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# Computer ethics and type of computer used

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## ABSTRACT

*The widespread use of microcomputers has introduced the issue of computer ethics to a larger and more diverse population than was the case with traditional mainframe computing. An ever-increasing larger number of people must now deal on a daily basis with ethical issues involving the use of information technology. This paper addresses the question of whether the ethical views of computer users is dependent on the type of computer used. The results should be of value in focusing institutional efforts on addressing the ethical uses of technology.*

## INTRODUCTION

The ethics of information technology or computer ethics, to be short, is an ever-more important issue of concern as a result of the increased number of users of information technology. This increased awareness and concern regarding computer ethics is reflected in the current information systems literature. This literature is broad in nature, ranging from the need to educate users in the ethical uses of information technology to research indicating the presence or lack thereof of ethics in a single area of computer use. Authors such as Bloombecker (1987) offer reasons to despair with respect to computer ethics despite his belief that the problem is not hopeless.

Solomon and O'Brien (1990) point out that references in the *Reader's Guide to Periodical Literature* to the unauthorized use of computer software began in 1982, a year after the introduction of the IBM PC. They cite five reasons that argue for the fact that software piracy was not a problem prior to the widespread use of the microcomputer. Im (1992) also argues that software piracy did not receive much attention until the mid 1980s. Both references cite that the advent of software piracy as an ethical issue concurred with the widespread use of microcomputers. It would appear that researchers have tacitly accepted these suppositions as evidenced by the numerous articles focusing on microcomputer software piracy.

Many such studies have used college students as subjects. For example, Cohen and Cornwell (1989a) in a study of 309 college students found that software piracy and other forms of information systems unethical behavior were viewed as acceptable and normative behavior by the students. Their study also found no significant relationship between computer work experience and attitude toward software piracy. These results are consistent with those of Christoph et al. (1987/88) who found no evidence that work experience changes the ethical outlook of students.

In another study involving 266 students at two universities (Solomon & O'Brien, 1990), it was found that a majority of the students admitted to having made unauthorized copies at some time. Seventy-one percent admitted allowing someone else to make copies of protected software which they personally owned. Their results indicated that software piracy was widespread among students taking MIS/CIS courses and a significant proportion of these students viewed it as socially and ethically acceptable behavior.

Other researchers have focused on software piracy, but have used faculty members as subjects. Gray and Perle (1992) found that faculty generally believe illegal copyright activities are unethical and that copying software for use by others is theft of intellectual property. Unfortunately, these same faculty did not hold themselves to the same ethical standards when it came to copying software for personal use. Wickman et al. (1992) found that a majority of faculty in a major university rejected rationalizations for copying microcomputer software in all situations.

Moving from the academic world, Shim and Taylor (1989) found in a survey of 500 members of The Institute of Management Sciences that only 4 percent of the respondents indicated that they copied software often or very often. Eighty-one percent indicated that it was unethical to copy software on the job. The authors concluded that unauthorized copying is not a problem for practicing managers.

Ethical issues involving more than copying software were used in Kievit's (1991) study involving college students. Seven scenarios were presented to information systems (IS) majors and non-majors with four of them yielding significant differences in the responses obtained from the two groups. Kowalski and Kowalski (1990) asked samples of Swedish and Canadian university students a series of questions on the ethical use of computers. They found no significant relationship between work experience and computer abuse.

As previously cited, the use of scenarios for eliciting responses on computer ethics has been used by researchers in several studies. Parker et al. (1990) popularized this approach in reporting on the results of presenting scenarios involving the ethical use of information technology to a group of approximately 25 people with interest and expertise in ethics. On a smaller scale, Freeman (1991) presented four scenarios involving computer ethics to six panelists which included three IS executives, an attorney specializing in computer and software law, a college instructor of IS, and the President of the Association for Systems Management. Both studies revealed that in many instances there is little agreement as to what is ethical behavior when dealing with computer ethics.

Cohen and Cornwell (1989b) argue for the use of scenarios in teaching ethics, as does Couger (1989). On the other hand, Ferns and Helft (1992) have questioned the value of using scenarios to teach ethics, but cite no research to substantiate this belief. Others (Gotterbarn, 1990; Grillo & Kallman, 1993; Kallman & Grillo, 1993) urge the use of a case study methodology in the learning of approaches to dealing with ethical issues.

Generalizations from the previous studies have been limited for two reasons. First of all, most of the studies have concentrated on software piracy rather than the broader issue of computer ethics. Secondly, the subjects of these studies for the most part have been college students and faculty members.

