

The Relationship Between Ethical Decision Making and Ethical Reasoning in Information Technology Students

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ABSTRACT

This study examined undergraduate information technology (IT) students' (N =122) level of ethical reasoning and decision making at a Midwestern university. The purpose was to determine whether IT students' level of ethical reasoning provided information about the degree of their ethical decision making. The Defining Issues Test-2 (DIT-2) was used as well as an Ethics in IT survey instrument containing 21 vignettes related to the field of information technology. The findings did reveal a correlation between ethical reasoning scores (as measured by the DIT-2) and the level of ethical decision making related to an IT setting (as measured by the Ethics in IT survey).

Keywords: Ethical Reasoning, Ethical Decision Making, Moral Judgment, Ethics In Information Technology

1. INTRODUCTION

The last century led to much advancement in technology, which has brought about changes in society, business, and education. However, it is evident that no matter how much things change and technologies advance, it will always be essential to emphasize the importance of teaching ethical decision making. In fact, now with the availability of computers and the ease of access to information through the Internet there seems to be an even greater need to focus on ethical reasoning and ethical decision making. There is a statement made by presidential financial advisor, Bernard Baruch (as cited in Eigen and Siegel) that seems to imply that this issue is timeless when he stated that, "During my eighty-seven years I have witnessed a whole succession of technological revolutions, but none of them has done away with the need for character in the individual" (1989, p. 130).

News stories abound with elaborations of the disreputable behavior of American citizens from many professions and walks of life. One area at the forefront more recently with the use of the Internet is that of information technology. "Ethical computer and Internet behavior involves dozens of issues, including plagiarism,

inappropriate use of computer resources, social engineering, cyber-stalking, and piracy" (Hillier, 2003, p. 1). As assessments of the expenses that are caused by ethics deficits continue to rise, one responsibility for information technology programs on university campuses is to address this issue in the classroom. Successfully transferring technical knowledge from educators to students in the classroom is part of the formula, but without ethics being internalized, students are limited in their ability to weigh situations and make better decisions. Most educators and business professionals have recognized for years the need for ethics in the curriculum, and it is included in most curricula recommended by such organizations as the Association for Computing Machinery. However, as the availability and use of electronic data continues to grow, so also does the need to focus more on ethics instruction. Gaining a better understanding of IT students' ethical reasoning processes and moral behavior has practical implications for IT education and future IT ethics research. The results can aid universities in developing and incorporating adequate ethics curricula to increase students' ethical awareness, which may better prepare students for the challenges faced in the workplace. Rest (1994) argues that developing adequate

ethics training begins with gaining an understanding of individuals' ethical reasoning processes.

The purpose of the study was to measure the level of ethical reasoning and ethical decision making in undergraduate information technology (IT) students. Specifically, the study was conducted to see if knowledge of students' ethical reasoning could provide information about the degree of ethical decision making related to the IT field.

2. RELATED LITERATURE

2.1 Relationship Between Ethical Reasoning and Decision Making

There have been numerous empirical studies that have revealed a relationship between ethical reasoning and evaluation of ethical dilemmas using the Defining Issues Test (DIT) (Leming, 1978; Ponemon, 1990, 1992; Ponemon & Gabhart, 1993; Trevino, 1986; Trevino & Youngblood, 1990; Richmond, 2001). The DIT is a validated measure for ethical reasoning (Rest, 1979). The most influential research focusing on moral development in student populations was research done by Lawrence Kohlberg (1958, 1964, 1967, 1969). Kohlberg's work is particularly relevant for research related to students' ethical decision making because it combines cognitive and moral development. In Kohlberg's model, the development of ethical behaviors relies on a learning process; growth in cognitive development creates a "state of readiness" necessary for moral development (Walker, 1988, p. 53). Implicit in Kohlberg's model is the idea that ethical reasoning is not static, but can move along a developmental trajectory; individuals can and do move from a less developed moral position to a more sophisticated moral position. This is important in understanding ethical training and assessment of IT students. If ethical development were not possible, instruction would be irrelevant and assessment of instructional efforts and individual growth would be unnecessary.

