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**AN EXAMINATION OF THE EFFECT
OF SUBJECT SPECIALISATION,
CULTURE AND PRIOR EDUCATION
ON COMPUTER ETHICS**

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Abstract

Ethics is currently an issue of considerable importance to accountants, and there have been calls from the accounting profession for greater attention to be paid to this topic. The paper reports on a study which examined the ethical perceptions of accounting and computer science students. The research also compared the perceptions of a New Zealand group with those of an international group (mainly composed of Malaysians), and examined the effect on interviewees' perceptions of previous education, or lack of it, on the topic of computer ethics. There were significant differences particularly between accounting and computing students, and between New Zealand and Malaysian students.

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1. Introduction

Ethics has been a topic of considerable recent concern for accountants in New Zealand. This is shown for example by an issue of the *Chartered Accountants' Journal of New Zealand* focusing on ethics in September 1998, and by articles on the topic by Institute of Chartered Accountants of New Zealand president Tim Fairhall and Professional Practices Board chairman Graeme Sinclair. Computer issues are also a topic of considerable professional concern.

To allow analysis, this study compared ethical judgements about hypothetical situations by New Zealand final-year accounting students with those of Malaysian students and computer science students. This approach provides information about New Zealanders' perceptions of ethical issues, compared to other groups. It also provides information about accounting students which is indirectly relevant to the ethics of professional accountants. There were significant differences particularly between accounting and computing students, and between New Zealand and Malaysian students.

The study also examined whether previous education about computer ethics had an impact. The question of "Ethics - can they be taught?" was raised by Fairhall in 1997.

The research was carried out by asking the subjects to read case scenarios about computer ethics and give their opinion about whether the behaviour of the participants was ethical, unethical or did not concern ethical issues. The questionnaire is attached as Appendix 1.

2. Issues Examined

2.1 Subject Specialisation

Ethics related to computer issues may be interpreted differently by computer specialists and by other professional groups, including accountants. In this study, the views of computer science students and accounting students are considered. Computer science students might concentrate on computer issues to a greater extent than other groups. Accounting students are likely to use computers more than most other disciplines, but they might not share similar perceptions to those of computer science students as to what is ethical or unethical computer-related behaviour. The subject of the first hypothesis, therefore, is to establish whether or not

there is a variation in perception of computer ethics between students of computer science, and students of accounting.

Accounting students might have different perceptions about computer ethics from those held by computer science students. Accounting education may place a different emphasis on the material covered. This approach may lead to accounting students' attitudes to their subject being different from the attitudes of their computer science counterparts. For computer science students, greater familiarity might tend to push back the barrier at which an action is deemed unethical. That is, computing science students may get more chances to be placed in computer related situations where a choice of action has ethical or unethical connotations; and some might become less scrupulous. Studying accounting and computer science students also provides some insight into the perceptions of the respective professional groups in relation to computer ethics.

Final year students with accounting majors at a New Zealand university were chosen as the accounting group for study. Their responses were contrasted with another group of students in a professional subject area, computer science students at another New Zealand university.

2.2 Culture

Hofstede (1980) has drawn attention to the existence of cultural variation, and defined four dimensions in which cultures vary. The second theme of this study tests the applicability of Hofstede's model by considering the differences in perceptions regarding computer related ethics between students educated in New Zealand and those educated overseas. The two groups include a substantial number of international students, mainly from Malaysia. This provided us with the opportunity to examine whether there are cultural differences between New Zealanders and others.

A large-scale study of national cultures and their work-related consequences was carried out by Hofstede (1980) and has been widely cited subsequently. According to Hofstede, there are significant variations in the ways that members of a national culture behave when compared with other cultures.

Hofstede identified four dimensions by which employees varied according to their national culture. These were *Power Distance*, *Individualism*, *Uncertainty Avoidance*, and *Masculinity*. Power distance was concerned with relationship to authority; individualism

with the relationship of the individual to society collectively; masculinity with the way in which gender differentiation affects society; and uncertainty avoidance to anxiety, need for security and dependence on experts (Hofstede, 1980).¹ New Zealand and Malaysia differ considerably on two of these dimensions: individualism and power distance.

