their computer. What the users do not know is that as part of registration, Homelink scans their hard drive assessing their system for potential new software marketing opportunities.	
3.	Ruth likes to play lots of practical jokes. Once she tried to log on to Jim's account, guessing his password was his wife's name. She got directly into his account. She then wrote a program that would flash the message "There is no Escape" every time the escape key was pressed. Jim found the joke in a few days and was mad.	
4.	Joe is giving an on-line demonstration in which he uses software that was licensed for 90 days. Prior to giving the seminar, he has noted that the license would expire. Rather than pay the licensing fee, he changes the date on his computer, effectively fooling the software into believing it is at the beginning of the licensing period.	
5.	Anna needs software to convert TIFF formatted images to GIF format. She found an excellent piece of shareware and has used it once to convert the images. The shareware developer requests that she sent $5 if she likes and uses the software. She has not sent a check to the developer to date.	
6.	Joan is a programmer at Xcorp, Inc. While working late one night, she notices that her boss has left his computer on. She enters his office to turn of the monitor and finds that he is still connected to his electronic mail. She scans the message briefly noticing whom they are from and what the topics are. One message in particular catches her eye. It is regarding herself in an unflattering way.	
7.	Jim was recently fired from The Spot, a national discount department store. Jim is a techno-savvy guy who felt he was wrongfully fired. His protest against The Spot was to create a web page called "This Spot Unfair" and to state his case to the world about The Spot's unfair treatment.	

Table 2. Scenarios Related to Opportunity

No.	Situation	Scenario	Action
1.	Opportunity to Obtain Software	An employee is given a PC at work but not all of the software needed to do his/her job.	The employee copies licensed software from a friend outside of the company to use at work.
2.	Opportunity for unauthorized use	An employee discovered a way to access all accounts on the company computer system. This flaw in the system security was reported to the appropriate authorities in the company.	Until the problem was corrected, the employee continued to "browse" the system.
3.	Opportunity for destructive behavior	Many workers who use the computer system in the company do not take the time to log out properly.	A systems programmer decided to teach the workers a lesson by locking out those who had violated the log out procedure for 24 hours with a message indicating why they were locked out of their accounts.

Lorents et al. [13] then redefined the ethical factors (replacing the original motivations defined by Paradice [16] as:

- Infringing on software licenses.
- Using computer technology illicitly (writing and disseminating viruses or causing a system to crash).
- Misusing corporate resources.

An example of the scenario (Lorents et al.'s redefined factors) wording with sub-scenarios and response choices is illustrated in Table 3.

Details of the seven ethical scenarios Lorents et al. [13] developed are presented in Table 4. The study focuses on a single measure of ethical.

Table 3. An Example of Scenario

A student suspected and found a loophole in the university computer's security system that allowed him to access other students' records. He told the system administrator about the loophole, but continued to access others' records until the problem was corrected 2 weeks later.
A. The student's action in searching for the loophole was
B. The student's action in continuing to access others' records for 2 weeks was
C. The system administrator's failure to correct the problem sooner was
1) very ethical 2) ethical 3) somewhat ethical 4)questionable
5) somewhat unethical 6) unethical 7) very unethical

Table 4. Computer-related Scenarios

No.	Scenarios	Scale Used
1.	*Loophole in Computer System* A. Students searches for loophole. B. Student accesses other student's records. C. System administrator fails to correct problem on a timely basis.	
2.	*Company Manager Using a Competitors Similar Services* A. Tries to break security system to cause competitors system to crash. B. Used access to identify customers for sales prospects.	
3.	*Programmer at Bank Makes Change in Code to Eliminate a Fee* A. Code is changed back to original as soon as the balance is updated.	
4.	*Population of "Bots" on Computers Using the Internet* A. Causes a website of a company with questionable labor and environmental practices to be unavailable for a few hours. B. Causes infected PCs in companies to calculate Pi to 8 billion decimals when those PCs have idle resources. C. Causes degraded service of an online site for hours, and demand a ransom to remove the "bots".	Single-item ethics scale
5.	*Student's use of Software for Educational Use Only* A. Uses the software as a volunteer for charitable organizations. B. Uses the software for correspondence and job search activities. C. Uses the software for a for-profit business services company she started.	
6.	*Download of a Music CD by a Famous Artist on a Major Record Label* A. Uses the music on personal PC and MP3 player B. Sends copies of music to 3 friends. C. Makes copies of music available to anyone accessing his website. D. Makes copies on CDs and sells them.	
7.	*Purchase of CD Sold by a Local Band* A. Makes copies on CD to give to friends. B. Sends copies on CD to anyone requesting the CD. C. Makes copies on CD and sells them.	

Six additional computer-related scenarios were developed by Ellis and Griffith [6] to examine ethics in various information systems (IS)-related situations. These scenarios are illustrated in Table 5.

Table 5. IS-related Ethics Scenarios

Scenario 1	A programmer developed a tool that would contact corporate sites, scan their networks, and find flaws in their security system. The programmer made the software available to everyone over the Internet. Corporations felt the programmer was assisting hackers and cyber-criminals. The programmer felt that he was providing a tool for network managers to trouble shoot their security systems.
Scenario 2	A popular Internet Service Provider (ISP) offers online registration. Any user with an Internet connection can access the Hookyouup Network and register for Internet service. What the users do not know is that as part of registration, the ISP scans their hard drive assessing their system for potential new software marketing opportunities.
Scenario 3	Ruth likes to play practical jokes on friends. Once she tried to log on to Jim's account, guessing his password was his wife's name. Once she has access, she installed a program that would flash the message "There is no Escape" every time the escape key was pressed. Jim discovered the joke after a few days and was upset.
Scenario 4	Joe is giving an on-line demonstration in which he uses software that was licensed for a 90-day trial period. Prior to giving the seminar, he noted that the license would expire. Rather than pay the licensing fee, he changes the date on his computer, effectively fooling the software into believing it is at the beginning of the licensing period.
Scenario 5	Anna needs software to convert TIFF formatted images to GIF format. She found an excellent piece of shareware and has used it once to convert the images. The shareware developer requests that she send $5 if she likes and uses the software. She has not sent a check to the developer to date.
Scenario 6	Joan is a programmer at XYZ, Inc. While working late one night, she notices that her boss has left his computer on. She enters his office to turn it off and finds that he is still connected to his e-mail. She scans the messages briefly, noticing whom they are from and what the topics are. One message catches her eye. It is regarding herself in an unflattering way.

