

AC 2009-356: ADAPTING ANTI-PLAGIARISM TOOL INTO COURSEWORK IN ENGINEERING PROGRAM

Jeongkyu Lee, University of Bridgeport

Jeongkyu Lee received a B.S. from Sungkyunkwan University in Mathematic Education and an M.S. from Sogang University in Computer Science, both of Seoul, Korea in 1996 and 2001, respectively. Before he pursued his doctorate, he worked as a database administrator for seven years with companies including IBM. In fall 2002, he entered the Doctoral program in Computer Science and Engineering at the University of Texas at Arlington. After he received Ph.D. degree in summer 2006, he joined the Department of Computer Sciences and Engineering at University of Bridgeport, CT as an assistant professor. His primary research interest is in the multimedia database management. His work also includes techniques for multimedia data mining, video processing, multimedia ontology, and medical imaging. He is a member of IEEE, ACM, and ASEE. He is a program committee of IEEE International Symposium on Multimedia 2006, ACM Symposium on Applied Computing (SAC) 2007, and International Resources Management Association (IRMA) 2007.

Jalpa Bani, University of Bridgeport

Jalpa Bani is a M.S. student of Computer Science at University of Bridgeport. She completed her under graduation in Computer Engineering from Saurashtra University, Gujarat, India. She has a deep urge to know more in the fields of Artificial Intelligence, Computer Networks, Database Management System and Mobile Computing. During her under graduation, she researched on Cyborg - an active area in applied Robotics. She continued her research quest by concentrating on security vulnerabilities in network and wireless communication protocols; 1024-bit+ encryption/decryption of data; and enhancing performance of mobile database query engine. In April 2008, she published a innovative paper at the IEEE Wireless Telecommunications Symposium 2008. The paper presented a unique algorithm to prevent cache timing attack on Rijndael Algorithm.

Ying-ju Chen, University of Bridgeport

Ying-ju Chen is a full-time Ph.D. student of Computer Science Engineering at the University of Bridgeport. She received the B.S degree in Computer Science from Tangkang University in 1995 and the M.S. degree in Computer Information System from Golden Gate University in 1998. Prior to her pursuing of the Ph.D. degree, she worked for the BEA Systems in WebLogic Server Division as a Sr. Software Engineer. During her stay with the BEA Systems, Ying-ju was recognized as the technical lead of the quality assurance department for various teams like EJB, JSP and Servlet, Workshop EJB Plug-in cross various releases.

Adapting Anti-Plagiarism Tool into Coursework in Engineering Program

Key words: Plagiarism, Anti-Plagiarism Tool, Plagiarism Detection, Turnitin

Abstract

Plagiarism in higher educations includes not only copied words in writing, but also any illegal activities reusing previous data, ideas, and processes. Specifically, plagiarism issues in engineering schools are getting important because of cultural difference of their students and rapid changes of technology used in their classroom. The well-known examples include master thesis controversy in Ohio University, and Dr. Hwang's case in stem research. Both of the cases bring us the following questions: (1) *What makes engineering students cheat on their writing?* (2) *What types of plagiarisms are happened in engineering classroom?* and (3) *How do instructors in engineering educate their students to prevent plagiarism?* In order to answer the questions in this paper, we investigate and discuss the plagiarism issues in engineering program. For the first step of this research, we investigate the types of plagiarism that frequently happen in engineering classes. Then, we select '*plagiarism in writing*' for our further investigation among various types of plagiarism, since this is the most frequent and serious one in engineering classes. The second step is to adapt an anti-plagiarism tool to the classes. Among several plagiarism software, Turnitin.com is selected for this research not only because it can detect plagiarized writing but it can provide statistical information to both instructors and students. In addition, we collect the survey of plagiarism issues from both students and instructors. Lastly, we analyze the outputs of Turnitin.com, and the results of the survey to answer the questions above. The results show that engineering students realize the importance of plagiarism, but have committed cheatings in their classroom because of lack of time and knowledge for the assignments. Also, we realized that internet is the source where they get the information without proper citation. However, a variety of technology and policy work effectively to reduce plagiarized writing in engineering courses. Our future work will be directed toward other types of plagiarism in engineering classroom, such as programming, webpage, and multimedia.

1. INTRODUCTION

Since the last few decades, higher education systems have been infected by a big virus called *plagiarism* a lot. Specifically, plagiarism issues in engineering schools are getting important because of cultural difference of their students and rapid changes of technology used in their classroom. Although various definitions of plagiarism are used in education systems, the definition of plagiarism in higher educations generally include any illegal activities reusing previous writing, data, ideas, and processes done by someone else. This is just one example of the definition of plagiarism used in University of Bridgeport for Academic Honesty Standards¹.

¹ Academic Standards, Guidelines and Resources, University of Bridgeport, <http://www.bridgeport.edu/pages/2626.asp>

“Intentional as well as unintentional failure to acknowledge sources as well as the use of commercially available so-called research papers without full recognition of the source.”

The well-known cases of plagiarism in engineering education include master thesis controversy in Ohio University [1], and Dr. Hwang’s case in stem research [2]. Both of the cases bring us the following questions: (1) *What makes engineering students cheat on their writing?* (2) *What types of plagiarisms are happened in engineering classroom?* and (3) *How do instructors in engineering educate their students to prevent plagiarism?* In order to answer them, many researches have been performed to prevent plagiarism in the academic domain and to make students realize the true meaning of education. In this paper, we investigate and discuss the aforementioned plagiarism issues in engineering program by focusing on plagiarism in writing.