New Zealanders score very highly on individualism and low on power distance. These results are similar to those of Australia, Britain, and the United States. Greater individualism suggests that New Zealanders are less likely to conform to group norms. Low power distance means employees are more likely to be independent and idiosyncratic in their behaviour, and more likely to question their superiors. Malaysia, by contrast, scores low on individualism and high on power distance, which is similar to the Philippines, Singapore, and Mexico. Hofstede's model suggests that Malaysians are more likely to adhere to the group's behaviour, and to accept instructions from higher management without question. New Zealand and Malaysia are relatively similar on the remaining dimensions, masculinity and uncertainty avoidance.

Studies applying Hofstede's model in an accounting context have been able to explain some variations, but not all. The studies have shown that the culture scores of Taiwanese employees of US-affiliated accounting firms differ from those of Taiwanese employees of Taiwanese firms (Chow and Hwang, 1995); and that some differences between Japanese and Taiwanese budget practices can be explained by Hofstede's cultural dimensions (Chang, Yeh and Wu, 1995). Preferences for management controls by Japanese and US MBA students also varied significantly, but most of these variations could not be explained by Hofstede's model (Chow, Kato and Shields, 1994). A field study by Merchant, Chow and Wu (1995) found that differences between US and Taiwanese firms were generally not consistent with Hofstede's explanations based on national culture, but could be explained by other variables such as the education and experience of senior managers.

2.3 Prior Education in Computer Ethics

Another motivation was to establish whether education has an impact on a student's perception of ethical behaviour in relation to computers. There are several points of view. Education in computer ethics, and increased awareness of ethical issues, could reduce

¹ A later study introduced another dimension, *Confucian dynamism* (Hofstede and Bond, 1988). This dimension is not examined in our study, as only limited information is available about it. It does not have the body of research to support it that the earlier Hofstede model has, and no information about Malaysia was obtained by Hofstede and Bond.

unethical behaviour. Gotterbarn (1992) asserted that if effort is made to make people aware of computer ethics concerns, unethical behaviour will decrease.

Athey (1993) considered that it was necessary to expose students to different situations so that they have the ability to examine the possible consequences of their decisions. With no professional experience, most students would be unaware of real-world conditions before making decisions as to which actions are unethical. Consequently, they need to be aware of the issues so that they will have some idea of what to fall back on if a similar situation occurs in their future professional careers.

However, McCampbell and Liedlich (1996) provided an illustration of how lessons in computer education can produce a contradictory result. A computer science student applied the techniques acquired in a final year paper to enter and corrupt the university's computer system. It is possible that computer ethics education makes a student more likely to act unethically.

3. Hypotheses

The research aimed to determine whether the fact of being in a particular subject specialisation (accounting or computer science), has an effect on students' perceptions about certain actions being ethical or not. Similarly, it examined whether differing educational cultures provide variations in subjects' views about such matters, and, finally, whether education in computer ethics has an effect on ethical perceptions.

H₁: Accounting students and computer science students have the same computer-related ethical beliefs.

H₂: Students educated predominantly overseas and students educated predominantly in New Zealand have the same computer-related ethical beliefs.

H₃: Students with prior computer ethics instruction and students without prior computer ethics instruction have the same computer-related ethical beliefs.

4. Methodology

The scenarios and the questions provided to students were derived from an earlier study, in the United States, by Athey (1993). The scenarios comprised a brief description of a situation an accountant or computer professional may face within the early years of professional employment. Questions asked whether subjects perceived the actions of characters in the scenario to be ethical or unethical (or to indicate if they felt it was not an ethical issue).

