



Attitudes towards information ethics: a view from Egypt

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Abstract

Purpose – The information technology (IT) related ethical issues will only increase in frequency and complexity with the increasing diffusion of IT in economies and societies. The purpose of this paper is to explore Egyptian students' attitudes towards the information ethics issues of privacy, access, property, and accuracy, and it evaluates the possible impact of a number of personal characteristics on such attitudes.

Design/methodology/approach – This research utilized a cross-sectional sample and data set to test five hypotheses. It adopted an instrument to collect the respondents' background information and assess their attitudes towards the information ethics issues of privacy, property, accuracy, and access. Egyptian business students at Alexandria University were asked to participate in the survey. A total of 305 responses were collected and analyzed.

Findings – The analysis revealed that students are sensitive to the ethicality of information privacy, information accuracy, and information access. However, students are insensitive to the ethicality of property (software) right. In addition, years of education have a main effect on students' attitudes towards property, and gender and age have an interaction effect on students' attitudes towards access.

Research limitations/implications – The findings of this research are based on a cross-sectional data set collected from a sample of business students at a public university. Students, however, may make poor surrogates for business or IT professionals. Future similar research designs that employ large samples from Egyptian working professionals and students in other private and public universities are needed to verify the findings of this research.

Practical implications – The findings suggest that the investigated university as well as the other similar Egyptian universities should consider integrating ethics education into their curricula. Teaching information ethics, especially from an Islamic perspective, is expected to positively influence students' information ethical attitudes. The enforcement of the existing property right protection laws should also curb software piracy in the Egyptian market.

Originality/value – It is vital to expand the ethical research currently being performed in IT in order to help bridge the gap between behavior and IT. The findings of this research extend the understanding of students' attitudes towards the information ethics issues in Egyptian culture and contribute to the growing body of knowledge on global information ethics.

Keywords Information ethics, Information privacy, Information accuracy, Information access, Software copyright, Information technology, Ethics, Egypt

Paper type Research paper



1. Introduction

With the pervasiveness of information technology (IT) in business and everyday life, one can expect that the frequency and complexity of information ethical problems will only increase (Moor, 2005, p. 115). In addition, the potential for a revolutionary application of age-old ethics by all stakeholders is likely to persist (Mumford, 2003, p. 202;

Altschuller, 2004, p. 2; Biot-Paquerot and Hasnaoui, 2009, p. 59). Understanding the factors that might influence the intention to behave ethically or unethically when using IT can help with designing strategies that will lead to improved ethical behaviors (Grupe *et al.*, 2002, p. 53).

Information ethics encompass the ethical issues that are associated with the development and application of IT (Martinsons and Ma, 2009, p. 816). Information ethics research is involved with studying potential systems abuses and malfunctions and the related conceptual models and theories (Altschuller, 2004, p. 2). The findings of such research suggest that many IS professionals and users tend to neglect or inadequately consider the ethical aspects of their decisions and actions. In particular, younger people tend to be ignorant or dismissive about ethical dilemmas concerning the management of information and its associated technology (Martinsons and Ma, 2009, p. 817). While O'Boyle (2002, p. 276) stresses the importance of developing standards of ethical decision making for IT professionals, Couger (1989, p. 213) emphasizes the importance of having students develop appropriate ethical values.

Although information ethics continues to be an interesting research subject (Tavani, 2002, p. 37; Martinsons and Ma, 2009, p. 817), Most of the literature has primarily originated in Western countries, and further empirical evidence on information ethics and its determinants from developing countries such as Egypt is warranted. Hejase and Tabch (2010, p. 20) posit that more research is needed in order to test demographic variables versus ethics perceptions and education and compare the obtained findings with the findings of the multitude number of researches reported worldwide.

Given the lack of Egyptian-based empirical evidence on information ethics, this research adopts Mason's (1986, p. 5) information ethics framework to explore the Egyptian students' attitudes towards the four information ethics issues of privacy, access, property, and accuracy and assess the possible impact of a number of individual characteristics (e.g. age, gender, marital status, years of education, and computer experience) on such attitudes. The findings of this research should extend our understanding of the information ethics attitudes in an Egyptian context (e.g. culture) and contribute to the growing body of knowledge on global information ethics.

2. Background

2.1 Information ethics

Information ethics stems from practical challenges and issues arising from the impact of IT on contemporary society. Over the years, the misuse of and unethical behavior towards IS have caused significant losses to businesses and societies (Leonard and Cronan, 2005, p. 1150). In order to develop a better understanding of information ethics, a number of researchers proposed and/or addressed a number of frameworks that characterize the phenomenon and identify its dimensions (Mason, 1986, p. 5; Anderson *et al.*, 1993, pp. 98-102; Conger *et al.*, 1995, p. 161; Davison, 2000, pp. 23-7; Spinello, 2005, p. 70; Fallis, 2007, p. 24).

Mason's (1986, p. 5) taxonomy of information ethics –, i.e. privacy, accuracy, property, and accessibility – is perhaps the most popular framework among researchers. Although the examples brought up by Mason for each of the four issues are somewhat limited to the decade in which they were proposed (Spinello, 2005, p. 70; Martinsons and Ma, 2009, p. 819), the concepts can easily be adapted to a more current IT/IS environment (Smith, 2002, p. 9; Altschuller, 2004, p. 8). The other frameworks seem to echo Mason's classification with appending additional ethical issues to the framework and/or

modifying its structure (Altschuller, 2004, p. 10). The four information ethics issues of Mason are briefly presented as follows:

(1) *Privacy*. Privacy issues arise from the information that people reveal about themselves or their associations and include the conditions under which this type of information is revealed and how it is subsequently safeguarded (Mason, 1986, p. 6; Martinsons and Ma, 2009, p. 818). A more recent view of information privacy emphasizes one's right to control the circulation of information concerning him or her (Collste, 2008, p. 80). This view clearly indicates a close relationship between privacy and personal information in the information age.

