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A SYSTEMATIC LITERATURE REVIEW OF COMPUTER ETHICS ISSUES

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ABSTRACT

Given the importance and concern of computer ethics, four issues have been identified in the field of computer and Information Technology (IT). This study was carried out to review the work done on computer ethics issues for the years 2010 to 2014. This paper identifies the methods used, topics addressed, and the main findings published of the research about ethical issues in computer usage. Systematic literature review (SLR) has been conducted according to the standard guidelines, and a study protocol was applied to answer three research questions: 1) What are the ethical issues in computer ethics that have been discussed in previous research?, 2) What are the most recent topics among computer ethics issues?, and 3) To what extent does investigation among IT students, Non-IT students and IT professionals display different perceptions of IT issues? Based on the evidence extracted from 40 studies, it has been clearly stated that software piracy in Privacy, Accuracy, Property and Accessibility (PAPA) and general issues are the topics most frequently discussed. It shows the gaps in the current literature pertaining to computer ethical issues and in particular, the issue of software piracy.

Keywords: *Computer Ethics, Ethical Issues, Systematic Literature Review, Papa Framework, Software Piracy*

1. INTRODUCTION

Ethics involve decision making to do something good or bad, right or wrong behavior within a society. It is all about moral principles driven by their values and perceptions. Computers and computer technology have become an integral part of our daily life; they provide good and useful benefits if properly used but can prove detrimental if abused. Ironically, the rapid advances in computer technology have also provided opportunities for abuse. Ethics in computer usage have fallen into a "grey" area with regard to the “dos" and "don'ts" in the interaction with a computer in the Internet context[1]. The “grey” area refers to the ethical issue of human misuse and abuse of technology. The study on ethics needs to be perpetually updated as computer technology is dynamic. Computer ethics refers to ethical problems arising from the use or misuse of computer technology. In addition, computer ethics is viewed as an "umbrella" that is more specifically labeled as cyber ethics, IT ethics, Information ethics, and many others [2], [3]. All these have been used in discussions on various aspects of computer ethics that are associated with the Internet. Research [4] suggested that computer and IT ethics should be clearly identified in order to address these ethical problems. There should be serious discussions on computer ethics issues in order to know and understand different opinions and perceptions. Because it is a challenge to find an effective solution for ethical issues in the area of computer technology[5].

Given the unethical use of the computer and Internet, ethics have been one of the broadest areas of computer-related research. Nonetheless, the extensive use of IT in society has worsened existing ethical problems, and prompted the emergence of new ethical dilemmas such as unauthorized access, software piracy, internet pornography, privacy protection, information gaps, and many more[6]. However, unethical behavior in terms of culture is

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lacking consensus. For instance, the widespread agreement of unethical behavior, other behaviors that are acceptable to one culture might be unacceptable to another [7]. It is an interesting finding obtained from various people because they come from different backgrounds. The subject investigated also is a useful tool for the examination of perception towards computer ethics issues. Different people have different perceptions towards computer ethics issues due to their different individual backgrounds [8]. Therefore, the identification of who should be involved in accessing awareness and behavior towards computer ethics is an important factor to be investigated. Several methods can be used as alternative ways to promote and inculcate the correct perception among computer users when dealing with computer ethics issues. If the misuse of IT is prevalent among users no matter who they are, they might feel comfortable regardless of the unethical issues and will feel less sensitive to unethical issues and continue their misuse and computer abuse practice[6]. Thus, such unethical activities may lead to a significant loss to people and society [9].

To the best knowledge of this researcher, there is no existing systematic literature review of research on computer ethics issues. Previous studies have investigated the issues that arise in computing and internet context, however, the growth of ethics has also been paralleled by rapid technology changes. Several studies [10]–[14] have claimed that IT ethical issues in computer usage should be researched because IT will make computer ethics more important in a dynamic world. For that reason, a systematic literature review is performed, guided by [15] and [16]. Despite the significance of these earlier studies with regard to the importance of ethical issues in computer ethics, this paper is intended to cover studies published during the years 2010 to 2014. It seeks to address the recent problems related to the identified issues in computer ethics in order to obtain the latest updated information. Thus, this paper will systematically review published work on the issue of computer ethics.