The format of this questionnaire was modified to represent the local environment. United States terminology was replaced by its New Zealand counterpart as far as practicable. For instance, references to company 'President' were replaced with 'Chief Executive'. The scenarios comprised a brief narrative, indicative of situations an accountant or computer professional may face within the early years of professional employment. Questions following these passages focused upon whether subjects perceived the actions of characters in the scenario, to be ethical or unethical (or to indicate if they felt it was not an ethical issue).

The questionnaire also requested information about whether the majority of the subjects' education had been overseas or in New Zealand, and whether or not they had previously taken a course of which computer ethics was a component.

Athey's (1993) study compared computer science students with professional computer specialists. Differences were found between experts' responses and those of various student categorisations (including male/female students, low/high income students, and computer science students). However, the only hypothesis for which there were variations in the majority of scenarios was that which compared the results of experts with those of computer students (where significant differences were recorded in 10 out of the 18 cases).

Athey concluded that the differences could merely represent an altered perception as to what is ethical today, when compared to what was deemed ethical in previous decades. It may be that events which now occur more frequently become more widely accepted.

5. Results

Descriptive statistics are shown in Table 1. There were substantial differences between the groups. More of the overseas-educated students were studying accounting, and the students who had previous computer ethics instruction were more likely to be computer science students. This is a limitation of the study, as we are unable to assess the effect of each variable individually.

Results of testing are summarised in Table 2 and shown in detail in Tables 3, 4 and 5. Chi-square tests were employed to determine the questions for which students' responses were dependent upon the variable being tested. Significant results are discussed below.

Hypothesis 1: Accounting students and computer science students have the same computer-related ethical beliefs.

Table 3 shows the detailed results classified by subject area. Six out of the 18 scenarios displayed significant differences between students of accounting and computer science. Each scenario where $p \leq 0.05$ is briefly summarised.

- SC2 (ii) This question asked for subjects' opinions on a management team ordering a system prematurely into production and forgoing various controls. No computer science students deemed the action to be ethical, while less than 50% of accounting subjects thought that this was unethical.
- SC3 (i) Dealing with a supervisor disclaiming responsibility, this question addressed concentration on personal duties, as opposed to acting for the benefit of the entire firm generally. No large response rate was recorded from either student group labelling this situation as unethical, however over 50% of the accounting students believed that the supervisor acted ethically in comparison with a similar proportion of computer science students who thought that this did not involve an ethics issue.
- SC5 (i) This scenario had only one question. Subjects were asked to consider a programmer who occasionally developed and marketed invalid consumer profiles. Representing the equal largest response under this hypothesis, 85%

of the computer science students deemed this action to be unethical, compared with barely 50% of the accounting subjects.

- SC7 (i) The results show that 85% of computer science students perceived an information security manager's monitoring of electronic correspondence by employees as unethical. Only 35% of the accounting class agreed with this view, with over half believing that the manager acted ethically.
- SC7 (ii) This question involved the information security manager notifying superiors of personal electronic communications (of the employees) that he/she had discovered. Of accounting students, 68% believed that this behaviour was ethical and although computer science students appeared undecided, the majority felt that the information security manager was acting unethically.
- SC7 (iv) A scenario involving top management failing to set and inform employees of rules on e-mail usage provided the next statistically significant difference. Again, half the computer science students responded by considering this unethical. Most of the accounting students, 71%, did not consider this action to be an ethical issue.

Hypothesis 2: Students predominantly educated overseas and students predominantly educated in New Zealand have the same computer-related ethical beliefs.

Results are shown in Table 4. Half of the 18 scenario questions produced statistically significant differences. Again only those which are significant will be discussed.

- SC1 (i) This question involved a student using computer services by taking advantage of a vulnerability in the system. A statistically significant result was provided as a result of an extremely high 'unethical' response (83%) by the locally educated. Although the larger number of foreign educated students also labelled the behaviour 'unethical', response numbers remained very close across the three options.
- SC1 (iii) Almost the same proportion of respondents from both backgrounds deemed that a service director not correcting a system vulnerability would be acting

unethically. The notable difference lay where none of the New Zealand educated students answered 'ethically'. There were a number of foreign students who did consider the action to be ethical.