First, we investigate the types of plagiarism that frequently happen in engineering classes, and identify the sources of plagiarism where students get the original data. There are many sources of plagiarism, such as published papers, books, and online manuscripts. Among them, the main source is internet or World Wide Web. McCabe noted that *“there is evidence that cheating has increased in the last few decades, and the Internet is likely to intensify the problem”* [3]. Students can comprehensively search on any academic research topic or assignment given as homework. Internet is the easiest way to copy or steal others’ ideas, and they don’t need to hand-write the content but just use “copy, cut and paste” trick. In this paper, we select ‘*plagiarism in writing*’ for our further investigation, such as types and sources of plagiarism, since this is the most frequent and serious one in engineering classes.

Second, we adapt an anti-plagiarism tool into engineering classes. Among several plagiarism software, *Turnitin.com*² is selected for this research not only because it can detect plagiarized writing but because it can provide statistical information to both instructors and students. Turnitin.com has a large database of original manuscripts collected from scholarly journals, magazines, papers, and web pages. Basically it compares assignment submitted by the students with its database and returns the originality in percentage. In addition, we conduct the survey of plagiarism issues in engineering from both students and instructors. From the survey, we can collect more information about plagiarism from students and instructors in engineering.

Lastly, we analyze the outputs of Turnitin.com and the results of the survey to answer the aforementioned questions. Since Turnitin.com provides the originality for each submission as well as the source of copies, we can find several important aspects of plagiarism in engineering class, such as the effectiveness of anti-plagiarism tool over different courses and semesters. Also, by the analysis of the survey we can have more productive results, such as the gap between instructors and students regarding to various plagiarism issues in engineering classes.

2. RELATED WORK

It is surprising to note that many college graduates do admit that they did cheat at least once during their college days. In a study performed by Todd-Mancillas and Sisson in 1986 [4], it was found that 56% of students in an engineering college class have accepted cheating in

² <http://www.turnitin.com/>

assignments. There have been numerous research and development of plagiarism prevention and detection for higher education [4-13].

With the rapid evolution of internet search engine, it would not be surprising to use web search engines like Google.com and Yahoo.com as plagiarism detection tools. Simply, the plagiarized work can be identified by copying and pasting students' work in such web search engines. Although these web search engines may not be the best plagiarism detection tool, they are available free of charge and efficient sometimes. Some web browsers, such as Firefox³, have come-up with plug-in software to assist tracking plagiarized text over the internet. Based on this strategy, i.e., searching internet, many plagiarism detection softwares are being introduced in the market very rapidly. Anti-plagiarism software detects plagiarism after a student submits the plagiarized material, and is more dependent on the punishment imposed to discourage plagiarism [7].

In [5], an interdisciplinary approach to preventing plagiarism is introduced. Specifically, librarians are equally important in preaching anti-plagiarism, and library professionals must work collaboratively with professors to prevent plagiarism. Since students are expected to be creative in their study assignments, librarians should be in a better position to instruct them on how to utilize the library resources like books and internet without indulging in plagiarism. In addition, librarians must teach students how to take notes and present ideas in their own words instead of copying, and let them know the consequences of cheating.

Nowadays plagiarism issues in engineering education are not just educational problem, but interdisciplinary one. Therefore, there have been a number of literatures that deal with plagiarism in engineering education [8-13]. Perry [8] points out the diverse cultural background in engineering education to address the needs of students for writing. In international educational institutions, instructors need to understand that there are cultures across the globe that may not be inclined towards accepting the intellectual property rights [9,10]. There are cultures that do not think highly about the social value associated with a person's work [11]. Instructors would pinpoint the students for plagiarism and will not be in a position to understand the cultural or educational aspect. In today's world of globalization of education, it is implied that the discernment of plagiarism will change with different cultures. However, it is very important to emphasize that students in under-developed countries cannot be prominently stamped to be vulnerable to plagiarism [12]. Students who are unclear on plagiarism, cannot value the copyrights of the material on the internet [13].

In addition to traditional way of plagiarism by copying existing one, recently a new type of cheating is getting popular, i.e., cheating by falsified data. A report published by the National Institutes of Health and the U.S. National Science Foundation states that the number of cases involving falsified or staged data has be increase in scientific publishing [6].

3. TYPES OF PLAGIARISM AND DETECTION TOOLS

³ <http://www.mozilla.com/>

In this section, we discuss on types of plagiarism that frequently happen in higher educations, and kinds of assignments that are vulnerable to plagiarism. Then, several software and tools that are adapted into academy institutions are introduced to prevent and detect such plagiarism.

3.1 Types of Plagiarism in Engineering Classes

Generally, plagiarism can be defined as stealing or borrowing other's works or ideas without appropriate acknowledgements. Based on the definition, the various types of plagiarism have been investigated in many literatures [7, 8]. However, most of them focus on plagiarized writing that is only one example among many different types of plagiarism in engineering class. To address it, we are going to classify various plagiarisms in engineering classes into four types: plagiarism in *writing*, *programming*, *internet*, and *multimedia data*.

Plagiarism in Writing is not only a traditional type of cheating but also the most frequently occurred plagiarism in engineering classes. Recently, this type of plagiarism is getting more serious since students can easily access most of journals and papers through internet. Then, they copy and paste the original writing in their research papers, writing assignments, and term papers. Such plagiarism in writing can be classified in detail as follows:

- *Ghost writing*: When student writes an assignment or paper, one changes word-to-word from another's work, which is called Ghost Writing. In other words, we can say it is pure plagiarism.
- *Potluck paper*: This kind of paper falls into the category of plagiarized paper because the content of this paper is collected from different sources but student doesn't modify the sentences or phrases of the copied material.
- *Photocopy writing*: Sometimes in writing, students put the exact same important paragraph or phrase from one source without changing a word or text, this is called photocopy writing.
- *Poor disguise*: In this kind of plagiarized paper, students change the outlook of the paper or assignments, put different synonyms of words but keep the important original content from the resources.
- *Labor of laziness*: If students really spend quality time to read the related materials of given topic and prepare the paper from those materials that suit accordingly, that kind of paper or assignment falls into this category. Though student puts his effort to make this paper, it doesn't count as an original work.
- *Self-stealer*: Plagiarism means stealing some other's work. However, sometimes students or writers repeat their own ideas or proposal in the paper which has already been published earlier in his/her previous paper [14]. That means they are not stealing from others but from self which still disobeys the definition of plagiarism.

