

# Chapter 10

## Embedding Plagiarism Detection Mechanisms Into Learning Management Systems

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### ABSTRACT

*The main objectives of this chapter are to review available plagiarism detection tools, discuss the most popular software tools on the market and describe the new architecture for plagiarism detection tools. The proposed architecture emphasizes lightweight integration with LMS as well as the possibility for the LMS owner to adjust the amount of information that is being transferred to plagiarism detection service based on the intellectual property protection rules adopted by the school. This chapter shows how the proposed architecture was implemented as a plug-in for the Moodle LMS. A set of user trials is provided to show practical applicability of the proposed solutions.*

### INTRODUCTION

The problem of digital plagiarism arose along with development of digital technologies. In the last two decades, another dimension has developed as the Internet became the most popular tool for information access. Digital plagiarism appears not only in education but also exists in different forms in industry (Nitterhouse, 2003), web design (Bailey, 2006), and research publications (Boisvert & Irwin, 2006; Spafford, 2010). Although from this point forward this chapter will primarily focus on digital plagiarism in

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education, many of the concepts discussed can be extended to plagiarism detection on websites and in research papers and other sources of information.

There are a number of definitions for plagiarism. Most of them are covered by the same umbrella of action that misrepresent the actual author of the text, idea, music tune or any other artifact created by someone. Speaking about plagiarism in text documents we can say that the level of plagiarism varies from simplest copy-paste all the way to plagiarism of ideas rewritten by different words (Alzahrani, Salim, & Abraham). In education plagiarism requires special attention as one of the tasks for a professor –especially in the earliest steps of higher education - is to teach how to work with the different information sources and refer them properly. Teaching and learning is impossible without extensive use of different texts. United States copyright law (Copyright Act, 1976) lists non-profit education purposes as one of the “fair use” factors to make the decision on violation of copyright. Educators should help students to understand the border line between proper and improper use of information sources.

The level of plagiarism has remained high all over the world for the last two decades (Austin and Brown, 1999; Hart and Friesner, 2004). For example, one study estimated that as many as 90% of American high school students have engaged in plagiarism (Jensen, Arnett, Feldman, and Cauffman, 2002). Other studies show a high level of plagiarism in higher education institutions in developing countries such as Ethiopia and Botswana (Teferra, 2001; Batane, 2010). There are many definitions for plagiarism but simply said it is using the work of someone else in a students’ submission without attributing the source. In this chapter, the term student submission is defined as a file that contains virtually any kind of information such as text, a picture, a sound file or a motion picture. This chapter primarily concentrates on plagiarism detection tools with regards to text submissions but it will be highlighted if the approach can be extended to other kinds of submissions.

Software tools for uncovering digital plagiarism are evolving along with information technology (IT), moving from earlier desktop systems for plagiarism detection in programming assignments in the 1980’s (Donaldson, Lancaster, & Sposato, 1981) to the Internet-based plagiarism detection services (PDS) of today. PDS uncover plagiarism using two main approaches: (i) comparing the submission with other submissions by searching for similarities in content and/or (ii) comparing the submission with previous work done by a student and looking for unusual style. This study is focused on the first category of search approaches.

The use of PDS has also evolved from the “police” role of catching up students who misrepresent their work to the more of teaching / counselling role helping students to learn how to proper cite and refer information sources (Cohen, 2010). Such developments made PDS a must have tool for any LMS. Educational role of PDS is even more important in blended learning environments where students may get constant guidance on their papers from an embedded PDS without extra efforts.

For purpose of detection, each case of digital plagiarism can be categorized into two types: intra-corporal (local) and extra-corporal (global) plagiarism. Extra-corporal plagiarism occurs if parts of a paper were obtained from a source not included in the database of the learning community (university, school, or learning center). Such sources for global plagiarism include the Internet, books, periodicals, CDs, and P2P networks (Underwood and Szabo, 2003). The second type of plagiarism is intra-corporal plagiarism, where the original source of the plagiarized submission is located within the learning community. The source can be from the same class, another section of the course, or the same course offered in a previous semester. For intra-corporal plagiarism detection additional methods can be available including placing labels on the individual assignments (Singh, Mangalaraj, & Taneja, 2012) making detection task little easier. On another hand, literature reviews show that extra-corporal plagiarism prevails through peer-to-

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