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Ethical Attitudes among Finnish Computer Science Students and Computer Professionals

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Abstract

The purpose of this replication study was to find out if there were differences between computer professionals' and computer science (CS) students' ethical attitudes. Those differences and diversities among students and professionals imply issues, which should be taken into the computer ethics teaching. The study was accomplished among CS students at the University of Joensuu and at the University of Kuopio. Computer professionals were attained with the help of member database of The Finnish Information Processing Association. In addition, two surveys were accomplished in two organizations. Because of low response rate among professionals, results can not be generalized to cover attitudes of all the computer professionals in Finland. Students' attitudes are supposed to represent all the Finnish CS students.

This study found diverse attitudes among CS students in the following areas: ownership of intellectual property, usage of computer resources for own purposes, and large databases. There were differences pertaining to gender among CS students concerning honesty, customer relationships, and the usage of computer resources for own purposes. Differences in attitudes between professionals and students were found in the following areas: accomplishment of worktasks, ownership of intellectual property, usage of computer resources for own purposes and customer relationships. All these issues should be included in the teaching of computer ethics.

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TABLE OF CONTENTS

1. FOREWORD

It is supposed that attitudes towards certain computer related issues differ among CS students and computer professionals. Those issues include the use of computers and developing computer systems. This study is a replication of the study of Benham and Wagner (1995) in which subjects read 20 scenarios and classified 31 behaviours described them as acceptable, questionable and unacceptable. Benham and Wagner (1995) found differences in attitudes between management information systems (MIS) employees and undergraduate business students. The author used the same research instrument but added three additional cases to the questionnaire concerning software engineering.

The goals of the study were to find out if there were differences between CS students and computer professionals in Finland and if there were diversities in attitudes among students and professionals. Differences and diversities imply issues that should be taken into computer ethics teaching. In addition the differences pertaining to gender among CS students were investigated. Cross-cultural study was not conducted.

This study does not cover all the ethical issues that CS students and computer professionals meet in their work life. This report describes moral views among CS students at the University of Joensuu and at the University of Kuopio. Those views are supposed to represent the attitudes of Finnish CS students. The study partly reflects the morality of computer professionals in Finland. Because of low response rate among professionals, future studies should investigate if these results could be generalized.

Previous attitude measurements are found e.g. in Morris, Jones and Rubinsztein (1993), Conger, Loch and Helft (1994), Hanchey (1994) and Sumner and Werner (1997).

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2. METHOD OF THE STUDY

In this research the methodology and the questionnaire almost equivalent with those of Wagner and Benham (1995) were used. In addition, there were three more questions concerning software engineering. Questions in English and responses are found in Appendix B. Questionnaires in Finnish are found in Vartiainen (1999).

Differences between Wagner's and Benham's (1995) and the Finnish questionnaires

All original cases of Wagner and Benham (1995) were translated in Finnish by the author. Besides some cases were transformed to be suitable with the Finnish culture: county courthouse was changed into tax department (case 8), FBI was transformed into Secret Police (case 9) and the English name was transformed into Finnish one (case 16). Case 9 is not comparable in cross-cultural analysis because FBI and Secret Police are not same thing. In the follow-up questionnaire (see Appendix C) Central Criminal Police was used. Case 6b was changed to be more understandable. Thus cases 9a-c and 6b are not suitable for cross-cultural analysis.

Chi-square tests

StatsGraphics program was used in the statistical calculations. Chi-square tests were used to show whether the two variables (status and response) are independent. Chi-square tests were used comparing results of CS students and computer professionals (see Tables 3 and 4 in Appendix A), and male and female CS students (see Table1 in Appendix A). P-value below 0.05 and 0.01 means 95% and 99% (respectively) probability of dependence of the status (student or professional) on the responses. Some results had to be abandoned because of small (<5) cell values.

Students

The selected CS students were studying at the University of Joensuu and at the University of Kuopio. Both universities are small universities in eastern part of Finland. Both have small departments of computer science (Department of Computer Science and Department of Computer Science and Applied Mathematics). All in all 264 students of which 198 CS students answered the questionnaire. 18% of CS students were women. Questionnaires were filled in CS courses but few students filled them in their own time. Ages of students and professionals can be seen in Table 2-1. Summary of the quantity of students and professionals is presented in Table 2-2.

Table 2-1: Ages of students and professionals.

Age	Students, CS %	Follow-up Students, CS %	Professionals: Group 1 %	Professionals: Group 2 %	Professionals: Group 3 %
-19	12	12	2	0	0
20-29	84	86	13	23	15
30-39	4	2	33	18	41
40-49	0	0	33	36	33
50-59	0	0	17	23	10
60-	0	0	2	0	0

Table 2-2: Quantity of professionals and students at the University of Joensuu and at the University of Kuopio. Last two rows are from Benham and Wagner (1995). Because all respondents did not tell their gender, the sum of the quantities of men and women may be less than quantity of all the respondents.

	Joensuu	Kuopio	Total
Students Freshmen (non-CS)	56	8	64
Students Freshmen (CS)	48	36	84
Students Second year (CS)	17	32	49
Students Third year (CS)	21	15	36
Students Fourth year (CS)	9	6	15
Students Older students (CS >=5)	9	5	14
Students All students (CS)	104	94	198
Students (CS third + fourth)	30	21	51
Students (CS men)	78	75	153
Students (CS women)	19	17	36
Students Follow-Up Freshmen (non-CS)	7		7
Students Follow-Up Freshmen (CS)	38		38
Students Follow-Up Second year (CS)	10		10
Students Follow-Up Third year (CS)	16		16
Students Follow-Up Fourth year (CS)	9		9
Students Follow-Up Older students (CS)	4		4
Students Follow-Up All students (CS)	77		77
Professionals: Group 1, all			181
Professionals: Group 1, men			125
Professionals: Group 1, women			48
Professionals: Group 2, all			23
Professionals: Group 2, men			20
Professionals: Group 2, women			3
Professionals: Group 3, all			39
Professionals: Group 3, men			33
Professionals: Group 3, women			6
Students: USA			125
Professionals: USA			59

Students: Follow-up

Because of translation errors the follow-up study was conducted among students at the University of Joensuu. There were 77 CS students participating in the follow-up study. Students filled the questionnaires in exercises. Questions are in Appendix C.

Professionals: Group 1

The first group of professionals was selected from the database of The Finnish Information Processing Association (in Finnish: Tietotekniikan liitto ry). A sample of size 500 of the 25 000 members population (autumn 1997) was selected randomly. First the population of members was purged from those members whose occupation was different from pure computer professional. For instance, there are secretaries, professionals of economic sciences, and engineers as members of the association. All those members whose occupation dealt purely with computing were taken into account when the final sample of 500 members was selected; 21% of those were women. After a couple of weeks reminder was sent to all the 500 members. All in all 181 (36.2%) returned the questionnaire; 27% of those were women. In the Association 24 % of the members are women.

Professionals: Group 2

The second group of computer professionals was working in academic environment in a university in Finland. The questionnaires were delivered to 34 computer professionals of which 23 (67.6%) answered to the questions; 13% of those who answered were women.

Professionals: Group 3

The third group of computer professionals was working in an organisation, which consisted of about 300 computer professionals. The organisation is a national part of international enterprise, which offer large-scale information technology services from the hardware to consultation. The contact person in the organisation recommended that the questionnaire should be conducted with the help of Internet. The author converted the questionnaire into WWW-page and wrote short paper to be delivered to the sample of professionals. Professionals were given special code with which the answers of possible outsiders were avoided. The contact person delivered the paper to 101 professionals. S/he delivered the papers systematically in the alphabetical order. All in all 40 responded one of which was not a computer professional. Thus the response rate would be 39%; 15.4% of those who answered were women.