4. ETHICAL CIRCUMSTANCES

According to Ellis and Griffith [6], although studies have tried to determine ethical judgment and behavior, the literature concerning computer ethics has still focused on a single measure of ethical. Reidenbach et al. [17] introduced the multidimensional scales for measuring ethics. Reidenbach and Robin [18] and Reidenbach et al. [17] proposed that ethics consists of three theoretical dimensions:

- Moral equity is comprised of concepts such as fairness and justice.
- Relativism is comprised of concepts such as cultural and traditional acceptability.
- Contractualism is comprised of concepts dealing with unwritten contracts and unspoken promises.

They stated that measuring ethics using a single-dimensional construct is inadequate. The dimensions and measurement items they proposed are shown in Table 6. Each

measurement item was measured using a 7-point Likert scale, where 1 = Strongly Disagree and 7 = Strongly Agree.

Table 6. Dimensions and Measurement Items

Dimensions	Measurement Items
1. Moral Equity	● Fair / Unfair ● Just / Unjust ● Morally right / Not Morally Right ● Acceptable to My Family / Unacceptable to My Family
2. Relativism	● Culturally Acceptable / Unacceptable ● Traditionally Acceptable / Unacceptable
3. Contractualism	● Violates/ Does Not Violate an Unwritten Contract ● Violates /Does Not Violate an Unspoken Promise

Ellis and Griffith [6] also pointed out that perceptions of various dimensions of ethical behavior in IT are related to the circumstances of the ethical scenario. In this context, ethical circumstances include how explicit the contract (for example, software license contract) is, the extent to which the scenario involves personal privacy; the level of technology; and the perceived seriousness of the outcome.

5. OTHER MEASURE OF COMPUTER ETHICS

In this section, we present examples of other measures used to examine computer ethics. Maldacker and Varden [19] explore the issue of privacy and ethical guidelines related to computer use. Their measurement items were designed as opinion statements and participants were asked to provide their level of agreement or disagreement (see Table 7). Typically, in this type of measurement, participants were not asked for a written response of any kind.

Peterson [15] identified a number of potential ethical issues regarding the use of company computers. The ethical attitudes of individuals in her study were based on a composite score derived from the various ethical issues presented. The composite score was used because typically an aggregate measure based on multiple items is used for investigations that involve beliefs and attitudes. Some examples used in Peterson's [15] study are as follows:

Issues in computer ethics

- Using company computers for nonprofit activities, such as e-mailing friends and using the internet, as long as it does not interfere with an employee's productivity.
- Marketing software for personal profit that was developed for a previous employer, assuming no prior written agreement was made regarding ownership of the software.
- Monitoring subordinates' activities on company computers as long as subordinates are aware that they are being monitored.
- Using company computer equipment for personal profit as long as it is not completed on company time.
- Reading e-mail files belonging to fellow employees.
- Copying computer software the company has purchased to use at home for personal use.

- Accessing private computer files of a potential client before an interview in order to be better prepared for the interview.
- E-mailing potentially offensive jokes to fellow employees as long as they are sent only to employees who will not be offended by the jokes.
- Marketing software containing minor bugs, without informing customers that the bugs exist.
- Browsing confidential company computer files to obtain information such as the salaries of fellow employees.

Table 7. Measurement Items

No.	Measurement Items	Level of Agreement/Disagreement
1.	*Personal Ethics Practice* It is acceptable to access computer-based information not required to do your job about your organization as long as no harm.	SA = Strongly Agree A = Agree U = Unsure D = Disagree SD = Strongly Disagree
2.	*Personal Ethics Practice* It is acceptable to access computer-based information not required to do your job about fellow employees as long as no harm is done.	
3.	*Personal Ethics Practice* It is acceptable for me to access computer-based company information about my confidential personnel records if I couldn't be discovered.	
4.	*Personal Ethics Practice* It is acceptable for others in my organization to access computer-based information about my confidential personnel records that is not part of their job without my knowledge.	
5.	*Corporate Guidelines* My company has the right to access personal computer-based information (such as e-mail) that I maintain at work.	
6.	*Corporate Guidelines* My company has a formal set of guidelines, other than those listed, relating to the ethical use of computers.	

5. CONCLUSION

Using computer-related scenarios that present different ethical situations allows researchers to evaluate responses in a standardized context with a relatively high level of reliability. This paper presents numerous computer-related scenarios that can be used to explore the IT users' ethical attitudes, including students or information system or information technology (IS/IT) professionals. This paper also describes ethical circumstances and other measures of computer ethics used in previous studies. In terms of measures, computer ethics researchers can consider two types of measures in the computer-related ethics studies, namely: (1) measure only one dimension (moral equity), or (2) measure more than one dimension or multidimensional (moral equity, relativism

and contractualism). For those who favor using the single scale, the single ethical construct is a conservative estimate. Nevertheless, computer ethics researchers still need to identify and develop better measures of ethics among IS/IT professionals and students (i.e. the future IS/IT professionals).

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