Kohlberg's model progresses through six stages; the six stages are embedded within three levels (pre-conventional, conventional, and post-conventional). The six stages document an individual's movement from highly egocentric concerns (decisions based on personal interest), through a stage of making decisions based on what others expect or what rules require (maintaining norms), to a view of morality based on universal principles such as equality, justice and human rights. In this way, Kohlberg's (1969) work centers on moral reasoning as an understanding of abstract social rights and rules.

Many researchers have used and expanded on Kohlberg's work, including Gilligan (1977), Rest (1979), Bebeau (2002), and Bebeau and Thoma (2003). Rest (1979) borrows directly from Kohlberg and articulates six stages of moral development, but rejects Kohlberg's hard stages, arguing that individuals may move between stages at particular times. According to Rest (1979), individuals may show development in more than one stage at once. Rest's stages are not strictly hierarchical, but reflect his belief in moral development as a continuous process.

The DIT is a paper-pencil exam which uses six hypothetical dilemmas. Each dilemma is followed by twelve interpretive statements about the dilemmas. Respondents rate

and rank the statements in terms of how each would influence their decision-making; each statement is linked to various stages in Rest's (and Kohlberg's) moral development model. Scores reflect the relative importance participants give to "postconventional" or "principled" (Kohlberg's highest level of moral reasoning) justification. Higher scores suggest that the individual is more morally developed. However, Kohlberg himself stated that stage 4 (maintaining norms) of ethical reasoning is the highest level attained by most adults (Kohlberg, 1981).

In 1999, the Center for the Study of Ethical Development at the University of Minnesota created a second version of the DIT, called the DIT-2 (Rest, Narvaez, Thoma, & Bebeau, 1999). This version is shorter (with five ethical dilemmas rather than six), and has updated scenarios. The DIT-2 offers an additional measure of post conventional moral development, the N2 score, which combines the degree to which post conventional items receive higher and personal interest items receive lower ratings (Bebeau & Thoma, 2003). As with the original DIT, participants are required to choose between twelve responses that reflect Kohlberg's stages of moral development.

Rest et al., (1999) assert that the DIT has proved itself valid and reliable in hundreds of studies. This conclusion is supported in part by a mega-sample comprised of 45,856 DITs scored from 1989 through 1993 that evidence the DIT's validity and reliability in spite of differences in age and cultural background of participants as well as the region where the tests were administered (Rest et al., 1999). Cronbach alphas for the DIT are in the upper 0.70s and lower 0.80s and test/re-test reliability is commensurate (Rest & Narvaez, 1998). In validity testing, DIT-2 results have been comparable to the original DIT. In addition to the practical advantages of shortened length and updated language, the DIT-2 has correlated positively with the original DIT ($r = 0.79$) and has also proven internally reliable (Cronbach's $\alpha = .81$) (Rest et al., 1999). In short, the DIT-2 does not sacrifice validity and may actually improve validity through its updated construction (Rest & Narvaez, 1998). Although the DIT-2 was developed to measure general moral development, it has been found to measure moral development in many types of educational programs including medicine, business, public administration and law (Bebeau, 2002; Rizzo & Swisher, 2004).

A study conducted by Cooper (2005) compared moral judgment in a control and experimental group. The experimental group was known violators of the university conduct code. The control group consisted of students who did not violate the university conduct code. Moral judgment was measured using the DIT-2 (Rest et al, 1999). In this study, an effort was made to identify differences between moral judgment, the type of code violation, and certain demographic variables. The results showed that students who violated the university's conduct code reasoned at a lower level of moral judgment than students who did not violate the code.

Richmond measured ethical reasoning in accounting students using the DIT-2. She found "accountants that exhibited higher ethical reasoning levels were more capable and sensitive to questionable dilemmas not well defined by the profession" (2001, p. 12). Trevino and Youngblood

(1990) found that MBA students at higher levels of ethical reasoning were more likely to behave more ethically compared to students at the lower levels of ethical reasoning using the DIT-2. As cognitive moral development theory states, the progression from stage 1 to stage 6 indicates an individual's ability to make ethical judgments less dependent on outside influences. Individuals throughout life's experience will struggle with feelings about what is right and what is wrong. More adept individuals at ethical reasoning are more likely to make judgments based on principles they choose as opposed to those gained through peer pressures and other outside influences. Individuals with higher levels of moral development are less likely to engage in unethical behavior (Trevino & Youngblood, 1990). These types of individuals view questionable behavior as not acceptable, and demonstrate a lower propensity to engage in unethical behavior when compared to less morally developed individuals.