Computer professionals seemed to have no much time to answer questionnaires. It was extremely difficult to get professionals answer to the questionnaires. The author tried to persuade five other organisations to fill the questionnaires but e.g. one manager said that they don't have time, one did not ever answer the emails and was not reachable by phone. In one organisation the questionnaires were delivered to 20 professionals but only three answered. Even the manager of that organisation said that s/he did not have time. During telephone conversations the author felt that he was disturbing busy people.

Generalization of the study

The study of professional group 1 was conducted during fall 1997 and the study of professional group 2 was conducted during fall 1998. The study of professional group 3 was conducted during winter 1998-99. The study of CS students was conducted during fall 1997 and the follow-up study in the beginning of spring 1998.

Because in the professional groups 1 and 3 there were very limited amount of responses we cannot scientifically generalize professionals' attitudes to cover all the Finnish computer professionals' attitudes. The results of the professional group 2 support the generalization but more studies are needed. Although there are some exceptions the answers were almost similar to each other between groups.

Students participated in the surveys during the exercises of the CS courses and it is believed that the sample represents Finnish CS students' attitudes.

3. RESULTS

The author argues that the diversity of attitudes in a certain case means that the issue of the case is worth taking out in the teaching of computer ethics. Diversity in opinions does not necessary imply that some ones' thinking needs correction. Merely the understanding of other opinions and viewpoints develops moral thinking (Rest 1994; Rest and Narvaez 1994). Also, if critical ethical analysis is opposite to peoples' attitudes such issues should be taken into ethics teaching. Diversity in opinions does not absolutely imply that some one is thinking unethically. Diversities may occur at least in the following ways: i) among students, ii) among professionals, iii) between students and professionals and iv) between genders. The effect of gender was investigated among students. Diversities among professionals are likely to indicate issues in which the computer professionals as a whole (in Finland) do not have clear and constant moral stands. Diversities between students and professionals are likely to indicate students' unfamiliarity about worklife and it's practices. However, we cannot argue that professionals' attitudes are always more ethical than those of students' but we may argue that professionals can give more profound arguments for their positions and courses of actions than students can give. It is possible that professionals' and students' attitudes may be opposite to the law and ethics. These kinds of attitudes may in the long-term cause changes in the law or the moral attitudes may change.

Results of the study are found in Appendix B. Because percentages were rounded to whole numbers some percentages are 101 or 99 when summed. Summary of diversities in attitudes is presented in Table 3-1.

The author's definition of diversity

There is clear and strong diversity of opinions within a group if all the alternatives (acceptable, questionable, and non-acceptable) have got at least 20% or if both acceptable and non-acceptable alternatives have got at least 30%.

The question of low response rate among professionals

Although response rates were too low for generalization among all three professionals groups (36.2%, 67.6% and 39.0%) it is noteworthy that the form of responses were mostly similar to each other in professional groups 1, 2 and 3. Future studies will show whether these results could be generalized.

Table 3-1: Cases in which there are diversities among students and professionals. The last row indicates case 9b from the follow-up study which not conducted among professionals (**).

Case	Issue	Diversity among students	Difference pertaining to gender among CS students	Diversity among professionals	Difference between students and professionals
6a	use of computer resources for own purposes			yes	
9	large databases (charged with crime)			yes	yes
9b	large databases (Ph.D.)		yes		
10	customer relationship, honesty		yes		
13	acknowledging other person's contribution			yes	
14	accomplishment of worktasks				yes
15	ownership of intellectual property	yes			yes
17	use of computer resources for own purposes			yes	yes
18	customer relationships, honesty		yes		yes
19	use of computer resources for own purposes	yes	yes		yes
20a	ownership of intellectual property	yes		yes	yes
20b	ownership of intellectual property				yes
20c	ownership of intellectual property				yes
21a	customer relationships				yes
9b (FolUp)	large databases	yes		**	**

3.1 Diversities among CS students

There are four cases where there are clear and strong diversities in responses among students (see Table 3-1): 15, 19 and 20a in the first study and 9b in the follow-up study. These cases include issues concerning *ownership of intellectual property* (15, 20a), *use of computer resources for own purposes* (19) and *large databases* (9b). The effect of academic years among students was not investigated. In many cases the form of answers were similar to each other and in some cases even the percentages were near each other among classes. There are, however, exceptions.

3.2 Differences pertaining to gender among CS students

In four cases (9b, 10, 18, 19) there were found statistical differences between men and women among CS students (see Appendix A, Table 1). In the cases 10, 18 and 19 men were more inclined to *dishonest behaviour*: in the case 10 where the programmer did not point out design flaws to his/her client (*customer relationships*), in the case 18 the salesman did not tell the exact truth to his/her client. In the case 19 men were a little bit more inclined to developing commercial software with the help of employer's computer (*use of computer resources for own purposes*). Case 9b (first study) is best to be ignored because the issue of the case is (hopefully) unrealistic in Finland.

3.3 Diversities among professionals

Responses of the professional group 1 are taken into this analysis. There are five cases where there are clear and strong diversity in responses among professionals (see Table 3-1): 6a, 9, 13, 17 and 20a. These cases include issues concerning *use of computer resources for own*

purposes (6a, 17), *large databases* (9), *acknowledging other person's contribution* (13) and *ownership of intellectual property* (20a).

3.4 Differences between students and professionals

Responses of the professionals group 1 are taken into this analysis. There are ten cases where responses differed significantly between students and professionals (see Table 3-1 and Tables 3 and 4 in Appendix A): 9, 14, 15, 17, 18, 19, 20a-c and 21a. Those cases include the following issues: *accomplishment of worktasks, honesty, use of computer resources, ownership of intellectual property* and *customer relationships*. Case 9 should be ignored because the issue of the case is not realistic in Finland. Chi-value of case 7 is not usable because of small cell values. Wagner and Benham (1995) found out that cases 1, 3a, 9b, 14, 17 and 19 differed significantly in their study in USA. Cases 14, 17 and 19 differed in both studies in Finland and USA.

In the cases 14, 15 and 18 honesty is at stake. Cases 14 and 15 describe student facing opportunity to gain something by an unethical action. Case 14 describes a student who was to interview customers with children. Because the student had not been successful obtaining responses he interviewed his friends. 72% of professionals and 53% of students hold action unacceptable (see Appendix A Table 2). Case 15 describe student holding unordered word processing program. Should student send the program back or is she justified holding it? 52% of professionals and 32% of students hold keeping program unacceptable. In the case 18 the salesman did not tell the exact truth to his/her client. Interestingly professionals hold it a little bit more acceptable to withhold the exact truth: 47% and 32% of students and professionals (respectively) hold the action unacceptable and 8% and 17% (respectively) hold it acceptable.

Cases 17 and 19 describe employee's use of employer's computer resources. Responses differed significantly between students and professionals. The use of employer's resources for commercial purposes was hold unacceptable by 32% of students and 59% of professionals. The lack of experience from "business" situations may explain the differences. Wagner and Benham (1995) found same differences.

Case 20a describes student who made illegal copy of software to finish her/his assignment. Student destroyed her copy at the end of semester. In the group of older students 34% accepted the action and 51% held it questionable and 15% unacceptable. Student's attitude to illegal action is different from that of professionals': 26 % accepted, 34% held it questionable and 40% unacceptable.