The objective of this paper is to make a contribution to the computer and IT ethics literature. A presentation of a summary of systematic literature reviews in the ethical issues of computer and IT area was made in an effort to fill the gap in the literature. A systematic literature review classifies and illustrates all related research to answer the research questions. Therefore, this paper seeks to answer several specific research questions:

RQ1: What are the ethical issues in computer ethics that have been discussed in previous research?

RQ2: What are the most recent topics among computer ethics issues?

RQ3: To what extent does investigation among IT students, Non-IT students and IT professionals display different perceptions of IT issues?

This paper is organized as follows. the review method is reported in Section II. Then, in Section III, the results of the review are presented, and answer the research questions. Finally, in Section IV, conclusions are drawn and suggestions for future work are presented.

2. LITERATURE REVIEW

2.1 Review Method

Review strategy has been applied by categorizing the questions, search sources, inclusion and exclusion criteria, study selection, data extraction, and synthesis according to guidelines. This review has adopted the guidelines of [15], [16] for a complete review. Therefore, this review paper has been recognized as a part of evidence-based research in both software engineering as well as Information Systems. A comprehensive search carried out in the automated and manual search is shown in Table 1. This paper uses the common digital databases to search for relevant journal papers and conference proceedings.

Several potentially relevant publications were found using the keywords. Furthermore, additional references were searched based on references found in primary studies to ensure that important material was not overlooked.

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Table 1: Search Sources

Automatic search	Manual search
• ACM Digital Library • Elsevier ScienceDirect • IEEEXplore Digital Library • Others (Google Scholar)	• Proceedings of special interest group Communications of the ACM • Information System Education Journal • Issues in Information Systems • Information System Education Conference • International Conference on Software Technology and Engineering (ICSTE) Empirical

2.2 Inclusion and Exclusion

The selection of the materials in this paper was based on the following inclusion and exclusion criteria as shown in Table 2.

Table 2: Selection Criteria

Inclusion Criteria	Exclusion Criteria
• Any title that answers the research questions. • Was published in the years between 2010 and 2014. • Focus on computer ethics and ethical decision making, ethical issue of education and organization level.	• Does not answer any research question. • Not related to computer ethics. • External to practice of computer ethics. • Papers not written in English.

The search terms were based on the research questions. There are several keywords used which include "computer ethics, ethical issues, IT students, IT professionals". A few synonyms were established for each of the keywords. For example, in RQ1 which contains keywords "ethical issues" and "computer ethics": keywords (ethical issues* OR ethical behaviour* OR ethical decision making* OR ethical dilemma*) AND computer ethics* OR Information Technology ethics* OR Information ethics*). The search terms must be relevant to match every single research question. This provides the easiest way for researchers to search the keywords in getting more information and details of a particular field of interest.

The syntax of the search string was adapted according to the rules of each search engine in order to get important material for this review. The combination of the key words was search using several search engines to locate relevant papers. The relevant papers were identified by different publications such as IEEE, ACM and many more.

2.3 Study Selection

Figure 1 shows the study selection. This study selection resulting in a total reference (n=593) including automated and manual search was based on the title and abstract. Papers were evaluated and irrelevant papers and also duplicated papers were excluded. There are three stages of filtering which are screen titles, screen abstract and screen full text papers. After filtering, irrelevant papers were rejected. Finally, a total (n= 40) useful and related papers are determined in the review (Appendix A).

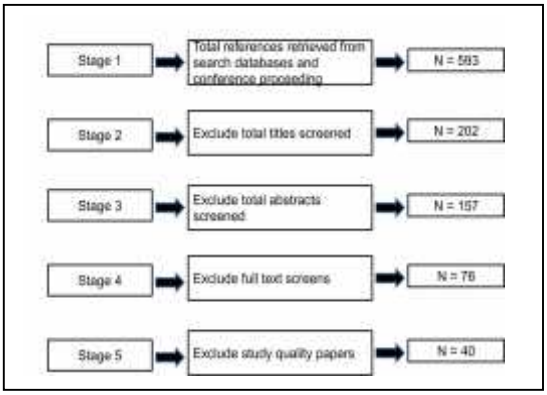

Figure1. Stages of the Study Selection Process

2.4 Data Extraction and Synthesis

Data extraction was performed after filtering the related paper. Each relevant paper was assigned a unique key representative (S1 to S40). The information was extracted from each paper, including the year of publication, author names, objective of the research topic, and type of study (empirical, theoretical). The research method and

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the subject of investigation (professional or student) in the empirical studies were also included in this review. Empirical study is a research that contains data of observation and experience that is able to answer the research questions in a study. While a theoretical study is a scientific research that provides an explanation of why the phenomenon has occurred and allows prediction to be made. The abstracted data can be used to answer the research questions. The researcher divided the similar variables into different categories of research topics and reports in the discussion section, thus providing a frequency count of the number of times each issue is identified in this study. The frequencies simply show how many times a given factor is identified in different papers.

