

The use of software to identify plagiarism in academic and educational texts

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Abstract

This study corresponds to a project of a teaching research group, which analyzed the authorship of textual works of eleven students. These studies were developed throughout the subject of Biological Sciences of the stricto sensu graduate course of a private university in the state of San Pablo, Brazil. The main objective of this research was to evaluate the existence of plagiarism to answer the research question: Do postgraduate students commit plagiarism during the courses? Thus, the results of plagiarism verification were analyzed and compared using various software available online in paid or free versions. During this study, we observed that most academic studies of postgraduate students presented some plagiarism characteristic and we still found that the amount of plagiarism identified is different depending on the analysis characteristics of the program used. Despite the limitations of the softwares, their regular use to verify the authorship of a text is essential to identify plagiarism and to take educational measures that guide students on the creation process and the impact plagiarism has on learning. We therefore concluded that new pedagogical strategies must be developed and implemented to discourage plagiarism and thus reduce the impoverishment of education. At the same time, we showed that the choice of plagiarism verification software should not be made in a frivolous manner, but consciously and responsibly, because it may lead to different results.

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Plagiarism – Technology – Software – Graduation.

Introduction

Plagiarism is defined by Gipp (2014) as the use of ideas, concepts, words or structures without the recognition of the author or the source from which this information was extracted. Although there are no doubts about the negative impact plagiarism has on the teaching and learning process, Eaton (2017) warns that there are variations on what behaviors should be considered as plagiarism and states that there is an increasingly rigorous tendency to distinguish them from others, mainly in terms of ideas, statements and conclusions. However, although there is a great deal of discussion on the subject, there is still no consensus on all aspects related to copyright textual production (VASCONCELOS, 2007).

In the past, data research was based on information available in books and physical publications, which made it difficult to verify and identify plagiarism. However, in recent years and as a consequence of technological evolution, teaching methods and learning have undergone major changes, leading to the inclusion of new methodological and educational approaches. All areas and levels of formal education included more dynamic teaching and learning strategies, which were accompanied by changes in the role of teacher, who became a mediator in the learning process while students started to play a more important role in building their own knowledge (ROEDER, 2015; WATANABE-CROCKETT, 2014).

In the 19th century, the German philosopher Johann Friedrich Herbart (apud (CHEVALLARD, 2007, 1776-1841) already indicated the importance of changing the roles of teachers and students with the following statement: “The university professor is no longer an educator (lehrender), the student is no longer a scholar (lernender), the latter does personal research while the educator has the task of guiding and advising such studies” (2007, p. 348-349). These changes lead us to consider and reflect on the importance of students’ personal research, and the teacher’s orientation is the responsibility, regardless of the level of education. The correct orientation and supervision of the students during the research process, selection of bibliographical references, preparation of texts and discussions on academic ethical aspects is fundamental and should be guided by professors so that the students understand the stages of authoritarian textual production. The new forms of learning apply to undergraduate and postgraduate courses and cover strategies at all levels of education, including changes in education, learning, curricula, and in the role of educators. With these changes, educators are expected to allow students time and space to read, express their ideas, and write in an autonomous way, being closely accompanied by a professor who looks seriously at what the student produces. In addition, it is important that the university works on authorship and ethical issues from an educational rather than punitive point of view, encouraging reflections on the consequences and limitations that plagiarism has in the teaching and learning process (DIAS; EISENBERG, 2015). The

orientation and explanation of the strategies used for building academic texts is essential and should include the correct identification and citation of documents and publications used in accordance with the norms of the institution.

The change of strategy proposed in the 19th century by the German philosopher Herbart is increasingly necessary, particularly when considering the advance of technology, since using the new information search tools, it is possible to find texts that need to be evaluated and discussed by the students with the help of professors (CHEVALLARD, 2007). This requires a new attitude of professors and students, especially when it is desired to make changes that begin with the reconstruction of curricular plans adapted to the professionals' demanded competencies. In this sense, the use of new methodologies is essential to understand the importance of changing the working model during the teaching and learning process, including the use of inverted, interactive classes, problem base learning, among others, they lead us to rethink the didactic activities proposed to the students and, consequently, new forms of evaluation that value the personal development of each of the students. In this sense, Bar-Yam et al. (2002) highlighted the importance of changes that occur in school curricula, which require constant vigilance to adapt education to the students' needs. Complementary and interactive activities are fundamental during quality teaching and learning processes. However, this new reality may favor students who commit plagiarism, since there are currently a large number of works and texts ready on the Internet that can be used to solve didactic activities, we cannot deny that the advance of technology allows us to find texts that can help and enrich in the construction of copyright texts, however, when this is understood in an improper manner, this advance ends up becoming a plagiarism facilitator, which compromises the student's learning.