Tavani and Moor (2001), however, argue that privacy is best defined in terms of restricted access to personal information, not control. Nowadays, privacy legislation usually centers on the regulation of the collection, storage, processing, use, and circulation of personal information (Murata and Orito, 2008, p. 234). Therefore, privacy concerns may include the information that others should be able to access about a person with or without his/her permission and the safeguards that should exist for a person's information protection.

(2) *Accuracy*. Accuracy issues refer to the authenticity of data and information in the information systems. Systems that collect information concerning people can portray a wrong profile of someone if the information is inaccurate. Therefore, there is a need for responsibility and accountability in order to ensure the authenticity, fidelity, and accuracy of information (Mason, 1986, p. 5; Mathieu and Woodward, 1995, pp. 6-7; Martinsons and Ma, 2009, p. 818). Information accuracy concerns may include responsibility for the reliability and accuracy for information, accountability for errors, responsibility for keeping information correct, and remedial actions.

In the development and introduction of software and systems, an ethical dilemma stems off of the question of who is responsible for the outcomes of the decisions that are made by the systems or by those using them (Altschuller, 2004, p. 34). Has care been taken to eliminate all possible malfunctions in the system (Sipior and Ward, 1998, p. 68)? Has all the data and information involved been verified for accuracy (Mathieu and Woodward, 1995, pp. 6-7)? And has any bias been built into the logic that runs the program or the model (Khalil, 1993, pp. 18-19; Wood-Harper *et al.*, 1999, pp. 68-9)?

(3) *Property*. Property issues reflect the ownership and pricing of information and its transmitting channels (Mason, 1986, p. 5; Martinsons and Ma, 2009, p. 819). One of the more controversial areas of information ethics concerns the intellectual property rights connected with software ownership. Who owns information? Who owns the channels of distribution and how should they be regulated? How is compensation determined? Software companies would only invest time and money in software development if they could get their investment back. Examples of issues in this area include softlifting, copying of digital art forms, and the ease of transferring electronic contents (Phukan and Dhillon, 2000, p. 240; Grosso, 2000, p. 23).

Moores and Dhillon (2000, p. 91) found that 81 percent of the individuals surveyed admitted to committing the offense of using pirated software on a regular basis, with the most common offenders identified as male (Moores and Dhillon, 2000, p. 91). Recently, researchers have raised questions on the ethicality of freely sharing music files among individuals (Calkins, 2002, p. 61), and compared and contrasted file sharing to software piracy (Bhattacharjee *et al.*, 2003, p. 110). Siegfried (2004, p. 219) found that university students in entry-level courses felt that copying software and downloading

music from the internet to be acceptable. In addition, country-level software piracy seems to significantly correlate to gross national product (GNP) per capita and income inequality (Husted, 2000, pp. 206-7; Gopal and Sanders, 2000, p. 58).

(4) *Accessibility*. Accessibility issues refer to what information a person or an organization has the right to obtain, under what conditions, and with what safeguards. Accessibility issues deal with the rights, responsibilities, and/or privileges to obtain or receive specific information (Mason, 1986, p. 5; Martinsons and Ma, 2009, p. 819). Altschuller (2004, p. 9) argues that Mason's (1986) view of accessibility mostly describes the potential social problem in which access to information via computers is limited to those who have the education, resources, and money to access the information they need. Also, security, which includes confidentiality, integrity, consistency, and controlling access to resources, is an accessibility-related issue.

Mason's (1986, pp. 5-10) framework has limitations as new dimensions of information ethics have emerged since the 1980s. In particular, the growth of the internet-based systems cyberspace has raised specific concerns about cyberethics (Spinello, 2005, p. 70; Martinsons and Ma, 2009, p. 819).

Nevertheless, Mason's framework has been the conceptual foundation for many of the information ethics research because of its parsimony and popularity (Martinsons and Ma, 2009, p. 819). Many scholars view Mason's framework as the most important influential category of IS ethics (Smith, 2002, pp. 9-10; Peslak, 2006, p. 117). The framework has drawn numerous researches aiming at either validating the robustness of the framework in different settings and/or using it to measure attitudes towards the four ethical issues of privacy, accuracy, property, and access.

2.2 Factors affecting attitudes towards information ethics

The general literature on ethical decision making and behavior presents a number of models that identify plausible determinants of ethical decision making (Rest, 1986; Trevino, 1986, p. 220; Boomer *et al.*, 1987, p. 265; Banerjee *et al.*, 1998, p. 34; Kreie and Cronan, 1998, p. 72). Rest (1986), for example, proposes a four-stage model of ethical decision making that consists of recognizing moral issues, making moral judgment, establishing moral intent, and moral behavior. The ethical decision-making model of Boomer *et al.* (1987, p. 265), however, identifies factors that affect ethical decision making including social environment, governmental and legal environment, professional environment, working environment, personal environment, and individual attributes (e.g. age, gender, and education).

Specific factors that are believed to be determinants of information ethics attitudes and behaviors include moral beliefs, organizational climate (Banerjee *et al.*, 1998, p. 34), self-esteem (Hsu and Kuo, 2003, p. 305), self-efficacy (Kuo and Hsu, 2001, pp. 311-12), ethical judgment processes (Thong and Yap, 1998, p. 230), and age (Sims *et al.*, 1996, p. 839; Gattiker and Kelley, 1999, p. 242). Among these factors, one's individual characteristics (e.g. gender, age, marital status, education, and computer experience) are believed to influence ethics-related variables such as moral judgment, beliefs, values, attitudes, intention, and behavior (Loch and Conger, 1996, p. 76; Karande *et al.*, 2002, p. 769; Peace *et al.*, 2003, p. 155; McCabe *et al.*, 2006, pp. 106-8; Peslak, 2006, p. 117). These five individual characteristics are briefly discussed as follows:

(1) *Gender*. Many researchers have proposed and investigated gender as a significant variable in explaining attitudes towards ethical values and ethical

decision-making behavior (Loch and Conger, 1996, p. 76; Deshpande, 1997, p. 82; Reiss and Mitra, 1998, pp. 1585-8; Leonard and Cronan, 2001, p. 20). Women are more likely than men to be ethically sensitive (Ford and Richardson, 1994, p. 205; Sims *et al.*, 1996, p. 839; Kreie and Cronan, 1998, p. 72, 2000, p. 70; Stedham *et al.*, 2007, p. 171). Males tend to adopt an impersonal approach that abstracts the moral dilemma from the interpersonal situation, but females tend to view a moral dilemma as involving a network of connections and relationships (Stedham *et al.*, 2007, pp. 171-2).