This paper addresses the aforementioned limitations by using the concept of computer ethics to include more than software piracy and by using professionals as the subjects for study. Since, almost without exception, previous studies have been confined to microcomputer users, it was decided to use the type of computer used by the subjects as the variable of interest. In this way, the issue of whether the reported epidemic cases of software piracy are coincidental with the widespread use of microcomputers or that the larger issue of whether computer ethics was related to the type of computer used could be examined. Thus, the purpose of this paper is to determine if there is a relationship between type of computer used and the ethical views of managers and users of computers.

## METHODOLOGY

A questionnaire was sent to 1,800 randomly chosen members of the Association for Systems Management asking them to read eight scenarios involving information technology and to choose for each of the scenarios whether the action of the individual(s) in the scenario was ethical, unethical or a computer crime. Replies were received from 706 of which 698 were usable for an initial response rate of 39 percent, but, as with most surveys, not all respondents made choices for each scenario. Therefore, it was decided to report the results for only those subjects who responded to all scenarios which resulted in a sample of 622 subjects for a final response rate of 35 percent.

Among the demographic information requested, respondents were asked to indicate which type of computer they primarily used with the choices being mainframe, minicomputer, workstation, or microcomputer. Thus, in each of the tables that follow, types of computers used are shown as the rows and the responses to each scenario are shown in the columns. Chi square tests were performed on the data in each of the tables to test the null hypothesis that the variables type of computer used and ethical views are independent (not related). A rejection of the null hypothesis indicates that there is a significant relationship between the type of computer used and the responses to a scenario involving computer ethics.

## RESULTS

1. A computer operator runs a program at work for a friend and uses 10 minutes of computer time. The program was run when the computer was idle; that is, not being used for company business. Action of the computer operator is:

Ethical       Unethical       Computer Crime

The value of Chi Square in Table 1 does not permit the rejection of the null hypothesis of independence which indicates that there is no significant relationship between the type of computer used and the views of the respondents regarding the computer operator's unauthorized running of the program for a friend. A majority of computer users of all types believed the action of the operator was unethical with the percentages of respondents making this choice ranging from 62 to 68 percent.

**Table 1. Responses to Scenario**

	Ethical	Unethical	Computer Crime	Totals
Mainframe	40	175	54	269
Minicomputer	20	59	15	94
Workstation	7	21	3	31
Microcomputer	<u>50</u>	<u>142</u>	<u>36</u>	<u>228</u>
TOTALS	117	397	108	622

Chi Square = 6.804

p = 0.339

2. A student gives out a password to another student not enrolled in a computer class for which a laboratory fee is charged. The password allows access to the school computer. The unauthorized student uses 3 hours of computer time in a timesharing environment.

A. Action of student enrolled in class is: Ethical  Unethical  Computer  
Crime

B. Action of unauthorized student is: Ethical  Unethical  Computer  
Crime

**Table 2A. Responses to Scenario**

	Ethical	Unethical	Computer Crime	Totals
Mainframe	1	158	110	269
Minicomputer	0	61	33	94
Workstation	0	20	11	31
Microcomputer	<u>2</u>	<u>149</u>	<u>77</u>	<u>228</u>
TOTALS	3	388	231	622

Chi Square = 4.26

p = 0.641

As was the case for the first scenario, the value of Chi Square in Table 2A does not permit the rejection of the null hypothesis of independence which indicates that there is no significant relationship between the type of computer used and the views of the respondents regarding the action of the student enrolled in the class.

Table 2B. Responses to Scenario

	Ethical	Unethical	Computer Crime	Totals
Mainframe	1	79	189	269
Minicomputer	0	27	67	94
Workstation	0	11	20	31
Microcomputer	2	91	135	228
TOTALS	3	208	411	622

Chi Square = 8.997

p = 0.174

The value of Chi Square in Table 2B does not permit the rejection of the null hypothesis of independence which indicates that there is no significant relationship between the type of computer used and the views of the respondents regarding the action of the unauthorized student. While these results are not significant which is consistent with the results displayed in Table 2A, here two-thirds of the respondents believed the action of the unauthorized student was a computer crime rather than being unethical.

3. A copy of a payroll program developed by a programmer on the job is given to a friend at a different company. Action of programmer is:

Ethical  Unethical  Computer Crime

Table 3. Responses to Scenario

	Ethical	Unethical	Computer Crime	Totals
Mainframe	17	104	148	269
Minicomputer	5	38	51	94
Workstation	3	13	15	31
Microcomputer	9	91	128	228
TOTALS	34	246	342	622

Chi Square = 2.764

p = 0.838

As in the previous scenarios, the value of Chi Square in Table 3 does not permit the rejection of the null hypothesis of independence which indicates that there is no significant relationship between type of computer used and the views of the respondents regarding the giving away of a program by a programmer to a friend in another company. Unlike the previous tables, there is no overwhelming choice regarding the action of the programmer in this scenario with only a small majority (55 percent) believing it to be a computer crime.