Currently, the educators have found a greater amount of partial or fully copied work, which not only represents an attempt against ethics and morals, but also implies a real commitment to the teaching and learning process of the students involved. This behavior points to the need for educators to have adequate tools to identify plagiarism and thus being able to constantly guide their students on the seriousness of this behavior and encourage reflections on new methods and evaluation actions to avoid this type of behavior. Plagiarism is not an exclusively current problem, it has always been a delicate issue for education, because during the learning process a large amount of written production of the students is required. The lack of awareness of the consequences that plagiarism has in the learning process and the lack of adequate training on the subject are the main reasons for its high frequency. The justifications presented by the students who identified committing plagiarism include lack of time, ease of finding ready texts, unclear guidelines on how to research and develop texts, and difficulty in understanding what behaviors are associated with failures in the authoring process of text production. (DIAS; EISENBERG, 2015).

In many countries around the world, plagiarism is considered a legal offense, and is often categorized as a crime against intellectual property. In Brazil, Law 9.610/98, on copyright (BRASIL, 1998) frames plagiarism as a crime, however the legislation covers commercial works and indicates that short fragments can be cited without characterizing the same as plagiarism (BAPTISTA, 2014). In the academic world, the act of plagiarizing

affects the credibility and directly affects the reputation of the institutions involved, therefore, several preventive, diagnostic and corrective measures have been adopted by many universities. However, according to Krokosz (2011), in Brazil there is still a delay in the use of measures to identify plagiarism and only a few institutions have chosen to include verification and the use of punitive measures to inhibit such behavior.

The advancement of technology allowed the emergence of several softwares whose function is to identify texts or part of plagiarized texts. A Google search using words such as Plagiarim and Plagiarim Detector, points to dozens of free and paid web pages and software to verify the veracity of the authorship of a text, corroborating the integrity of the content. Universities are using various programs to identify plagiarism, including: Turnitin (http://turnitin.com/es_br/), which corresponds to a program that seeks to maintain integrity in education, because in addition to verifying published texts, it has its own database where it keeps copies of all the works consulted for future research; Checkforplagiarism (www.checkforplagiarism.net/), which includes separate categories for students, professors and researchers, but it is not a free software. Among other free programs, we have: Anti-plagiarism (Anti plagiarism.net), DupliChecker (www.duplichecker.com), PaperRater, (www.paperrater.com), PlagiarismChecker (www.plagiarismchecker.com), Plagium (www.Plagium.com), PlagTracker (www.plagtracker.com), Viper (www.scanmyessay.com), Plagscan (www.plagscan.com), Detector de plágio (plagiarismdetector.net), noplag.com (noplag.com), grammarly (www.grammarly.com), Copyspider (www.Copyspider.com.br/) and Copyleaks (Copyleaks.com). Each of them has different particular characteristics, including limitations on the number of searches or the number of words, databases used for verification or difficulties in pointing paraphrased texts or plagiarized ideas.

Based on the conditions presented above, the problem addressed in this study arose, focused on the impact of the change in the roles played by the professors and students already indicated by the German philosopher Herbart, in the 19th century, on the plagiarism of academic works, and the advancement of technology that facilitates the identification of plagiarism in the same way as it makes it possible to maintain the integrity of scientific production. The need to effectively identify plagiarism emerges as a form of diagnosis that may indicate reasons that significantly compromise learning. The diagnosis of behaviors associated with plagiarism allows its recognition and alert to the need to identify the reasons that lead students to plagiarize texts, allowing the correction of this behavior, positively impacting the process and construction of knowledge about the various academic contents. However, there are still many doubts among professors, students and researchers about what should be considered plagiarism, which compromises its identification and correction, since the difficulty of recognizing which behaviors should be avoided makes it difficult to take preventive and educational measures (DIAS; EISENBERG, 2015).

Objective of the study

The main objective of this research was to verify the existence of plagiarism in academic works of postgraduate students, in order to answer the research question: Do students make plagiarism when they do graduate courses?

The specific objectives were to determine the incidence of plagiarism in the articles presented by postgraduate students in a subject in the area of Biological Sciences, in order to verify the frequency of plagiarism and to reflect with the students involved on the causes and consequences of this behavior to recognize and avoid the negative impact on the process of learning treated themes. In parallel, the efficiency in the recognition of plagiarized text using various software was compared to show the importance of the correct choice of the tool when identifying plagiarized texts.

Methodology

This study corresponds to a project of a teaching research group from the postgraduate program of the Teaching of Science and Health, During which the academic studies of eleven students from a stricto sensu graduate course presented as an activity in a subject in the area of Biological Sciences of a private university in the state of Sao Paulo, Brazil All students were graduated, exercised professional functions related to teaching and were starting their careers as scientific researchers in the biological area. Academic works correspond to the content of the first unit of the discipline that addresses basic and mandatory knowledge for the postgraduate course and included six introductory questions on topics previously covered in class. The six questions covered themes previously presented and discussed by the discipline teacher, and the activity should be answered individually by each student. As an inclusion criterion, academic studies of postgraduate students on topics already addressed in the classes and corresponding to issues widely publicized in the media and easily accessible on the Internet.

The applied didactic activity aimed to verify the learning of the contents discussed in the classroom. All questions of practical work were direct and involved answers that could easily be found in books or other publications. The questions were: 1) What are the types of tissues that have stem cells? 2) What can I use stem cells For? 3) What types of cells can I use for cell therapy? 4) the Nobel Prize in Medicine 2012 was awarded to a Japanese researcher: What was the discovery that made him win this prize? 5) What is the DNA model proposed by Watson and Crick? And 6) What is the difference between gene therapy and cell therapy?

