AC 2009-1574: UNDERSTANDING PLAGIARISM USING BOARDMAN’S
SOFT-SYSTEMS METHODOLOGY

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Understanding Plagiarism using Boardman’s Soft Systems Methodology

Abstract

This paper explores plagiarism through the system’s lens and takes you on a journey through the complex world of plagiarism using the tools of Boardman’s Soft Systems Methodology (BSSM) to bring deeper insights into how plagiarism has proliferated the academic landscape. In a recent survey of 11 universities across the United States, Donald McCabe of Rutgers, The State University of New Jersey, showed that plagiarism is a growing phenomenon on campuses that, with the evolution of technology, is continuing to grow at an exponential rate. By applying the methods of systems thinking, we plan to present a deeper insight into this growing epidemic. Using BSSM as our lens and Systemigrams (i.e. Systemic Diagrams) as our modeling approach, we will map the multiple perspectives that are involved in understanding plagiarism as a system.

Systemigrams allow us to represent the dynamics of a complex system in a graphical form by focusing on the relationships of the system. In this paper we will briefly review a few forms of plagiarism followed by a detailed analysis of plagiarism in the academic environment. We will also look into the reasons why students plagiarize and briefly discuss the role of technology in the manifestation and growth of plagiarism. Finally, we will present and discuss our Systemigram model and conclude with recommendations for the future state of plagiarism within the engineering education environment.

Introduction: What is the real problem?

Plagiarism, as defined by Webster’s, is “to steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source” and is derived from the Latin word plagium, or “a kidnapping”. From the copying of artwork in ancient China to more current examples such as copying music lyrics or cookie recipes, the inappropriate use of another’s intellectual property has a legacy of concerns.

As an example, in June 2006, the award winning Japanese painter Yoshihiko Wada was accused of plagiarism when a striking resemblance was noted in most of his paintings to an Italian artist, Alberto Sughii. Yoshihiko initially denied accusations saying he had
worked with Sughi in the past and had merely painted them in collaboration with the artist. His most interesting, and bizarre, argument was that he had used different colors. The review panel appointed by the Japanese Government found Yoshihiko guilty of plagiarism and revoked awards he had received.

Another example that sent shock waves within the journalism community was the highly publicized 2003 case of Jayson Blair, a celebrated New York Times reporter. Blair had risen from being an intern to a national desk reporter within a few short years, this in spite of not having a degree, which he never informed the Times editors. Four years after he joined the Times, and after authoring over 600 articles, an editor at the San Antonio Express News pointed out similarities between an article written by Blair and a recent story written by one of the San Antonio Express News reporters. All of Blair’s articles were reviewed and many were found to be plagiarized or fabricated. The NY Times described the Blair scandal “as a low point in the 152-year history of the newspaper”.

The seemingly gifted, but ethically challenged reporter was forced to resign in May 2003 while the hard earned reputation of the Times was badly tarnished.

One of the most common forms of plagiarism, and the focus of this paper, is Academic Plagiarism. In a recent survey of 11 universities across the United States, Donald McCabe of Rutgers, The State University of New Jersey, showed that plagiarism is a growing phenomenon on college campuses. The survey results were astounding; while 47% of students witnessed cheating one or more times, only 5% of them reported it, and only 45% thought that cheating was a serious problem. On further analysis of the specific behavioral trends in the survey – the most conspicuous behavioral trend was “working with others when asked for individual work” and only 9% thought that this could be classified as “serious cheating”. Even though roughly half of the students agreed that cheating was a serious problem, they tended not to favor any form of reporting (faculty reporting, student monitoring etc.). Results of the survey also indicated that the student’s view of course difficulty and their academic workload were among the top reasons for plagiarizing. Overall, the survey results clearly revealed that students are aware of academic plagiarism and its resulting consequences. Regardless, academic plagiarism continues to be a major problem.
Plagiarism in the academic environment has plagued universities for a long time. While most commonly committed by students, professors and researchers have been guilty as well. According to R. Murray Thomas\textsuperscript{4}, Professor Emeritus, University of California, Santa Barbara, “Students have plagiarized book reports, term papers, essays, projects, and graduate-degree theses. Teachers—including college professors—have plagiarized journal articles, course materials, and textbooks. Researchers have plagiarized reports, articles, and book chapters.” Most people may not be aware that the late civil rights leader, Martin Luther King Jr., was believed to have plagiarized\textsuperscript{5} his doctoral dissertation in theology, completed at Boston University. In his dissertation he used information from Boston University graduate, Jack S. Boozer’s dissertation without proper citation. Even though this came to light in 1991, nearly 35 years following King’s death, it tends to portray one of the greatest American leaders in a bad perspective. Even though the inquiry committee at Boston University acknowledged that he had indeed committed plagiarism, his degree was not withdrawn and the case was declared closed\textsuperscript{6}.