Several studies have been conducted with conflicting results in the area of ethics and gender. A substantial amount of literature (Beltrami, Peterson, & Kozmetsky, 1984; Miesing and Preble, 1985; Jones and Gautchi, 1988; Ameen, Guffrey, & McMillan, 1996) suggests that ethical judgments vary according to gender, where females have historically been more ethical compared to males. However, other studies have suggested no significant difference on gender.

In today's Internet-driven society, holding the behavior of those in academia as well as business to the highest standard is imperative. However, before this can be addressed, researchers and educators must first seek to understand the attitudes and perceptions of people who are confronted with a multitude of decision making issues daily that test their core values.

2.2 Ethical Decision Making in Information Technology

The last decade has seen a surge of research devoted to the development of ethics programs across the science, technology, engineering, and mathematics disciplines at the university level. Currently the media, government, and industry have increased their attention on ethical issues where IT is involved. Information technology can be an enabler for innovative seekers who want to conduct security breaches, distribute intellectual property illegally, and violate the privacy of individuals. In 2006, Choicepoint, a company that settled two lawsuits against it by the Federal Trade Commission (FTC), paid a record \$15 million for allowing criminals to purchase sensitive financial and personal data on 163,000 Americans. It is the largest civil penalty ever obtained by the FTC (Krebs, 2006).

The combination of a rapid pace in IT changes along with accelerated distribution networks creates momentum for technology advancement outpacing ethical development in a society. For example, identity theft is one of the fastest growing forms of fraud. Ten million Americans were victims of identity theft in 2003 alone, costing business and victims \$50 billion (FDIC, 2006). A criminal with an individual's social security number, financial institution's account number, and computer logon information "can access a consumer's existing asset and credit accounts, create fraudulent new accounts in a consumer's name, or create synthetic identities that can be used to obtain services and

credit fraudulently" (FDIC, 2006). Unfortunately, employees contribute significantly to the workload of IT professionals when it comes to inappropriate or illegal actions. In a 2005 FBI Computer Crime Survey, over 44% of respondents indicated they had experienced intrusion from within their organization (FBI, 2005). These facts illustrate the need to place more emphasis on ethical training.

The DIT-2 has been used in experimental research designs as a tool for measuring the ethical reasoning of undergraduate students, after they were exposed to a particular instructional method. In one study this tool was used to examine the effects of case method instruction on the participant group. These researchers, Harris, Pritchard and Rabins (2000) noted a need to consider a more discipline-centered approach to ethics instruction that would lend itself to a professional setting.

In a study conducted by Staehr and Byrne (2003), university students were exposed to an ethical dilemma discussion as the treatment. Using the DIT-2, researchers compared the short-term ethical development of this group to a control group. Based upon these results, the researchers suggested that additional efforts were needed to develop moral reasoning assessments with profession-oriented dilemmas to more specifically target growth in moral reasoning.

While investigating the difference in ethical development between IT undergraduates engaged in case method discussions and a control group exposed to lecture-discussion, Woodward and Ashby (2006) came to a similar conclusion: the ability of the DIT-2 to detect discipline-specific ethical development over a treatment period of short duration is not sensitive enough. These same researchers also suggest that perhaps development of a new instrument modeled on the DIT-2 would offer more definitive results for short-duration research studies. Such an instrument would incorporate "ethical dilemmas more particular to the field of information systems technology" (p. 7).

In a study designed to analyze students' ethical decision making related to IT scenarios, Harris (2000) developed a survey based on four categories originally selected by Mason (1986)--Privacy, Accuracy, Property, and Access. Harris modified Mason's categories to cover the interest of the IT field. These categories included misuse of software programs, alteration of data, programming abuses, using hardware illegally and accessing data. This survey was validated previously on a study which analyzed students' ethical decision making specifically related to information technology. Harris found that there was a change of sensitivity of ethics as students matured and progressed through various academic levels (freshman/sophomores, junior/senior, or graduate) on half of the individual situations (10 of the 20) between at least two of the three groups (levels). According to Harris (2000), graduate students, in all but one of these situations, indicated the highest sensitivity and rated the individual's action higher on the scale. Harris also found that there was a difference in sensitivity between males and females in 8 of the 20 situations; females specifically had a higher sensitivity to software issues than males. The scenarios that the students, in general, found to be the highest on the scale of unethical (4) and computer crime (5) were those dealing with selling shareware,

changing data others used, changing data to avoid payment of dollars, and failure to report an error in a program. This survey was later modified by Harris and formed the basis for the one used in this research which is referred to as the IT in Ethics Survey. It was based on a 5-point scale that included the following choices:

- Ethical - There is no question that the action is correct in every sense of the word. Ethically, morally, and legally, this is proper behavior.
- Acceptable - The action is acceptable to you, although you may have some doubts due to morals or other beliefs.
- Questionable - There is some question as to the moral or ethical aspects of the action. The action truly belongs in the "grey area" of human behavior.
- Unethical - The action is contrary to moral and ethical standards, although not a crime. This is truly unacceptable behavior.
- Computer Crime - The action is unethical and illegal and the person responsible should be prosecuted for a criminal act (Harris, 2000).

3. PURPOSE AND GOALS OF THE RESEARCH

The purpose of the study was to determine if knowledge of the level of ethical reasoning can offer useful information about the propensity for ethical decision making in the field of information technology. Previous studies have shown that students with higher stages of ethical reasoning were less likely to agree with unethical behavior or make unethical decisions. Specifically, the study was to determine if there was a relationship between general ethical reasoning, as measured by the DIT-2 test, and ethical decision making in various situations related to information technology, as measured by the Ethics in IT survey. Lastly, the study was designed to provide a baseline to identify the level of ethical decision making of the IT students at the university employing the researchers.

The Defining Issues Test, version 2, (DIT-2) was used to measure ethical reasoning. The original DIT has been used extensively, but the newly revised DIT-2 has only been used in a limited number of empirical studies concerning the field of information technology. This study further tested the DIT-2 in an information technology setting. As Blasi (1980) stated in his extensive review of ethical reasoning and moral behavior literature "any new domain of behaviors that can consistently be shown to be related to ethical reasoning strengthens the theory as a whole" (p. 40).

4. METHODOLOGY

After an extensive review of the literature, two existing survey instruments were selected to evaluate the ethical reasoning and ethical decision making of students enrolled in classes in an information technology major at a Midwestern university. The first survey, referred to as the Ethics in Information Technology (IT) survey, was developed to analyze students' ethical decision making specifically related to information technology. This survey, used with the author's permission, contained 21 vignettes (three vignettes had two scenarios for a total of 24 items).

The other survey selected for this study was the Defining Issues Test, version 2 (DIT-2). The DIT-2 booklet contains five hypothetical scenarios and a computerized score sheet as previously described. This survey was chosen because it has been tested widely and revised to evaluate ethical reasoning. The DIT-2 booklets and score sheets were obtained from the Center for the Study of Ethical Development at the University of Minnesota.

After receiving approval for this study from the Human Subjects Review Board, the researchers gathered data at the beginning of the fall 2005 semester. The researchers identified faculty members of several classes in the information systems and technologies program at a Midwestern university who were willing to allow the researchers to come into their classes to administer the surveys. The researchers made appointments with the faculty members for times when one of them would be available to visit the classroom in the first month of the semester (both fall and spring).

The response sheets for each survey were numbered and code sheets (contained in a database) listing all students' names and survey numbers were developed so that the number assigned to each student was the same for both surveys (for comparison purposes). Students were only allowed to complete the surveys in one class; if they had already completed it in another class, they were not included the second time. Some faculty members offered extra points for completing the surveys and others just used it as a regular class activity with no points assigned.

The following procedures were used.

1. The purpose and procedures of the research study were explained to the students by one of the researchers. This explanation included the fact that their participation was voluntary and all information was anonymous (with no names on the surveys).
2. The first survey (Ethics in IT) was given to each student. The directions were stated, and the students were asked to complete the demographic information together. Then the students were given approximately 20-30 minutes to complete the survey in class.
3. Once the students completed the first survey, the second survey (the DIT-2) was given to each student (making sure each student received the survey containing the same assigned number as the first survey). The booklet containing instructions guiding the participant on how to fill out the test was explained by the researcher. The directions were given and the sample scenario was read aloud for all to see how to interpret the directions. Due to time constraints the students were asked to take the DIT-2 home since it takes about 30-45 minutes to complete.
4. When the DIT-2 survey was returned by each student, the number was recorded on the code sheet to make sure that only students who completed both surveys were included in the study.