To identify plagiarism, the following softwares were used: Copyleaks, obtained at Copyleaks.com, Copyspider downloaded from www.copyspider.com.br, Plagiarism at <http://plagiarisma.net/es/>, Grammarly at www.grammarly.com, Plagiarism detector obtained from plagiarismdetector.net, Plagiarim Checker from www.plagiarismchecker.com using www.plagium.com version X and Plagium, all available for free. All these softwares require registration and allow only a limited number of checks. In addition, the Plagium program was used in the premium version that includes additional search levels, accepts various types of formats, requires registration and checks are not free. Each software has distinct characteristics described, with different analysis specifications, algorithms and reference databases, all of which should be considered when analyzing and comparing the results. For the presentation of the data, comparative tables were constructed with the results using Excel spreadsheets.

Results

During this study, it was possible to verify that the online and free software available to check plagiarism has several limitations, such as some do not allow to analyze complete works due to the limit in the number of words, or are not effective in identifying obvious plagiarism, such as, the free versions of Grammarly, Plagiarism Detector and Quetest. In fact, at the time of conducting a search using the free versions many of these sites or software have failures, request registration and payments or are unable to identify plagiarized text from public databases such as Wikipedia. On the other hand, the identification of identical texts is also not possible using programs that do not keep a copy of the texts previously consulted. In this study, it was found that, among all the studies evaluated, two were identical, and this was only identified when programs that have their own databases were used, in which copies of all the texts checked are saved, once again, highlighting the importance of choosing the right software to verify plagiarism.

When analyzing the percentage of plagiarism in each study using Copyleaks software, it was found that only one of the eleven students had not been appropriate for information from other authors in any of the six responses (Table 1). Among the different studies that presented some indication of plagiarism, the use of five to more than fifty bibliographic sources (pages, files or works) whose text or part of it was plagiarized was identified.

Table 1- Amount of plagiarism per analyzed text

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Identical	0%	11%	75%	54%	97%	66%	88%	72%	72%	32%	32%
Similar	0%	3%	2%	1%	1%	2%	2%	1%	4%	1%	1%
Similar themes	0%	0%	0%	0%	0%	1%	2%	1%	1%	1%	1%
Number of bibliographical sources	0	6	50	65	71	66	34	30	33	5	5

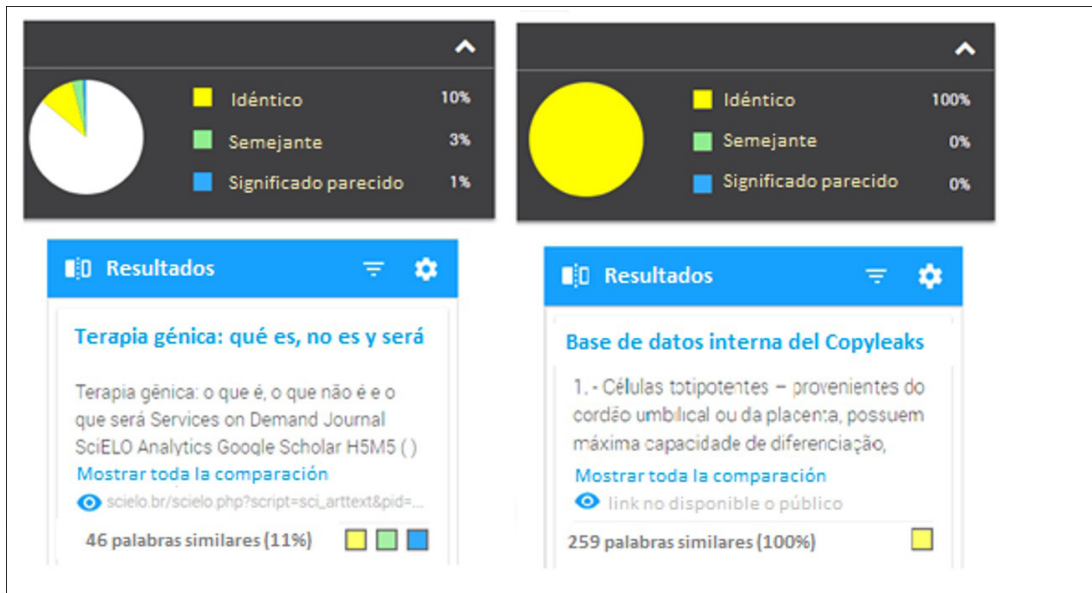
The percentage indicates the amount of text that is identical, similar to, or similar to other texts found in databases used by the software. In the lower line, the number of bibliographic sources with which the presented text had some degree of similarity.

Source: Own elaboration.

Copyleaks software is one of the most complete free programs as it uses algorithms that scan and verify text in multiple languages, and it also presents a version aimed at verifying education-related work and another for the business area. In the education version, it is possible to choose the educational level of the students between the school or the university. On the other hand, this software allows a certain number of free checks,

however, it is possible to buy credits when this limit is reached. Finally, this program has its own database where copies of all the texts used are kept, which makes it impossible to verify the same text more than once, without concluding that there is another text that is 100% identical to that verified (Figure 1).