Plagiarism in Programming is one of hot issues in any engineering classes that are based on programming or lab assignments. Sometimes, writing seems to be the only part where students can cheat in their assignment. However, students may cheat in their programming assignments or lab-based assignments [16]. It is very easy for them to cheat in programming because of the following reasons: (1) the logic behind the programming remains the same; (2) students can change just variable names or function / method names just like poor disguise in writing; (3) the final output is a compiled executable file that can hide the originality of source code. Nowadays,

with the benefit of internet, students utilize auction web sites to buy and sell the source code of assignments online through bidding.

Plagiarism in Internet is a new type of plagiarism in engineering school because many engineering students utilize internet to publish their accomplishment. The incomplete list of such publishing includes homepage, blog, and wiki. However, if the students copy and paste some one else's works or materials, it is considered as plagiarism in internet. As mentioned in plagiarism in writing, it is not allowed any types of plagiarized work in internet, such as copying and pasting homepage or illegal links the online contents.

Plagiarism in Multimedia Data is another new type of plagiarism due to the rapid development of digital media including audio, image and video. Students do not cheat in only writing or programming assignments but they do plagiarism with other multimedia data for their assignments and research, such as music, images, animation, and video. The example of this type of plagiarism is to violate copyright of the contents. When students acquire image data from internet for their research purpose, it is obviously plagiarism in multimedia data. However, students overlook the importance of copyright protected contents in multimedia data.

3.2 Detection Tools

After knowing the types of plagiarism, we need to know what kinds of plagiarism detection tools or softwares are used to find plagiarism in assignments.

1. **Plagiarism in Writing:** About 60% of the plagiarism takes place while writing assignments, e.g., copying in writing term paper, report, thesis, reading assignments, etc. Therefore, there are many tools and software that can detect plagiarism in writing assignments [15].

Following is the incomplete list of tools used to discover plagiarism in paper writing tasks:

- **Turnitin.com:** This is the most popular website used to detect plagiarism. It has very large database containing millions of articles, PDFs, books, online materials, online essays, web-pages etc. This software calls array of programs that converts the submitted document's text data into digital data. Then, this finds similar pattern, even if the students has changed the order of the texts in the documents.
- **Cut-and-Paste Plagiarism Detection:** This Cut-and-Paste detection tool is also known as CopyCatch⁴. Copy & Paste is the easiest and common way of plagiarism. More than 38% of undergraduate students that were under investigation by Rutgers University, had confessed that one or another way, they were involved in Copy-Paste plagiarism [4]. This online plagiarism detection and tracking tool matches the documents submitted by the students and tries to find out the similarities in sentences or paragraphs.
- **Essay Verification Engine (EVE)**⁵: EVE is very efficient software tool which verifies essays, reports and projects. Within 15 minutes, EVE can compare 4 papers. It has large number of composite seeking algorithms to match the submitted assignment from the internet.

⁴ <http://www.copycatchgold.com/>

⁵ <http://www.canexus.com/>

- Plagiarism.org⁶: This is an online service which helps to stop plagiarism and increases an ethics spirit inside the students. Similar to turnitin.com, it matches the submitted papers from the term papers available online.
 - MyDropBox.com⁷: This is also an online service that prevents plagiarism. When a paper assignment is submitted into this site, computer compares the paper against the online paper mills.
2. Plagiarism in Programming: As mentioned before, students cheat in their programming assignments [16], since it is very easy to copy and paste the programming code that will be hidden from a compiled executable file. However, it is very difficult for instructor to find out the plagiarism in code files rather than in writing assignments. Therefore, few companies have invented new plagiarism detection tools for programming assignments. Following are examples of detection tools used for finding same source files in programming assignments.
- JPlag⁸: This is an online tool. It is a web-service that matches the source code from the available set of source codes. It mostly uses to detect plagiarisms in Java, C, C++, C# programs. JPlag knows the structure and syntax of programming languages. Thus, it can differentiate whether the source code is pirated or not.
 - MOSS⁹: MOSS stands for Measure Of Software Similarity. It works same as JPlag in the sense of finding out the similarities of Java, C, C#, C++ languages. In addition, it helps to analyze plagiarism from Pascal, ML, Schema, Ada or Lips, FORTRAN, TCL, VHDL, Python, Visual Basic, JavaScript, Perl, Matlab, 80X assemblies, and HCL2 Programming languages. MOSS has very powerful and improved plagiarism detection algorithm that helps to prevent cheating in programming area.
3. Other Tools: There are other tools that provide different methodology to detect plagiarism and make students realize their mistake, such as, Glatt Plagiarism Softwares¹⁰. It comes up with three software packages that help to prevent plagiarism; (1) Glatt Plagiarism Teaching Program (GPTeach) gives you information about the plagiarism and helps how to prevent plagiarism in study; (2) Glatt Plagiarism Screening Program (GPSP) uses to detect cheating in writing material. This software uses the unique detecting method to find out whether the assignment is done by students or not; (3) Glatt Plagiarism Self-Detection Program (GPSD) is to let students detect themselves and make them realize how much they plagiarize.