Nevertheless, the empirical findings of the gender effect on attitudes towards ethical values and/or decision-making behaviors are mixed (Ruegger and King, 1992 p. 179; Glover *et al.*, 1997, p. 1319). Gender was found to have a significant effect on software piracy (Sims *et al.*, 1996, p. 839), illegal copying of software packages (Wood and Glass, 1996, pp. 40-1), moral development (Cohen *et al.*, 1998, p. 256), assessment of the appropriateness of illegal gaming (Gattiker and Kelley, 1999, p. 245), attitudes towards information ethics in Kuwait (Alshawaf *et al.*, 2002, pp. 61-3), perceptions of privacy and accuracy as important ethical issues (Peslak, 2006, p. 117), propensity to perceive unethical behaviors as unethical (McCabe *et al.*, 2006, pp. 106-8), and on German students' intention to behave unethically (Stedham *et al.* (2007, pp. 170-1). However, gender was found to have no effect on students' ethical beliefs (Davis and Welton, 1991, p. 451), an individual's ability to identify ethical criteria (Pearson *et al.*, 1997, p. 94), the USA and Sultanate of Oman bank employees' perceptions of IS ethics (Al-Lawati, 2003, p. 93), and on ethical intention (Villazon, 2004, p. 129).

(2) *Age*. The ethics literature suggests that older individuals, who are more morally developed, have higher ethical standards than do younger individuals (Ford and Richardson, 1994, p. 205; Borkowski and Ugras, 1998, p. 1117). Nonetheless, the past ethics research has produced varied results. Age was found to have a significant effect on students' ethical computer self-efficacy and ethical intention (Villazon, 2004, p. 129), but to have no effect on dealing with ethical issues (Glover *et al.*, 1997, p. 1319). In addition, compared to their older counterparts, younger students were found to be more ethical in terms of honesty and equality (Sikula and Costa, 1994, pp. 662-3), and less frequent violators of software copyright (Sims *et al.*, 1996, p. 839). Older computer users, on the other hand, were found to have a less permissive sense of what is right and wrong for an illegal game, and, therefore, were more responsible and more ethical than their younger counterparts (Gattiker and Kelley, 1999, p. 242).

(3) *Years of education*. Years of education may correlate with the individuals' attitudes towards ethical dilemmas and ethical behavior. The relevant research, however, has produced only conflicting results. The level of education was found to have no effect on marketing professionals' ethical standards and intended ethical behavior (Merritt, 1991, p. 630), and have a negative impact on Egyptian students' perception of ethical problems (Ahmed *et al.*, 2003, p. 100). In addition, level of education was found to affect students' ethical beliefs (Lane *et al.*, 1988, p. 223), managers' sensitivity to the unethical practice of padding expense accounts (Deshpande, 1997, p. 83), ethical cognition of business students (Abdolmohammadi and Reeves, 2000, p. 269), ethical computer self-efficacy and ethical intention of students (Villazon, 2004, p. 129), and on tolerance for unethical behavior (Lopez *et al.*, 2005, p. 341).

(4) *Marital status*. Although it has not received much attention in ethics literature, marital status may influence information ethics attitudes and behaviors. Married individuals are expected to be older and, therefore, are more morally developed than

are their unmarried counterparts. In addition, the economic pressures that are placed on married individuals may cause them to be more pragmatic in their views of the world and more tolerant to unethical behavior than are unmarried individuals. However, the past relevant research has reported conflicting results.

Marital status was found to have no effect on students' perception of ethical beliefs (Lane and Schaupp, 1989, pp. 945-7), the ethical views of small businesses (Serwinck, 1992, p. 555), or on the ethics of academic misconduct (Rawwas and Isakson, 2000, p. 321). On the other hand, compared to their unmarried counterparts, married individuals were found to have higher level tax ethics (Song and Yarbrough, 1978, p. 442), be more conservative and moral (Poorsoltan *et al.*, 1991, p. 6), and be more accepting of questionable shopping practices (Erffmeyer *et al.*, 1999, p. 44; Swaidan *et al.*, 2003, p. 175).

(5) *Computer experience.* Computer experience may also affect an individual's attitude towards information ethics. The higher the computer experience that an individual has, the more likely he or she will be conscious of the consequences of computer and information misuse. Nevertheless, the past relevant research has produced mixed findings. Personal computer ownership was found to correlate with unethical attitudes and computer abuse behavior of Canadian and Swedish data processing students (Kowalski and Kowalski, 1990, p. 206). Computer literacy, measured by programming experience, was found to positively correlate with the violation of intellectual property rights (Winter *et al.*, 2004, p. 293). Finally, computer experience was found to have an ambiguous relationship to students' perceptions of software piracy in Singapore (Gan and Koh, 2006, p. 640).

The findings of cross-cultural ethics research suggest that similarities and dissimilarities do exist in attitudes towards ethics in different cultures and in different settings within the same culture (Eining and Lee, 1997, pp. 15-16; Whitman *et al.*, 1999, pp. 684-5; Milberg *et al.*, 1995, p. 65, 2000, p. 35; Al-Lawati, 2003, p. 93; Martinsons and Ma, 2009, p. 816). Given that the existing findings on information ethics attitudes are inconclusive, more research is needed in order to test demographic variables versus ethics perceptions and education using larger samples from different contexts (Hejase and Tabch, 2010, p. 20).