3. RESULTS

The study selection process from automatic and manual search (Figure 1) resulted in 40 relevant papers selected for data extraction and analysis. Figure 2 illustrates the physical distribution of relevant papers. Based on the bar chart provided, there are 9 papers published in year 2014.This indicates that computer ethics issues have been the focus of recent research since year 2010. According to Table 3, 75% (30/40) represent empirical studies while the rest are theoretical studies. Table 4 shows a survey is the most applied method contributing 83.33% (25/30), followed by experiment method contributing 10% (3/30) in testing the ethical issues associated with computer usage. However, there is only one case study (3.33% or 1/30) and one mixed method (survey + interview) 3.33% (1/30) among the papers. It may indicate that the easy way is to conduct surveys on students compared with professionals.

The overall review shows a dominant use of students, to whom 73.33% (22/30) was, devoted which is more than professionals (6.67 % or 2/30) in the subjects investigated as shown in Table 5. A total of 70 % (28/40) of the studies were published in journals and 30% (12/40) of the related studies were published in the conference proceedings. In addition, there are 33 papers that have been published in the field of computer technology and seven papers in the area of business ethics.

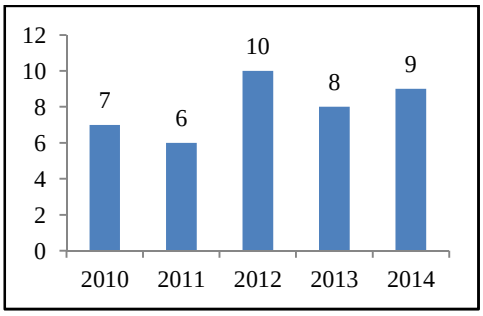

Figure2. Physical Distribution of relevant papers

Table 3. Studies Types

Study type	Number of studies and Study ID	Percentage
Empirical	30(S2-S8,S12-S16,S18-S21,S23-S30,S33, S35, S36, S38-S40)	75
Theoretical	10(S1,S9-S11, S17,S22,S31,S32,S34, S37)	25
Total	40	100

Table 4. Research Methods

Research Method	Number of studies	Percentage
Experiment	3	10
Case Study	1	3.33
Survey	25	83.33
Interview + Survey	1	3.33
Total	30	100

Table 5. Subjects of Investigation

Subject of Investigation	Number of studies	Percentage
Students	22	73.33
Professionals	2	6.67
Both	4	13.33
Others	2	6.67
Total	30	100

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3.1 Answers to the Research Questions

This section presents the synthesis of the findings of this review organised according to the three research questions. A separation between the synthesis of empirical and theoretical studies was performed as shown in Table 6 and Table 7. This is to ensure a clear, empirically-based evidence from non-tested propositions and models is explained to answer Research Question 2.

Table 6. Summary of Empirical Studies

Topic in computer ethics issues	Study ID	Frequency of the studies
PAPA	S8, S12, S18, S21, S27, S28, S33, S35, S38	9
Software Piracy	S2, S13,S15,S16, S19, S20,S23, S40	8
Computer security	S14, S24	2
General issues	S3, S4, S5, S6, S7, S25, S26, S29, S30, S36, S39	11
Total		30

Table 7. Summary of Theoretical Studies

Topic in computer ethics issues	Study ID	Frequency of the studies
PAPA	S9, S10, S22, S31, S32, S37	6
Computer security	S17	1
General issues	S1, S11, S34	3
Total		10

RQ1: What are the ethical issues in Computer Ethics that have been discussed in previous research?

A total of 40 papers have answers related to RQ1. The research topic was categorized and briefly described. Four ethical issues in computer ethics were identified, including PAPA framework, computer security, software piracy, and general issues.

