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# Software piracy: Issues and perceptions of Australian university students

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## ABSTRACT

*Software piracy is reported as an ongoing problem for software developers and vendors. Significant revenue is lost when illegal copies of software are utilized, estimated by some to exceed \$8 billion per year. Of particular concern are estimates that the problem is increasing, especially in those countries that have lax or no laws to protect intellectual property.*

*Research was conducted to evaluate the attitudes and practices of selected first year Australian university students towards software copying practices. The findings show that respondents were most likely to let someone copy their software to gain favor, and students behave in a more ethical manner when they consider the consequences of their copying. The study also found that males were generally less ethical, and with this sample about 25% had illegally copied software and 25% had let someone illegally copy their software. The results were generally consistent with recent studies using populations from other countries.*

## INTRODUCTION

During the past decade there has been a dramatic increase in the capabilities and use of microcomputers, and this has been accompanied by a corresponding increase in the illegal copying and use of commercial proprietary software. According to Ken Wasch, President of the Software Publishers Association, 25% of all personal computer software currently being used throughout the world has been illegally copied (Slofstra, 1996). Another technology trade association, *The Business Software Alliance*, suggests that as much as one-half of all software currently in use is illegally copied (Sweet, 1996). This is clearly a serious problem for software vendors.

Software copying can be shown to have a direct impact on the bottom line of software development companies. Illegal copies of software generate no revenue, and in fact there is an economic cost as some of those users of "free" copies of the product would be potential buyers. Estimates of annual losses due to software copying vary widely. A representative sample of published estimates losses would include: \$1 billion in the U. S. and \$8 billion worldwide (Moseley & Whitis, 1995); \$1.4 billion in the U. S. (Harper, 1993); \$2 billion in the U. S. (Taylor & Shim, 1993); \$2.4 billion in the U. S. and \$4.5 billion worldwide (Goldman, 1992); \$5.2 billion in the U. S. (Pruzan, 1995); \$2.8 billion in the U. S. and \$15.2 billion worldwide (Barman, 1996); \$6 billion in Europe (Bird, 1995); \$12.8 billion worldwide (Taft, 1994); and \$16 billion worldwide (Garber, 1996). It is important to note that there are some timing differences as to when the estimates were made, and the earlier estimates generally are much smaller than the later ones. This suggests that experts believe the negative financial impact of illegal software copying is escalating rapidly. Clearly we are dealing with estimates here, and while it would be very difficult to prove exact amounts, there is clear evidence that the revenue losses are staggering, especially for smaller software vendors working to establish markets and recover their research and development expenses from software product sales.

Software piracy by users has been identified as the worst problem facing the software industry today (Givon et al., 1995), and according to Davies (1992) is on the increase. Software piracy has been defined as the direct, unauthorized copying of a program for commercial gain (Weisband & Goodman, 1993). Many discount the notion of commercial gain, and support a definition that casts a wider net. The more comprehensive definition describes software piracy as any unauthorized use of software contrary to the specific conditions set forth in the product license, and this unauthorized use is prohibited by U. S. and international copyright laws and treaties (Aminmansour, 1996). Software piracy is an immense problem seen in two principal forms: 1) Commercial pirates who copy software for resale and 2) End users, including business persons and students, who illegally copy for personal or organizational use (Witoshynsky, 1992).

According to copyright law, copying a piece of software for any reason other than as a back-up, without the permission of the copyright holder, is illegal (Wasch, 1992). In the United States, commercial software is protected by the Computer Software Piracy and Counterfeiting Amendment to the Federal Copyright Act (O'Brien, 1996), perhaps the toughest of all the laws throughout the world protecting intellectual property and software. Purchasing a license for a copy of software does not authorize the user to duplicate or distribute the software without permission. The law only allows the purchaser to install the software on a single computer and make a copy for archival purposes (Aminmansour, 1996). The key problem with controlling software piracy seems to be that copying software is easy to do but very difficult to control.

Strategies for controlling illegal software copying include technological solutions, legal strategies, and pricing, promotion, and distribution strategies (Malhotra, 1994). These are briefly described in Figure 1.

## Figure 1. Strategies for Controlling Illegal Software Copying

### Technological Solutions

- *Access Locks:* These protect the software operations by including codes that have to be initiated from the legal copy of the software and/or a specific machine before the software can be executed.
- *Copy-protection security devices:* These include copy counters or other embedded techniques to disable the copy function after one backup copy is made.
- *Hardcoded numbers in computer memory:* The software application runs on a computer only if it recognizes a specific serial number hardcoded into the memory of the system.
- *Holographic images of software packages:* Because of the high cost of producing these images, they discourage copying and packaging for resale.
- *Software distributed on a read-only memory chip:* The code is placed in firmware and cannot be duplicated using traditional copying procedures.