All completed DIT-2 forms were returned to the Center for the Study of Ethical Development at the University of Minnesota for scoring. The computer scantron sheets for the other study (referred to as the Ethics in IT survey) were sent to Instructional Support Services at the researchers' university for analysis.

When scoring the DIT-2, there are a series of reliability checks that are performed to consider ways that a respondent might give false data. Participants in the DIT-2 are purged if they fail to meet the standard for any of the following: rate-and-rank consistency, meaningless items, missing data, and non-differentiation of rates or ranks (Bebeau & Thoma, 2003, p. 7-8). In order to ensure that the same students' data was analyzed in both surveys, the researchers had to exclude students from the Ethics in IT survey whose data was purged from the DIT-2 instrument. Therefore, the results were based on the 102 usable surveys, as 20 of the original 122 were purged.

5. RESEARCH QUESTIONS

The researchers sought to find answers to the three research questions listed below:

1. What is the information technology (IT) students' ethical decision making (sensitivity toward ethical dilemmas) as measured by the Ethics in IT survey?
2. What is the level of ethical reasoning as measured by the DIT-2?
3. Does knowledge of students' level of ethical reasoning provide information about the degree of their ethical decision making in an IT setting?

6. FINDINGS

An analysis of the descriptive statistics of the students' characteristics indicated that the average age of participants was 23.49 (standard deviation = 6.38). Forty-five percent of the students were seniors in college and seventy-eight percent were male.

The correlations between the scores on the two instruments are presented in Table 1. In this table, stage 2/3, stage 4P and N2SCORE are the subscale scores of the DIT-2 instrument; whereas, ETHICSSC score is the composite score associated with the Ethics in IT survey. The terms used by the DIT-2 for each of the subscales are: stage 2/3 (personal interest stages, sometimes referred to as pre-

conventional), stage 4 (maintaining norms, sometimes referred to as conventional), and PSCORE (post conventional). The N2SCORE is a more advanced measure of ethical reasoning because it is a combined measure of how much post conventional ethical reasoning is used and how little personal interest is used for the same decision (as cited in Bebeau & Thoma, 2003). Therefore, the N2SCORE was used rather than PSCORE for the analysis.

For each student, the ETHICSSC score was obtained by adding their corresponding scores on each of the 21 vignettes. The term ethical decision making in these findings represents the ethical decision making score from the Ethics in IT survey. The reliability of the scores that resulted from the administration of this instrument was assessed by calculating Cronbach's alpha. The value (0.816) indicated a high level of reliability.

6.1 Results of the Ethics in IT Survey (Research Question No. 1)

The students were given 21 vignettes (real-life scenarios) relating to information technology. Each vignette consisted of one or two actions of the individuals in the scenario, resulting in a total of 24 items. The student was asked to evaluate that action and indicate whether it was ethical, acceptable, questionable, unethical, or computer crime using a 5-point Likert scale with 1 representing ethical actions and 5 representing computer crime. The lowest possible score on the Ethics in IT survey was 24 and the highest 120. A person scoring at the lower end of the scale exhibits a lower propensity to ethical decision making whereas one scoring at the higher end displays a higher level of ethical decision making. The average ethical decision making score for all students was 87.92.

The 21 vignettes (3 with two responses) are summarized in Table 2 in descending order of their mean scores. The percentages are given for each of the five responses, as well as the means. The two scenarios that received, on the average, the greatest concern regarding ethical decision making were (1) intentionally creating a virus to force users to register for a program (mean = 4.59) and (2) using trade-

		STAGE2/3	STAGE4P	N2SCORE	ETHICSSC
STAGE2/3	Pearson Correlation	1	-.519(**)	-.553(**)	-.282(**)
	Sig. (2-tailed)		.000	.000	.004
	N	102	102	102	102
STAGE4P	Pearson Correlation	-.519(**)	1	-.172	.316(**)
	Sig. (2-tailed)	.000		.085	.001
	N	102	102	102	102
N2SCORE	Pearson Correlation	-.553(**)	-.172	1	.049
	Sig. (2-tailed)	.000	.085		.622
	N	102	102	102	102
ETHICSSC	Pearson Correlation	-.282(**)	.316(**)	.049	1
	Sig. (2-tailed)	.004	.001	.622	
	N	102	102	102	102