- SC2 (ii) As for the previous hypothesis, this question illustrated significant differences. Only one New Zealand student believed premature introduction of a potentially faulty system was ethical, and 64% identified this as unethical. Although the larger number of foreign students agreed, their results were not consistent.
- SC2 (iii) The results for this question were similar to the previous one. In this case, 86% of New Zealand students asserted that management blaming the project leader was unethical, but a substantial proportion of overseas students found this to be ethical.
- SC5 (i) As in H1, the hypothesis for this scenario was rejected. Developing and marketing invalid consumer specifications was considered unethical by 75% of the New Zealand educated subjects. The results provided by the overseas students were not decisive.
- SC6 (i) Half of the foreign students believed that marketing software containing bugs was ethical. Nearly 70% of the New Zealand students considered this to be unethical.
- SC7 (i) Substantial differences were recorded with this question. Monitoring personal electronic correspondence of employees was determined to be unethical by 72% of New Zealand students, and ethical by 71% of foreign students. Only four students in total thought that the provided scenario did not involve any ethical issues.
- SC7 (iii) The use of e-mail for personal communications by employees was thought unethical by the majority of foreign students, while those locally educated believed that no ethics' issue was involved in this question.

SC7 (iv) This question concerned the morality of top management failing to establish and communicate rules on e-mail usage by employees. Most people in both subject groups thought that this did not involve an ethics issue, however 39% of New Zealand students regarded this action as unethical (compared with 14% of overseas students).

Hypothesis 3: Students with prior computer ethics instruction and students without prior computer ethics instruction have the same computer-related ethical beliefs.

These results are shown in Table 5.

On the subject of whether or not students had perceived themselves to have had previous computer ethics education, there were only two statistically significant results. Both emanated from Scenario 2, and the levels of significance were not as high as results concerning the other hypotheses.

SC2 (i) Over half the students who stated that no component of any previous course had contained instruction in computer ethics believed that project leaders implementing incomplete and inadequate systems acted ethically. Most of the students who had received this type of education did not feel that an ethics issue was involved.

SC2 (ii) Both groups agreed that premature production of a system was unethical (53% of those with prior computer ethics education, and 58% of those without). A large proportion (44%) of students with prior computer ethics education saw this as not an ethical issue, while the remainder of those without computer ethics education were equally divided between regarding this behaviour as ethical and not considering this an ethical issue. The significant result arose because only one of the 'computer ethically educated' students deemed this action to be ethical. Incidentally, a significant result was obtained when the responses for this scenario were tested under all three hypotheses.

Summary

Three of the significant results concerning the first hypothesis (subject specialisation) were recorded in scenario seven. The two groups of subjects clearly had conflicting views regarding electronic communications. The remaining half of the significant outcomes were

spread among the other scenarios. In five of these cases, the computer science students were more likely to regard actions as unethical. In the other scenario, regarding software that used input from other units, computer science students were more likely to regard the matter as not an ethical issue.

Hypothesis two (educational backgrounds) produced many significant results. This outcome suggests that differences in computer related ethical perceptions exist between students educated in New Zealand and overseas. Only scenarios three and four (both dealing with software specialists) did not result in significant differences; in all other situations, statistically significant results were recorded for most questions. There were nine results in which the differences were significant ($p. <0.05$). In all but one case, the New Zealand students were more likely to regard actions as unethical. In only one situation, that of an employee using e-mail for personal communications, were the overseas students more likely to regard this action as unethical.

The results from hypothesis three (prior ethics instruction) did not produce sufficient evidence to suggest that a substantial difference exists between the computer related ethical perceptions of those who had prior ethics instruction, and those who had not. Both significant results in this section came from the scenario involving implementation of an inadequate system (scenario two). In each case, the students with prior ethics instruction were more likely to regard certain actions as not being an ethical issue.