PAPA framework was developed by [17] to identify the major ethical issues in computer use. There are four significant issues highlighted in the PAPA framework such as Privacy, Accuracy, Property, and Accessibility. Many researchers have applied the PAPA framework in ICT ethics[18].

This PAPA framework mostly tests a scenario that simulates a similar situation that can reflect the actual behaviour of respondents.

- Privacy refers to ownership details, exchange fairness, and access characteristics.
- Accuracy refers to the legitimacy, precision and purity, with which information is carried out.
- Property refers to the information about self that an individual is willing or forced to give up.
- Accessibility refers to the right or authority to gather data or information from another source.

Computer security refers to the idea of being free from danger of computer abuse. Lacking knowledge in confidential data has provoked computer security issues. The computer security policies can be indicated by awareness of data protection policy, password policy, download data at a safe website policy and many others.

Software piracy often happens in an internet context. It also can be defined as unapproved exchange using the technology. The practice of illegal copying without permission has been on the rise worldwide and it has economic implications. Downloading music from the internet is also viewed as a type of software piracy.

The general issue of computer ethics is referred to a board of investigation that monitors computer usage issues such as copying online, plagiarism, buying a paper online, downloading music and collaborative programming. This topic also reveals that it has no particular issues to focus on. This kind of topic has no specific issues to discuss. There are general issues that are displayed and asked, usually in the form of a questionnaire.

RQ2: What are the most recent topics among Computer ethics issues?

A table of the review has been developed to answer this research question. There is a summary of the frequencies of the papers which are relevant to computer ethics issues. A total of 11 general issues that discuss computer ethics in 30 empirical studies, followed by the citing of computer issues in PAPA framework and the issue of software piracy in empirical studies (Table 3).

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PAPA framework: 15 studies discuss this topic, including nine studies [14], [19]–[26] in empirical investigation and six studies [13], [27]–[31] in theoretical investigation. PAPA frameworks are mostly presented in the scenario.In [19] the researhers have declared that the PAPA issue is cyber ethics due to computer use behaviour in the Internet context. Several indicators have been used to evaluate PAPA issues. For instance, ethical evaluation and ethical judgment [26], social, situational and technological [22], Multidimensional Ethics Scale MES scale [20], moral intensity [14], attitude towards behaviour, self-efficacy and security[25] have been used to test the relationships with PAPA issues. On the other hand, demographic background [23], [24] factors show that various cultural backgrounds could provide different outcomes on the perception of PAPA issues. Ethical evaluation and ethical judgment have a strongly significant relationship. This indicates that respondents from different cultures hold different values regarding unethical issues. Meanwhile, [21] have begun research to explore the behaviour of working adults when facing problems dealing with privacy and intellectual property issues. They found that the elements of, gender and computer literacy in the form of programming experience have been mediated by Machiavellianism that has influenced the intention of committing unethical behaviour. On the other hand, three ethical computer issues which are privacy, intellectual property, and security among six theoretical studies were identified [27]. This paper has discussed the SPI course offered to computer science students. Students are expected to increase the level of awareness towards ethical issues after attending the course. An ethical issue or dilemma is a situation that will often involve an apparent conflict between moral imperatives, in which to obey one would result in transgressing another. It is about the way our lives are being affected by information, which is becoming increasingly important in a society that is defined as “the information society”. On the other hand, the importance of a professional code of ethics [28], information sharing on social interaction in networking sites (SNS) [29], responsible research and innovation (RRI) method [31] have been stressed. Additionally, [30] has identified six issues from PAPA, which include ACTIVE and it integrates virtue ethics as a mechanism to help the professionals` to promote manner behaviour in the Internet context. Therefore, the educational context and industrial developments in organizations [13] must seriously consider providing a healthy information system environment. This method perhaps could help to increase the professional capability and strengths in optimal use by IT. At the same time, the PAPA framework appears to be a relevant foundation from which to develop the aforementioned ethical principles for information sharing on SNS web sites.