Cases 15 and 20a-c describe copyright issues, which are controversial between students and professionals. Students hold it more acceptable to copy software for educational purposes than professionals. However, there was no unity in professionals' answers. But when student copied the software with no intention to destroy the copy both students and professionals hold it more unacceptable compared with the case student was to destroy the copy. Case 20b describes student forgetting destroy the copy at the end of semester. Interestingly both students and professionals were more intolerant (40%, 66% hold it unacceptable respectively) although the intention of the act was no different from 20a.

When the boss tells the programmer to leave the error to the program attitudes towards responsibility are different comparing the case of furniture database to traffic lights program (cases 21a-d). According to responses the more safety-critical program the more responsibility the programmer has about final product and the more unacceptable the boss' action is considered. Different degrees of experience in worklife may explain the significant difference in case 21a (furniture database) where 61% of professionals and 42% of students hold boss' action unacceptable. In the case 21c (traffic lights) there were no differences: over 80% of both groups condemned the action unacceptable. Cases 21b and 21d described programmer obeying her boss' orders. Because of misleading text cases 21b and 21d had to be abandoned. Respondents did not understand whether it was the action of fixing the error or the action of obeying the boss, which was to be assessed. Case description was changed to mean obeying the boss and the changed case was used in the studies of professional groups 2 and 3. Responses of both groups were quite similar to each other in the cases 21a, 21c and 21d. Boss' action was held mostly unacceptable in both cases 21a and 21c. Programmer's action was held acceptable in the case of furniture database but unacceptable in the case of traffic lights system – responses were not unanimous, however.

The changed case was used also in the follow-up study, which was arranged among students: responses to cases 21a and 21d were similar to first study. In the case of furniture database and traffic lights program programmer's action was considered acceptable by 56% and 17% of students (respectively). According to students programmer has more responsibility over boss' orders in the case of traffic lights program than in the case of furniture database. However in both cases 21b and 21d third of students hold action questionable which demonstrates that there is no consensus.

3.5 Other issues

There are issues in which there is no major diversity in opinions but which need closer investigation and critical analysis (see Table 3-3). Those controversial issues are presented - critical analysis is left for the future research.

Table 3-3: Issues in the need of critical analysis

Spreading of harmless virus
Hacking into systems with good purposes
Usage of databases
Confidential corporate information
Usability of the program

Cases 2a-c describe a programmer who writes a virus program. Such an activity is condemned by all the students and professionals except when the virus is harmless 28% of students and 17% of professionals conceived the activity questionable. Students and professionals in Finland and USA responded in the same way. *Spreading of harmless virus* is misuse of computer resources and can not be justified.

Case 3a describes a student searching for loophole in university system. The intention of the student was not told in case. Vast majority holds the action either acceptable or questionable. 25% of the answers did not hold it unacceptable that student continued to access others'

records (case 3b). The issue of *hacking into systems with good purposes* should be critically analysed.

Case 4 describes an issue of *databases and the human relationships*. In the case there is a student who is part time data entry clerk in university. He is going to ask another student out. He decided to access her records in the university database to find out about her background. Vast majority hold the action unacceptable in all groups. However, in every group at least 36% hold the action questionable - except female CS students who were most negative to this case. 76% of those hold the action unacceptable. Two professionals even wrote ”everything is permitted in the war and love.”

Case 8 describes an employee who has access to the databases of tax department (county courthouse in the English version). Employee’s use of database is seen a little bit more acceptable if employee suspects that some one might be involved in criminal activity. Results of cases 3b, 4, 8a and 8b seem to point out that although most respondents hold it unacceptable to read the data in database for own purposes it is not absolutely forbidden activity. It would be interesting to survey attitudes towards *modifying* the data in database for variety of reasons.

In the case 22 there is agreement in students’ and professionals’ responses. When systems analyst moves to her employers’ competitor she may tell about his previous employer’s new and efficient work methods to her new employer. But telling information about previous employers’ clients is considered unacceptable. The question about what is *confidential corporate information* should be analysed.

Cases 23a-c describe a programmer in conflict with *usability of the program* and her responsibilities to another important projects. The students and professionals show concern for usability of the software. The programmer explaining that she didn’t have time to develop user friendly solution and giving users manuals was considered more acceptable than if she just gave them manuals without explanations. The fact that the programmer had more important projects did not seem to affect attitudes. This case describes situation where a computer professional has to make trade-off between unfinished worktasks, which is not rare occasion in work life.

Cases 9, 9a and 9b in the follow-up study point out diverse attitudes towards the usage of databases. It seems that CS students accept databases of convicted criminals (this has been carried out in Finland) but the registration of persons charged with a crime is seen mostly unacceptable. The results to the question about registration of persons earned a Ph.D. are very diverse.

4. IMPLICATIONS TO ETHICS TEACHING

The study has pointed out issues that should be included in the ethics teaching in computer science. The summary of those issues is presented.

4.1 Issues

The teaching of professional ethics should include at least the teaching of ethics theory (see experiences in Vartiainen 1998) and the main issues concerning the ethics of the profession. One purpose of this study was to highlight some main issues, which should be included in the teaching of professional ethics. Those issues in which there are no homogenous answers should be taken into teaching of computer ethics. Because of limited number of cases this study does not reflect all the possible issues in computing. In searching for content for teaching ethics in computer science this study has pointed out at least eight issues (see Table 4-1). Some of those issues are general in nature (like honesty and the problem of collective responsibility). But some of those include difficult questions, which have emerged along the computerisation (e.g. usage of databases and ownership of computer programs).

Table 4-1: The issues in which students and/or professionals did not have homogenous attitudes.

Ownership of intellectual property
Use of computer resources for own purposes
The purpose and usage of large databases
Acknowledging other person's contribution
Customer relationships
Accomplishment of worktasks
Honesty
Problem of collective responsibility

There are also some controversial issues and questions like hacking with good purposes, spreading harmless virus, using database in workplace for own purposes (perhaps for justified or innocent purposes), questions about confidential corporate information and the authorities' usage of databases. We need constant value discussions among CS students, computer professionals and other parties in societal level about new possibilities that this emerging technology creates.

4.2 Future research

Cross-cultural study among USA (Benham and Wagner 1995), South-African (Morris, Jones and Rubinsztein 1993) and Finnish students is now possible.

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Appendix A: Tables

Table 1: Differences between men and women among Finnish CS students. In the Significance column * means significance at 0.05 and ** means significance at 0.01 (see P-value column). Chi- and P-values were not counted when there were at least one cell value below 5.

Case	Chi-value	P-value	Some cell counts < 5	Significance
1			yes	
2a			yes	
2b			yes	
2c			yes	
3a	5.76	0.0563		
3b			yes	
3c			yes	
4			yes	
5			yes	
6a	0.42	0.8098		
6b			yes	
7			yes	
8a			yes	
8b	1.45	0.4832		
9	0.81	0.6669		
9a	3.41	0.1813		
9b	11.33	0.0035		**
10	8.58	0.0137		*
11a			yes	
11b	2.06	0.3578		
12			yes	
13	4.43	0.1089		
14			yes	
15	3.67	0.1600		
16			yes	
17	2.70	0.2597		
18	6.52	0.0384		*
19	7.62	0.0221		*
20a	0.64	0.7260		
20b	2.04	0.3606		
20c	0.76	0.6835		
21a	2.54	0.2809		
21b	2.15	0.3406		
21c			yes	
21d	0.37	0.8300		
22a	1.37	0.5035		
22b			yes	
22c			yes	
23a			yes	
23b	5.95	0.0511		
23c	5.11	0.0775		

Table 2: Differences between students and professionals. Results of this study and study of Wagner and Benham (1995). FIN and USA means Finnish and American respondents, respectively. Stu and prof means students and professionals, respectively. Accp, ques and unac means acceptable, questionable and unacceptable, respectively.