** Correlation is significant at the 0.01 level (2-tailed).

Table 1 - Correlation Between Ethical Reasoning and Ethical Decision Making

mark on a website without permission (mean = 4.59). The two scenarios that received the least concern on the average were: (1) an employee sending messages critical of management even though the company policy states that email is to be used only for company business and may be reviewed by managers (mean = 3.08) and (2) a manager of a company (from same scenario as previous one) entering the email to review messages sent to ensure that the system is not being used for private purposes (the policy states that managers may review the mail of subordinates) and reprimanding the employees for the critical messages of management (mean = 2.5).

Although students were able to rank the criminal and unethical situations at the top of the list; the relatively low average score of some items indicated they still did not recognize all scenarios that were in fact computer crime (such as providing inaccurate information to external auditors and burning DVDs to sell). In essence, they realized that these actions were more wrong than others, but they did not recognize them to be criminal. Therefore, this reinforces the need for ethical training and education in increasing student awareness to discipline specific ethical dilemmas.

Scenario	1	2	3	4	5	Mean
A man creates a virus to force users to register for a shareware program he created.	0	3	4	25	69	4.59
A website designer posts a seal that says "Approved by the BBB" and a seal indicating the "Fisher-Price" trademark on the website to increase sales without permission to use their names.	1	2	5	21	72	4.59
A manager tells a programmer working for him to write a program that he knows will generate inaccurate information for the company's external auditors.	1	7	9	34	49	4.24
A girl downloads files and uses her DVD burner to make albums for her friends which she sells for \$5 a piece.	5	3	11	33	48	4.17
An employee of a company gives a friend the code of a registered innovative business model used by his company, the friend decides to use the technology; and figures if she is caught, she can settle with the company that registered it later.	2	6	15	30	47	4.15
The employee who has access to the code of the registered innovative business model (as mentioned above) offers to give it to a friend for her company to use. Anyone who wanted to use the technology was to get permission from the company and pay them a royalty.	0	7	16	37	40	4.11
A maintenance programmer for a loan company finds an error in a program computing interest. He estimates that 25-50 cents is added to each bill per month. He is very busy and decides not to report the error to management since it is such a small amount.	3	2	20	47	28	3.96
A salesperson believes she is not being paid the same as the other salespeople. She figures out how to access the payroll records on the main computer and reviews them; she concludes she is getting paid appropriately and no other use of the information was made.	1	7	30	36	26	3.78
A student changes the data in a file needed in a class competition to favor his team; just before the results are due to the professor, he changes the data back to its original value and his team wins.	6	12	4	60	19	3.74
A branch bank employee realizes he has accidentally overdrawn his checking account and will have to pay \$25 for three checks that will bounce. He changes the account status of the account until he makes a deposit so no overdrawn check charges will be assessed.	8	12	20	23	38	3.72
A person is asked to create a Web site to collect personal information from internet surfers. He is aware the company sells the data to advertisers for a profit and they may use it to send SPAM and sexually explicit mailings to unwitting people. He goes ahead and creates the site.	2	13	23	40	23	3.68
A programmer is asked to write a program which he knows will generate inaccurate information for the company's external auditors. The manager tells him he must write the program or be reassigned to the maintenance staff, so he writes it.	10	16	19	29	27	3.65
A non-student of a university asks a student to let him use her password to gain access to the school's computer on which he plays games for several hours a week during the summer.	3	16	19	39	24	3.65

(1 = Ethical, 2 = Acceptable, 3 = Questionable, 4 = Unethical, and 5 = Computer Crime)

Table 2 – Information Technology Vignettes (Frequencies Shown in Percentage and Means)

