

ELECTRONIC PLAGIARISM DETECTION SOFTWARE AS SELF-TEACHING TOOL FOR PLAGIARISM AVOIDANCE IN BIOSCIENCE UNDERGRADUATES

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Abstract:

Following the initial enhancement of plagiarism detection by Turnitin[®], academics started to use it successfully. However, many academics are using it as detection software, without using this as a tool to enhance the students' learning. This study was designed to evaluate the potentials of Turnitin[®] software for educating students to avoid plagiarism. This study was carried out with two cohorts of level 1 undergraduates from 2008 to 2009. After the initial induction about good academic practice, students were set an academic essay. They were allowed to use the Turnitin[®] software only once to improve their essays, before final submission. After their re-submission, the articles were again checked for plagiarism using the software and by proof reading in comparison with original articles.

The results from their first attempt have shown that 37 out of 70 students (approximately 53%) were able to write a scientific essay with proper attributions and referencing. Of the remainder, around 11% (8 out of 70) of the student submissions had worrying amounts of plagiarism and the rest had incidences of inappropriate paraphrasing (5 students 7%), copy-pasting without proper referencing (5 students 7%) and “patch-working” (15 students 22%). Interestingly, the data from the second submissions showed that at least 59% of students (22 out of 37) were able to re-write their essays without plagiarising. The rest were shown improvements in their academic writing. The data from this study suggests that it is possible to use Turnitin[®] as a learning tool to improve the students' academic writing.

Background—Historical prospective:

Many “text-matching” tools have been developed to detect inappropriate use of information and plagiarism. However the introduction of Turnitin[®] software has revolutionised the detection process. Since its introduction, several academics have reported that compared to other tools, this software is superior as it is simple to use, accurate in matching the broadest range of sources, embedded with grade marking facilities and above all has the potential to be used as an educational tool (Sivasubramaniam, 2002; Satterwhite and Gerein 2003; Gauder, 2004; Jocoy and DiBiase, 2006). It is an accepted fact that Turnitin[®] has tremendously reduced the time spent by the academics when checking work for plagiarism. Jocoy and DiBiase (2006) reported that it detected five times more instances of plagiarism than manual methods. Moreover, by highlighting where malpractice has occurred it provides definitive proof for academic misconduct inquires. However as Wright and Nigel (2008) correctly pointed, the software “should be regarded only as a tool to assist in the detection of plagiarism”. The actual decision making (whether it is plagiarism or not) actually relies on academic wisdom.

Others, like Jones (2008) further emphasized that Turnitin[®] is not a plagiarism detection service but simply a text-matching system a fact accepted by many experienced

academics who use this matching to decide academic integrity. Thus like any other e-learning devices, Turnitin® only assists, rather than replaces, human decision making. More importantly it is clear that increased use of this software has in itself resulted in plagiarism deterrence (Sivasubramaniam, 2004, 2006)

After its initial usage for “plagiarism detection”, Turnitin® was transformed into a grade marking tool. This has opened up the opportunity of using this software for teaching and/or formative feedback. Even during its introductory phase, reports claimed that students would like to use this tool to check their work before final submission, since they would be able to learn from their mistakes and improve writing skills (Sheridan and Brake, 2001; Dahl, 2007). In fact Turnitin® reports themselves can be used as feedback. Therefore it is clear that using Turnitin® feedback together with redesigning of the assessment can encourage students to be interactive with academics (Nicol and Draper 2008). Other authors went further and proposed using it as a teaching tool to increase (a) the understanding of plagiarism (b) its avoidance and (c) competencies amongst students (O’Hara et al 2007; Cheah and Bretag, 2008). Thus in 2009, Davis and Carroll concluded that Turnitin® can be used as a formative assessment tool to help students avoid plagiarism and improve citation practices.

Introduction

Plagiarism amongst undergraduates has been a well-studied and researched concept since the creation of the Plagiarism Advisory Service (JISC-PAS) in 2002. JISC-PAS has not only highlighted plagiarism practices amongst undergraduates but also assisted UK academic institutions to use Turnitin® software for free. The publication of Turnitin® and other detection software’s, made the “detection” quicker and also played a large part in reducing plagiarism in universities (Wicker, 2007). Nottingham Trent (NTU) was one of the first universities to adopt electronic detection since its introduction in 2002. Interestingly in Biomedical Science at NTU, this increased the detection rate from 4 per year (average) before 2002 to 18 per year in 2003 (Sivasubramaniam, 2004; 2006). This is largely due to better and effective detection by this software. As a result of the improved detection rate, several academics within NTU started to use it; some used it only to confirm suspected plagiarism and others used it as a routine for all coursework. Some others even made the reports available to the student viewing. However, the School has a strict policy of not allowing the students to use this software for student viewing and re-submission. It has been argued that the student would use this software simply to reduce the “high scoring” and getting away with plagiarism, just by quoting, patchworking, rearranging the sentences and referencing (Australian universities teaching committee, 2007).