case #	FIN stu % accp	FIN prof % accp	USA stu % accp	USA prof % accp	FIN stu % ques	FIN prof % ques	USA stu % ques	USA prof % ques	FIN stu % unac	FIN Prof % unac	USA stu % unac	USA prof % unac
1	5	4	7	5	58	52	27	45	38	44	66	50
2a	0	0	7	1	2	0	0	4	98	100	93	95
2b	2	2	3	6	28	17	22	31	70	80	75	63
2c	0	0	2	0	0	0	0	1	100	100	98	99
3a	37	44	41	38	50	44	35	47	13	12	24	15
3b	4	4	3	2	21	19	19	13	75	77	78	85
3c	0	2	5	2	30	20	29	40	70	79	66	58
4	3	5	3	8	36	41	32	24	62	53	65	68
5	1	2	5	1	9	9	7	12	90	89	88	87
6a	37	45	14	18	45	36	42	46	18	20	44	36
6b	2	2	8	5	28	21	17	30	70	76	75	65
7	1	0	2	6	13	2	7	16	87	98	91	78
8a	3	2	3	5	20	22	14	17	77	75	83	78
8b	13	13	10	6	51	40	32	46	36	46	58	48
9	39	25	39	53	45	37	42	35	16	38	19	12
9a	6	4	17	27	24	20	34	34	70	76	49	39
9b	16	12	10	18	43	40	36	51	41	48	54	31
10	8	8	10	11	50	51	51	56	42	41	39	33
11a	97	98	90	93	2	1	8	5	1	1	2	2
11b	7	3	14	26	35	27	42	43	58	70	44	31
12	1	5	2	1	23	30	25	30	76	65	73	69
13	15	23	19	16	54	44	39	36	31	34	42	48
14	8	4	5	6	39	24	17	35	53	72	78	59
15	24	11	15	20	43	37	37	42	32	52	48	38
16	5	4	15	15	22	16	34	46	73	80	51	39
17	56	34	30	50	38	46	40	44	6	20	30	6
18	8	17	10	15	46	51	53	59	47	32	37	26
19	22	7	12	34	45	34	42	44	32	59	46	22
20a	34	27	19	19	45	36	42	39	21	37	39	42
20b	14	5	12	9	46	29	34	35	40	66	54	56
20c	8	3	5	3	32	12	9	19	60	85	86	78

Table 3: Differences between students and professionals. Chi-values in this and Wagner's and Benham's (1995) study. Symbol * means significance at 0.05 and ** means significance at 0.01. Chi-value of cases 2a and 2c could not be counted because of small cell values.

Case #	FIN chi	FIN p-value	FIN significance p-value	USA chi	USA significance p-value
1	0.87	0.6465		7.04	*
2a	-	-		8.52	
2b	3.35	0.1873		3.57	
2c	-	-		3.00	
3a	1.03	0.5981		14.20	**
3b	0.13	0.9388		1.62	
3c	4.54	0.1034		3.56	
4	1.51	0.4702		3.48	
5	0.34	0.8441		3.99	
6a	1.88	0.3905		1.48	
6b	1.24	0.5375		5.00	
7	9.72	0.0078		6.52	
8a	0.32	0.8536		0.94	
8b	2.54	0.2802		4.46	
9	12.81	0.0017	**	4.35	
9a	1.01	0.6034		3.41	
9b	1.23	0.5405		11.09	**
10	0.00	1.0000		0.78	
11a	0.34	0.8443		0.74	
11b	3.76	0.1528		5.87	
12	4.45	0.1081		0.90	
13	2.84	0.2419		0.78	
14	7.79	0.0203	*	8.96	*
15	10.04	0.0066	**	2.19	
16	1.38	0.5019		3.40	
17	13.68	0.0011	**	21.19	**
18	6.34	0.0420	*	3.24	
19	17.30	0.0002	**	19.03	**
20a	6.22	0.0447	*	0.22	
20b	14.49	0.0007	**	0.48	
20c	15.67	0.0004	**	4.46	

Table 4: Results of the additional questions, which were not in the study of Benham and Wagner (1995).

Case #	FIN Stu % accp	FIN prof % accp	FIN stu % ques	FIN prof % ques	FIN stu % unac	FIN prof % unac	FIN chi	p-value
21a	11	6	47	33	42	61	7.43	0.0244
21b	71	59	20	26	9	15	3.39	0.1836
21c	5	4	13	13	82	83	0.12	0.9431
21d	43	40	29	23	28	37	2.05	0.3594
22a	69	78	24	19	7	3	2.73	0.2551
22b	6	2	24	19	71	79	3.00	0.2228
22c	7	3	30	21	62	76	4.60	0.1001
23a	6	8	62	51	32	42	2.70	0.2589
23b	41	54	50	34	9	12	5.26	0.0723
23c	35	26	55	55	10	19	4.12	0.1274

Appendix B: Questions and summary of responses of the study

A student had access to the university computer system because a class she was taking required extensive computer usage. The student enjoyed playing games on the computer and frequently had to request extra computer funds from her professor in order to complete her assignments.

1. Was the student's usage of the computer to play games:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	3	47	50
Students: Freshmen, CS	2	58	39
Students: Second year, CS	4	63	33
Students: Third year, CS	8	56	36
Students: Older students, CS	7	52	41
Students: All, CS	5	58	38
Students: All, CS, men	5	59	36
Students: All, CS, women	0	53	47
Professionals: Group 1	4	52	44
Professionals: Group 2	13	26	61
Professionals: Group 3	5	44	51
Students: USA	7	27	66
Professionals: USA	5	45	50

A virus program is a program that performs tasks that a user has not requested, or does not want to perform. Some virus programs erase all files on a disk, some just print silly messages. Virus programs always copy themselves on other disks automatically, so the virus will spread to unsuspecting users. One day, a student programmer decided to write a virus programs that caused the microcomputer to ignore every fifth command entered by a user. The student took his program to the university computing laboratory and installed it on one of the microcomputers. Before long, the virus had spread to hundreds of users.

2a. Was the student's action infecting hundreds of users' disks:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	2	0	98
Students: Freshmen, CS	0	0	100
Students: Second year, CS	0	6	94
Students: Third year, CS	0	0	100
Students: Older students, CS	0	3	97
Students: All, CS	0	2	98
Students: All, CS, men	0	3	97
Students: All, CS, women	0	0	100
Professionals: Group 1	0	0	100
Professionals: Group 2	4	0	96
Professionals: Group 3	3	0	97
Students: USA	7	0	93
Professionals: USA	1	4	95

2b. If the virus program outputs the message ”Have a nice day”, would the student’s action infecting hundreds of users’ disks have been:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	3	30	67
Students: Freshmen, CS	5	27	68
Students: Second year, CS	0	39	61
Students: Third year, CS	0	22	78
Students: Older students, CS	0	17	83
Students: All, CS	2	28	70
Students: All, men, CS	1	26	73
Students: All, women, CS	5	34	61
Professionals: Group 1	2	17	80
Professionals: Group 2	0	13	87
Professionals: Group 3	0	13	87
Students: USA	3	22	75
Professionals: USA	6	31	63

2c. If the virus erased files, would the student’s action infecting hundreds of users’ disks have been:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	0	2	98
Students: Freshmen, CS	0	0	100
Students: Second year, CS	0	0	100
Students: Third year, CS	0	0	100
Students: Older students, CS	0	0	100
Students: All, CS	0	0	100
Students: All, CS, men	0	0	100
Students: All, CS, women	0	0	100
Professionals: Group 1	0	0	100
Professionals: Group 2	0	0	100
Professionals: Group 3	3	0	97
Students: USA	2	0	98
Professionals: USA	0	1	99

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 two weeks later.