4. METHODS

Based on our observations and studies plagiarism issues in engineering classes, the following research questions are brought to us:

- (1) *What makes engineering students cheat on their writing?*
- (2) *What types of plagiarisms are happened in engineering classroom? and*

⁶ <http://plagiarism.org/>

⁷ <http://mydropbox.com/>

⁸ <https://www.ipd.uni-karlsruhe.de/jplag/>

⁹ <http://theory.stanford.edu/~aiken/moss/>

¹⁰ <http://www.plagiarism.com/>

(3) How do instructors in engineering educate their students to prevent plagiarism?

In order to answer these questions, we decide to collect data on plagiarism issues in happening in our department by using two different methods. First, we adapt an anti-plagiarism tool, i.e., Turnitin.com to engineering classes, where we can get data on how much percentage of students have copied and what are the sources of copying and pasting. Second, by requesting our students and instructors to fill an online survey questionnaire, which can help us to know the awareness of plagiarism among students and how much instructors are serious about plagiarism. Among many different types of plagiarism mentioned in Section 3.1, we selected *plagiarism in writing* in our research, since this is the most traditional and common type in engineering education.

4.1 Turnitin.Com

Turnitin.com is the most popular online tool used as a plagiarism detection tool for writing. At the University of Bridgeport more than 60% of instructors are using Turnitin.com in their classrooms to detect plagiarism in students' assignments. In addition, it can provide statistical information about the plagiarized writing. Therefore, we applied it and collect data in 2008 including Spring, Summer, and Fall semesters. Total 15 writing assignments were given to the students in eight different subjects in a period spanning over three semesters. Table 1 shows the details about the courses where Turnitin.com is applied.

Semester	Subjects	# of assign	# of students	Level
Spring 2008	(CPSC450) Database Design	2	30	Graduate
	(CPSC450-DL) Database Design	2	2	DL ¹¹
	(CPSC550) Multimedia Database Systems	2	20	Graduate
Summer 2008	(CPSC556) Data Mining	3	10	Graduate
	(CPSC503) Operating Systems	2	31	Graduate
	(CPSC450-DL) Database Design	1	22	DL
Fall 2008	(CPEG408) Operating Systems	1	13	Undergraduate
	(CPSC550) Multimedia Database Systems	2	9	Graduate

Table 1: Course information that Turnitin.com is applied for.

Figure 1 shows a sample screenshot taken from one of the above courses. The name of the student is hidden for privacy. As we can see in Figure 1, even if student copies from different sources, Turnitin.com has ability to track down those sources and shows the amount of percentage copied from it. In this way, we can determine more information such as, what are the main sources of plagiarism, and total percentage of plagiarism. We focus on the following information to examine the result of Turnitin.com:

- (1) finding sources where students are mostly copying and pasting,
- (2) finding average percentage of plagiarism occurred in each subject,
- (3) finding average percentage of plagiarism occurred in each subjects taken in each semester, and
- (4) figuring out whether the tool helps to prevent plagiarism in engineering classes.

¹¹ DL: Distance Learning (online) course

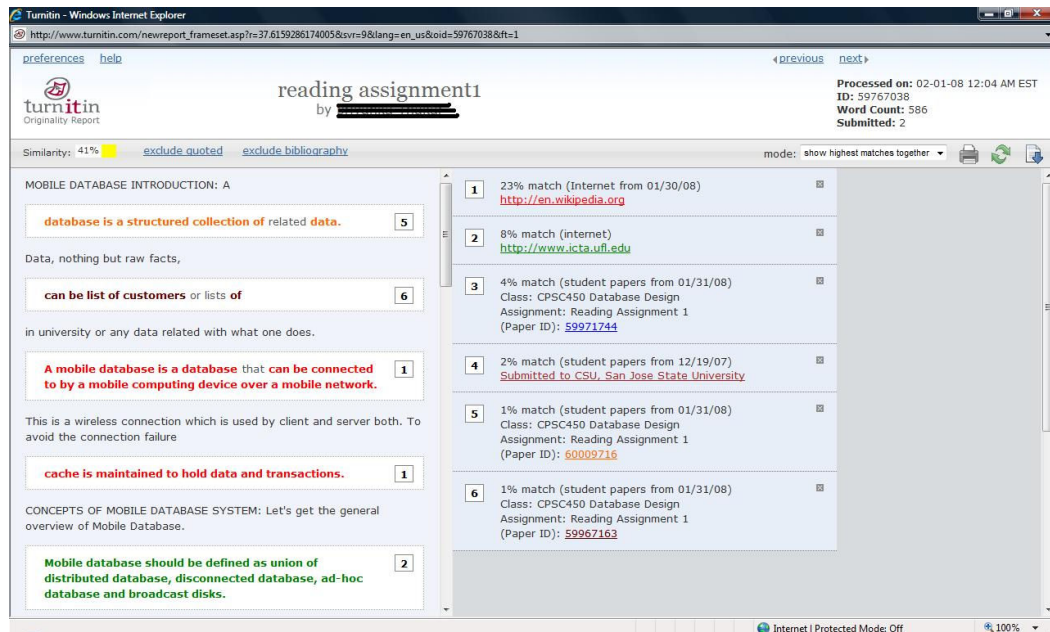


Figure 1: A sample screen shot for plagiarism result of a student submission in Turnitin.com.