3. Research hypotheses

The literature on business ethics, in general, and information ethics, in particular, suggests a number of factors that are believed to affect attitudes towards ethics and ethical behaviors. The individual characteristics appear to be particularly important determinants of attitudes towards ethics (Loch and Conger, 1996, pp. 67-77; Karande *et al.*, 2002, p. 769; Peace *et al.*, 2003, p. 155; Villazon, 2004, p. 132; McCabe *et al.*, 2006, pp. 106-8; Peslak, 2006, p. 117). The personal characteristics of age, gender, marital status, educational level (i.e. years of college education), and computer experience are hypothesized to affect one's attitude towards Mason's (1986, pp. 5-10) information ethics issues of privacy, property, accuracy, and access.

Nevertheless, the empirical findings of the earlier research that investigated the effect of these five individual characteristics on attitudes towards ethics and ethical behavior are mixed: gender (Ruegger and King, 1992, p. 179; Glover *et al.*, 1997, p. 1319); age (Ford and Richardson, 1994, p. 205; Sikula and Costa, 1994, p. 664; Sims *et al.*, 1996, p. 839; Glover *et al.*, 1997, p. 1319; Gattiker and Kelley, 1999, p. 242; Al-Lawati, 2003, p. 103; Villazon, 2004, p. 50); marital status (Song and Yarbrough, 1978, p. 442; Lane and

Schaupp, 1989, pp. 945-7; Poorsoltan *et al.*, 1991; Serwinck, 1992, p. 555; Erffmeyer *et al.*, 1999, p. 44; Rawwas and Isakson, 2000, p. 321; Swaidan *et al.*, 2003, p. 175); education level (Lane *et al.*, 1988, p. 223; Merritt, 1991, p. 630; Deshpande, 1997, p. 83; Abdolmohammadi and Reeves, 2000, p. 269; Ahmed *et al.*, 2003, p. 100; Villazon, 2004, p. 129; Lopez *et al.*, 2005, p. 341); and computer experience (Kowalski and Kowalski, 1990, p. 206; Winter *et al.*, 2004, pp. 296-8; Gan and Koh, 2006, p. 640). Given the reported inconsistent findings, five null hypotheses are stated below:

- $H_{0.1}$. Age has no effect on individuals' attitudes towards information privacy, property (software) right, information accuracy, and information access.
- $H_{0.2}$. Gender has no effect on individuals' attitudes towards information privacy, property (software) right, information accuracy, and information access.
- $H_{0.3}$. Marital status has no effect on individuals' attitudes towards information privacy, property (software) right, information accuracy, and information access.
- $H_{0.4}$. Years of education has no effect on individuals' attitudes towards information privacy, property (software) right, information accuracy, and information access.
- $H_{0.5}$. Computer experience has no effect on individuals' attitudes towards information privacy, property (software) right, information accuracy, and information access.

4. Methodology

4.1 Measurement

In an earlier study, Alshawaf *et al.* (2002, pp. 59-60) translated and verified an Arabic version of an instrument that was originally designed by Eining and Lee (1997, p. 8) to measure respondents' attitudes towards Mason's (1986, pp. 5-10) four information ethics issues of privacy, property, accuracy, and access. This research adopts Alshawaf *et al.*'s (2002, pp. 59-60) instrument in order to measure attitudes towards the four information ethics issues.

The data collection instrument includes four scenarios based on Mason's (1986, pp. 5-10) information ethics framework (Appendix 1). In each scenario, a central character faces an ethical dilemma. Each scenario is followed by a main question asking whether the respondent agrees or disagrees with the decision/action contemplated by the central character in the scenario. A six-point Likert-type scale (where 1 – strongly disagree and 6 – strongly agree) is used, as a response of disagreement with the decision/action contemplated in the privacy, property, and access scenarios and agreement with the decision/action contemplated in the accuracy scenario reflect sensitivity to the ethicality of the underlying issues. In addition, a number of questions are included underneath each scenario asking the respondent to use a six-point Likert-type scale (where 1 – absolutely not important and 6 – absolutely important) to indicate the importance of the identified factors in affecting his/her response to the main question in the scenario.

The instrument also includes questions designed to gather information on the five individual characteristics (gender, age, educational level, marital status, and computer experience) as well as information on students' software piracy behavior and attitudes, piracy reasons, and awareness of piracy laws. This last set of questions is designed to help interpret students' attitudes towards property (e.g. software) right.

4.2 Sampling

For the purpose of this research, a sample was drawn from the business students at the Faculty of Commerce of Alexandria University in Egypt. Upon graduation, these students will likely work in the private and public sectors in Egypt as well as in the neighboring Arab countries. Students were chosen as informants because of convenience and the findings can be generally applicable to actual business managers, especially when studying ethical decision making (Leonard and Cronan, 2005, pp. 1154-6). In addition, student samples have been commonly used in the ethics literature to explain ethical intention and behavior (Rest, 1986; Loch and Conger, 1996, pp. 76-7; Kreie and Cronan, 1998, p. 72, 2000, p. 67; Leonard and Cronan, 2001, p. 10).

4.3 Data collection

A cross-sectional field survey using a structured questionnaire was used to collect the needed data. In addition to the four scenarios that are used to measure attitudes towards the four information ethics issues, the questionnaire included questions to collect data on the individual characteristics of age, gender, marital status, years of education, and computer experience.

Two groups of students at the Faculty of Commerce at Alexandria University were asked to participate in the survey:

- (1) first year students; and
- (2) fourth year/diploma students.

Participation was voluntary and students were asked to complete the questionnaire in a standard classroom environment. The respondents were assured of the anonymity and confidentiality of their responses.

In total, 305 ($n = 305$) complete, usable responses were returned. Table I depicts the sample profile. About 70 percent of the respondents are 26 years old or younger, and approximately 46 percent are male (coded as male = 1, female = 2). Only 13 percent of the respondents are married (coded as married = 1, unmarried = 2).

About 37 percent of the respondents are first year students and 63 percent are senior/diploma students. In addition, 13 percent of the respondents never used computers, and 83 percent of the respondents indicated that their computer experience ranges from "rarely used" to "always used."