3a. Was the student's action in searching for the loophole:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	36	45	19
Students: Freshmen, CS	42	52	36
Students: Second year, CS	27	55	18
Students: Third year, CS	44	36	19
Students: Older students, CS	34	52	14
Students: All, CS	37	50	13
Students: All, CS, men	35	54	11
Students: All, CS, women	39	39	21
Professionals: Group 1	44	44	12
Professionals: Group 2	38	29	33
Professionals: Group 3	51	38	10
Students: USA	41	35	24
Professionals: USA	38	47	15

3b. Was the student's action in continuing to access others' records for two weeks:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	6	11	83
Students: Freshmen, CS	6	20	74
Students: Second year, CS	2	20	78
Students: Third year, CS	3	22	75
Students: Older students, CS	3	21	76
Students: All, CS	4	21	75
Students: All, CS, men	5	21	74
Students: All, CS, women	0	21	79
Professionals: Group 1	4	19	77
Professionals: Group 2	0	17	83
Professionals: Group 3	3	10	87
Students: USA	3	19	78
Professionals: USA	2	13	85

3c. Was the system administrator's failure to correct the problem sooner:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	3	38	59
Students: Freshmen, CS	0	26	74
Students: Second year, CS	0	31	69
Students: Third year, CS	3	36	61
Students: Older students, CS	0	31	69
Students: All, CS	0	30	70
Students: All, CS, men	1	31	68
Students: All, CS, women	0	24	76
Professionals: Group 1	2	20	79
Professionals: Group 2	9	35	57
Professionals: Group 3	3	15	82
Students: USA	5	29	66
Professionals: USA	2	40	58

A university student obtained a part-time job as a data entry clerk. His job was to enter personal student data into the university's database. Some of this data was available in the student's directory, but some of it was not. He was attracted to a student in his Algebra class and wanted to ask her out. Before asking her, though, he decided to access her records in the database to find out about her background.

4. Was the student's action in accessing a fellow student's personal information:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	2	30	69
Students: Freshmen, CS	4	33	63
Students: Second year, CS	2	39	59
Students: Third year, CS	3	39	58
Students: Older students, CS	0	34	66
Students: All, CS	3	36	62
Students: CS, men	3	39	58
Students: CS, women	0	24	76
Professionals: Group 1	5	41	53
Professionals: Group 2	9	45	45
Professionals: Group 3	5	36	59
Students: USA	3	32	65
Professionals: USA	8	24	68

A manager of a company that sells computer processing services bought similar services from a competitor. She used her access to the competitor's computer to try to break the security system, identify other customers, and cause the system to "crash" (cause loss of service to others). She used the service for over a year and always paid her bills promptly.

5. Was the manager's action:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	2	9	89
Students: Freshmen, CS	1	8	90
Students: Second year, CS	4	8	88
Students: Third year, CS	0	6	94
Students: Older students, CS	0	14	86
Students: All, CS	1	9	90
Students: All, CS, men	2	10	88
Students: All, CS, women	0	3	97
Professionals: Group 1	2	9	89
Professionals: Group 2	0	9	91
Professionals: Group 3	3	13	85
Students: USA	5	7	88
Professionals: USA	1	12	87

A telephone system employee saw an advertisement in a newspaper about a car for sale. The car sounded like a good buy to the employee. The advertisement listed the seller's telephone number, but not the seller's address. The telephone system employee knew he could determine the seller's address by accessing the seller's telephone records. He did this and went to the seller's house to discuss buying his car.

6a. Was the telephone system employee's action:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	48	30	22
Students: Freshmen, CS	45	42	13
Students: Second year, CS	27	49	24
Students: Third year, CS	42	44	14
Students: Older students, CS	24	48	28
Students: All, CS	37	45	18
Students: All, CS, men	38	43	19
Students: All, CS, women	34	47	18
Professionals: Group 1	45	36	20
Professionals: Group 2	52	29	19
Professionals: Group 3	41	33	26
Students: USA	14	42	44
Professionals: USA	18	46	36

6b (Changed case). If the person had monitored potential buyers with the help of equipment of the telephone company the action would have been:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	5	26	69
Students: Freshmen, CS	4	25	71
Students: Second year, CS	4	27	69
Students: Third year, CS	0	36	64
Students: Older students, CS	0	25	75
Students: All, CS	2	28	70
Students: All, CS, men	3	29	68
Students: All, CS, women	0	24	76
Professionals: Group 1	2	21	76
Students: USA	8	17	75
Professionals: USA	5	30	65

6b (Original case). If you know the seller wanted to screen potential buyers over the phone, was the telephone system employee's action:

	Acceptable %	Questionable %	Unacceptable %
Professionals: Group 2	4	32	64
Professionals: Group 3	13	36	51

A programmer at a bank realized that he had accidentally overdrawn his checking account. He made a small adjustment in the bank's accounting system so that his account would not have an additional service charge assessed. As soon as he made a deposit that made his balance positive again, he corrected the bank's accounting system.

7. Was the programmer's modification of the accounting system: ___

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	2	9	89
Students: Freshmen, CS	1	17	82
Students: Second year, CS	0	6	94
Students: Third year, CS	0	14	86
Students: Older students, CS	0	10	90
Students: All, CS	1	13	87
Students: All, CS, men	1	13	86
Students: All, CS, women	0	11	89
Professionals: Group 1	0	2	98
Professionals: Group 2	0	0	100
Professionals: Group 3	3	3	95
Students: USA	2	7	91
Professionals: USA	6	16	78

In the following case *tax department* was used in the Finnish study instead of *county courthouse* which was used in the study of Benham and Wagner (1995).

A MIS employee at the county courthouse had access to all the county records in the county database. Over the past few weeks, she had become suspicious about her neighbor's buying habits. The neighbor had repainted the house and purchased new lawn furniture and an expensive new car. She decided to access her neighbor's records to determine how these purchases could be afforded.

8a. Was the MIS employee's action:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	5	14	81
Students: Freshmen, CS	5	24	71
Students: Second year, CS	4	14	82
Students: Third year, CS	0	28	72
Students: Older students, CS	0	7	93
Students: All, CS	3	20	77
Students: All, CS, men	4	21	75
Students: All, CS, women	0	16	84
Professionals: Group 1	2	22	75
Professionals: Group 2	0	19	81
Professionals: Group 3	5	18	77
Students: USA	3	14	83
Professionals: USA	5	17	78

8b. If the MIS employee suspected that the neighbor might be involved in criminal activity, would this make her actions:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	19	45	36
Students: Freshmen, CS	19	51	30
Students: Second year, CS	6	53	41
Students: Third year, CS	14	47	39
Students: Older students, CS	7	48	45
Students: All, CS	13	51	36
Students: All, CS, men	14	52	34
Students: All, CS, women	11	47	42
Professionals: Group 1	13	40	46
Professionals: Group 2	5	32	64
Professionals: Group 3	13	31	56
Students: USA	10	32	58
Professionals: USA	6	46	48

In the following cases (9, 9a and 9b) Secret Police was used instead of FBI used in Benham's and Wagner's study (1995). In the professionals group 2 and 3 Central Criminal Police was used.

The Secret Police wants to build a database to maintain information about all persons convicted of a crime. Any person convicted of a crime would be required by law to provide information requested by the Secret Police. The data would be maintained for the life of the person.