4. Utilizing a terminal, an individual breaks a security code and reviews confidential company salaries of corporate executives. No use is made of the information . . . "I was just curious" is the response when caught. Action of the individual is:

Ethical       Unethical       Computer Crime

**Table 4. Responses to Scenario**

	Ethical	Unethical	Computer Crime	Totals
Mainframe	5	138	126	269
Minicomputer	0	48	46	94
Workstation	0	15	16	31
Microcomputer	2	107	119	228
TOTALS	7	308	307	622

Chi Square = 4.104      p = 0.663

The value of Chi Square in Table 4 does not permit the rejection of the null hypothesis of independence which indicates that there is no significant relationship between type of computer used and the views of the respondents regarding the breaking of a security code to gain unauthorized access for the purpose of browsing through corporate data. The results here are even less clear cut, for while almost no one believed the action of the individual was ethical, there was an even split between the view that his action was unethical versus it being a computer crime.

5. A bank teller electronically transfers money from a relatively inactive customer account to his own personal account and then transfers the money to a credit card account to pay current credit card charges. On pay day, money is deposited into his personal account, and then he electronically transfers the money back to the customer's account. No money changes hands, and no interest is lost to the customer's account. Action of the teller is:

Ethical       Unethical       Computer Crime

**Table 5. Responses to Scenario**

	Ethical	Unethical	Computer Crime	Totals
Mainframe	0	11	258	269
Minicomputer	0	7	87	94
Workstation	0	3	28	31
Microcomputer	<u>2</u>	<u>8</u>	<u>218</u>	<u>228</u>
TOTALS	2	29	591	622

Chi Square = 7.695                      p = 0.261

The value of Chi Square in Table 5 does not permit the rejection of the null hypothesis of independence which indicates that there is no significant relationship between type of computer used and the views of the respondents regarding the action of the teller. This is not surprising for an examination of the table indicates that an overwhelming percentage (95 percent) of all respondents believed that the action of the bank teller was a computer crime.

6. An individual buys a special program that can duplicate a word processing program, even though the manufacturer built in a copy protect feature. The individual uses the copied program as a backup disk only. Action of the individual is:

Ethical       Unethical       Computer Crime

**Table 6. Responses to Scenario**

	Ethical	Unethical	Computer Crime	Totals
Mainframe	101	97	71	269
Minicomputer	41	30	23	94
Workstation	10	14	7	31
Microcomputer	<u>116</u>	<u>71</u>	<u>41</u>	<u>228</u>
TOTALS	268	212	142	622

Chi Square = 12.066                      p = 0.061

The value of Chi Square in Table 6 does not permit the rejection of the null hypothesis of independence at the 0.05 significance level which indicates that there is no significant relationship between type of computer used and the views of the respondents regarding the action of the individual in defeating the copy protect feature. The results are not surprising when the table is examined. There is no perceptible pattern in the totals of the responses to the actions of the individual using the program to thwart the copy protect feature, but it is interesting to note that 43 percent of the respondents believed the action of the individual was ethical.

7. A programmer is asked to write a program which she knows will generate inaccurate information for stockholders of the company. When she questions her manager about the program, she is told she must write it or lose her job. She writes the program.
- A. Action of the company is:  
 Ethical       Unethical       Computer Crime
- B. Action of the programmer is:  
 Ethical       Unethical       Computer Crime

**Table 7A. Responses to Scenario**

	Ethical	Unethical	Computer Crime	Totals
Mainframe	0	113	156	269
Minicomputer	1	33	60	94
Workstation	2	10	19	31
Microcomputer	4	104	120	228
TOTALS	7	260	355	622
	Chi Square = 15.802		p = 0.015	

The value of Chi Square in Table 7A indicates that there is a significant relationship between type of computer used and the ethical views of the respondents regarding the action of the company in requesting that the programmer write a program to generate inaccurate information for the stockholders of the company.

In an attempt to determine the nature of the relationship, another Chi Square test was performed by collapsing the table into one with the two rows of large system (mainframe and minicomputer) and small system (workstation and microcomputer) users. The results were significant with Chi Square = 7.018 and  $p = 0.030$ . Thus, the significant results in Table 7A can be attributed to differences between the views of large system users and those of small systems users with regard to the actions of the company in this scenario.