Figure 1- Amount of plagiarism using Copyleaks software



Results of the amount of plagiarism using Copyleaks software in the first comparison (left) and using the same work in a second comparison (right). Source: Own elaboration.

When performing the same type of analysis using another software, Copyspider, one of the most widely used programs among students, professors and researchers in Brazil, was observed a different amount of plagiarism than that reported by Copyleak for each study (Table 2). Copyspider allows an analysis to identify the number of identical words between the work used and the texts available in the database. Table 2 shows the study of each student (Roman numbers) (top line) and the percentage of similar responses, the number of identical words, and the number of sources from which the text was plagiarized.

Table 2- Amount of plagiarism detected by Copyspider software

	I	II	III	IV	V
Maximum similarity	1.09%	3.58%	9.34%	11.98%	32.81%
Amount of words	308	295	1226	943	450
Most of the words in a bibliographic source	2957	10158	10158	2614	10699
Most of the words in common	13/907	46/1328	353/10158	198/907	
Number of sources identified	10	9	9	10	10
Conclusion	-	The first three answers are very short. Answer 4 very similar.	Answers 4, 5 and 6 similar. Answers 1 and 2 partially similar.	Answers 1 and 2 are very similar. Answer 4 is identical.	Answers 1, 2, 3 and 5 are identical. Answer 6 similar.

	VI	VII	VIII	IX	X	XI
Maximum similarity	10.44%	14.56%	39.95%	5.7%	4.6	2.62%
Amount of words	513	697	654	285	241	239
Most of the words in a bibliographic source	1713	10158	9524	2607	2670	10158
Most of the words in common	131/1240	213/10158	305/434	55/734	30/1942	30/1942
Number of sources identified	10	10	10	10	10	10
Conclusion	Answer 5 is identical. Answer 6 is similar.	Answers 3, 4 and 6 are identical.	Answer 4 is identical.	Answers 3, 4 and 6 are identical.	Answers 4 and 6 are similar.	Answers 4 and 6 are similar.

Plagiarism percentage for each of the eleven academic papers composed of answers to six questions using Copyspider software. The work of each student was identified with Roman numbers. The verification is done by the number of words for each identified bibliographic source. Source: Own elaboration.

Copyspider software is designed to be accurate in identifying similar documents available on the Internet, to use it one needs to download the program. The free version (used in this study) is intended primarily for students. With this analysis it was possible to detect that this software does not necessarily show all possible sources of plagiarism, since it presents a maximum of ten research papers from which the verified text may have been plagiarized, and the maximum percentage refers to the reference with greater similarity. Probably the percentage of final plagiarism corresponds to the sum of the plagiarism of

several sources. On the other hand, when analyzing the work carried out by student V, it was possible to identify in a first survey that questions 1 to 3 showed plagiarism and, when performing a second verification (with the same software, Copyspider), excluding these questions, It was possible to verify that questions 4 and 5 were also identical to other texts published on the Internet and, at the same time, showed that answer 6 was similar to other work on the Internet, showing that there is a limitation by this software to identify plagiarized texts.

To better understand which questions were the most plagiaristic, a separate analysis was performed for each question using the Plagium software in its paid version. Table 3 shows the number of identified texts that are similar to the texts presented by the students as answers to each question, and in parentheses the highest percentage found by answer is explained in at least one of the bibliographical sources indicated as used to commit plagiarism.

Table 3- Amount of plagiarism per question using *Plagium software*

Questions	I	II	III	IV	V
1	0%	0% *	0%	0%	10 similar texts (22%)
2	10 similar texts (80%)	0%*	0%	0%	10 similar texts (100%)
3	0%	7 similar texts (100%)	6 similar texts (100%)	0%	0%
4	0%	3 similar texts (73.8%)	6 similar texts (7%)	0%	3 similar texts (31%)
5	10 similar texts (27%)	10 similar texts (100%)	0%	3 similar texts (15%)	0% *
6	0%	0%	0%	0%	0% *