4.2 Online Survey for Plagiarism

In addition to Turnitin.com, we conduct online plagiarism survey for students and instructors in engineering school at UB. Students and instructor were voluntarily asked questions about plagiarism issues in engineering classes. The survey had been conducted for a week using online survey site. As a result, we received 45 students and 12 faculty responses. Table 2 describes the full questions that are asked in both student and instructor surveys.

In instructor survey, we asked questions that can be classified into 4 groups as follows: (1) how much instructors are aware of plagiarism in the classroom (I1 ~ I2 in Table 2); (2) what is the current situation of plagiarism in engineering class (I3 ~ I8); (3) what is the punishment against plagiarism, and how effective is it (I9 ~ I10); (4) whether instructors are aware of the existing policy for anti-plagiarism (I11 ~ I12).

For student survey, we asked questions consisting of 4 groups as follows: (1) background and experience in plagiarism (S1 ~ S2 in Table 2); (2) how much students are aware of plagiarism in the classroom (S3 ~ S4); (3) what is the current situations of plagiarism in engineering class (S5 ~ S7); (4) whether students are aware of the existing policy for anti-plagiarism (S8 ~ S10).

Student Survey Questions	Instructor Survey Questions
S1: Are you aware of the term called 'Plagiarism' before you join at UB?	I1: Which of the following actions would you consider as Plagiarism?
S2: Have you ever committed Plagiarism in your academic life?	I2: Do you think 'Plagiarism' is a crime since it means stealing or copying other's work without his/her permission?
S3: If you copy or use some other's work, you must mention that person's name in your assignment. Do you agree?	I3: How much serious about plagiarism in classroom?
S4: Do you think 'Plagiarism' is a crime since it means stealing or copying other's work without his/her permission?	I4: Do you use any plagiarism detection tool?
	I5: Do you inform your students about plagiarism?
	I6: Are you teaching your students the ethics of writing or researching; as an effective way to prevent plagiarism?

S5: What would be the reason for committing plagiarism? S6: Which kind of plagiarism do you do the most? S7: Which of the following sources you would use the most? S8: Do you know UB has rules and regulations for plagiarism? S9: Does your university have any department that handles plagiarism cases? S10: How many courses that you have taken at UB have informed you about plagiarism?	I7: In which following cases you find your students copying their assignments the most? I8: Which are the following sources student uses for plagiarism? I9: Which of the following action would you take against the student who plagiarized in your assignment? I10: Do you think that detecting and penalizing students will stop them from committing plagiarism? I11: Does UB have any policy for plagiarism? I12: Does your department handle students' plagiarism appropriately?
---	--

Table 2 Questions that are used for student and instructor surveys.

5. RESULTS

In this section we describe the results of two methods, i.e., Turnitin.com and online surveys, regarding to plagiarism issues in engineering classes.

5.1 Result of Turnitin.Com

As mentioned earlier, Turnitin.com is very popular plagiarism tool that shows the originality (or similarity) of the submitted paper for plagiarism. Based on the similarity and other information, we have examined 15 assignments from 8 subjects over three consecutive semesters.

The Effectiveness of Turnitin.com

In order to verify the effectiveness of Turnitin.com in engineering classes, we examine the trend of average similarity over multiple assignments. In other words, if Turnitin.com works well to prevent from plagiarizing, the average of similarity over multiple assignments will be decreased, and vice versa. As shown in Figure 2 (a), the average similarities of the first, second and third assignments are 38%, 30%, and 24%, respectively. As students did their writing assignments more and more, the similarities were decreased clearly. In addition, we can find the similar pattern in Figure 2 (b) that is for average similarities over three consecutive semesters. Based on the results, we can realize that students become aware of plagiarism process by Turnitin.com, and tried not to plagiarize in their assignments.

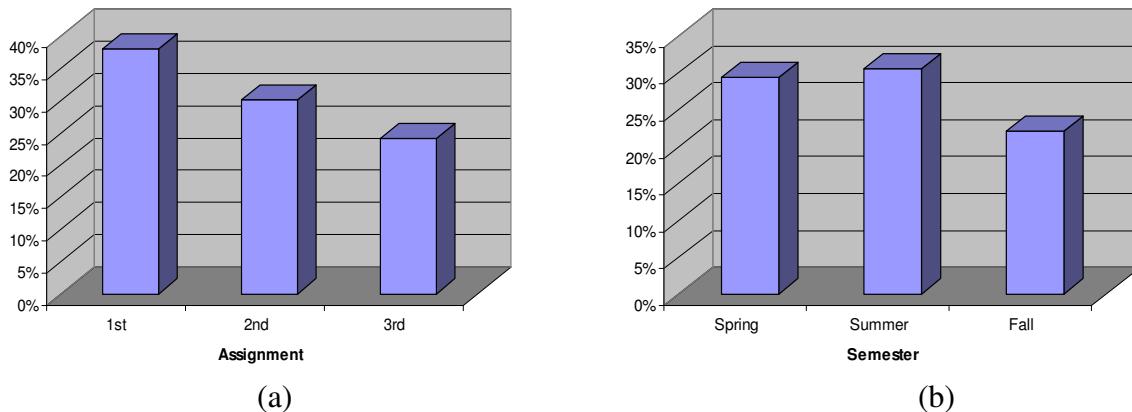


Figure 2 Average similarity: (a) by assignments and (b) by semester.

The Source of Plagiarism

Using Turnitin.com results, we find out the main source of plagiarism in students' writing. Students copy from many different sources including blogs, informative websites, online research papers, magazines, and journals. Therefore, we classify the sources of copies into three groups as follows:

- Publications: any published papers, magazines, or journals.
- Wikipedia¹²: this website has all basic information which student needs and it is very popular among students. Therefore, we put this website as a separate source.
- Internet: All the other web resources.