5. Analysis

5.1 Descriptive statistics

Table II presents descriptive statistics of the respondents' attitudes towards the four information ethics issues of privacy, property, accuracy, and access. The respondents generally disagreed (mean = 2.66) with the disclosure of the confidential information described in the first scenario in the data collection instrument and the violation of the right to privacy. On the other hand, the respondents generally agreed (mean = 4.95) to the acceptance and use of copied (i.e. pirated) software in the second scenario, and consequently, agreed to the violation of software copyright.

In addition, the respondents generally agreed (mean = 4.19) that the software provider in the third scenario should be held responsible for the damages caused by the inaccurate information provided by the system (i.e. accuracy). Furthermore, the respondents generally disagreed (mean = 1.91) with the unauthorized access/use of

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Characteristics	Frequencies	Percentage
<i>Age</i>		
18-20 years	65	21.3
21-23	123	40.3
24-26	38	12.5
Over 26	68	22.3
Missing	11	
Total	305	
<i>Gender</i>		
Male	135	45.8
Female	160	54.2
Missing	10	
Total	305	
<i>Marital status</i>		
Married	38	13.1
Unmarried	253	86.9
Missing	14	
Total	305	
<i>Years of education</i>		
First year (freshmen)	109	36.9
Senior (141) and diploma (45)	186	63.1
Missing	0	
Total	305	
<i>Computer experience</i>		
No use	21	7.2
Rarely used	14	4.8
Sporadically used	46	15.9
Frequently used	74	25.5
Habitually used	46	15.9
Always used	89	30.7
Missing	15	
Total	305	

Table I.
The respondents' profile

	<i>n</i>	Minimum	Maximum	Mean	SD
Privacy	296	1	6	2.66	1.963
Property	297	1	6	4.95	1.606
Accuracy	293	1	6	4.19	1.918
Access	294	1	6	1.91	1.571

Table II.
Descriptive statistics for attitudes towards the four information ethics issues

Note: 1 – strongly disagree and 6 – strongly agree

computing resources and information (i.e. access) for personal purposes as described in the fourth scenario.

Pearson correlations were calculated in order to explore the relationships among the research variables (Table III). As for the relationships between the independent and dependent variables, age has negative correlations with privacy and property. Gender correlates with privacy, as the female respondents exhibit higher agreement with the violation of privacy than do men respondents. Marital status correlates with privacy

	Property	Accuracy	Access	Age	Gender	Marital status	Computer exper.	Years of edu.
Privacy	0.041	0.135*	-0.013	-0.185**	0.136*	0.180**	0.004	-0.028
Property		-0.033	0.085	-0.133*	0.054	0.113	0.114	0.020
Accuracy			0.102	0.008	0.084	-0.062	-0.039	-0.036
Access				-0.082	-0.056	0.118*	-0.004	0.089
Age					-0.280**	-0.550**	-0.109	0.247**
Gender						0.239**	-0.048	-0.128*
Marital status							0.119*	0.000
Computer experience								-0.176**

Note: Significant at: * $p \leq 0.05$ and ** $p \leq 0.01$

Table III.
Pearson correlations for the individual characteristics and the information ethical issues

and access, as the unmarried respondents exhibit higher agreement with the violation of privacy and unauthorized access to computer resources than do married respondents. Computer experience and years of education, however, do not have significant correlations with any of the information ethics issues.

5.2 Testing the research hypotheses

A multivariate analysis (MANOVA) was performed for the five individual characteristics and the four information ethics issues in order to test the research hypotheses and explore the possible effects of the five individual characteristics on the four information ethics issues. The analysis produced a significant model, and Table IV summarizes the results.

Only years of education has a significant main effect on students' attitudes towards property ($F = 5.349$, $p = 0.022$). Students with higher education levels (e.g. senior and diploma students) exhibit stronger disagreement with the violation of property right than do students with lower education levels (e.g. first year students). In addition, the multivariate analysis revealed only one interaction effect of age and gender ($F = 8.664$, $p = 0.000$) on students' attitudes towards access.

To further explore the direction of the age and gender interaction effect on the respondents' attitudes towards unauthorized access of computing and information resources, a comparison between the means of responses grouped by gender and age was performed. Table V summarizes the results.

Although students generally disagreed with the unauthorized access to computing and information resources, their disagreements vary significantly depending on gender and age. At the younger age (26 years or younger), female students exhibit stronger disagreement with the contemplated action than male students. However, at

Source	Dependent variable	Df	F	Sig.
<i>Main effects</i>				
Years of education	Property	1	5.349	0.022
<i>Interaction effects</i>				
Age * gender	Access	3	8.664	0.000

Table IV.
Summary results of a two-way analysis of the effect of the individual characteristics on the four information ethics issues

the older age (older than 26 years), male students exhibit stronger disagreement with the contemplated action than do female students. Figure 1 shows the interaction effect of gender and age on access.

Given the hypotheses testing results reported in Table IV, only years of education has a significant main effect on students' attitudes towards access. These results lend support for a partial rejection of the null hypothesis of $H_{0.4}$ and the acceptance of the null hypotheses of $H_{0.1}$ - $H_{0.3}$ and $H_{0.5}$.

6. Discussion

This research explored students' attitudes towards Mason's (1986, pp. 5-10) information ethics issues of privacy, property, accuracy, and access as well as the effect that gender, age, marital status, years of experience, and computer experience could possibly have on such attitudes. Students appear to be sensitive to the ethicality of privacy, accuracy, and access and insensitive to the ethicality of property right (e.g. software copyright).

The results of testing the five research hypotheses suggest that years of education affects attitudes towards property right, and gender and age have an interaction effect on attitudes towards information access. However, gender, age, marital status, and computer experience were found to affect none of the four information ethics issues.