### Legal Solutions

- *Copyright laws:* Copyright protection of software includes the program's code, structure, sequence, and organization or the look and feel as well as the structure.
- *Intellectual Property:* Protection is based on trade agreements between countries, such as one signed with China on March 18, 1995. Shutting down illegal software operations is largely dependent on the cooperation of the local and federal governments in the country where the operation takes place.
- *Whistleblowing:* Crimelines have been set up inviting informers to report use of illegal software and claim a reward. This is typically directed at larger organizations.
- *Litigation:* Depending on the nature of the violation, students, employees, managers, and company executives might face litigation and fines. In October 1966 the Software Publishers Association sued three Internet service providers for utilizing their web page to provide protected software and "cracker" tools for removing copyrights and copy protection from software on their web page.

### Market Solutions

- *Licensing agreements:* These are legal agreements that make it clear to the software owner that copying the software is a federal crime.
- *Withholding source codes:* Commercial software can be sold as a compiled object code, often with coded traps included to deter copying.
- *Reasonably priced multiple copies:* Site licenses providing large discounts for multiple use applications discourage software copying.

Adapted from: Malhotra, "Controlling Copyright Infringements on Intellectual Property: The Case of Computer Software," *Journal of Systems Management*, July 1994.

Software piracy takes place throughout the world. However, there are some countries that provide a climate more conducive to copying than others. For example, in 1992 Japan was estimated to have about 10% of all illegal software copied that year (Gwynne, 1992). In Mexico, it is estimated that there are eight illegal copies for every legal copy of software in use (Witoshynsky, 1992). A study of diffusion of spreadsheet and word processing software done in the UK found that 6 of every 7 software users utilized pirated copies (Givon et al., 1995). In Korea, software piracy is seen as the most serious violation (in terms of economic impact) among the various intellectual property rights abuses (Chang, 1993).

Copied software in Latin America ranged from an estimated 72% of all software used in Venezuela to 98% in Peru (Pereira, 1994). China has yet to make software copying a criminal offense (Abrahams, 1994), and the piracy rate is approaching 98% (Guth & Uimonen, 1995). Slofstra (1996) reports that Canada has the lowest software piracy rate in the world. The ministers of the European Community have responded to rampant software piracy in the European market by introducing the EC Directive on the Legal Protection of a Computer Program, which is intended to correlate with the software copyright laws of the 12 member countries (Kahn, 1992).

Closer to home, the software industry wants the U. S. government to clamp down on more countries that allow software piracy (Moltzen, 1995). China is finally beginning to respond to international pressure from the political community to institute controls on and protection for intellectual property rights. They signed a trade agreement with the U. S. in 1995 (Guth & Uimonen, 1995) in an effort to control counterfeit CDs. Perhaps the strongest forces at work today are from the trade associations that are vigorously pursuing litigation and seeking financial penalties for software copying. The Software Publishers Association and the Software Alliance, trade associations that crusade against software piracy, have been the most active. In a sting operation initiated by the Software Alliance and carried out by the Westchester County district attorney's office, a felony charge of *trademark counterfeiting in the second degree* was lodged against two area individuals for selling CD-ROMs with counterfeit software (Barmann, 1995).

Most technology copyright protection is susceptible to failure, and while the legal system plays a role in controlling software piracy, it is not as effective as free market solutions. Legal solutions are generally targeted at end-users and unless there is vigorous and sustained activities by organizations such as the Software Publishers Association, there is little investigation or legal challenge to illegal software use (Malhotra, 1994).

Over the past decade, most business schools have become very dependent on microcomputers for educational activities. This has exposed them to the risk of unauthorized software copying by faculty, staff, and students. While there are no estimates for the copying that is being done in schools, we believe that it presents a serious problem for information technology operations and school administrators. It appears that the problem will continue until those in authority recognize that taking a strong stand against piracy is ultimately in their best interest (Im & Van Epps). Softlifting (software piracy by individuals) is a behavior that pervades our society, and research has shown that ethical perceptions have no significant impact on softlifting behavior (Simpson et

al., 1994). The majority of the revenues lost from software piracy are a result of softlifting, a crime usually committed by otherwise law-abiding people making copies for use in school, at the office or for their home computers (Bodnar, 1995).