Software Piracy: nine empirical investigation studies discuss this topic [18], [32]–[39]. The majority of the relevant papers on software piracy have stated that piracy is one of the major ethical and legal issues and it is still on-going [18], [32], [35], [39]. The piracy issue has many categories including software piracy [18], [32]–[34], music piracy [36] and hard disk loading [18]. Piracy issues and copying software codes [34] fall under intellectual property [14], [18], [31].Students' attitude towards software piracy issues [35] , effects of religion and awareness [33], code of ethics [39] have all been tested to mitigate software piracy behaviour. The cost-saving purpose is one of the reasons for people to engage in software piracy [37] .According to the ACM Code of ethics, the terms of copying from others have many ideologies of different people. They indicated that the majority of respondents displayed a tendency to view themselves as ethical regarding the illegal or unethical use of software. For instance, respondents accepted that illegally downloaded music from the Internet is not an unethical behaviour [36]. They expressed the belief that these are free for everyone when put online. The findings of this research raise the question of the differences between the real world and the Internet environment regarding moral judgment and moral behaviour, as terms relating to ownership, duplication and copying of contents change. Therefore, ethical empowerment among students to mitigate this unethical behaviour is necessary.

Computer security: two studies [40], [41] in empirical investigation and one study [5] in theoretical investigation discuss this topic. Computer security and code of ethics [39], [40] have been applied to gain awareness of computer security issues among students. They discussed computer security such as passwords, (ii) data backups, (iii) antivirus software, (iv) firewalls, (v) software updates and patches, and (vi) uninterruptible power supplies. Results indicated that students from different related fields have come from various socio-cultural backgrounds. Therefore, basic education on data and file protection should be provided to students in tertiary

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institutions. Kert et al. [5] has stated that the problem of computer ethics issues is more complex than other computer-related issues. Thus, a scenario based online support system in security has been proposed to counter the computer security problem.

General issues: there was altogether 14 studies that discuss this topic -; 11 studies [4], [12], [38], [42]–[49] in empirical investigation and three studies [6], [50], [51] in theoretical investigation. Among these general issues, some issues are redundant when PAPA issues and software piracy are discussed. This is because general issues have been explored broadly in the questionnaire and scenario form. Most of the studies had used a scenario form to assess respondent's ethical decision making towards IT ethics issues and behaviour [38], [42], [44], [46], [47], others had used questionnaire form [8], [10], [12], [45], [48], [49]. All statements presented some activities/conditions related to the ethical use of computer and internet; which helped to portray their awareness of the ethical use of computer or IT. Statistically, moral judgment [42], [45], [49] was found to have the most influential impact on unethical computer behaviour. For instance, e-book copying, paying for editing essays and group projects [42] and collecting and storage of personal data [45] is the most unethical issue in general point of view. The researcher suggests that these kinds of issues are useful to computer educators to develop and provide an effective lesson to students. Students perhaps behave in good manner in the IT context when facing ethical dilemmas. On the other hand, [43] uses 16 statements to get feedback from respondents. However, there are some statements which could not get the expected response from respondents and this indicated that respondents have poor knowledge of ethical utilization of the computer and IT resources. Overall, general issues have indicated the concern of downloading software without acknowledgement [4], [38], [48] as the most serious issue. This issue becomes more worrying when a student believes this behavior is totally legal and right. This has indicated that software piracy is a common occurrence and the increased use of computers and internet access demands that educators and students as well as professionals should be knowledgeable about computer ethics. However, a study of unethical issues (unauthorized acts, according to the UNAC), internet stickiness (INST), and plagiarism (PLAG) shows that gender and social economic status (SES) can influence the decision to engage in unethical behaviour among secondary school adolescents [12]. The researcher strongly believes that SES is a significant factor because students from low SES families are inclined to behave unethically. Moreover, every issue presented has various perceptions according to changes overtime [38]. The usefulness of training on computer ethics and the computer code of ethics have been suggested. Due to the serious occurrence of unethical behaviour, training should be done and a test of awareness towards unethical issues should be given. However, the results of [46] investigation have concluded that attitude of students towards unethical behaviour does not change even after training provided by the college. The challenge of increasing awareness among respondents is therefore more daunting than ever. As such, this issue still remains an unsolved problem for computer educators and society as a whole.