Other educational organisations have successfully been using this software as a tool for educating students. In fact Becton (2007) has pointed out that the software can be a useful tool for teaching students about plagiarism and assisting them to avoid it. By highlighting the origin of a “patchwork”, it would show the original reference and reinforce the need for appropriate citation. However this is only possible if the report is well interpreted by the students. Thus, it is still not clear whether this software can be used as self-studying tool for improving academic writing by “learning from

their mistakes”. Carroll and Jameson (2009) have correctly pointed out that Turnitin® cannot be a substitute for all the careful teaching and feedback. In fact it is generally believed that academic input, in the form of tutoring/mentoring (spending some time with the students) to explain the originality report, is necessary. This pilot study aimed to investigate whether the Turnitin® software can be used as a self-studying tool to improve the academic writing of level 1 undergraduates.

Methods

The study was carried out in the School of Science and Technology, Nottingham Trent University; Nottingham UK Level 1 undergraduates from the 2008 to 2009 cohorts were used in this study as a part of the workshop on how to avoid plagiarism. In the workshops, the students were first introduced to good academic writing and explained the ways to avoid plagiarisms. They were also trained to use the Turnitin® software. Then a task in a form of a scientific essay was set; each student was given a separate scientific title.

They were told to submit their essays to the software, read the originality reports and correct any “potential” plagiarisms and re-submit for academic assessment. Analysis of student learning was carried out by comparing their first and re-submitted reports.

The following criteria were used to check the authenticity of student learning:

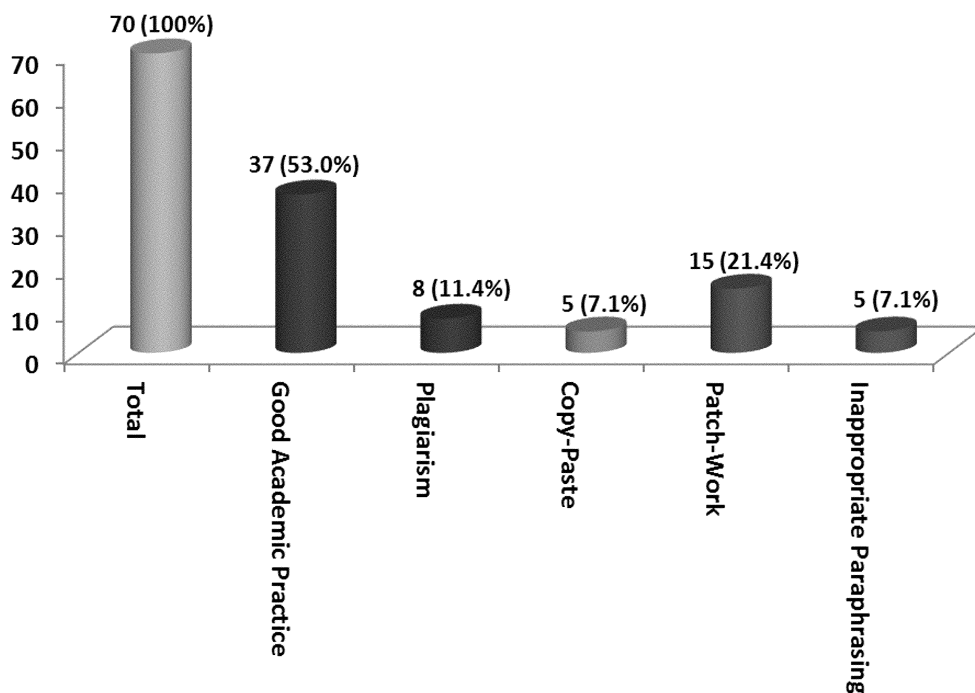
1. Number of student reports with good academic writing
2. Reports with “patchwork”
3. Copy-pasting with proper referencing
4. Inappropriate paraphrasing/summarising.

Although the similarity index provided by the software was used as guide, the final decision for categorising into above criteria was made by the academic.

Results

The results from the first and the re-submissions are summarised in figures 1 and 2. From figure 1, it was interesting to note that 37 out of 70 students (approximately 53%) were able to write well-referenced essays with appropriate citations. Although the academic rigour of these essays varied (marks ranging from 45% to 89%), these students were able to read, understand the concept of their title and then write a well attributed essays. On the other hand the rest of the essays (around 47%) had significant incidents of “bad academic practice” or were slightly plagiarised. However, only 8 out of 70 student (around 11%) essays were blatantly plagiarised. Many of them (15 students) used patchwork to bring the essence into their essays. While other essays had (a) incidences of inappropriate paraphrasing/summarising (5 students); or (b) copy-pasted sentences without proper attributions (see figure 1).