6. Conclusion

The major finding was that perceptions of ethical behaviour involving computers vary greatly between the two groups with different educational backgrounds. Hofstede's model of cultural differences is relevant. The concepts of individualism and power distance appear to explain many differences in the results. Malaysians (with expected low scores for individualism and high power distance) were more likely to accept any action by a superior; New Zealanders (high individualism, low power distance) were more likely to question it.

There were also some differences between accounting and computer science students, and those with prior computer ethics education were different from the rest. Computer science students were more likely to consider business practices to be unethical. Prior ethics

education had an effect in only two of the 18 questions, and its effect was that students were more likely to regard an action as not concerning an ethical issue. However, we did not inquire into the nature of the ethics education the students had undergone.

The analysis of all of these differences was made more complicated by overlaps among the groups. The overseas students were more likely to study accounting; and the computer science students were more likely to have had computer ethics education. The problems these overlaps cause are a limitation of the study.

Appendix 1

SURVEY

The Ethics of Students in Computer Related Situations

NOTE: You are invited to participate in a project entitled *The Computer Ethics of Students* by completing the following questionnaire. The aim of the project is to establish what effect education in computer ethics might have on practice or perceived practice. The questionnaire is anonymous, and you will not be identified as a respondent without your consent.

Thank you for agreeing to take part in my research. Please answer all questions **HONESTLY**. Remember that all answers are strictly **CONFIDENTIAL**, and therefore your name is not required to be situated anywhere on the answer sheet. The data will be used only in the aggregate for analysis. Please tick on the line next to the statement you wish to select.

QUESTION 1) Has the **MAJORITY** of your education been in New Zealand or overseas?

_____ in NEW ZEALAND
_____ OVERSEAS

QUESTION 2) Have you previously undertaken any course of which computer related ethics was a component?

_____ YES
_____ NO

Scenarios

Please read each scenario. At the end of each scenario you will be given a person and an action taken by that person to consider. In each instance you are to decide whether the specified act was, in your honest opinion, ethical, unethical, or if an ethical act was even

involved. Select the answers which best match your personal beliefs. Again, all responses are clearly CONFIDENTIAL.

SCENARIO 1) A university student used the campus computer time-sharing service as an authorised user. The service director announced that students would receive public recognition if they successfully entered portions of the computer system to which they did not have authorised access from their terminals. Students were urged to report the weaknesses they found. This created an atmosphere of casual game playing and one-upmanship in attacking the system.

The student found a means of compromising the system and reported it to the director. However, nothing was done to correct the vulnerability, and the student continued to use his/her advantage to obtain more computer time than he/she was otherwise allowed. This time was used to play games and to continue to attack the system to find more vulnerabilities.

i) The STUDENT in using computer services by taking advantage of a vulnerability was acting

- Unethically
- Ethically
- Not an ethics issue

ii) The SERVICE DIRECTOR in encouraging the compromise of the computer system was behaving

- Unethically
- Ethically
- Not an ethics issue

iii) The SERVICE DIRECTOR in not correcting the vulnerability was acting

- Unethically
- Ethically
- Not an ethics issue

SCENARIO 2) A project leader was given a project responsibility to develop a customer billing and credit system for his employer, a large retail business. The project leader thought the budget and resources were adequate. However, the budget amount was expended before completion of the system. This project leader had continually warned management of impending problems, but was directed to finish the development as soon as possible and at the lower cost. The project leader was forced by management to do this, foregoing many of the program functions, including audit controls, safeguards, flexibility, error detection and correction capabilities, automatic exception handling, and exception reporting. A 'bare bones' system was installed. This project leader was told that all the omitted capabilities could be added in subsequent versions, after production of the initial system.