Scenario	1	2	3	4	5	Mean
An employee of a company that allows its employees to use the Web for limited personal use visits pornographic sites frequently.	1	9	28	53	10	3.61
In a company that has no policy on the use of e-mail, an employee sends hundreds of SPAM messages to political donors.	5	17	18	41	20	3.56
A woman purchases the latest upgrade of a word processing program she owns. The license says that the old version is to be discarded or kept only for backup purposes. She loads the old version on her secretary's computer since she does not have a word processing program.	4	25	21	29	22	3.40
A student of a university gives his password to someone who is not a student so he can use it for whatever purpose he wants.	3	14	32	45	6	3.37
A man downloads a shareware program which requires anyone using it to register and pay a small fee. He uses the program every day and decides not to register his use since no one will ever know.	8	17	27	32	18	3.34
A graduate student is writing a college paper on the effects of computer viruses. She writes a short program that would release a PEACE message through email exchange. The message would not affect the receivers' data but would interrupt their screen. She does it just to see how fast a simple, non-destructive virus can spread.	9	21	29	16	26	3.34
A manager of a company who has no policy on the use of e-mail enters the email system and reviews mail messages sent by subordinates to ensure that the e-mail is not being used for private purposes. When he finds an employee has sent hundreds of SPAM messages to political donors, he reprimands him.	10	16	23	40	12	3.28
A mid-level employee is having a hard time making ends meet in tough economic times. His company had to cut employees' hours, so they encouraged them to get part-time jobs. This employee got a part-time consulting job for a small business that is setting up their own database. The new hire uses the other company's computer to create databases for the clients of the new business, who pay him for his services.	7	13	28	45	7	3.25
A girl likes to download music from file-swapping sites onto her PC. She uses another person's account to download several hundred songs.	10	22	28	19	23	3.19
An employee sends messages critical of management even though the company policy states that email is to be used only for company business and may be reviewed by managers.	1	20	46	29	6	3.08
A manager of a company (as mentioned above) enters the email to review messages sent to ensure that the system is not being used for private purposes (the policy states that managers may review the mail of subordinates). When he finds two employees sending messages to other employees critical of management he reprimands them.	14	44	26	16	2	2.50

(1 = Ethical, 2 = Acceptable, 3 = Questionable, 4 = Unethical, and 5 = Computer Crime)

Table 2 (continued) – Information Technology Vignettes (Frequencies Shown in Percentage and Means)

6.2 Results of the DIT-2 (Research Question No. 2)

In comparison to overall DIT-2 national scores, the students in this study were at lower levels of ethical reasoning. The mean score for stage 2/3 (STAGE2/3) on a scale from 0 to 95 was 30.411. This indicates that 30% of all responses related to stage 2/3 (personal interest). The mean score for stage 4 was 35.683, which indicates that the average proportion of items selected that appealed to stage 4 (maintaining norms) consideration was approximately 36%. The mean score for N2 score (N2SCORE) was 25.494, which indicates that the average proportion of items selected that appealed to N2 score consideration was approximately 25%. Taking into account that the largest mean of the three subscales of the DIT-2 was associated with stage 4, it can be concluded that for this group of IT students, the level of ethical reasoning as measured by the DIT-2 corresponds to Kohlberg's maintaining norms stage. A summary of the statistics for the DIT-2 subscales is presented in Table 3.

6.3 Comparison of Ethics in IT and DIT-2 Results (Research Question No. 3)

In order to answer Research Question 3, an examination was needed of the pattern of inter-correlations between the DIT-2 subscales (STAGE2/3, STAGE4P, and N2SCORE) and the ethics in IT score (ETHICSSC). As seen in Table 4, the negative correlation (-.282, $p = 0.004$) between stage 2/3 score and ethics score illustrates that the lower a student's stage 2/3 score the higher his/her ethical decision making score. This is an important relationship between the two scores that is also consistent with the fact that if a student scored lower in stage 2/3 then he/she does not belong to stage 2/3 but to a higher level of ethical reasoning. The fact that the correlation is statistically significant ($p = 0.05$) shows that this is a non-chance finding. The positive correlation (.316, $p = 0.001$) between ethics score and stage 4 score illustrates the fact that the higher a student's stage 4 score, the higher his/her ethical decision making score. Finally, the very small (and highly non-significant) correlation between ethical decision making score and N2

	N	Mean	Std. Deviation	Std. Error Mean
PSCORE	102	27.042	12.817	1.269
STAGE2/3	102	30.411	13.247	1.312
STAGE4P	102	35.683	14.004	1.387
N2SCORE	102	25.494	13.963	1.383

Table 3 - Summary of DIT-2 Scores

		ETHICSSC	STAGE23	STAGE4P	N2SCORE
ETHICSSC	Pearson Correlation	1	-.282(**)	.316(**)	.049
	Sig. (2-tailed)		.004	.001	.622
	N	102	102	102	102

** Correlation is significant at the 0.01 level (2-tailed).

Table 4 - Correlation of Ethics Scores and DIT-2 Scores

score (0.49, $p = .622$) suggests that the majority of students are not in the post conventional stage of ethical reasoning.