It was interesting to note that out of 33 final re-submitted essays 19 students (approximately 58%) managed to re-write (or amend) their essays into acceptable submissions. However, most of these students either used attributions using quotes



Bars represent actual numbers with calculated percentages in brackets. Good academic writing refers to the essays without (or with negligible amounts of) bad academic practice; copy-paste refers to the essays with sentences lifted from the original articles without proper attributions

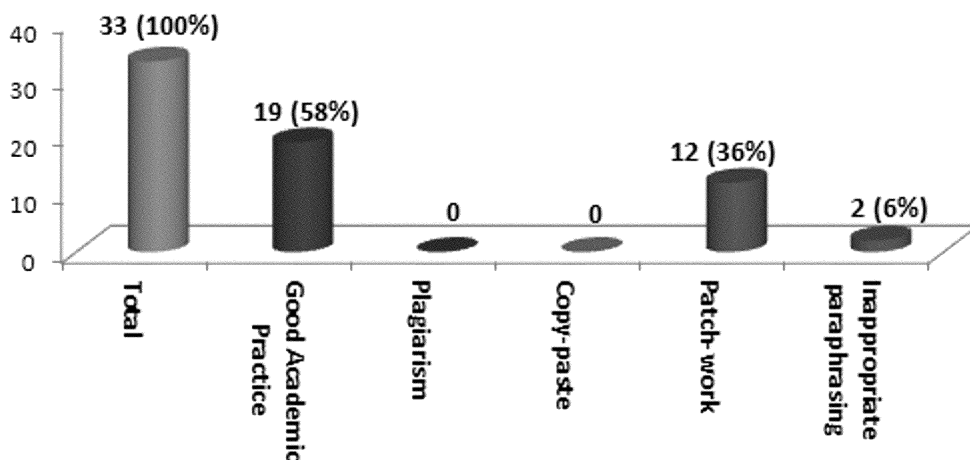
Figure 1. Student performance—First submission

and citations or tried to paraphrase or summarise the original sentences with proper referencing. Almost all of these students produced a good reference list.

Another 12 student essays (36%) showed incidences of patch working. In other words students tried re-word the original sentences just by changing the format and/or grammar. Finally very few students [around 2 (6%)] tried to paraphrase the original sentence without any success (see figure 2). From this the author was able to differentiate the students who could improve their academic writing by self-learning from the Turnitin® similarity reports (12 students) from the ones who would need academic assistance or tutoring to improve their academic writing skills.

Interestingly, during the tutorial session, the author was able to identify certain common misconceptions about “good scientific writing” amongst the students. These are summarised in table 1.

Although it is difficult to show entire reports, example paragraphs from the first and re-submissions are compared in table 2 to show how students have improved their reports using Turnitin® feedback.



Total numbers of re-submitted articles were 33; Note the incidences of plagiarism and/or “copy-paste” has reduced to zero

Figure 2. Students performance—Re-submission

Discussion

It has become a routine practice amongst several UK universities to automatically check all (or important) student submissions for plagiarism. In fact Turnitin® reports are being used as absolute evidence in academic disciplinary hearings. Also there is evidence that indicates the use of anti-plagiarism software led to a decrease in plagiarism (Batane, 2010). However less data is available on the effectiveness of this software as a teaching tool (Bilic-Zulle et al, 2007). Therefore the main objective of this study was to assess the potential of Turnitin® software as a self-teaching tool. The study was carried out as a part of on-going anti-plagiarism activity workshops aimed at level 1 undergraduates.

It is reassuring to note from the data that most students have a positive attitude towards academic writing and avoiding plagiarism. Approximately 53% of (37 out of 70) students were able to write this scientific report with proper attributions and referencing. Secondly, by highlighting the matches with original sources, the software has clearly helped the students to learn their mistakes. Interestingly, the data from second submissions have shown that at least 59% of (22 out of 37) students were able to re-write their reports without plagiarising. The rest (15 out of 37 students) showed improvements in their academic writing. Thus allowing them to view their submission reports helped them to identify their mistakes. The exercise also helped the author to identify the “needy” students who required extra help in avoiding plagiarism.