A difficult, expensive, and extensive conversion to the new system occurred. After the new system was in production, great problems arose. Many customers received incorrect and incomprehensible billing and credit statements and became outraged. The retail company was unable to correct errors or explain confusing system output. Fraud increased, business and profits declined, and customers suffered much anguish and personal expense. The project leader was blamed for the losses.

i) The PROJECT LEADER in implementing an incomplete and inadequate system acted

- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue

ii) MANAGEMENT in ordering the system into production prematurely acted

- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue

iii) MANAGEMENT in blaming the project leader acted

- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue

SCENARIO 3) A software developer was assigned the task of developing software to control a particular unit of a large system. Preliminary analysis indicated that the work was well within the state of the art, and no difficulties were anticipated with the immediate task. To function correctly, or to function at all, however, the software to be developed required inputs from other units in the system. Someone gave the software professional an article by an eminent software specialist that convinced the software professional that inputs from other units could not be trusted. Thus, neither the software being designed, nor the unit the company was providing, could correctly accomplish their task. The professional showed the article to his/her supervisor and explained its significance. The supervisor's response was "That's not our problem; let's just be sure that our part of the system functions properly." The software professional continued to work on the project as originally defined.

i) The SOFTWARE PROFESSIONAL in working on a project that depends on questionable inputs acted

- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue

ii) The SUPERVISOR by being concerned only with one part of the system acted

- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue

SCENARIO 4) Company XYZ has developed the software for a computerised voting machine. Company ABC, which manufactures the machine, has persuaded several cities; on the strength of these orders, it is planning a major purchase from XYZ. XYZ's software engineer, Smith, is visiting ABC one day and learns that problems in the construction of the machine mean that one in ten is likely to miscount soon after installation. Smith reports this to his/her superior, who informs him/her that this is ABC's problem, not XYZ's. Smith does nothing further to bring the problem to XYZ Company's attention.

- i) SOFTWARE ENGINEER SMITH by not going beyond his/her immediate supervisor acted

_____ Unethically
_____ Ethically
_____ Not an ethics issue

- ii) SMITH'S SUPERIOR by telling Smith to ignore the malfunctions acted

_____ Unethically
_____ Ethically
_____ Not an ethics issue

SCENARIO 5) An enterprising programmer used publicly available information stored in a variety of places or available for purchase from the Department of Motor Vehicles, mail order firms, and other sources to compile "profiles" of people (shopping habits, likely income levels, whether the family was likely to have children, etc.) The programmer sold the profiles to companies interested in marketing specialised products to niche markets. Some of the profiles were inaccurate, and the families received a large volume of unsolicited, irrelevant mail and telephone calls. They did not know why this increase in junk mail and calls had occurred and found it annoying and bothersome. Other profiles were accurate and families benefited from receiving the sales material.

- i) The PROGRAMMER by developing and marketing sometimes invalid consumer profiles acted

_____ Unethically
_____ Ethically
_____ Not an ethics issue

SCENARIO 6) A software development company has just produced a new software package which incorporates the new tax laws and figure taxes for both individuals and small businesses. The president of the company knows that the product probably has a number of bugs, but believes that the first firm to put this kind of software on the market is likely to capture the largest market share. The company widely advertises the program. When the company actually ships a disk, it includes a disclaimer of responsibility for errors resulting from use of the program.

The company expects it will receive a certain number of complaints, queries, and suggestions for modifications. The company plans to use these to make changes and eventually issue updated, improved, and debugged versions. The president argues that this is general industry policy and that anyone who buys version 1.0 of a program knows this and will take proper precautions. Because of the bugs, a number of users filed incorrect tax returns and were penalised by the IRD.

- i) The PRESIDENT by marketing this software that has bugs acted
- _____ Unethically
_____ Ethically
_____ Not an ethics issue
- ii) The PRESIDENT by marketing the product with a disclaimer of responsibility acted
- _____ Unethically
_____ Ethically
_____ Not an ethics issue

SCENARIO 7) The information security manager in a large company was also the access control administrator of a large electronic mail system operated for company business among its employees. The security manager routinely monitored the contents of electronic correspondence among employees and discovered that a number of employees were using the system for personal purposes. The correspondence included love letters; disagreements between married partners, plans for intimate liaisons, and a football betting pool.