As for attitudes towards the information ethics issues, students are generally sensitive to the ethicality of protecting the privacy of personal (confidential) information. They seem to form such an attitude based on a number of factors that

Table V.
Comparison of students' attitudes towards access grouped by gender and age

	Male		Female	
	Mean	SD	Mean	SD
26 years or younger	2.27	1.841	1.89	1.496
Older than 26 years	1.52	1.662	1.60	1.429
Total	2.01	1.662	1.85	1.486

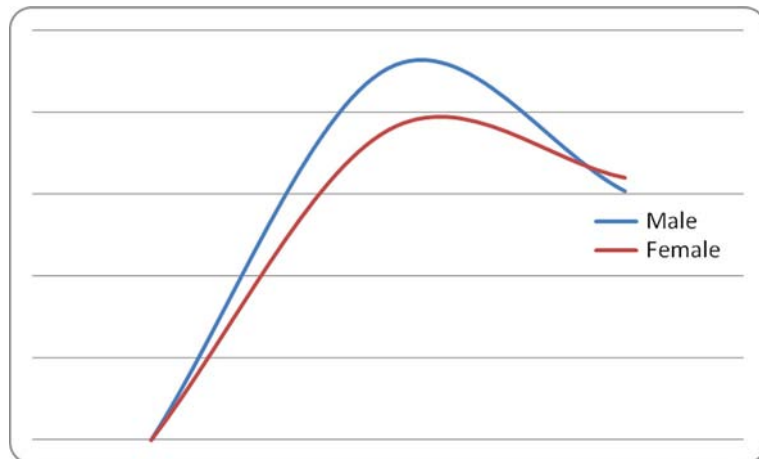


Figure 1.
The interaction effect of gender and age on access

they considered important in the given privacy scenario, including information confidentiality, probable damage to the professor-students relationship, that professor was not convicted for a crime, possible damage to the university's reputation, and that police official has no right to access the professor's personal information.

Students perceive the inaccuracy of the information provided by a system in a health care setting as a serious ethical issue. They are sensitive to the ethicality and the importance of designing systems that provide accurate information for decision making. They agree that software providers should be held responsible for the damages caused by the inaccurate information produced by an information system. This concern is apparent in their perception of the importance of a number of factors that influenced their attitudes including: the significance of a physician's verification of the diagnosis recommend by the system, the importance of information accuracy in a life threatening situation, the patient's physical and financial consequences, the physician's responsibility for proper use of the system, the software company's responsibility for the system performance, and the software company use of an appropriate system development method.

Students are also sensitive to the unethicity of having unauthorized access to computing and information resources for personal purposes. Factors that students thought to be important to their responses to the main question contemplated by the central character in the access scenario include: personal use of the company's internet subscription is considered stealing, use of the company's internet subscription for personal purposes is illegal, and one can lose his/her job if caught using the company's computing resources for personal purposes.

Holding positive attitudes towards the information ethics issues of privacy, accuracy, and access among Egyptian students lend support to Martinsons and Ma's (2009, pp. 829-30) argument that the economic globalization and the proliferation of IT will homogenize human values and actions. Egyptian business students, as future managers and professionals, hold ethical attitudes and beliefs similar to those of their worldwide counterparts and tend to apply similar moral values when assessing IT/IS-related ethical dilemmas such as information privacy, information accuracy, and information access.

In addition, students at Egyptian national (public) universities, such as those who participated in this research, typically come from middle and lower socio-economic classes and are, therefore, likely to be religious and conservative. Since teaching business and information ethics has yet to be a formal part of the business curricula in such universities, religion can significantly affects students' attitudes towards the information ethics issues of privacy, accuracy, and access. This interpretation is consistent with Hejase and Tabch's (2010, p. 18) conclusion of the existence of a possible influence of religion on Lebanese business students' attitudes towards business ethics.

However, students unexpectedly displayed negative attitudes towards the protection of software copyright. They are insensitive to software copyright violation, and it is "morally" acceptable to use illegally copied software. Factors cited by students as important to the formation of their negative attitudes towards property (software) right include: the student's grades will suffer if not copy the software, the student cannot afford buying the software, the student will not use the copied software for profiting, software is available only to those who can afford it, and software copying is a common practice anyway.

The additional software piracy awareness and behavior information that the respondents provided shows that 64 percent of them purchased illegal software copies. Reasons cited for such a behavior include: software companies make great profit; there is no risk of getting caught and prosecuted; it is easy to purchase the illegal copies; and the original copies are expensive. This finding is also consistent with Moores and Dhillon's (2000, p. 91) finding of having a high percentage (81 percent) of the individuals they surveyed admitting to using pirated software on a regular basis. It also agrees with Siegfried's (2004, p. 219) finding of students accepting copying software and downloading music from the internet.

Given that the GNP per capita in Egypt is relatively low, it is not a surprise to find a high percentage of the surveyed students admitting to using pirated software, as a country-level software piracy significantly correlates with GNP per capita, income inequality, and individualism (Husted, 2000, pp. 206-7; Gopal and Sanders, 2000, p. 85). This finding also supports Jones' (1990) assertion that business students display flexible views on ethical issues such as software copyright, and they may be more susceptible to altering their views and behaviors in response to perceived pressure to engage in questionable business practices.

However, the finding of female students being less sensitive to the violation of software copyright is inconsistent with Wood and Glass' (1996, pp. 40-1) and Moores and Dhillon's (2000, p. 89) findings that the most common offenders of software copyright are male, and the common belief that women are more likely than men to be ethically sensitive (Ford and Richardson, 1994, p. 205; Sims *et al.*, 1996, p. 839; Kreie and Cronan, 2000, p. 70; Stedham *et al.*, 2007, p. 171). Furthermore, older students in this research were found to be more sensitive to illegal copying of software than were younger students. This finding is inconsistent with Sims' *et al.* (1996, p. 839) finding that older students are more software pirate than are younger students.

As to the effect of the individual characteristics on the information ethics issues, only the characteristic of years of education was found to affect students' attitudes towards property. Although students were found to be generally insensitive to the right to property, students with higher level of college education (e.g. senior and diploma students) were less insensitive to the unethicity of the violation of software copyright than were students with less education (e.g. first year students). This finding agrees with Villazon's (2004, p. 129) finding of students' education level to have a significant effect on both ethical computer self-efficacy and ethical intention, and disagrees with the finding of Ahmed *et al.* (2003, p. 100), who found number of years studying business to have a negative impact on students' perception of ethical problems.