These findings are consistent with the fact that the average ethical decision making score (ETHICSSC) for all students in this study was 87.92 (on a scale between 24 and 120). This average is much closer to the higher end than to the lower end of ethical decision making. As a result of comparing the findings from these two instruments, it is clear that knowledge of students' ethical reasoning can provide information about their ethical decision making in an IT setting.

7. DISCUSSION AND CONCLUSION

An understanding of ethical decision making within the IT profession is critical due to the fact that to a large degree professional judgment is dependent upon the ethical beliefs and attitudes of the individual. The purpose of the study was to determine if knowledge of the level of IT students' ethical reasoning can provide statistically significant information for their ethical decision making in the field of information technology. Specifically, the study was to determine if there was a relationship between general ethical reasoning, as measured by the DIT-2 test, and ethical decision making in various situations related to information technology, as measured by the Ethics in IT survey.

In summary, the Ethics in IT survey was used to answer the first research question regarding the information technology (IT) students' level of ethical decision making. Students were, in general, able to rate the criminal and unethical situations at the top of the list; but some were not able to distinguish between unethical actions and computer crime. The DIT-2 was used to answer the second research question regarding the IT students' level of ethical reasoning. The results indicated that the largest number of students were at stage 4 of ethical reasoning and the next largest at stage 2/3 of ethical reasoning. Kohlberg (1981) stated that stage 4 was the level of ethical reasoning reached by the majority of adults. In a study conducted by Davison, Martinsons, Lo, and Kam (2006), they stated that their research "upholds the validity of Kohlberg's contention" regarding stage 4 (p. 54).

The third research question was: does knowledge of students' level of ethical reasoning provide information about the degree of their ethical decision making in an IT setting?

The results indicated a significant correlation between IT students' ethical decision making (as measured by the Ethics in IT survey) and ethical reasoning levels (as measured by the DIT-2). These results are consistent with prior literature, which suggests that individuals who exhibit higher ethical reasoning levels are more able to recognize unethical actions not well defined by the profession (Leming, 1978; Ponemon, 1990, 1992; Ponemon & Gabhart, 1993; Trevino, 1986; Trevino & Youngblood, 1990).

Cognitive moral development posits that individuals advance along a stage-sequence continuum in their moral development. Consistent with cognitive ethical reasoning theory, this study found that IT students at higher stages of ethical reasoning did more strongly recognize unethical behavior than IT students at the lower stages of ethical reasoning. This substantiates the findings of a recent 2006 study that stated "the IT profession in Hong Kong has a level of ethical reasoning that satisfies interpersonal expectations (stage 3) and tends to abide by established laws and rules (stage 4), but findings suggest there is room for improvement in terms of conforming to the spirit of social expectations (stage 5) and establishing and upholding more ambitious principles of rights and justice (stage 6)" (Davison, et. al, 2006, p. 55).

In conclusion, it is essential that students progress to higher stages of ethical reasoning to ensure they make sound ethical decisions as they enter an IT work environment. More emphasis needs to be placed on increasing awareness to discipline specific ethical situations encountered on a daily basis in the workplace.

Any results that can be gleaned from this study are subject to a number of limitations, such as sample size and uniqueness of students. The fact that the sample consisted of approximately 78% males and 22% females does not seem to negatively affect the potential for generalization of the results of the study. There was no significant difference between mean scores of male and female students on any of

the scales (i.e., STAGE2/3, STAGE4P, N2SCORE, and ETHICSSC) regardless of the instrument used (p values associated with these tests ranged from .49 to .93).

It is recommended that more research be conducted to (1) determine ways to help students of all ages develop higher levels of ethical reasoning (which should assist in higher levels of decision making) and (2) determine which pedagogies and instructional methods work best in teaching students how to recognize unethical actions in the field of information technology and (3) replicate this study with a larger sample size and varying background of students from different universities.

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