We compute the average of copied ones from each source group among all the 15 assignments mentioned in Table 1. Figure 3 (a) is a graph that shows the percentage copied from three different source groups in engineering classes. From the figure, we can easily recognise that internet is the main source of plagiarism in engineering classes. That is 74% of copy sources are from internet, while 26% of sources are from published papers, magazine and journals. That is because powerful search engines, such as google or yahoo, are used for the main gate of finding such sources, Wikipedia is the most frequently used website in plagiarism in this research, i.e., 10%, since the documents in the website are well-organized and easily transferred to a report by changing only format.

In addition, we would like to see the trend of plagiarism in terms of major resources used by students for plagiarism over all courses. Figure 3 (b) shows the average similarity of each course offered in 2008. The graph shows the similar distribution in Figure 3 (a) over different courses and semester, i.e., internet is the main source of copies. However, as we can see in Multimedia Database Systems (MDB) offered in Spring 2008, sometimes many students copies their assignment from published papers. That is because the students find more materials from publications when the topic cannot be found in internet easily.

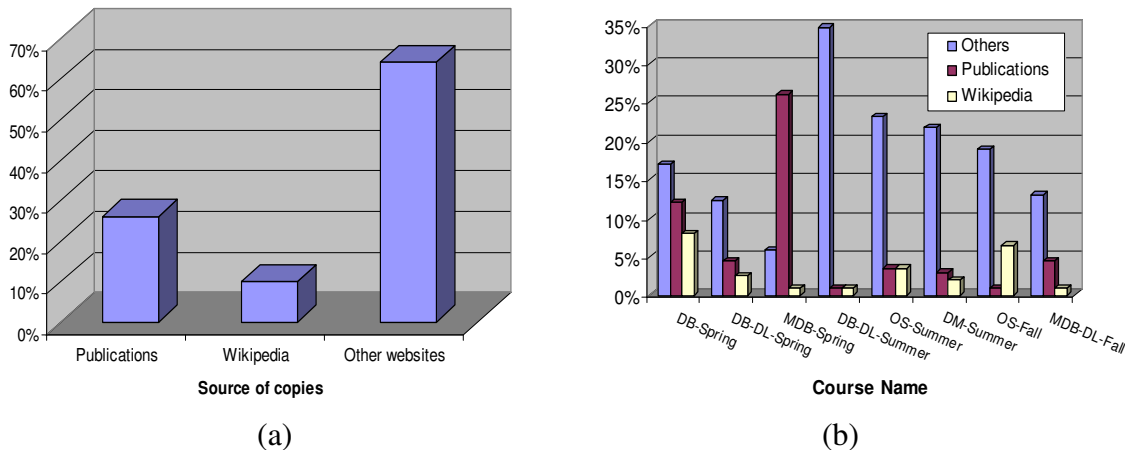


Figure 3 Percentage of source of copies: (a) total and (b) by courses.

¹² <http://www.wikipedia.org>

5.2 Result of Online Survey

Awareness of Plagiarism

Instructors and students were asked how much they are aware of plagiarism in their classroom (see the questions I1 ~ I2 for instructors, and S1 ~ S4 for students in Table 1). It is very important to know how plagiarism is considered in engineering classes, and the gap between instructor and student with respect to the plagiarism. Figure 4 is the selected survey results for awareness of plagiarism. As shown in Figure 4 (a), 57.6% of students are aware of ‘plagiarism’ before they join the university. However, only 3.4% of students have taken any course or seminar for plagiarism. Although students know what plagiarism means, their knowledge are not well educated one. Another interesting question for both instructor and student is question I2 and S4 for instructors and students, respectively, i.e., “Do you think ‘Plagiarism’ is a crime since it means stealing or copying other’s work without his/her permission?” Even though this is still controversial if plagiarism is a crime, we can use the result to project how they regard plagiarism as. As seen in Figure 4 (b), only 58.3% of instructors agree with it, while 86.2% of students regard plagiarism as a crime.

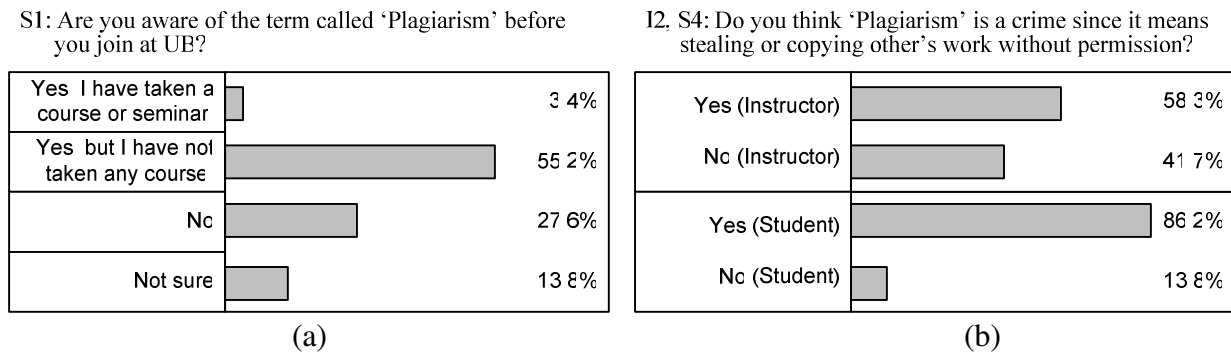


Figure 4 Survey results for awareness of plagiarism: (a) S1, and (b) S4 and I2.