An article written by Australian Asher Moses, a writer at The Age Newspaper, describes about how Australian students “outsourced” their homework to India\textsuperscript{7}. In the article, Mosses details the process, with websites where individuals can post homework and invite bids. With the lowest bidder being awarded the “job”. In an era where outsourcing has become a bane to the western world and a boon to Asian countries, “contract cheating” has proved to be a menace for yet another reason. The article mentions that this type of plagiarism is difficult to detect using high tech plagiarism detection software.

**Mapping the current state of academic plagiarism by following Boardman’s Soft System Methodology\textsuperscript{28} (BSSM).**

We have identified plagiarism as the system of interest. To capture the required data to create the structured text (system description) a literature search was conducted to ensure that we captured information about the different stakeholders, their roles and relationships in the current system.

Once the information was captured, a system description was written. This description was written to create a storyboard effect, by creating specific scenes in the story. Each scene would naturally lead to successors thereby conveying added meaning to the
“drama”. After completion of the system description, the systemigram was created using the SystemiTool.

Figure 1: Boardman Soft Systems Methodology

Brief Overview of the SystemiTool:

We will introduce the use of the SystemiTool, a modeling tool used for a visual representation of a system. Developed by John Boardman, the SystemiTool is used to support the creation, editing, and portrayal, in the form of a storyboard of scenes, of systemic diagrams referred to as systemigrams. Boardman’s tool was based on the premise - Is there value in transforming “rich text” into a structured diagram in which the principal concepts are identifiable and the sentence structures recoverable? In other words, once the words describing the system and its relationships are translated into the systemigram, will the reader be able to recreate the words that were used to create the systemigram. The tool provides an interesting way to enhance understanding via visual representation of relationships and presents a complex system by focusing the user on the relationships between components of the system and the system’s interaction with external components of other systems.
There are a few design rules to be followed as defined by Boardman:

- Primary sentence (mainstay) which supports the purpose of the system will read from top left to bottom right
- Ideally there should be 15-25 nodes (less can make for a trivial system description, more can create clutter and illegibility)
- Nodes must contain noun phrases
- Links should contain verb phrases (to reduce trivial links)
- No repetition of nodes
- No cross-over of links
- Beautification (e.g. shading and dashing of links and nodes) should help the reader read the sentences in the diagram
- Exploit topology to depict why, how, what (who when and where is built into system description)

Central to the systemigram is the Mainstay, which represents the critical element within the systemigram. The mainstay within the plagiarism systemigram represents the definition of plagiarism, as previously defined by Webster’s dictionary, depicts how it compromises academic integrity.

**Literature Review – to capture information required to create system description**

Whitley, Jr.\(^{18}\) conducted a review of the results of 107 studies of the prevalence and correlates of cheating among college students over a given period of years. The research reviewed two types of data, the first type being the prevalence of cheating, what proportion cheated and whether cheating rates varied over the selected period, the second type of data was factors classified as possible correlates of cheating; these factors were categorized cheating into five broad categories – “student characteristics, attitudes towards cheating, personal variables, situational characteristics and other factors that did not fit into these categories”\(^{18}\). Based on the data analysis he created a causal model of
Twenty two variables were identified as causes for cheating and their respective correlation coefficients determined; we clustered these variables and have included them on the systemigram (see Fig.1.) as factors causing students to plagiarize. Although there were a few shortcomings in Whitley, Jr’s review, it is an impressive and extensive study conducted in the late 1990’s. The studies selected were conducted within the US and Canada – with very few studies conducted outside these regions, there was neither sufficient data to conduct cross-cultural comparisons nor was cultural differences identified as a contributing factor. Another missing factor in this study was not exploring the effect of the faculty-student relationship. And of course we have progressed technologically since then and students have innovated new methods of plagiarizing via the internet.

“Assumptions about what constitutes plagiarism or ownership of text may or may not be exclusively or even predominantly a matter of culture, but cultural difference can serve to muddy some already murky waters.” Buranen emphasizes that the difference in cultural assumptions or expectations of both the students and faculty further complicates the multi-cultural setting. Not having a good command over the English language lead to students struggling to convey their ideas in their own words, which leads to unintentional plagiarism. Buranen also points out that among the faculty there seemed to be a stereotypical view that Asian and Middle-eastern students plagiarized.