Theoretical studies on general issues have been discussed in studies of [6], [50], [51]. [50] which have provided several definitions of computer ethics in diverse areas. IT ethics do not have a generally conventional definition, therefore the participants' divergences in understanding and explaining the various ethical issues associated with IT can be one of the probable limitations of the study. Perhaps a study by [6] in proposing computer-related scenarios for computer ethics examination can be applied to fill the gap. Several scenarios have been presented in a short explanation of an ethical situation. Then respondents have to rate the ethics of the scenario to identify the ethical issues involved. This paper could benefit the researcher on using the scenarios to better understand the level of awareness of respondents regarding ethical issues. Besides, the financial impact is very significant if compared to other factors that contribute to unethical behavior [51]. This has attracted society to the need for further investigation on this factor.

RQ3: To what extent do different investigations among IT students, Non-IT students and IT professionals display different perception of IT issues?

There were 30 papers that served to answer RQ3 and the intention in this section is to identify the subject investigation in various contexts applied in the studies. Two types of subject investigations are available, including students and professional. There are 73.33% (22/30) that used students in their studies, 6.67% (2/30) used professionals and those that used both constituted 13.33% (4/30). However,

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there was one study, 3.33 % (1/30) that did not identify the respondents used in the study. Six studies were applied to IT students, while five studies were applied to Non-IT student (business students). There were also three studies that used IT professionals in testing computer ethics issues. There were six studies involving IT and Non-IT students in the review. Following that, the Table 8 states the type of subjects investigated according to the issues discussed in the literature. Nevertheless, most of the studies have used students as their subject investigation. This is because ethical problems are rapidly occurring at the educational level especially higher education institutions[52].

Table 8. Types of Subject Investigation and Frequency of The Studies

Type of subjects investigated	Study ID	Frequency of the studies
IT students only	S3, S16, S25, S28, S29, S33	6
Non-IT students only	S12, S13, S18, S19, S35, S38	6
Both (IT and Non-IT students)	S2, S5, S6, S14, S24, S39	6
Professional only	S15, S21, S26	3
Students and Professional	S4, S7, S36, S40	4
Others (Primary, Secondary, do not state)	S8, S20, S23, S27, S30	5
Total		30

IT students have mostly shown an awareness of or perception towards ethical issues. Three studies were on general issues, two studies on the PAPA framework, and one study on software piracy. Overall, the IT students are computer literate in the perception of ethical issue of the research topic. There are also categories of IT students among two different countries. [42] have concluded that IT students, mostly have completed many courses related to computer technology and tend to make more significant contribution by their moral judgment towards unethical computer issues. However, there are some studies which show contrary results such as [23], study to determine the awareness among two IT student groups one American and the other European. The results indicated that American students were likely to rate unethical practices than European students. However, [46] have concluded that behaviour of students towards unethical behaviour has no changes before and after ethical training provided by the university. On the other hand, [14] indicated that IT students gave high ratings to all given issues. They did not even have any idea about unethical issues. This showed that students lacked knowledge in computer ethics issues in year 2010. [48] had expressed the opinion that installing a software programs to the PC from a friend is legal and ethical. The result of the study showed that most of the students are unaware of many ethical and legal issues concerning copyright and intellectual property rights. This was supported by [18], who also had indicated that usage of pirated software is a serious problem among students of computer science and they do not consider piracy as unethical. It has become more difficult to deal with software piracy due to the ease of access to the internet.

Non-IT students: in the five studies that were applied to Non-IT students, there are four studies used in PAPA and one study applied in software piracy. The result shows that the gender of Non-major IS student at a public University in Turkey the PAPA framework has resulted in different results based on cultural backgrounds [35]. This indicated that students from various cultures have different views of the computer ethics issue. For instance, [26] reveal that China students are more sensitive to privacy and accessibility issue compared to American students. Meanwhile, American students are more sensitive in property issues regarding software piracy, etc. Students basically were capable of acknowledging the illegal activities as unethical as well, but they mostly were able to accept the behaviour as long as it did not bring harm to others and it could bring benefits to themselves [20], [25], [33]. Khalil and Seleim [24] revealed that Egyptian business students did not behave ethically towards property issues but act ethically to other issue such as privacy, accuracy and accessibility. This is witnessed also by [35] who found that male students are involved more in software piracy than female students. This also indicated that software piracy is prevalent among Non-IT students compare with other computer ethics issues.There is a need for enforcement of the existing property rights protection laws to the software market. [33] had indicated that business students have a significant impact of religion and awareness towards digital piracy.