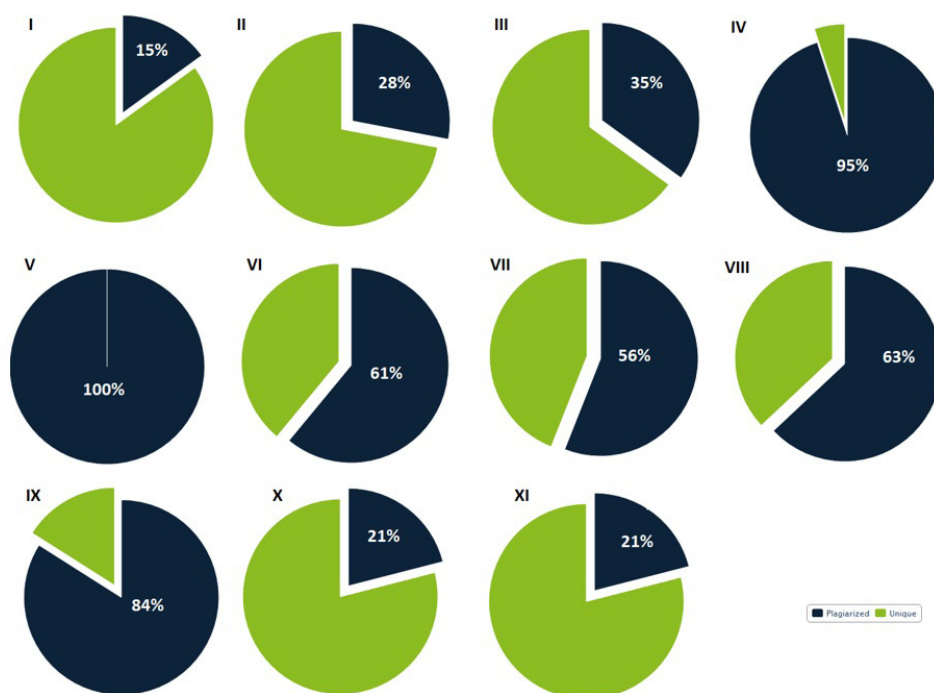
Questions	VI	VII	VIII	IX	X	XI
1	0% *	0%	2 similar texts (100%)	0%*	10 similar texts (100%)	10 similar texts (100%)
2	0%	0%	10 texts (78%)	0%*	0% *	0% *
3	0%	0%	0% *	0%*	0% *	0% *
4	0%*	0%	0%	0%	6 texts (75%)	6 texts (75%)
5	0%	0%	1 similar text (10%)	0%	10 similar texts (100%)	10 similar texts (100%)
6	0%	0%	1 similar text (23%)	0%	10 similar texts (100%)	10 similar texts (100%)

The plagiarism percentage for each question (in Arabic numbers) of the eleven works (in Roman numbers) evaluated using the Plagium software. At each intersection between the line and the student, the number of similar texts is indicated with the answers presented by the student and the highest percentage of similarity. Very short responses may compromise plagiarism in this software (indicated in the table with asterisk).

Source: Own elaboration.

When each answer was analyzed separately, a greater amount of plagiarism was observed for the issue that addressed a topic that had a major impact on the media. The answers to the questions that implied concepts or definitions also showed a high frequency or amount of plagiarism (see Table 3), which points to the need for the professors to guide the students about the importance of recognizing who proposed the concept or definition. On the other hand, very short answers, such as questions 1, 2 and 3, compromise the identification of plagiarism in various software, since the algorithms used carry out an analysis of the words used. On the other hand, upon using the free version of the Plagiarism Checker X program, which allows the analysis of 150 words, it was possible to verify that all texts presented some percentage of plagiarism (Figure 2).

Figure 2- Percentage of plagiarism in the issues of the eleven academic papers.



Graphical representation of the percentage of plagiarism in the questionnaires of the eleven students. In Roman numerals the work of each student is identified. The amount of plagiarism is indicated as a percentage (in black) using the First 150 words of the questionnaires (from I to XI) of the students who participated in the research. In green it indicates the percentage of original words according to the analysis performed using the X plagifier software. Source: Own elaboration.

It is important to point out that the programs of Plagiarisma Grammarly and Plagiarism Detector do not support the existence or absence of plagiarism in the submitted

texts, probably because free versions were used, which do not include sufficiently robust databases, forcing the use of paid versions.

With this project, it is possible to see that new methodological forms must be included to discourage copying of texts, ideas or paragraphs, and at the same time, professors must be encouraged to verify that there is a plagiarism in the texts presented by the students, in order to detect this behavior and take corrective action to educate and guide students on the consequences of these practices. To inhibit this practice, the professors need to ask questions and create activities that require elaborated and knowledge-based answers that involve building opinions and not just conceptual answers. We suggest proposing activities that require comparing at least two concepts for the construction of knowledge and, thus encouraging the learning of a particular subject, and may even leave the student in charge of choosing the one that seems most appropriate to him or her, implying also on the need for arguments to justify the posteriori election. It may still be necessary for students to describe how the evolution of knowledge or concept was to encourage the association of proposals from different authors. Thus, the student may include the author's definition and make a careful analysis of how it evolved.

Discussion

The ease of finding texts on the Internet makes checking for plagiarism in written productions increasingly necessary, as this is increasingly common in the various educational institutions. New strategies to identify plagiarism, and further guidance on the consequences in the teaching and learning process of this type of conduct is increasingly needed. In this sense, several authors have shown the lack of capacity on what is characterized as plagiarism and point to the urgency of broadening the discussions on its meaning and impact on the learning process to define an agenda for the author production (DIAS; EISENBERG, 2015; VASCONCELOS, 2007; VASCONCELOS et al., 2009). For Moretti (2017), plagiarism corresponds to the literal copy of ideas, conclusions, demographic data, graphs or paragraphs without naming the author. On the other hand, Dias and Jeffrey (2019) point out that, in addition, it is necessary to include as plagiarism the presentation of a previously evaluated work, the use of other students' works and the purchase of academic texts. Currently, there is a tendency to zero tolerance to plagiarism in the scientific environment, even in cases where plagiarized texts correspond to the paraphrase, and these are defined as the rewriting of a text using synonymous words (VASCONCELOS, 2007). Plagiarism can occur in several ways and all of them must be avoided, including those resulting from the creation of intertexts, described as texts created by a process of transformation of another cited text (KRISTEVA, 1969).