Dr. Phan Le Ha, from Monash University, Melbourne Australia, argues that the stereotypical view regarding Asian societies and plagiarism, that it is not discouraged, is not true. Dr. Ha articulates the effects of culture on the system by analyzing a specific Asian community. This research suggests that while there are many reasons students plagiarize, culture only plays a small role, citing a lack of knowledge, or being unaware, of citation and referencing protocol. Her conclusion was that “to help students avoid being charged with plagiarism, it is necessary for academics to be explicit about what they expect in terms of citation and referencing, and be willing to compromise over differences in writing practices.” However, we tend to disagree with the statement that academic institutions need to compromise on academic integrity due to cultural difference. When in Rome, do as the Roman’s do.
The topmost priority of every University should be to maintain the academic integrity of the institution. Plagiarism has been around for many centuries. What is new is the method used in “accomplishing” plagiarism – it keeps changing with the ages and keeps evolving with technology. Advances of technology in general and the internet specifically have created a unique channel that has aided in plagiarism.

The internet and Google have opened up an entirely new way of learning about our world. Google gives you links to blogs, subject related websites, articles, journals, books – essentially pointers to all places where you could find information about any topic you wish to know more about. Technology has given us solutions to many problems but at the same time it comes at a cost. The downside of using the internet is its use to commit plagiarism, cyber plagiarism. In this age where students have turned to online research, plagiarism creeps unintentionally and “educators are alarmed by the potential of the internet to encourage unlawful copying” \(^22\). Faculty should guide students in using the internet for research and not totally banning the use of the internet for education purposes \(^22\). The need to detect plagiarism led to two new business ventures – one to fight plagiarism and the other to capitalize on plagiarism by providing turnkey homework assignment projects.

**Stakeholders in plagiarism system**

The following are the stakeholders identified following the literature review. Within the Academic Institution: Administration – President/Provost, Students, Faculty, Honor Board, Library and IT Support Group. Outside the Academic Institutions: Parents, Companies developing Anti-plagiarism software, companies/individuals supporting plagiarism by providing services and the Center for Academic Integrity.

In this section the roles of the different stakeholders in the system will be defined.

**Administration (President/Provost)**

In addition to providing students with the best learning experience, the administration focuses on ensuring that the academic integrity of the institution is upheld. The administration also encourages liaison with the Center for Academic Integrity.
“Institutions without formal honor codes have to work harder to demonstrate to their faculty the fairness and effectiveness of their policies and to encourage faculty to follow these policies and procedures rather than handle cheating incidents on their own”\textsuperscript{16}. Some large universities have a modified honor code system, in which governance is shared by both the administration and students\textsuperscript{17}. These universities focus on the issue of academic dishonesty and “clearly communicate to students that integrity is an institutional priority”\textsuperscript{17}.

\textit{Honor Board}

Most Universities have an Honor Board which comprises of student representatives, known as the traditional honor code system\textsuperscript{17}. The board is responsible for interpreting the constitution of the Honor System and performing the functions of the system. The traditional system is more student-centric; students are given the responsibility to maintain academic integrity rather than administration/faculty, which encourages them to refrain from cheating\textsuperscript{17}. In the traditional system, it is easier to cultivate the essence of academic integrity in smaller campuses\textsuperscript{17}. As indicated earlier larger universities have a modified honor system code, with shared governance between students and the administration. Schools with traditional honor code systems experienced lower amounts of plagiarism, while schools with no honor system experienced higher levels of plagiarism; those with modified honor codes had a moderate level of plagiarism\textsuperscript{17}.

\textit{Faculty}

The faculty plays a supportive role in the effective functioning of the Honor System. It is their task to educate students about plagiarism, the consequences and what can be done to avoid it. Faculty should also explain the proper use of citation which would help students write successful research papers. Research to understand Faculty – Honor code relationships suggest that faculty attitudes and behaviors are different for institutions with honor code than those institutions without one - they have more faith on the academic integrity systems in institutions that have an honor code and believe that the policies are fair and effective\textsuperscript{17}. Research\textsuperscript{17} indicates that universities with an honor code system, traditional or modified help minimize academic dishonest; with universities trying to establish an honor code system, there seems to be strong resistance from faculty with
little or no honor code experience. McCabe et al\textsuperscript{17} concludes with a suggestion that the faculty can be introduced to a modified system, as a starting point for universities before establishing a full fledged traditional system.