A profile of undergraduate and graduate softlifters has been developed, and the findings are: males were found to pirate software more frequently than females; and older students pirate software more often than younger students (Sims et al., 1996). There is substantial evidence that many individuals do not perceive software piracy to be an ethical problem (Glass & Wood, 1996), and that it is considered an issue of how moral intensity (Logsdon et al., 1994). The commercial piracy market exists only because it is used by the end user. If the industry were to educate users so they understand what they are getting into when they purchase or use pirated and/or illegal software, the problem of resellers dealing in pirated software would be significantly reduced (Sweet, 1996). There is less expectation that knowledge will control the personal software copying activities that take place.

Organizations are beginning to take software piracy issues seriously, and are looking for policies, procedures, and remedies to control the problem and keep them from being a target of legal action. One of the main causes of illegal copying is seen as a lack of management control (Bird, 1995). Software management involves educating employees and students about copyright law, enforcing anti-piracy policies and programs, and conducting periodic audits (Bodnar, 1995). Boden (1995) believes that combating global piracy requires a multiple strategy if it is to be effective, differentiating control activities and legal action based on: 1) Software friendly countries; 2) Software almost friendly countries; 3) Software unfriendly countries; and 4) Developing countries.

Despite the software industry's attack on piracy, most users who believe that software is overpriced are unsympathetic to an industry that makes billions of dollars a year (Malhotra, 1994).

## THE STUDY

This research was conducted to evaluate the attitudes and practices of a selected population of Australian first year university students towards software copying practices. A questionnaire was used on-line in computer labs controlled by the Business Systems Department, School of Commerce, University of Wollongong. The questionnaire is one that has been used in other research and is well tested. The questionnaire was developed to elicit responses from subjects regarding their intentions to provide software to another student for illegal copying. It was designed to determine if there were situational factors that would influence students' attitudes regarding illegal software copying. The need for such an instrument was in response to considerable research which indicates that illegal software copying is not seen to be an ethical issue for college students. Thus, if the decision to illegally copy software is not an ethical one, what factors do influence a student in making such a decision (for a more complete discussion of determinants of software piracy see "Situational Determinants of Software Piracy: An Equity Theory Perspective," *Journal of Business Ethics*, 15, 1996; and "Sex as a Determinant of Software Piracy," *Journal of Computer Information Systems*, Winter 1996).

The questionnaire presents the subjects with a scenario in which the subject has purchased software for a course and another student requests the software in order to make an illegal copy. After providing some demographic information, the subjects are asked to respond to a series of fifteen questions regarding the scenario. The questionnaire is designed so that three questions are given to the subjects for each of five situational factors believed to be possible factors in determining whether an individual would participate in illegal software copying. That is, three questions present a situation in which the student as a consequence of giving the other student the software to be illegally copied may 1) receive a positive social outcome; 2) be able to repay a debt; 3) gain a favor from the recipient in return; 4) participate in an altruistic act such as providing software to a student who is financially distressed; and 5) receive a negative outcome. For each question the subject was requested to indicate on a five-point Likert scale ranging from Strongly Agree to Strongly Disagree the likelihood that in the described situation he or she would provide the other student with the software for illegal copying. The fifteen questions were randomly ordered and some questions were reverse scored.

Because all first-year university students must complete an MIS course, which includes a lab component, the questionnaire was placed on the file server supporting the college labs, and each student was requested to take the time to complete the survey before moving on to their scheduled lab assignments.

## FINDINGS

Means and standard deviations for the five constructs were calculated and are displayed in Table 1.

**Table 1. Descriptive Statistics**

<b>Construct</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>N</b>
Consequence	3.527	0.875	464
Social	3.279	0.686	464
Debt	2.959	1.027	464
Altruism	2.751	0.942	464
Favor	2.640	1.005	464

Examination of this table reveals the negative outcomes (consequences) construct had the largest mean while the construct to gain a favor had the smallest mean.

To determine if the differences in the means for the five constructs were significant, paired sample t-tests were calculated and are displayed in Table 2.

**Table 2. Paired Samples Test**

	Mean Difference	Standard Deviation	t
Altruism - Consequence	-.777	1.438	-11.632
Altruism - Debt	-.208	.619	-7.245
Altruism - Favor	.111	.680	3.506
Altruism - Social	-.528	.987	-11.526
Consequence - Debt	.568	1.527	8.017
Consequence - Favor	.887	1.466	13.035
Consequence - Social	.248	1.014	5.274
Debt - Favor	.319	.675	10.177
Debt - Social	-.320	1.027	-6.710
Favor - Social	-.639	.935	-14.719

The value of t for each of these pairs is significant at the 0.01 level of significance indicating that the means for the five constructs are significantly different.