Although were found to have no main effects on any of the four information ethics issues, gender and age do have an interaction effect on students attitudes towards access. The finding that gender has no main effect on the information ethics issues may suggest that these issue are not gender biased, and gender differences may depend on the ethical issue in question (Peterson *et al.*, 1997, p. 230). This finding is consistent with Al-Lawati's (2003, p. 103) finding that gender has no relationship with IS ethics. It also lends support to McCabe *et al.*'s (2006, p. 101) conclusion that based on gender alone, no differences exist between men and women in their ethical perceptions.

The finding that age has no main effect on the information ethics issues may be attributed to the fact that the age differences in the students sample were not large enough to tab such an effect. This finding disagrees with Sikula and Costa's

(1994, p. 664) finding of younger student to be more ethical than elder students in honesty and equality, Sims *et al.*'s (1996, p. 839) finding that elder students were more frequent violators of software copyright than were younger students, Gattiker and Kelley's (1999, p. 242) finding of age influencing user's judgments of information ethical issues and that elder students are more responsible and more ethical than are younger students, and Al-Lawati's (2003, p. 103) finding of age having a modest relationship with IS ethics. It is also inconsistent with the findings of the earlier research on the ethical development of students (Borkowski and Ugras, 1998, p. 1117) and the general belief that older individuals are more morally developed and have higher ethical standards than do younger individuals (Ford and Richardson, 1994, p. 205).

However, the finding of an interaction effect of gender and age on access is interesting. Although students were found to be generally sensitive to the unethicity of unauthorized access of computing and information resources, the interaction of gender and age affects the level of such sensitivity. Younger female students are more sensitive to unauthorized access of computing and information resources than do younger male students. However, older male students are more sensitive to unauthorized access of computing and information resources than do older female students.

The finding of an interaction effect of gender and age is consistent with those of Peterson *et al.* (2001, p. 229), who found an interaction effect of gender and age on the ethical beliefs of business professionals. It also supports the notion that gender and age influence the ethical beliefs of individuals. Due to early socialization process, men and women tend to develop different views of ethical issues. For men, morality centers on rights and rules; and for women, morality centers on interpersonal relationships, compassion and care (Gilligan, 1982 as cited in Dawson, p. 1143). Age also relates to ethical beliefs (Kohlberg and Hersh, 1977, pp. 53-9; Dawson, 1997, pp. 1148-9; Stedham *et al.*, 2007, p. 171), as women exhibit a faster moral development process than men. However, and as the findings of this research suggest, the difference between the ethical views of male and female students tend to diminish when they grow older.

7. Research implications

It is vital to expand ethics research in order to help bridge the gap between behavior and IT (Peslak, 2006, p. 122). This research provides empirical evidence on students' attitudes towards Mason's (1986, pp. 5-10) information ethics issues of privacy, accuracy, property, and access in an Egyptian context. The findings should contribute to the growing literature on global information ethics and the factors that shape attitudes towards such ethics.

In addition, this research provides evidence that Egyptian college students are insensitive to software piracy. Therefore, a number of implications for Egyptian educators, government officials, and software companies are in order. For educators, Davison *et al.* (2009, p. 834) posit that for many people, the very concepts of "business" and "ethics" sit uneasily together. However, business students, as IT users, should develop appropriate ethical values (Couger, 1989, p. 212; Chow, 2001, p. 258), and study information ethics in order to behave like responsible professionals and learn how to avoid computer abuse and catastrophes (Maner, 1996, p. 4).

The business curricula in the Egyptian national (public) universities, including Alexandria University, lack clearly defined formal modules on business ethics education in general and information ethics education in particular. Like many of the

business schools in different countries that have taken the responsibility of integrating ethics education into their curricula (Hejase and Tabch, 2010, p. 3), the faculty and administrators in the Egyptian public universities should consider integrating ethics education into their business curricula. Cases should be designed and used to stimulate students' moral development by helping them to consider genuine moral conflicts, recognize inconsistencies, and find ways to resolve them (Kohlberg and Hersh, 1997, p. 57). In addition, since the majority (approximately 90 percent) of the Egyptian college students are Muslims, teaching ethics from an Islamic perspective, as recommended is expected to contribute to the development of appropriate information ethical attitudes of students (Al-A'ali, 2008, p. 28).

In addition, the rising trend in using computers and other IT applications such as the internet will only increase students' demand for software and exacerbate the software piracy problem. This problem is further complicated by students' perception of highly priced software products, a situation that makes piracy even more desirable among students (Cheng *et al.*, 1997, p. 50). Therefore, the availability of up-to-date computing resources for students use at the public universities should curb students' drive towards software piracy. These universities should take advantage of the new political atmosphere, which has evolved as a result of the January 25, 2011 Egyptian Revolution, and call for the allocation of more resources to establish and maintain computer laboratories equipped with the software packages that students need for their studies. In addition, since there is a correlation between income levels and piracy (Gopal and Sanders, 2000, pp. 84-6), software producers may consider adopting pricing strategies that take into consideration the relatively low income levels in Egypt in order to ease the software piracy problem among college students.

Lastly, students cited "low risk of getting caught and prosecuted" and "ease of purchasing illegal software products" as two factors that contribute to software piracy. In 2002, a new legislation (Law No. 82) was passed with specific articles to protect intellectual property rights including software. Passing a law is a good step forward, but it is insufficient to curb software piracy. The Egyptian Government should make every effort to enforce the relevant laws and capture and prosecute the software pirates in order to curb the trading and use of the illegally copied software products in the Egyptian market.

8. Limitations and future research

The findings of this research should be interpreted and generalized in light of its limitations. The findings were reached based on a dataset that was collected from a sample of Egyptian students enrolled in a college at one public university. The generalization of these findings to all Egyptian students in public and private universities calls for future replications using research designs that employ large samples from various disciplines at different universities.

In addition, this research employed a cross-sectional sample and dataset. This research method assumes that the produced results are stable across places (e.g. universities) and over time. However, the individual characteristics and information ethics issues investigated in the present study may have place and time-specific components that vary across universities and over time. In order to take such a possibility into consideration and verify the internal and external validity of the findings of the present study, future research should adopt designs such as longitudinal

and case-based research methods in order to decrease the possible confounding effect of place and time variability.