“Leniency of professors and a tendency to avoid addressing issues of cheating and plagiarism were seen as factors contributing to cheating and plagiarism among graduate students”\textsuperscript{15}. Students indicated that the faculty either set high course expectations for students or were too lazy to update the exam every semester\textsuperscript{25}. The faculty should foster an environment of mutual respect in class which would in turn steer students away from cheating; once they have plagiarized faculty tend to see students in the same light\textsuperscript{25}.

\textit{Library and IT Support group}

Most academic institutions have an IT support group that works closely with the faculty in providing them the latest plagiarism detection software. In addition to helping students with researching tools, librarians also assist faculty in identifying plagiarized academic work.

\textit{Parents}

Even though this stakeholder seems to be invisible in the academic environment, parents play an important role in shaping their children for the rigors of University education.

Parents tend to have a lot of influence on their children. Children learn their first lessons on honesty and integrity at home. Parents need to understand that by not correcting mistakes children make during their childhood they are exposing them to potentially grave consequences in their future. “When parents condone dishonesty and deception as normative and defensible, educators have far more difficulty, countering the message that the prevalence of cheating makes the practice acceptable”. Greene and Saxe’s\textsuperscript{14} study on academic cheating indicate that students attributed their cheating to pressure from their parents. All parents have high expectations about their child’s academic success but setting unrealistic targets will only cause undue stress to their child’s academic lives. Their expectations may burgeon to a point where they may be willing to compromise on academic integrity in order to ensure that their children achieve what they feel should be achieved. This may include assisting or even volunteering to complete their homework.
assignments. In this age of helicopter parents, some of them get involved in academic-discipline issues\textsuperscript{15}. It is understandable that children need the support of parents when they face charges of plagiarism, but they need to distance themselves from getting involved and distorting the inquiry and proceedings that follow. “Some parents intervene in ways that ultimately escalate the issues, turn the process into an adversarial rather than educational proceeding, impair the ability of the judicial officer to persuade the student to tell the truth and take responsibility, and unduly prolong the process”\textsuperscript{15}.

Companies developing Anti-plagiarism software

“If students use technology to make cheating cheap and effortless, why shouldn't educators use technology' to catch them?”\textsuperscript{20}. iParadigm played an important role in identifying the need to fight cyber plagiarism and they led the effort in launching\textsuperscript{9} the world's first internet-based plagiarism detection service, turnitin. Many companies have since joined the bandwagon and have launched different anti-plagiarism software. Although various plagiarism detection software have been used in many universities across the country, there have been tech-savvy individuals have developed “internet videos and blogs giving step-by-step instructions for injecting digital markings into word documents to fool the program”\textsuperscript{20}.

Companies/Individuals supporting plagiarism

With the advances in technology, there are people who capitalize on plagiarism by providing “solutions” for those in need – from doing your homework’s to writing your theses. There are many sites like academicintegrity.com, hwform.com, schoolbytes.com which offer papers for sale, help with homework for a fee, invite students to help with other paper’s and earn money etc.

Center for Academic Integrity (CAI)

Established in 1992, this is a consortium of 360 institutions across the country that share their knowledge and experiences in creating successful policies, enforcing these policies and how academic integrity can be maintained across institutions. Member institutions also get access to research being done in this area. In addition to this they also provide an
Academic Integrity Assessment Guide that helps institutions “to assess the climate of academic integrity on their campuses”\textsuperscript{10}. CAI has defined\textsuperscript{10} the fundamental values of academic integrity as honesty, integrity, responsibility, trust/trustworthiness, respect/self respect and fairness/justice.

\textit{Students}

Students are the most important stakeholders and play a significant role in this system, by acting as the trigger switch for the flow of the system.
Primary sentence (mainstay) which supports the purpose of the system will read from top left to bottom right.
What did we learn by analyzing the systemigram?

Using the Systemigram to depict the plagiarism system, the relationships of the different stakeholders (marked in green in Fig. 2.) and their roles in the system, provides better insight into this complex system. The research papers reviewed in the previous sections focused on specific factors causing plagiarism. Each factor, along with findings was used as input to create the systemigram. The student node represents the hub of the system; as seen, it has more inward and outward traffic than other nodes, and is connected to the other stakeholders. Each sentence in the systemic description is identified by a different color. A sentence can be identified by starting at a node and following the specific colored links. The factors identified in the systemigram are directly linked to academics, student characteristics (behavioral, personalities, ethical values, emotional, cultural background etc).