The security manager routinely informed the human resources department director and the corporate security officer about these communications and gave them printed listings of them. In some cases, managers punished employees on the basis of the contents of the electronic mail messages. Employees objected to the monitoring of their electronic mail, claiming they had the same right of privacy as they had using the company's telephone system or internal paper interoffice mail system.

- i) The INFORMATION SECURITY MANAGER in monitoring electronic correspondence of employees acted
- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue
- ii) The INFORMATION SECURITY MANAGER in informing management of abuses acted
- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue
- iii) The EMPLOYEES by using the electronic mail system for personal communications acted
- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue
- iv) TOP MANAGEMENT in failing to set rules on e-mail usage and to inform employees of these rules acted
- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue
- v) TOP MANAGEMENT by punishing some employees based on the contents of the electronic mail messages acted
- _____ Unethically
- _____ Ethically
- _____ Not an ethics issue

Thank you.

Table 1
Descriptive Statistics

	Accounting students		Computer Science students		Total	
	Number	Percent	Number	Percent	Number	Percent
Educated in New Zealand	12	39%	24	92%	36	63%
Educated Overseas	19	61%	2	8%	21	37%
Total	31		26		57	
Prior ethics education	11	35%	21	81%	32	56%
No prior ethics education	20	65%	5	19%	25	44%
Total	31		26		57	

Table 2
Summary of Results

Scenario and question number	<u>SUBJECT</u>	<u>EDUC.</u>	<u>PRIOR</u>
	<i>p. value</i>	<i>p. value</i>	<i>p. value</i>
1i	0.100	0.002	0.314
1ii	0.264	0.101	0.146
1iii	0.471	0.006	0.207
2i	0.614	0.089	0.021
2ii	0.040	0.034	0.045
2iii	0.235	0.001	0.053
3i	0.005	0.201	0.361
3ii	0.538	0.084	0.479
4i	0.928	0.748	0.381
4ii	0.416	0.076	0.904
5i	0.034	0.004	0.479
6i	0.392	0.002	0.439
6ii	0.445	0.879	0.121
7i	0.000	0.001	0.381
7ii	0.024	0.353	0.205
7iii	0.267	0.047	0.311
7iv	0.007	0.016	0.478
7v	0.154	0.176	0.132

SUBJECT: significance levels of chi-square tests for differences between the responses of accounting students and computer science students.

EDUC.: significance levels of chi-square tests for differences between students educated in New Zealand and students educated overseas.

PRIOR: significance levels of chi-square tests for differences between students with prior ethics education and students without prior ethics education.

Results shown in **bold** are significant at $p. < 0.05$.

Table 3
Results by Subject (Accounting or Computer Science)

Scenario and question number	Unethically			Ethically			Not an ethics issue			Chi-square	<i>p</i>
	<i>Accounting</i>	<i>Computer Science</i>	<i>Total</i>	<i>Accounting</i>	<i>Computer Science</i>	<i>Total</i>	<i>Accounting</i>	<i>Computer Science</i>	<i>Total</i>		
1 i	17	21	38	6	3	9	8	2	10	4.618	0.100
1 ii	11	6	17	11	7	18	9	13	22	2.669	0.264
1 iii	16	14	30	4	1	5	11	11	22	1.506	0.471
2 i	9	6	15	11	8	19	10	12	22	0.975	0.614
2 ii	14	18	32	6	0	6	10	8	18	6.470	0.040
2 iii	18	21	39	4	2	6	8	3	11	2.899	0.235
3 i	9	4	13	17	8	25	4	14	18	10.486	0.005
3 ii	14	15	29	5	2	7	11	9	20	1.241	0.538
4 i	15	14	29	7	5	12	8	7	15	0.150	0.928
4 ii	23	21	44	4	1	5	3	4	7	1.757	0.416
5 i	16	22	38	7	1	8	7	3	10	6.796	0.034
6 i	16	18	34	9	4	13	5	4	9	1.876	0.392
6 ii	15	9	24	11	11	22	4	6	10	1.623	0.445
7 i	11	22	33	18	2	20	2	2	4	16.152	0.000
7 ii	9	12	21	21	9	30	1	5	6	7.514	0.024
7 iii	13	6	19	9	8	17	9	12	21	2.648	0.267
7 iv	4	13	17	5	1	6	22	12	34	10.011	0.007
7 v	17	20	37	4	3	7	10	3	13	3.746	0.154