According to Bonette and Vosgerau (2010), most students are aware of the consequences that plagiarism can have in learning, however, they state that the ethics associated with the actions of appropriation of text by other authors are confusing. The authors observe that the justifications presented by the students identified as plagiarists are among the most diverse, including lack of time, ease of finding information and pressure to not to be wrong. Many discussions seek to identify when plagiarism is due to

bad faith, error or ignorance. Regardless of the reason and according to Teixeira states (2012), plagiarism is defined and treated as a crime by Law 9.610 and the Brazilian Penal Code. As a function of the misconduct represented by the plagiarism, Pithan and Vidal (2005) warn about the importance of the educator and/or professor in the orientation about the severity of the inappropriate appropriation of ideas, phrases or texts of other authors and about the ethical, legal and pedagogical consequences of these actions. It is essential that professors involute themselves in a more incisive process about the teaching of the correct use of information extracted from other bibliographic sources, as well as the methods of selecting and citation of references. These actions require an ethical and pedagogical view on the development of academic and schoolworks, in this sense, Dias and Jeffrey (2019) highlight the need for three competencies for the possibility of free texts of plagiarism: Informational competence, research methodology and literary.

With this study, it is possible to verify that there is high frequency of plagiarism, which may be related to the increase and ease of ready jobs available in various databases. In this sense, it is possible to verify that answers to simpler and more direct questions are more easily found on different web pages, which tends to increase the plagiarism on the part of the students. Another important factor may be related to the teaching system, in which students are generally led to reproduce what the professor develops in the classes, encouraging in some way to commit plagiarism, in particular when it is proposed that students answer conceptual questions. Certainly, this is about changing the working models of professors and students, which demands a study project that addresses the right ways of building knowledge and the consequences of plagiarism.

Plagiarism is a problem which society and education have always faced and which seems to have increased in the light of technological development, which at the same time proposes various ways of detecting it. According to Li (2013), the plagiarism extends from high to post-graduate education, including professional practices in the fields of science and research. Among the reasons that they lead the students to commit plagiarism, in addition to the ease of finding ready texts, are also the constant bombardment of activities that cause anxiety and prevent the construction of an original text (RODRÍGUEZ, 2012), the lack of encouragement and the correct orientation of the professors (DIAS; EISENBERG, 2015), among other things. In many Latin American countries, including Brazil, plagiarism is not widely discussed or debated, and many professors and researchers point out that there is a lack of awareness and education on this subject (VASCONCELOS et al., 2009).

In fact, there is a border, often difficult to distinguish for students and in some cases for professors, between plagiarized texts and texts of authors, which makes understanding and recognition difficult (DIAS; EISENBERG, 2015). In addition, in many cases, professors and researchers have doubts about what is considered plagiarism, and the correct way in which fragments of text and ideas from other authors should be used when copyright texts are produced (VASCONCELOS et al., 2009). In this sense, one should also notice that there is a different understanding of what should be considered plagiarism among the various countries of the world. For example, in China there is a more flexible conception while the United States is at the other extreme, with a more rigorous conception, and

therefore the texts that in China are considered plagiarism-free are categorized as non-author texts in the United States (VASCONCELOS, 2007).

It is important to note that according to Bonette and Vosgerau (2010) plagiarism is not present only in undergraduate or postgraduate work, since it has in fact been registered at virtually all levels of education, beginning with greater intensity in school education. The main problem of plagiarism in education is the learning deficiency that the construction of the plagiarized text causes in the student, leading to a lack of understanding about concepts that may not be easily detected by the professors, since the activity was carried out. The educational impact of plagiarism can and should be avoided, and further capacity-building actions on the subject are needed for this. In this sense, the doctorate study by Dias (2017) shows that, although there is currently an incentive in school for the creation of copyright texts, there is still a lack of guidelines and skills to ensure that this activity is carried out correctly. Along the same line, Sonia Vasconcelos (2007) proposes that the plagiarism be treated during the courses of scientific writing in post-graduation, along with guidance on the practices necessary to avoid plagiarism. Despite this proposal, Hong (2017) warns that plagiarism as an increasingly recurring problem, even among students with a higher educational level like this study, affects the quality of publications and puts at risk the trust of publishers, therefore, it suggests a more rigorous control and greater efforts to improve the authors' abilities and facilitate retractions, if necessary. In fact, today many scientific journals include plagiarism checking to avoid publication scandals articles with previously disclosed or authored data from others. However, despite all these efforts to disseminate and train on legal consequences and in learning, plagiarism continues to pose a major problem in scientific publications, in science and in the production of academic texts, because sometimes with urgency of publication, some journals do not correctly verify the authorship of the texts, publishing articles wholly or partially plagiarized, and further retreats or acknowledgments are required.