Looking at the factors that cause plagiarism (the red nodes) we do not see links that show that those factors are being addressed by academic institutions. For e.g. Cultural and ethical difference is one area that has evoked great interest in researchers\textsuperscript{12}. The number of international students at colleges and universities in the United States continues to grow at a high rate, 7\% in 2007/08 academic year alone, and is now at an all time high\textsuperscript{11}. Given this statistic, one may assume that academic governance would address cultural differences; although researchers have discussed\textsuperscript{21} this as a factor causing plagiarism, the results from the literature search does not support this assumption. The earlier referenced McCabe survey\textsuperscript{29} indicates a phenomenal growth in plagiarism on campuses; although this might sound controversial, it is interesting to note that there has been growth in the international student population as well. Are Universities in the US calibrated enough to accommodate students from various cultural backgrounds?

Research\textsuperscript{15} shows that faculty is also responsible in aiding plagiarism but the systemigram does not depict a mechanism to correct that. In analyzing the Academic Institution node along with the Support Group node, it is evident that much effort is being put into trying to curb this menace, both at the University level as well as from organizations like the Center for Academic Integrity (CAI), iParadigms and the like.
Institutions like CAI were formed to promote academic integrity and provide an Academic Integrity Assessment Guide that helps institutions “to assess the climate of academic integrity on their campuses”\textsuperscript{10}. At the University level, the administration, honor board, faculty and the Academic Governance body lead the fight in plagiarism. A liaison with the Center for Academic Integrity may also be established. Universities are all geared up with people, scare tactics and methods to detect plagiarism in the hopes of curbing it. A lot of research has been done in trying to identify the different forms of plagiarism, reasons why students plagiarize and what can be done to minimize plagiarism. In spite of all these efforts why is plagiarism still on the rise? Are elaborate oversight mechanisms as described above enough to curb plagiarism?

**Conclusion**

We are trying to solve the problem from the peripheral instead of tackling the root cause of the problem. Solving one problem may give rise to yet another problem or set of problems. When software detection was introduced to fight cyber plagiarism, homework outsourcing helped students work around this. With social networking scaling to unprecedented levels, we can only wait to see what the new trend in plagiarism is.

Three potential impact clusters seem to exist as outlined below and are the basis for further exploration:

**Cultural Factors** – To what extent does cultural conditioning play a factor? In addition to the broader cultural notion, this includes factors which may feed into it, such as areas like family environment, parental pressure, etc.

**University Governance** – To what extent does university governance play a factor, from a preventive aspect and from a disciplinary aspect? This seems to be primarily focused on the disciplinary side of governance and not on the preventive side. The preventive side can be powerful especially if there is an impact to the culture. Also, to what extent is the faculty really engaged, other than as plagiarism cops? McCabe\textsuperscript{17} study suggests that “academic dishonesty is inversely related to the perceived certainty of being reported by a peer”\textsuperscript{17}. But the recent survey\textsuperscript{29} McCabe conducted across Universities in the country indicates that even though students see fellow classmates plagiarize only 5% of the given
sample would actually report it. So the question is, is it realistic to assume that students will report their peers? Based on the literature reviews, there seems to be an area in which the faculty themselves allow plagiarism to happen by reusing exams and being lenient on those cheating^{15}. Why do we always have to blame students? Is the administration putting all their focus on the honor system, plagiarism detection software and the other methods for tackling students involved in plagiarism? In this process they could be alienating the students and also creating campuses that sans a good faculty-student relationship?

**Academic Environmental Factors** - To what extent does the academic environment play a factor? This would be the non-governance function and includes things like faculty and student attitudes, grading system, and student peer pressure.

There has been much research done in the area of academic plagiarism. Much of this research is consistent with respect to findings. Not clear, though, is to what extent research has resulted in new methods and solutions from a practical standpoint to prevent plagiarism. Finally, the use of systemigram can be a very powerful way to better understand relations in any system. The literature search found no evidence of this or any similar method used to understand the bigger system of plagiarism and the various, complex relationships which exist. A key area for further research is what impact, on any current research results, would the application of the systemiTool have on that research conclusion? In other words, does this tool provide a more thorough understanding of the system and the relationships which may lead to different conclusions or other avenues of inquiry?

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