Observation for Plagiarism

In order to observe the current situations with respect to plagiarism in engineering classroom, we asked several questions to both instructors and students (see the questions I3 ~ I8 for instructors, and S5 ~ S7 for students in Table 1). First, for a question in S5, i.e., “What would be the reason for committing plagiarism?”, 55.2% and 48.3% of students are check for heavy loads and lack of knowledge for the assignment, respectively. Even, 34.5% of students have committed plagiarism just because of pursuing higher grade (see Figure 5 (a)). Second, when instructors are asked to rate the seriousness of plagiarism in their classroom, more than 90% of them think the plagiarism is serious. Only less than 10% of instructors believe that their students are free from plagiarism (Figure 5 (b)).

According to both students and instructors, in response to the question “what are the main sources of plagiarism?” (S7 for student and I8 for instructor), 83% of instructors and 100% of students respond that internet is the first main source of plagiarism. As the second main source, 58% students responded on magazine or journals, while instructors believed student’s best friend is the second main source of plagiarism. 50% instructors also responded that the third major source is senior’s readymade assignments from previous semester, while only 14% students

respond to this choice. Figure 5 (c) and (d) show the results of student and instructor surveys, respectively.

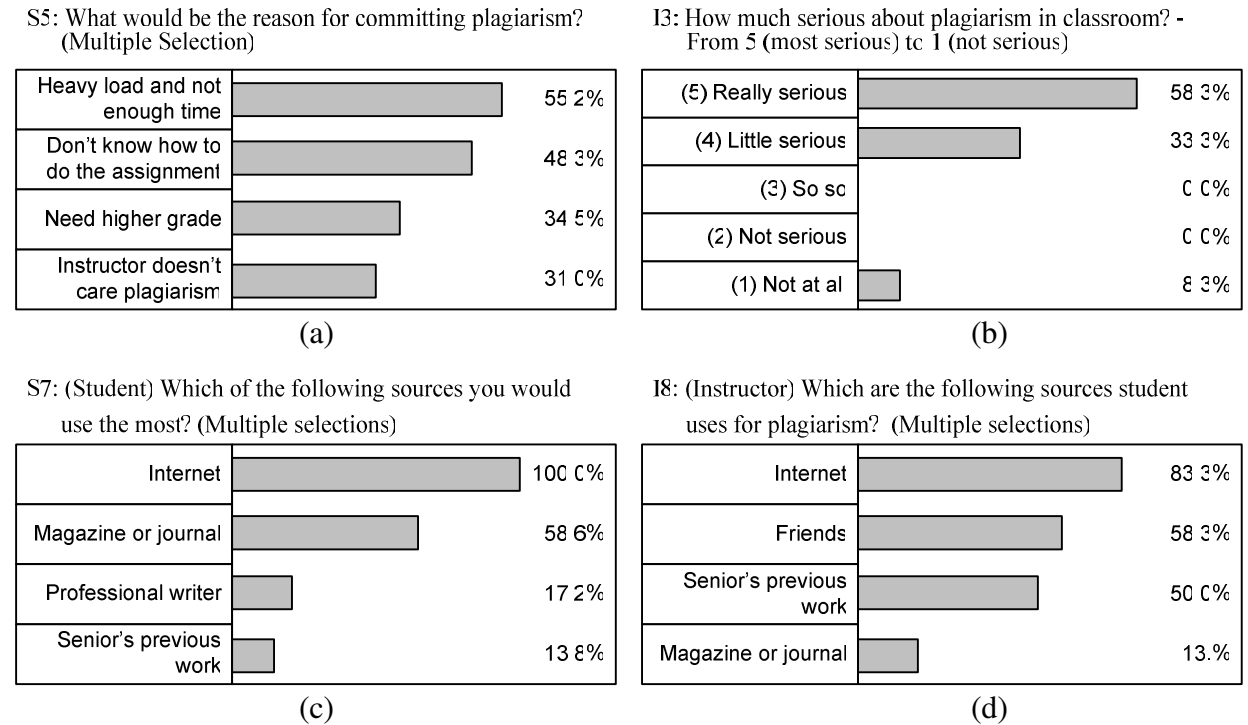


Figure 5 Survey results for observation for plagiarism: (a) S5, (b) I3, (c) S7, and (d) I8.

Effectiveness of Current Plagiarism Policy

The effectiveness of current plagiarism policy and methods can be observed through the survey results of questions I9 and I10 in Table 2 for instructors. The most common actions against the student who plagiarized are 'reducing grade (66.7%)' and 'failing the course (25.4%)'. Although instructors like less powerful punishment against the plagiarism, they believe that the punishment is very effective to stop repeating plagiarism (see Figure 6 Survey results for effectiveness of current plagiarism policy: (a) I9, and (b) I10.).

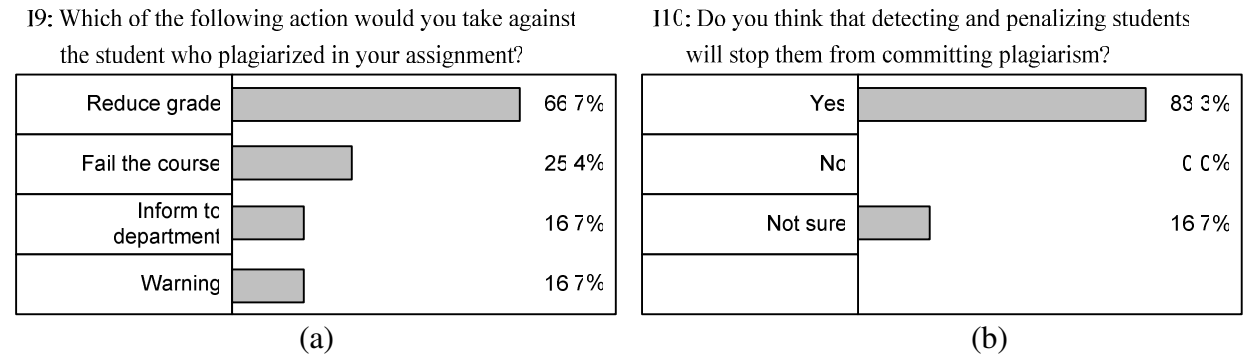


Figure 6 Survey results for effectiveness of current plagiarism policy: (a) I9, and (b) I10.