Considering the negative consequences of plagiarism in education and scientific publications, proper identification is essential for professors to take educational measures that train students on how to avoid it. In this sense and considering the large number of softwares available for plagiarism verification, this study also compared the efficiency of several programs to identify plagiarism and assist in the election to verify the plagiarism of academic papers. It should be noted that the results of plagiarism verification using different software may differ, since there are differences among the same. Several aspects should be considered and considered when analyzing the results. Among them, we cannot ignore that one of the fundamental requirements for Plagiarism is the use of reference databases that include texts published in various locations, both with free access and publications with restricted access.

With this study, it was possible to observe that when the free versions of Plagiarisma, Grammarly and Plagiarism Detector could not detect plagiarism in most of the issues analyzed, even those that had typical characteristics of plagiarism and that had been referred to as plagiarized by other softwares. These different results can be explained by the distinct algorithms used in each program and by the ability to identify the different types of plagiarism that exist for each program. On the other hand, the database that each

software uses to perform research and comparisons should also be considered as they can include only texts available free of charge on the Internet, leaving aside publications with restricted access, significantly compromising the result in the veracity of the authors' texts. Furthermore, the programs that have their own databases keep copies of the verified texts, which allows the identification of identical works of different authors, but makes it impossible to identify plagiarism efficiently when new versions of the same texts are analyzed, since the previous text is in the software database, resulting in a high percentage of plagiarism between the new text and the previous text. Although the use of the same text twice or of a different version of an authoritative text in the software storing the consulted texts limits its use, this type of program is efficient to verify whether there is a plagiarism among different students or colleagues on the other hand, most software have limitations to identify correctly cited texts, since most algorithms include only word checking and/or phrases, and in these cases a careful analysis of the results is essential to ignore the correctly cited texts. It is also worth highlighting free versions that are less efficient, especially in relation to the number of texts consulted to verify the plagiarism or number of words allowed. Finally, it is important to understand that the report of similarity and identity represent differences, and despite technological advances, a careful evaluation of plagiarism results is still necessary when several softwares are used. There are cases where the programs point to a high similarity and disregard the existence of the correct citation from which the text was removed, and at the other extreme there are also fragments that, although they present relatively low similarity, they correspond to the non-authoritative idea that was not properly cited, in both cases a careful evaluation of the professor or advisor is required for its recognition.

Currently, many educational institutions in Brazil and around the world offer students and educators free access to paid plagiarism verification software, which are generally considered more robust, mainly because they include texts not available free of charge in their databases. However, many professors still did not routinely check whether the academic texts presented by their students show signs of plagiarism, which has just made such behavior more flexible. The reasons for the lack of plagiarism by professors include little training on the consequences of learning for students who practice plagiarism, lack of time or interest, or lack of reliable, easy-to-access, and simple-to-use tools. On the other hand, an increasingly widespread and discussed issue is the lack of confidentiality and the guarantee of confidentiality that the verified text will have after its use in the software, this leads to resistance in checking textual authorship due to lack of confidence in the programs. The main reason for suspicion seems to be the fact that there is no legal support for the misuse of texts used to verify plagiarism and that they have been stored in the databases of the software used.

Several scientific scandals point out that plagiarism is now more frequent than previously believed, reaching high-impact journals in several areas, which is why it is increasingly common to portray authors and magazines (DYER, 2018). In fact, several institutions have provided guidelines on plagiarism in order to raise awareness and guide students and educators (CAPES, 2011; CNPQ, 2011). In this sense, the Foundation of Research Support O Estado de São Paulo in its publication about codes of good scientific

practice defines plagiarism as “[...] use of verbal, oral or written ideas or formulations of others without giving them, express and clearly, or becoming credit” (FAPESP, 2014, p. 25) and classifies such behavior as serious scientific misconduct. The guidelines and guidances are clear, however, to minimize the frequency of plagiarism in scientific and academic works, it is also necessary to teach and train about the correct way to research bibliographical information and how to use the data of interest to produce an authoritative text, citing the references appropriately. Further discussions and guidance on this subject are needed, as well as training and skills to guide professors in the students’ authoritative textual production.

According to Penders (2017), the identification and dissemination of cases of plagiarism has gained importance in recent years, not only among undergraduate students, but also among graduate students and researchers, negatively impacting on the credibility of those professionals. Regarding the consequences, Chaves (2010) notes that there is currently a great tendency that believes that mentors and teachers should also suffer consequences when plagiarized texts of students are denounced, as they are part of the process. Although it is a controversial proposal, it could encourage plagiarism to be verified in studies by authors submitted by students routinely. On the other hand, Bean (2017) points out that, despite sanctions, in recent years there has been an increase in the number of cases of plagiarism identified, indicating that many students and researchers take risks and prefer to accept the possibility of being discovered, regardless of the consequences they may have on their lives and careers. This indicates that only punishing people who commit plagiarism is not enough to reduce the frequency of this behavior, which underscores the importance of teaching the right way to research and produce authoritative scientific and academic texts.

According to Marques and Macedo (2016), despite the plagiarism affecting all levels, there is a greater tolerance to plagiarism when committed by students, both of a graduation degree and post-graduation, rather than when committed by researchers. However, it is important to analyze and reflect on this statement, since the plagiarism among students cannot and should not be ignored, making it necessary to take more effective measures to prevent and hinder this behavior among students. One of the greatest impacts of plagiarism is related to the lack of knowledge associated with the activity that should have been developed by the students and that was copied from other authors.