Correlations were also calculated for the five constructs and are given in Table 3.

**Table 3. Correlations**

	Altruism	Consequence	Debt	Favor	Social
Altruism	1.000	-.251	.805	.758	.297
Consequence	-.251	1.000	-.284	-.212	.174
Debt	.805	-.284	1.000	.779	.333
Favor	.758	-.212	.779	1.000	.440
Social	.297	.174	.333	.440	1.000

The correlations between the five constructs were all significant at the 0.01 level of significance and they were positive with the exception of consequence (negative outcome) which was negatively correlated with the constructs of altruism, debt, and favor.

To determine if gender is related to a student's ethical view of copying software, statistics were calculated on the five constructs and a t-test for differences between means was calculated. The results are displayed in Table 4.

Examination of Table 4 reveals that for three of the five constructs there is no significant difference in the views of males and females, but there was a significant difference for the constructs of debt and favor.

**Table 4. Statistics by Gender**

	Males N = 254		Females N = 210		t statistic
	Mean	Variance	Mean	Variance	
Altruism	2.794	1.072	2.698	.665	1.087
Consequence	3.478	.885	3.587	.619	-1.344
Debt	3.073	1.281	2.821	.750	2.657*
Favor	2.766	1.250	2.487	.683	3.002*
Social	3.319	.518	3.231	.411	1.375

\*Significant at the 0.05 level.

In addition to the 15 questions for the five constructs, the students were asked two yes/no questions: Had they ever illegally copied software and had they ever let someone else illegally copy software? The results for these questions are displayed in Table 5 and Table 6 respectively.

Of the 464 respondents, 128 or 28% indicated that they had copied software and 25% indicated they had let someone else copy software. To determine if the difference in the percentages for males and females was significant, Chi Sq tests were calculated for both tables. In each case, the value of Chi Sq was significant indicating that gender is related to whether a student had copied software or let someone else copy software.

**Table 5. Copied Software?**

	Yes (%)	No (%)	Totals
Males	91 (36)	163 (64)	254
Females	37 (18)	173 (82)	210
Totals	128 (28)	336 (72)	464

Chi Sq = 18.177p = 0.000

**Table 6. Let Someone Copy Software?**

	Yes (%)	No (%)	Totals
Males	79 (31)	175 (69)	254
Females	37 (18)	173 (82)	210
Totals	116 (25)	348 (75)	464

Chi Sq = 10.439p = 0.001

## DISCUSSION

As with previous studies using this questionnaire, the construct negative outcomes (consequences) was the one with the largest mean indicating that respondents are more ethical with respect to software copying when they consider the consequences as compared to the other constructs. The construct with the smallest mean was to gain a favor. This indicates that the respondents were most likely to let someone copy their software to gain a favor than for any of the other four constructs. In other studies (Glass & Wood, 1996; Wood & Glass, 1996), the construct to repay a debt has the smallest mean while to gain a favor had the second smallest mean. This is not surprising when one considers that the correlation between to gain a favor and repay a debt was 0.779, which was the second largest correlation for any of the pairs of constructs.

The results of this study are inconsistent with some studies which indicate females are more ethical than males. For three of the constructs, there were no significant differences between males and females and for the two other constructs males were significantly higher.

On the other hand, when the questions of whether the respondents had copied software or let someone else copy software, the females were clearly more ethical, which is consistent with other studies. For example, Sims et al. (1996) found that males pirate software more than females and Solomon and O'Brien (1990) found a significant difference in male and female responses to questions of whether they had made illegal copies and whether they had allowed other students to make illegal copies.

The results of this study can be considered positive in light of work done by Cohen and Cornwall (1989) who found in their study of American college students that 85% of them believed that software piracy is acceptable. For the Australian university students in this study, 28% admitted to copying software themselves and 25% had let someone else copy their software. While this is far from acceptable, it is much better than 85%. It does raise the question of whether what college students believe is acceptable behavior, is what they actually do themselves.

## CONCLUSIONS

This study found like other studies that Australian university students are not very ethical with regard to the copying of microcomputer software. Of the five situational factors—receiving a positive social outcome, repaying a debt, gaining a favor, performing an altruistic act, and receiving a negative consequence—respondents were least likely to allow illegal copying when faced with receiving a negative consequence and most likely to allow such copying to gain a favor from a friend.

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