6. DISCUSSION and CONCLUSION

In this paper, we investigate and research on plagiarism issues in engineering education. For the investigation, we classified various types of plagiarism and several tools for anti-plagiarism. On the other hand, for this research we conducted two methods, i.e., adapting anti-plagiarism tool and collecting surveys. Based on the results, we discuss about the research questions mentioned in the beginning as follows:

What makes engineering students cheat on their writing?

According to the results, the most common reasons of students' plagiarism are lack of time and lack of knowledge for a given assignment. Although there are literatures [8,10,12] that point out the cultural difference and diverse educational background of engineering students for the plagiarism issues, many of them are already aware of the plagiarism issue. Even, they regard the plagiarism issues very seriously. Another important reason of plagiarism in engineering classes is internet. Because of internet, it is getting easier for students to be exposed to various types of plagiarisms. Therefore, instructors and engineering school need to provide appropriate educational opportunities that can teach and train them regarding to plagiarism.

What types of plagiarisms are happened in engineering classroom?

As technologies have been developed, the types of plagiarisms are getting more diverse and complicated. For example, engineering school has plagiarism issues not only on writing, but also on programming, internet, and multimedia data. However, almost all existing researches [3-10] focus on plagiarism in writing. Because of rapid changes on the technology, the traditional method for anti-plagiarism is not enough to prevent and detect the plagiarism in engineering classroom.

How do instructors in engineering educate their students to prevent plagiarism?

The role of instructor with respect to plagiarism is not to detect plagiarisms, but to prevent them. Although it is hard to make their classroom free from plagiarism, it is true that instructors devote themselves to make their effort for them. In order to do that, instructors first establish their own policy of plagiarism since each course in engineering education has its own characterizes, such programming based, lab based, or research based. Next, instructors inform the policy to students clearly and periodically. Third, appropriate anti-plagiarism can be adapted to class activities. As seen in the result, such a tool or software works well to prevent and detect students' plagiarism.

REFERENCES

- [1] Thomas K. Grose, "The burden of plagiarism – the cheating scandal at Ohio University has raised all sort of questions", ASEE Prism, vol. 16, 2006.
- [2] David Cyranoski, "South Korean cloners indicted", Nature News, May 2006.

- [3] McCabe, D. L. 2001. Cheating: Why students do it and how we can help them stop. *American Educator*, 25 (4), 38-43.
- [4] Todd-Mancillas, W. R. and Sisson, E., "Cheating among engineering students: Some suggested solutions," *Eng. Educ.*, 757 (May 1986).
- [5] An Interdisciplinary Approach to Preventing Plagiarism: A Librarian - Social Work Educator Collaboration Jetta Culpepper, BS, MA, MLS, EdS. Associate Professor of Library Science Murray State University, Murray, Kentucky *Journal of Social Work Values and Ethics*, Volume 5, Number 1 (24th March 2008).
- [6] M. C. LaFollette, *Stealing into Print: Fraud, Plagiarism, and Misconduct in Scientific Publishing*. Berkeley, CA: Univ. of California Press, 1992, pp. 97–109.
- [7] J. D. Beasley, "The impact of technology on plagiarism prevention and detection: Research process automation—A new approach to prevention," in *Proc. Plagiarism: Prevention and Policy Conf.*, Newcastle Upon Tyne, U.K., Jun. 2004, pp. 23–29.
- [8] C. Perry, "Addressing the needs of students from diverse cultural backgrounds with respect to academic writing," in *Proc. Plagiarism: Prevention and Policy Conf.*, Newcastle Upon Tyne, U.K., Jun. 2004, pp. 151–162.
- [9] S. Yeo, "First-year university science and engineering students' understanding of plagiarism," *High. Educ. Res. Develop.*, vol. 26, no. 2, pp. 199–216, 2007.
- [10] L. Xiguang and X. Lei, "Chinese researchers debate rash of plagiarism cases," *Science*, vol. 274, no. 5286, pp. 337–338, 1996.
- [11] R. M. Howard, "Plagiarisms, authorships, and the academic death penalty," *Coll. English*, vol. 57, no. 7, pp. 788–806, Nov. 1995.
- [12] B. Leask, "Plagiarism and cultural diversity: Responsibilities, accountabilities and pedagogy," in *Proc. Plagiarism: Prevention and Policy Conf.*, Newcastle Upon Tyne, U.K., 2004, pp. 274–289.
- [13] C. Park, "Other (peoples') words: Plagiarism by university students— Literature and lessons," *Assess. Eval. High. Educ.*, vol. 28, no. 5, pp. 1–18, 2003.
- [14] C. Colberg and S. Kobourov, "Self-plagiarism in computer science," *Commun. ACM*, vol. 48, no. 4, pp. 88–94, Apr. 2005.
- [15] C. J. Neill and G. Shanmuganthan, "A web-enabled plagiarism detection tool," *IT Pro*, vol. 6, no. 5, pp. 19–23, Sep./Oct. 2004.
- [16] M. Joy and M. Luck, "Plagiarism in programming assignments," *IEEE Trans. Educ.*, vol. 42, no. 2, pp. 129–133, May 1999.