We know that the most efficient measures against plagiarism are not only associated with legal treatment. In the field of education, we need to reflect on new forms of ethical-pedagogical approach to reduce this practice that is even more common in the academic world. As we have seen, the use of specific software is necessary to distinguish plagiarized softwares, but due to the large number of options, the correct choice of the program is essential to identify this behavior efficiently and to be able to take corrective action and to work with the difficulties reported during the production of the copyright texts, to ensure that students learn the right way to search for information and write texts without plagiarism.

In addition to the needs already mentioned, it is important to consider Santana e Silva proposal (2008), which highlights the need to encourage a discussion on authorship,

which can be essential to clearly understand the difference between the copyright and plagiarism text, beyond understanding the meaning of plagiarism more broadly and correctly. The authors also point to the need to include a subject on Codes of Ethics in educational institutions to discourage plagiarism and increase educational commitment. Objective actions for students to understand what plagiarizing is, as well as guidance and professor follow-up to learn how to research and produce copyright texts are essential to reduce this practice.

Together with the increase in plagiarism and the increasing ease of finding texts that can be plagiarized, a large number of programs have also emerged to identify plagiarism, however, there is still a lack of awareness and guidance for students to understand the importance and consequence of this type of behavior. At the same time, the role that the professor plays during the teaching and learning process about how to produce scientific texts is fundamental to diminish this practice. Changes that discourage this type of behavior should be discussed and considered at all levels, to include more objective actions of teaching, guidance and follow-up of professors during the process of producing texts.

Conclusion

We began this study by observing how difficult it is to identify when plagiarism is turned into something frequent in education. We note that teaching practices focused on the reproduction of knowledge favor this type of behavior. It is interesting to note that since the 19th century, when technology was not accessible to all, the German philosopher Herbart already indicated that the need for changes in the teaching and learning process for which teacher and student study together was an essential issue for society, this requires a change in the teaching and learning process itself and, consequently, in the students' evaluation.

This study shows that new teaching methodologies and strategies are being used in academic institutions, placing the student as responsible for their intellectual development. This is not a question of reproducing institutional knowledge, but of understanding it and applying it to issues that are important to society. Considering this new way of working, it is also necessary to rethink the ways in which students are evaluated, in order to avoid the plagiarism of articles or studies by other authors previously published, not only in higher education, but in all levels of schooling.

Although the advancement of technology has allowed for tighter controls and easy identification of plagiarism cases, we think it is more important for educators to find new means of evaluation to avoid plagiarism through guidance and training, because as we have seen questionnaires with simple and direct questions tend to motivate this behavior further. Therefore, in addition to incorporating techniques to verify the existence of plagiarism, it is necessary to seek new guidance and teaching strategies to avoid this behavior on the part of the students. Orientation and support of students during the process of building knowledge is fundamental, especially to help them find answers to

questions related to the needs of a given discipline without being just a reproducer of studies already carried out.

In short, with the advancement of technology and the ease of access to reliable information in an immediate way, it is necessary to discuss and find efficient ways to make students aware of the plethora of ideas and texts from other authors. From the educator's point of view, identifying plagiarism as a frequent practice among students, it is necessary to reflect on the educational causes and consequences of this behavior in order to develop actions that have an educational character that leads students to understand the importance of building knowledge and texts of their own authorship. Thus, in the case of identifying a high plagiarism index in the students' productions, it is interesting to analyze whether the type of task proposed does not facilitate this behavior or whether there is a limitation or difficulty of judicious and authoritarian analysis. New forms of evaluation should be discussed, including perhaps the possibility of collaborative, group, or didactic work that will encourage the creation of hypotheses, propositions and problem solving, the creation and implementation of games, among others. On the other hand, from a student's point of view, some skills should be developed to acquire the skills of constructing copyright texts on a particular topic. It is necessary to know how to search and filter information, in order to subsequently produce an authoritative text, and this activity is a mixture of study and research into sources of information that verify the claims that are intended to be made, in order to support the arguments themselves, critical reading on the subject is essential to this. When ideas already formulated by other authors need to be included to work on the hypothesis raised, it is important that these are identified as such. Citing and giving credit to authorship is something that needs to be learned and exercised, highlighting the role of the teacher as a counselor, accompanying and guiding throughout the process of constructing the text.

Finally, we emphasize that the correct choice of software is essential for efficient plagiarism verification. The use of appropriate programs that assist in the identification of plagiarized texts allows to combat this type of behavior, since it alerts the educator about the need to review his teaching and evaluation methods and strategies and encourages the inclusion of ethical and moral discussions in his or her classes, in order to train the students and reduce the amount and frequency of plagiarism, ensuring that the student seeks to give meaning to the studied subject. However, due to the limitations that different software presents, it is essential to conduct a careful analysis of the results to understand their meaning. In general, plagiarism will be more or less identified regardless of the program used, which leads us to reflect on the frequency of this practice and the urgent need to find educational alternatives that help combat plagiarism to minimize its frequency.

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