For IT and Non-IT students: In [44] the researchers had concluded that students majoring in

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IT and Non-IT have been facing similar ethical issues. Research [40] is a mixed study, which compared two different types of students. Technology-based students are more aware of ethical issues regarding security and code of ethic compared to liberal arts students. This result is supported by [4]. For Non-IT students, who have not attended any computer ethics-related course, therefore did not have proper information about computer ethical issues. However, this result contradicts that of [32], [38], which showed that students from computer science background are more committed to software piracy compared to other background students. Students are more agreeable to unethical behavior to be accepted. This also happens in the [41] study, and this indicates they have found that although IT students have higher awareness of security issues in computer use compared to the education field students, but they tend to practice unethical behavior.

4. DISCUSSION

4.1 *Implications for Research and Practice*

This review paper yielded 40 relevant results papers in both automatic and manual search. The general issues of computer ethics have been fully focused on in recent years. These general issues also include the unauthorized act, downloading software without permission and many others. However, issues of software piracy as a type of intellectual property theft and also one of the general issues has gained the attention of many interested parties in the computer Information Technology area. Meanwhile, the literature revealed that the PAPA framework is still a huge area and a particular issue such as intellectual property garnered much attention from past reviews. However, it spears that in these reviews the topic of computer security has been little discussed.. It is also obvious from the findings that the research investigation of PAPA framework has highlighted four important keys which are Privacy, Accuracy, Property, and Accessibility. However, this paper reveals that there is a redundancy of some issues such as software piracy, which may reflect the great interest of many researchers in this topic. Meanwhile, a gap still exists in the literature on a solution to software piracy despite the attention that has been paid to it from time to time. On the other hand, this current review reveals that the survey is the most frequently applied research methodology. The overall review mostly shows the description of the ethical issues among selected respondents. In any case, there is just a little discussion on how the issues and behaviour have been influenced by other factors. The factors investigated include subjective norms, moral judgment, gender and also cultural background. The implications of the findings may help the researcher to better explore the computer ethics issues in the area of IT. The results of the investigation can be a guideline for future research and hopefully bring about the implementation of solutions to the problems that currently be set in computer ethics.

Most of the research has suggested that students have to provide the knowledge of ethical computer use. Thus, the issues of computer ethics should be well and correctly focused to achieve the desired solution.

4.2 Limitations

There are several limitations that are encountered in this paper. First, this review has limited the scope of the study to the period from year 2010 – 2014 and thus might miss relevant work done outside this period. Moreover, the research methodology and data of the studies used might not provide all the related information. Several studies have been found that did not constantly report the findings of their analysis in detail. All the results found might have limitations on the drawing up of conclusions from the empirical studies.

5. CONCLUSION

This systematic literature review has provided an insight into the work done by researchers on the topic of issues in computer ethics in an attempt to identify the gaps in the literature, the problems and propose solutions to unethical computer usage behavior.

There are 40 papers identified with critical reviews and these were systematically analyzed to access the current body of knowledge on ethical issues in computer and Information Technology use. The research questions have been answered pertaining to the type of computer ethics issues; the research methodology; and results are discussed to fill the gap. Of all the issues within computer ethics, the unauthorized duplication of software (usually called software piracy) has captured a major share of attention. Further research should focus on how to mitigate and determine the factors

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that contribute to software piracy. Furthermore, factors that affect software piracy can be focused on by the researcher to establish the gap in the literature**.** For future work, there is a need to perform empirical studies to further enhance the quality of the research in this area.

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Appendix A

Study ID	Reference
T1	[50]
S2	[32]
S3	[42]
S4	[43]
S5	[44]
S6	[4]
S7	[45]
S8	[19]
S9	[27]
S10	[28]
S11	[51]
S12	[26]
S13	[33]
S14	[40]
S15	[34]
S16	[18]
S17	[5]
S18	[20]
S19	[35]
S20	[36]
S21	[21]
S22	[29]
S23	[37]
S24	[41]
S25	[46]
S26	[47]
S27	[22]
S28	[23]
S29	[48]
S30	[12]
S31	[13]
S32	[30]
S33	[14]
S34	[6]
S35	[24]
S36	[49]
S37	[31]
S38	[25]
S39	[38]
S40	[39]