Table 4
Results by Education (New Zealand or Overseas)

Scenario and question number	Unethically			Ethically			Not an ethics issue			Chi-square	<i>p</i>
	<i>New Zealand</i>	<i>Overseas</i>	<i>Total</i>	<i>New Zealand</i>	<i>Overseas</i>	<i>Total</i>	<i>New Zealand</i>	<i>Overseas</i>	<i>Total</i>		
1 i	30	8	38	2	7	9	4	6	10	12.860	0.002
1 ii	8	7	15	9	9	18	19	5	24	4.610	0.101
1 iii	19	11	30	0	5	5	17	5	22	10.455	0.006
2 i	8	7	15	10	9	19	18	4	22	4.853	0.089
2 ii	23	9	32	1	5	6	12	6	18	6.773	0.034
2 iii	31	8	39	1	5	6	4	7	11	13.587	0.001
3 i	9	4	13	13	12	25	14	4	18	3.209	0.201
3 ii	22	8	30	2	5	7	12	7	19	4.969	0.084
4 i	20	9	29	7	5	12	9	6	15	0.582	0.748
4 ii	31	13	44	1	4	5	4	3	7	5.156	0.076
5 i	27	11	38	1	7	8	8	2	10	11.178	0.004
6 i	25	8	33	3	10	13	8	2	10	12.583	0.002
6 ii	15	9	24	15	7	22	6	4	10	0.259	0.879
7 i	26	5	31	7	15	22	3	1	4	15.243	0.001
7 ii	15	7	22	16	13	29	5	1	6	2.083	0.353
7 iii	8	11	19	12	6	18	16	4	20	6.152	0.047
7 iv	14	3	17	1	5	6	21	13	34	8.294	0.016
7 v	26	10	36	4	4	8	6	7	13	3.482	0.176

Table 5
Results by Prior Ethics Education

Scenario and question number	Unethically			Ethically			Not an ethics issue			Chi-square	<i>p</i>
	<i>Prior</i>	<i>No Prior</i>	<i>Total</i>	<i>Prior</i>	<i>No Prior</i>	<i>Total</i>	<i>Prior</i>	<i>No Prior</i>	<i>Total</i>		
1 i	24	14	38	4	5	9	4	6	10	2.318	0.314
1 ii	9	7	16	7	11	18	16	7	23	3.859	0.146
1 iii	17	13	30	1	4	5	14	8	22	3.158	0.207
2 i	11	4	15	6	13	19	15	7	22	7.770	0.021
2 ii	17	14	31	1	5	6	14	5	19	6.204	0.045
2 iii	27	14	41	1	5	6	4	5	9	5.877	0.053
3 i	10	4	14	12	13	25	10	7	17	2.040	0.361
3 ii	17	11	28	3	5	8	12	8	20	1.473	0.479
4 i	14	15	29	8	4	12	10	5	15	1.931	0.381
4 ii	25	18	43	3	2	5	4	4	8	0.201	0.904
5 i	23	15	38	3	5	8	6	4	10	1.471	0.479
6 i	22	13	35	5	7	12	5	4	9	1.650	0.439
6 ii	17	7	24	9	13	22	6	4	10	4.238	0.121
7 i	19	12	31	10	12	22	3	1	4	1.932	0.381
7 ii	15	6	21	14	16	30	3	3	6	3.179	0.205
7 iii	8	11	19	11	7	18	13	7	20	2.338	0.311
7 iv	9	7	16	2	4	6	21	14	35	1.479	0.478
7 v	23	13	36	2	6	8	7	6	13	4.056	0.132

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