9. Would this Secret Police action be:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	49	37	14
Students: Freshmen, CS	41	45	14
Students: Second year, CS	31	55	14
Students: Third year, CS	53	33	14
Students: Older students, CS	31	45	24
Students: All, CS	39	45	16
Students: All, CS, men	40	44	16
Students: All, CS, women	37	50	13
Professionals: Group 1 (Secret Police)	25	37	38
Professionals: Group 2 (Central Criminal Police)	22	39	39
Professionals: Group 3 (Central Criminal Police)	33	38	28
Students: USA	39	42	19
Professionals: USA	53	35	12

The Secret Police want to maintain information on all persons charged with a crime. Any person charged with a crime would be required by law to provide the information requested by the Secret Police. The data would be maintained for the life of the person.

9a. Would this Secret Police action be:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	11	27	62
Students: Freshmen, CS	7	20	72
Students: Second year, CS	0	27	73
Students: Third year, CS	11	33	56
Students: Older students, CS	7	21	72
Students: All, CS	6	24	70
Students: All, CS, men	6	22	71
Students: All, CS, women	5	34	61
Professionals: Group 1 (Secret Police)	4	20	76
Professionals: Group 2 (Central Criminal Police)	0	35	65
Professionals: Group 3 (Central Criminal Police)	5	18	77
Students: USA	17	34	49
Professionals: USA	27	34	39

The Secret Police wants to maintain data on all persons with a Ph.D. Their reason is that these persons present a significant national resource that may be desperately needed in times of crises. Any person who earned a Ph.D. would be required by law to provide the information requested by the Secret Police.

9b. Would this Secret Police action be:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	17	38	44
Students: Freshmen, CS	16	42	42
Students: Second year, CS	8	39	53
Students: Third year, CS	28	50	22
Students: Older students, CS	14	45	41
Students: All, CS	16	43	41
Students: All, CS, men	16	38	46
Students: All, CS, women	19	58	24
Professionals: Group 1 (Secret Police)	12	40	48
Professionals: Group 2 (Central Criminal Police)	14	18	68
Professionals: Group 3 (Central Criminal Police)	21	34	45
Students: USA	10	36	54
Professionals: USA	18	51	31

The owner of a small business needed a computer-based accounting system. He identified the various inputs and outputs he felt were required to satisfy his needs. He showed his design to a computer programmer and asked the programmer if she could implement such a system. The programmer knew she could implement the system because she had developed much more sophisticated accounting systems in the past. In fact, she felt this design was rather crude and would soon need major revisions. But, she did not say anything about this because the business owner did not ask her, and she thought maybe she could be the one hired to implement the needed revisions later.

10. Was the programmer's decision not to point out design flaws:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	3	48	49
Students: Freshmen, CS	7	46	47
Students: Second year, CS	6	55	39
Students: Third year, CS	11	47	42
Students: Older students, CS	7	55	38
Students: All, CS	8	50	42
Students: All, CS, men	9	52	39
Students: All, CS, women	3	39	58
Professionals: Group 1	8	51	41
Professionals: Group 2	4	54	41
Professionals: Group 3	10	41	49
Students: USA	10	51	39
Professionals: USA	11	56	33

An engineer needed a program to perform a series of complicated calculations. She found a computer programmer capable of writing the program, but would only hire the programmer if he agreed to share the liability that might result from an error in her calculations. The programmer said he would be willing to assume any liability due to a malfunction of the program, but was unwilling to share any liability due to an error in the engineer's calculations.

11a. Was the programmer's position in this situation:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	95	5	0
Students: Freshmen, CS	99	1	0
Students: Second year, CS	96	2	2
Students: Third year, CS	97	3	0
Students: Older students, CS	97	3	0
Students: All, CS	97	2	1
Students: All, CS, men	97	2	1
Students: All, CS, women	97	3	0
Professionals: Group 1	98	1	1
Professionals: Group 2	100	0	0
Professionals: Group 3	92	5	3
Students: USA	90	8	2
Professionals: USA	93	5	2

11b. Was the engineer's position in this situation:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	5	36	59
Students: Freshmen, CS	4	40	56
Students: Second year, CS	4	31	65
Students: Third year, CS	17	30	53
Students: Older students, CS	11	32	57
Students: All, CS	7	35	58
Students: All, CS, men	7	33	60
Students: All, CS, women	8	42	50
Professionals: Group 1	3	27	70
Professionals: Group 2	4	22	74
Professionals: Group 3	5	36	59
Students: USA	14	42	44
Professionals: USA	26	43	31

A bank was interviewing a customer with respect to a loan application. The banker was tired and was not paying close attention when the customer told him her highest education level. He did not want to appear inattentive, so he guessed that she probably said that she had earned a Bachelor of Science degree. That was the most common response in his experience, so that is what he recorded on his evaluation.

12. Was the banker's action:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	3	25	72
Students: Freshmen, CS	1	17	82
Students: Second year, CS	0	20	80
Students: Third year, CS	3	28	69
Students: Older students, CS	0	38	62
Students: All, CS	1	23	76
Students: All, CS, men	1	24	75
Students: All, CS, women	0	18	82
Professionals: Group 1	5	30	65
Professionals: Group 2	0	27	73
Professionals: Group 3	5	49	46
Students: USA	2	25	73
Professionals: USA	1	30	69

A scientist developed a theory that required construction of a computer model to prove. He hired a computer programmer to build the model, and the theory was shown to be correct. The scientist won several awards for the development of the theory, but he never acknowledged the contribution of the computer programmer.

13. Was the scientist's failure to acknowledge he computer programmer's contribution:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	17	50	33
Students: Freshmen, CS	5	56	39
Students: Second year, CS	22	55	22
Students: Third year, CS	11	53	36
Students: Older students, CS	38	45	17
Students: All, CS	15	54	31
Students: All, CS, men	18	51	31
Students: All, CS, women	8	58	34
Professionals: Group 1	23	44	34
Professionals: Group 2	17	48	35
Professionals: Group 3	33	54	13
Students: USA	19	39	42
Professionals: USA	16	36	48

A university student was hired to conduct a survey at a local shopping mall. The amount of money he was paid was based on the number of surveys that were completed. The company conducting the survey wanted to obtain input from shoppers regarding "family-oriented issues". The student's instructions were to obtain responses from persons with children, although he noticed that none of the questions specifically asked about a person's child. He saw a group of friends in the mall, and since he had not been too successful obtaining responses from shoppers, he convinced each of his friends to complete a survey.

14. Was the student's action:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	8	42	50
Students: Freshmen, CS	10	37	54
Students: Second year, CS	4	45	51
Students: Third year, CS	11	36	53
Students: Older students, CS	7	38	55
Students: All, CS	8	39	53
Students: All, CS, men	10	37	54
Students: All, CS, women	0	53	47
Professionals: Group 1	4	24	72
Professionals: Group 2	0	17	83
Professionals: Group 3	0	18	82
Students: USA	5	17	78
Professionals: USA	6	35	59

A computer user called a mail-order computer program store to order a particular accounting system. When he received the order, he found out that the store had accidentally sent him a very expensive word processing program as well as the accounting package that he had ordered. He looked at the invoice, and it indicated only that the accounting package had been sent. The user decided to keep the word processing package.

15. Was the user's decision to keep the word processing package:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	25	37	38
Students: Freshmen, CS	20	41	39
Students: Second year, CS	33	40	27
Students: Third year, CS	22	47	31
Students: Older students, CS	24	52	24
Students: All, CS	24	43	32
Students: All, CS, men	27	42	32
Students: All, CS, women	16	51	32
Professionals: Group 1	11	37	52
Professionals: Group 2	14	41	45
Professionals: Group 3	10	36	54
Students: USA	15	37	48
Professionals: USA	20	42	38

A telephone operator received a call requesting the telephone number of Dennis Barak. As he was entering the request into his information system, he could not remember whether the request was for Dennis Barak or Dennis Barat. He decided to have the system return the number for Dennis Bara*; The system would match any number of letters where the asterisk appeared. The system would automatically give the number of the first name that matched. If it was wrong, the caller could just call the operator again.