**Table 7B. Responses to Scenario**

	Ethical	Unethical	Computer Crime	Totals
Mainframe	66	163	40	269
Minicomputer	26	48	20	94
Workstation	6	18	7	31
Microcomputer	<u>46</u>	<u>141</u>	<u>41</u>	<u>228</u>
TOTALS	144	370	108	622

Chi Square = 5.841                      p = 0.441

The value of Chi Square in Table 7B does not permit the rejection of the null hypothesis of independence which indicates that there is no significant relationship between the type of computer used and views of the respondents regarding the programmer who writes the program. It is interesting to note that almost a fourth (23 percent) of the respondents thought the actions of the programmer were ethical.

8. A marketing manager uses her electronic spreadsheet program on a personal computer in the accounting department even though the licensing agreement that came with the software when she purchased it indicates use of the software is authorized only for her personal computer in the marketing department. The manager argues she should not have to buy a \$395.00 software package each time she moves from one computer to another. Action of the marketing manager is:
- Ethical       Unethical       Computer Crime

**Table 8. Responses to Scenario**

	Ethical	Unethical	Computer Crime	Totals
Mainframe	83	107	79	269
Minicomputer	28	32	34	94
Workstation	9	9	13	31
Microcomputer	<u>94</u>	<u>79</u>	<u>55</u>	<u>228</u>
TOTALS	214	227	181	622

Chi Square = 11.865                      p = 0.065

The value of Chi Square in Table 8 indicates that at the 0.05 significance level there is no significant relationship between type of computer used and the views of the respondents regarding the action of the marketing manager who violates the license agreement that came with the software. While the results are not significant, it should be noted that a higher percentage of microcomputer users believed the action of the marketing manager to be ethical than did the users of the other types of computers.

## DISCUSSION

The results obtained in this study indicate that there is very little relationship between type of computer used and computer ethics. In only one of the eight scenarios was there a significant relationship at the 0.05 significance level between type of computer used and the judgements of the respondents to the actions of the individuals in the scenarios. This is of importance when the scenarios are examined with regard to the specific behaviors. Scenarios 1 and 2 involve the unauthorized use of a computer (hardware and software), Scenario 4 involves the unauthorized viewing of data, Scenario 5 involves using a computer to steal funds, while Scenarios 3, 6, and 8 involve software piracy. The results for the latter three scenarios are important in light of the previous studies indicating widespread software piracy by microcomputer users, particularly in an academic environment.

Scenario 7 yielded mixed results. While there was a significant difference between type of computer used and the judgements of the respondents regarding the manager's action asking the programmer to write a program to generate inaccurate information, there was no significant difference regarding the action of the programmer in writing the program.

Another way of examining the results of the study is to consider the actions of the individuals in the scenarios. Since some scenarios involved more than one individual, respondents were asked to judge the actions of ten individuals. Of the ten, there was a significant difference between type of computer used and the judgements of the respondents of the actions of the individuals for only one of the ten.

For the scenarios which did not yield significant differences, the results do confirm results obtained in some previous studies. For example, the fact that approximately 81 percent of the professionals believed it unethical or a computer crime for the programmer in Scenario 3 to give a copy of the program to someone else is very consistent with the results obtained by Shim and Taylor (1989) who found that 81 percent of managers believed it unethical to copy software on the job.

The fact that in Scenario 4, approximately 99 percent of the respondents believed it either unethical or a computer crime for an individual to break a security code and review confidential data is consistent with Forcht's (1991) results indicating that chief executive officers hold very high standards concerning the ethical use of computers. It is also somewhat reassuring that only 1 percent viewed his action as ethical when compared to the Cohen and Cornwell study (1989a) where 79 percent of the undergraduate students believed it okay to copy software for educational use.

The fact that Scenario 5 did not yield significant results is not surprising. It would appear that computer professionals, regardless of the type of computer used, recognize a crime since 95 percent of them judged the action of the teller as a crime.

The results of Scenario 6 where 43 percent of the respondents believed it ethical to defeat a copy protect feature to make a backup copy may be one of the reasons why software developers have for the most part given up this security device.

The results in Scenario 1 where 19 percent of the respondents believed it ethical for a computer operator to make unauthorized use of the computer are somewhat encouraging. However, the results for Scenario 2 are even more encouraging since less than 1 percent of the respondents believed the actions of either student was ethical.

The results in Scenario 8 highlight the problem of software licenses which restrict use to a single computer for 34 percent of the respondents believed it ethical to use the spreadsheet program on more than one computer.

## CONCLUSION

Based on the results of this study, there is little evidence indicating a relationship between type of computer used and responses to scenarios involving computer ethics since in only one of the eight scenarios was there a significant difference. Based on the results of this study, organizations should not confine their efforts in addressing computer ethics to microcomputer users and software piracy. The results of this study also confirm that computer ethics is a complex issue and it will continue to be a major issue facing the business world.

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