Furthermore, the present study used a sample of college students as informants. Leonard and Cronan (2005, pp. 1154-6) argue that the results of using students as subjects can be generally applicable to actual business managers, especially when studying ethical decision making. Other researchers (Robin and Babin, 1997, p. 61; Davison *et al.*, 2009, p. 834), however, believe that students make poor surrogates for business or IT professionals, given their lack of professional experience and relative immaturity. Differences in the perception of business ethics between business students and practitioners do exist (Cole and Smith, 1996, p. 889). The findings of this research, therefore, may not be generalized to business settings. Similar future research designs should employ samples from IS/IT users working in different professions within the Egyptian private and public sectors in order to verify the findings of this research.

Besides, this research explored attitudes towards the four information ethics issues of privacy, accuracy, property, and access. However:

[...] [a]s our world continues to modernize [...] we need to track the social changes and understand their implications. These changes include the potential for convergence, divergence, or cross-vergence of information ethics. For researchers and practitioners involved with IS and business, it will be even more important to understand how issues of information ethics can be managed more effectively (Martinsons and Ma, 2009, p. 830).

Future research should include other ethical issues that are likely to arise from the adoption and management of the ever advancing IT applications.

9. Conclusions

With the pervasiveness of IT in business and everyday life, information ethical problems can only be expected to increase in frequency and complexity. This research adopted Mason's (1986, pp. 5-10) information ethics framework to explore the Egyptian students' attitudes towards the four information ethics issues of privacy, access, property, and accuracy, and assess the possible impact of the individual characteristics of age, gender, marital status, years of education, and computer experience on such attitudes.

Students are generally sensitive to the ethicality of information privacy protection and assurance of information accuracy, and the unethicity of unauthorized access of computing and information resources for personal purposes. However, students are insensitive to the ethicality of software copyright protection. It is "morally" acceptable to students to use illegally copied software. The relatively low personal incomes for most of the Egyptians students and their parents as well as the perceived "overpriced" software are two significant contributors to the pervasive negative attitudes towards software copyright.

Gender and age has an interaction effect on students' attitudes towards the information ethics issue of access. While young female students exhibit more sensitivity to unauthorized access of computing and information resources than do male students of the same age, older male students exhibit more sensitivity to unauthorized access to computing and information resources than do older female students at the same age.

Since college education positively affects students' attitudes towards the ethicality of property right protection, the curricula in the Egyptian public universities should be thoroughly assessed and revised in order to integrate ethics into business education. Given that Islam is the religion of the majority of students, teaching information ethics

from an Islamic perspective could effectively change students' attitudes regarding software piracy. In addition, the Egyptian Government has to effectively enforce the intellectual property laws, and software producers may consider adopting flexible pricing strategies that take into consideration the relatively low income levels in Egypt in order to ease the software piracy problem among college students.

Although students may make poor surrogates for professionals, the findings of this research should contribute to the growing literature on global information ethics. Yet, similar future research designs should employ samples from IT users working in different professions within the Egyptian private and public sectors in order to verify and validate the findings of the present study.

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Appendix. Information ethics scenarios (adapted from Alshawaf et al. (2002, p. 73)

Case 1: privacy

Hameed works in the Data Processing Unit of the Police Department at the Ministry of Interior. The department's computer system is linked to a centralized data bank that contains criminal information for the entire country. One day, while working on the computer, Hameed accidentally entered the highly classified "drug crime suspect profiles" which Hameed is not authorized to access. He was horrified to discover that one of the highly respected professors in his daughter's college was on the list. According to the record, the professor was suspected in a drug trafficking case 12 years ago. However, he was not convicted because of lack of evidence. The first thing that came to Hameed's mind was whether he should contact the dean of the college.

Case 2: property

Adil is a senior student at the local college. Most of his class projects require the use of a computer. Although the college provides all of the software necessary to meet requirements, the number of computers available is insufficient to meet students' needs. As a result, Adil has turned in homework late twice because of this problem. He decided to buy his own computer so that he can do the projects at home any time he wants. However, after spending all his savings on a used computer, there was no money left for software. His best friend Mehdi comes from an affluent family. He not only owns a state-of-the-art computer but also has an impressive collection of software. Mehdi found out about Adil's problem and generously offered to let Adil copy his software.

Case 3: accuracy

Gulf Tech Corporation has spent many years in research and finally developed a medical diagnosis expert system which allows doctors to feed a patient's symptoms and lab test results into the computer and receive a diagnosis. The local hospital was satisfied with the reliability of the software after thorough testing and purchased the system from Gulf Tech. However, on the sales contract, Gulf Tech explicitly indicated that although they have considered all possible situations and have followed proper design guidelines, they do not guarantee 100 percent accuracy simply because there are always unknown medical cases that are yet to be discovered. A year after the purchase, a patient's illness worsened and she developed an infection after her doctor treated her according to the computer's diagnosis. Further testing indicated that the computer diagnosis was incorrect. The patient suffered both physically and financially because of the error and she later filed suit against the doctor for malpractice.

Case 4: access

Khalid works full time during the day in a large corporation. His children will be going to college in a few years. In order to prepare for their education, he wanted to earn extra income by building and selling computer systems for small local businesses at home in his spare time. Khalid realizes that in today's world, quick access to information is power. He must stay ahead of other competitors in order to succeed in the volatile computer business. He decided that he should hook up to a 24-hour commercial on-line market information company. Besides the long distance telephone charges, such service normally involves a small hourly usage charge plus an expensive monthly flat charge. Khalid can handle the telephone charges and the hourly charge because he will be using it for a short time every evening. However, his current sales volume simply did not justify paying a large monthly fee at this point in time. The company Khalid works for has already connected to a similar service. Khalid decided to dial the service from his home computer in the evening using the company's user ID number. He figured the company is paying for the flat fee anyway. Therefore, the cost to the company is minimal.

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