16. Was the telephone operator's action:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	3	28	69
Students: Freshmen, CS	4	18	78
Students: Second year, CS	6	24	69
Students: Third year, CS	8	22	69
Students: Older students, CS	3	28	69
Students: All, CS	5	22	73
Students: All, CS, men	6	21	73
Students: All, CS, women	3	24	74
Professionals: Group 1	4	16	80
Professionals: Group 2	9	22	70
Professionals: Group 3	10	13	77
Students: USA	15	34	51
Professionals: USA	15	46	39

A computer programmer enjoyed building small computer systems to give to his friends. He would frequently go to his office on Saturday when no one was working and use his employer's computer to develop systems. He did not hide the fact that he was going into the building; he had to sign a register at the security desk each time he entered.

17. Was the programmer's use of the company computer:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	64	33	3
Students: Freshmen, CS	63	34	4
Students: Second year, CS	41	49	10
Students: Third year, CS	64	33	3
Students: Older students, CS	52	38	10
Students: All, CS	56	38	6
Students: All, CS, men	58	36	6
Students: All, CS, women	47	47	5
Professionals: Group 1	34	46	20
Professionals: Group 2	43	30	26
Professionals: Group 3	33	41	26
Students: USA	30	40	30
Professionals: USA	50	44	6

A computer store was having a sale on a limited number of computer systems. A person who bought one of the systems was so pleased with the purchase that he convinced a friend to buy one too. The friend called the store, described the system in detail to a salesman, and asked whether she could obtain a system identical to her friend's system. The salesman said yes, so the woman agreed to come to the store. When the woman arrived at the store, she found that the salesman had configured a system with a different monitor. When she asked about the difference, the salesman told her it was "functionally equivalent" to her friend's monitor. The only difference was that her friend's monitor had some switches that allowed the monitor's characteristics to be changes, whereas the monitor in her system relied on software signals to switch characteristics. Otherwise the monitors were equivalent and had the same cost.

18. Was the salesman's response during the telephone conversation:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	19	42	39
Students: Freshmen, CS	10	42	48
Students: Second year, CS	8	47	45
Students: Third year, CS	6	42	52
Students: Older students, CS	3	59	38
Students: All, CS	8	46	47
Students: All, CS, men	8	49	43
Students: All, CS, women	5	34	61
Professionals: Group 1	17	51	32
Professionals: Group 2	22	48	30
Professionals: Group 3	13	54	33
Students: USA	10	53	37
Professionals: USA	15	59	26

A computer programmer built small systems to sell. This was not his main source of income; he worked for a moderately sized computer vendor. He would frequently go to his office on Saturday when no one was working and use his employer's computer to develop systems. He did not hide the fact that he was going into the building; he had to sign a register at the security desk each time he entered.

19. Was the programmer's use of the company computer:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	23	42	34
Students: Freshmen, CS	22	48	30
Students: Second year, CS	20	39	41
Students: Third year, CS	25	47	28
Students: Older students, CS	24	45	31
Students: All, CS	22	45	32
Students: All, CS, men	25	44	32
Students: All, CS, women	10	53	37
Professionals: Group 1	7	34	59
Professionals: Group 2	0	35	65
Professionals: Group 3	13	26	62
Students: USA	12	42	46
Professionals: USA	34	44	22

A student at a university learned to use an expensive spreadsheet program in her accounting class. The student would go to the university microcomputer lab, check out the spreadsheet, complete her assignment and return the software. Signs were posted in the lab indicating that copying software was forbidden. One day, she decided to copy the software anyway so she could work on her assignments at her apartment.

20a. If the student destroyed her copy of the software at the end of the semester, was her action in copying the software:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	41	33	26
Students: Freshmen, CS	30	47	23
Students: Second year, CS	41	35	24
Students: Third year, CS	25	61	14
Students: Older students, CS	41	38	21
Students: All, CS	34	45	21
Students: All, CS, men	34	45	21
Students: All, CS, women	29	47	24
Professionals: Group 1	27	36	37
Professionals: Group 2	17	22	61
Professionals: Group 3	15	18	67
Students: USA	19	42	39
Professionals: USA	19	39	42

20b. If the student forgot to destroy her copy of the software at the end of the semester, was her action in copying the software:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	17	39	44
Students: Freshmen, CS	10	51	39
Students: Second year, CS	22	39	39
Students: Third year, CS	11	44	44
Students: Older students, CS	17	45	38
Students: All, CS	14	46	40
Students: All, CS, men	15	44	41
Students: All, CS, women	10	53	37
Professionals: Group 1	5	29	66
Professionals: Group 2	4	22	74
Professionals: Group 3	3	13	85
Students: USA	12	34	54
Professionals: USA	9	35	56

20c. If the student never intended to destroy her copy of the software, was her action in copying the software:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	14	22	64
Students: Freshmen, CS	6	29	65
Students: Second year, CS	6	37	57
Students: Third year, CS	8	33	58
Students: Older students, CS	14	34	52
Students: All, CS	8	32	60
Students: All, CS, men	8	32	60
Students: All, CS, women	5	34	61
Professionals: Group 1	3	12	85
Professionals: Group 2	4	17	78
Professionals: Group 3	0	8	92
Students: USA	5	9	86
Professionals: USA	3	19	78

In the first questionnaire (professional group 1) respondents did not understand what programmer's action means in questions 21b and 21d. The error was corrected in the second questionnaire (professional group 2): programmer's action means obeying his/her boss.

Programmer observed an error in the code and requirement specifications. He repaired the error in the code and reported about repair to his boss. The boss ordered the programmer to return the procedure to its original state. The requirement specifications had been agreed with customer and we deliver to customer what he wants, boss explained. The programmer obeyed her boss.

21a. If the software was furniture database, the boss' action was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	6	47	47
Students: Freshmen, CS	6	41	53
Students: Second year, CS	12	51	37
Students: Third year, CS	14	53	33
Students: Older students, CS	21	48	31
Students: All, CS	11	47	42
Students: All, CS, men	12	49	39
Students: All, CS, women	11	39	50
Professionals: Group 1	6	33	61
Professionals: Group 2	4	32	64
Professionals: Group 3	13	28	59

21b. If the software was furniture database, programmer's action was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	66	28	6
Students: Freshmen, CS	71	22	7
Students: Second year, CS	73	12	14
Students: Third year, CS	72	22	6
Students: Older students, CS	66	24	10
Students: All, CS	71	20	9
Students: All, CS, men	72	20	8
Students: All, CS, women	63	24	13
Professionals: Group 1	59	26	15
Professionals: Group 2 (obeyed his boss)	64	14	23
Professionals: Group 3 (obeyed his boss)	44	31	26

21c. If the software belonged to traffic lights system boss' action was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	3	2	95
Students: Freshmen, CS	5	10	86
Students: Second year, CS	2	22	76
Students: Third year, CS	6	8	86
Students: Older students, CS	7	10	83
Students: All, CS	5	13	82
Students: All, CS, men	4	14	82
Students: All, CS, women	3	10	87
Professionals: Group 1	4	13	83
Professionals: Group 2	0	4	96
Professionals: Group 3	3	15	82

21d. If the software belonged to traffic lights system programmer's action was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	45	23	31
Students: Freshmen, CS	51	23	26
Students: Second year, CS	39	37	24
Students: Third year, CS	36	28	36
Students: Older students, CS	34	34	31
Students: All, CS	43	29	28
Students: All, CS, men	42	29	28
Students: All, CS, women	39	29	32
Professionals: Group 1	40	23	37
Professionals: Group 2 (obeyed his boss)	13	35	52
Professionals: Group 3 (obeyed his boss)	16	32	53

X software house was developing and maintaining certain software. One of the systems analysts had been employed by X over 5 years. During last days he was not satisfied to the atmosphere and administration of software house. She decided change her employer and she moved to Y software house, which had been direct competitor to X. Thanks to the experience and know-how of this system analyst Y started to manage better than X.

22a. In Y systems analyst took into use those new and efficient workmethods developed in X but did not tell Y anything about the customers of X. Systems analyst's action was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	70	22	8
Students: Freshmen, CS	69	28	4
Students: Second year, CS	73	19	8
Students: Third year, CS	69	19	11
Students: Older students, CS	62	31	7
Students: All, CS	69	24	7
Students: All, CS, men	69	23	7
Students: All, CS, women	65	30	5
Professionals: Group 1	78	19	3
Professionals: Group 2	77	14	9
Professionals: Group 3	67	23	10

22b. In Y systems analyst took into use those new and efficient workmethods developed in X and she also told Y the information about customers of X. Systems analyst's action was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	3	11	86
Students: Freshmen, CS	5	24	71
Students: Second year, CS	8	24	67
Students: Third year, CS	8	25	67
Students: Older students, CS	0	21	79
Students: All, CS	6	24	71
Students: All, CS, men	7	26	67
Students: All, CS, women	0	16	84
Professionals: Group 1	2	19	79
Professionals: Group 2	4	9	87
Professionals: Group 3	3	18	79

22c. In Y systems analyst did not take into use those new and efficient workmethods developed in X but she told Y about the customers of X. Systems analyst's action was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	5	14	81
Students: Freshmen, CS	6	39	55
Students: Second year, CS	14	25	61
Students: Third year, CS	13	33	53
Students: Older students, CS	7	21	72
Students: All, CS	7	30	62
Students: All, CS, men	8	31	60
Students: All, CS, women	3	29	68
Professionals: Group 1	3	21	76
Professionals: Group 2	0	13	87
Professionals: Group 3	3	21	77

In the computing department of a large organisation there was a programmer who maintained software which was used by tens of secretaries in that organisation. There was a software problem, which needed solution, and the programmer had developed a technically easy solution to the problem. It would, however, make the work of users so complicated that they would need manuals. The programmer knew she could develop more user friendlier solution but implementation of that would take lots of time. She had much more important tasks like the maintenance of accounting system.

23a. The programmer decided to develop technically easy but hard-to-use solution. She did not discuss with secretaries about changes to come but when the solution was implemented she gave them manuals. The action of the programmer was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	5	72	23
Students: Freshmen, CS	6	66	28
Students: Second year, CS	0	53	47
Students: Third year, CS	11	61	28
Students: Older students, CS	7	66	28
Students: All, CS	6	62	32
Students: All, CS, men	5	65	30
Students: All, CS, women	3	53	45
Professionals: Group 1	8	51	42
Professionals: Group 2	9	56	35
Professionals: Group 3	10	59	31

23b. The programmer decided to develop technically easy but hard-to-use solution. She explained to the secretaries that she did not have time to develop user friendly solution. After implementation she gave them manuals. The action of the programmer was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	34	50	16
Students: Freshmen, CS	46	46	8
Students: Second year, CS	33	53	14
Students: Third year, CS	39	53	8
Students: Older students, CS	41	55	3
Students: All, CS	41	50	9
Students: All, CS, men	41	52	7
Students: All, CS, women	39	42	18
Professionals: Group 1	54	34	12
Professionals: Group 2	48	35	17
Professionals: Group 3	46	46	8

23c. The programmer decided to develop user friendly implementation, which took plenty of her work time. Users were given user-friendly solution and no manuals were needed. All the other projects in which the programmer was part of were delayed. The action of the programmer was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	52	40	8
Students: Freshmen, CS	45	49	6
Students: Second year, CS	33	63	4
Students: Third year, CS	28	58	14
Students: Older students, CS	17	59	24
Students: All, CS	35	55	10
Students: All, CS, men	34	55	11
Students: All, CS, women	34	63	3
Professionals: Group 1	26	55	19
Professionals: Group 2	39	61	0
Professionals: Group 3	23	59	18

Appendix C: Follow-up questionnaire

The follow-up study contained two cases: 9 and 21 from the original questionnaire. Central Criminal Police was used in case 9 and the authority of the chief was emphasized in case 21.

The Central Criminal Police want to build a database to maintain information about all persons convicted of a crime. Any person convicted of a crime would be required by law to provide information requested by the Central Criminal Police. The data would be maintained for the life of the person.

9. Would this Central Criminal Police action be:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	57	29	14
Students: Freshmen, CS	50	39	11
Students: Second year, CS	40	50	10
Students: Third year, CS	69	19	12
Fourth year (CS)	56	44	0
Students: Older students, CS	50	25	25
Students: All, CS	53	36	10

The Central Criminal Police want to maintain information on all persons charged with a crime. Any person charged with a crime would be required by law to provide the information requested by the Central Criminal Police. The data would be maintained for the life of the person.

9a. Would this Central Criminal Police action be:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	14	29	57
Students: Freshmen, CS	3	29	68
Students: Second year, CS	0	30	70
Students: Third year, CS	6	44	50
Fourth year (CS)	0	11	89
Students: Older students, CS	0	75	25
Students: All, CS	3	32	65

The Central Criminal Police wants to maintain data on all persons with a Ph.D. Their reason is that these persons present a significant national resource that may be desperately needed in times of crises. Any person who earned a Ph.D. would be required by law to provide the information requested by the Central Criminal Police.

9b. Would this Central Criminal Police action be:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	29	29	42
Students: Freshmen, CS	14	40	46
Students: Second year, CS	20	30	50
Students: Third year, CS	44	19	37
Fourth year (CS)	11	33	56
Students: Older students, CS	0	50	50
Students: All, CS	20	34	46

Programmer observed an error in the code and requirement specifications. He repaired the error in the code and reported about repair to his boss. The boss ordered the programmer to return the procedure to its original state. The requirement specifications had been agreed with customer and we deliver to customer what he wants, boss explained. The programmer obeyed her boss.

21a. If the software was furniture database, the boss' action was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	14	57	29
Students: Freshmen, CS	10	45	45
Students: Second year, CS	0	60	40
Students: Third year, CS	40	40	20
Fourth year (CS)	0	44	56
Students: Older students, CS	25	0	75
Students: All, CS	14	43	42

21b. If the software was furniture database, programmer's action was (obeyed his boss):

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	71	14	14
Students: Freshmen, CS	63	32	5
Students: Second year, CS	40	40	20
Students: Third year, CS	62	38	0
Fourth year (CS)	44	56	0
Students: Older students, CS	25	75	0
Students: All, CS	56	39	5

21c. If the software belonged to traffic lights system boss' action was:

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	0	57	43
Students: Freshmen, CS	0	13	87
Students: Second year, CS	0	20	80
Students: Third year, CS	6	6	88
Fourth year (CS)	11	11	78
Students: Older students, CS	0	0	100
Students: All, CS	3	12	86

21d. If the software belonged to traffic lights system, programmer's action was (obeyed his boss):

	Acceptable %	Questionable %	Unacceptable %
Students: Freshmen, non-CS	14	43	43
Students: Freshmen, CS	11	26	63
Students: Second year, CS	10	50	40
Students: Third year, CS	25	31	44
Fourth year (CS)	44	22	33
Students: Older students, CS	0	50	50
Students: All, CS	17	31	52