Manual proof reading and cross matching their first and the second submissions has highlighted several positive as well as negative aspects of using the software as an educational tool. On the positive side, it has highlighted the common mistakes made by the students while paraphrasing. Especially, students were able to identify the mistakes in using and/or attributing ideas from published sources. As the result of this they were

Table 1

Common student misconceptions and their justifications

Common Misconceptions	Justifications
Patch-work is not plagiarism.	It has been “modified” and properly referenced.
Figures from the internet need not to be referenced.	They are there to be freely used.
Information from abstracts can be copied	That is not the actual article
It is alright to collude with the student with whom “paired/group” was carried out.	This is what the “group/paired” work means
There is no need to reference non-copyrighted articles	Care should only be taken when “copying” copy-righted articles
Re-using essays or “text recycling” (self-plagiarism) is acceptable	It was me who wrote it in the first place
Information from the secondary source can be used without checking their validity	It is hard to get hold of the primary source
Paraphrasing means using sentences from the original article in inverted commas.	There are only a few ways the information can be re-written.

able to either address the mistake or seek academic help (Wicker, 2007). In other words it has enhanced reflective learning. This confirms the findings from a questionnaire-based study conducted by Whittle and Murdoch-Eaton in 2008. In their study students claimed that it was “reassuring to check” for plagiarism before submission. The main difference in this study from Whittle and Murdoch-Eaton’s results is the students were given a chance to improve their reports by allowing them to re-submit. Interestingly, this re-submission opportunity has been found to be a controversial subject amongst the academics, some supporting it with caution and recommending that it should be carefully monitored and coupled with proper guidance whilst others rejected it outright.

The later group’s argument was although this practice can be regarded as “feedback” to improve academic writing, this might also allow them to learn or discover the places where the software failed to highlight sentences which they knew they had plagiarised. This would eventually lead to students learning about faults in the system so potentially they could try to evade detection using these “holes” and ultimately make the software less useful as a teaching tool. This is a valid point as Turnitin[®] (like any other automated system) has limitations. On the accuracy of detecting the source, the software correctly matched most articles that are available on the internet. However the matching rate was low when students used information from the PubMed[®] abstracts. This may be due to the fact that the software cannot access this web page, as explained in Turnitin[®] software itself (www1). However this is worrying as PubMed is one of

Table 2
Examples excerpts from students' first and re-submissions

Excerpt from First submission	Potential academic irregularity	Modified Re-submission
<p>“<i>E. Faecalis</i> is a known pathogen and is known to colonise the large intestine and the urinary tract (Rollin, 2000). This is helped by the fact that its optimum temperature is close to the optimum of humans (Brooker et al, 2008)”</p>	<p>“Patch-work” using information from two books, without forming the link.</p> <hr/> <p>*Academic advice was given how to make a meaningful sentence, in context with the assignment title</p>	<p><i>E. Faecalis</i> is a pathogen that can cause intestinal and urinary tract infections (Rollin, 2000). Since the optimum temperature needed for its growth is approximately the same as human body temperature, it can easily colonise human intestine (Brooker, 2008).</p>
<p>...laboratory blood assays designed to give information about the state of a patient's liver, called liver function tests. The parameters measured include albumin, bilirubin and others. Liver transaminases (AST/ALT) are believed not to be liver function tests, but biomarkers of liver injury in a patient with some degree of intact liver function.</p>	<p>Cut & paste plagiarism. Information lifted, word-for-word from www.medlibrary.org</p> <hr/> <p>*Academic advice given but student was not fully engaged with the process. This can be seen in the re-submission which shows student tried to acknowledge the source but has not achieved the learning outcome.</p>	<p>According to www.medlibrary.org “<i>liver function tests are laboratory blood assays designed to give information about the state of a patient's liver</i>”. “<i>The parameters measured include albumin, bilirubin and others. Liver transaminases (AST/ALT) are not liver function tests, but biomarkers of liver injury</i>” (see reference)</p>
<p>Immunocytochemical analysis by TH showed a significant decrease in TH-positive cells after 1 mM MPP+ for 24 h, and the surviving TH-positive had an immature appearance with an apparent loss of processes. Scale bar: 400µm for 5X and 100µm for 20X. Inset: An example of TH-positive cells in a colony stained with DAPI to show cell nuclei (Freed, 2006)</p>	<p>Inappropriate paraphrasing when student tried to narrates data (and a figure) from published article.</p> <hr/> <p>*Student did not seek academic advice but tried to modify the statement with proper paraphrasing and attributions. Her re-submission shows the student has tried to understand the article and then paraphrased.</p>	<p>Using immunocytochemical analysis Freed (2006) has shown that after 24 hours treatment of 1 mM of MPP+ has significantly reduced the tyrosine hydroxylase (TH) positive cells. Interestingly the surviving TH-positive had an immature appearance. Figure adapted from Freed (2006):- Scale bar: 400µm for 5X and 100µm for 20X. Inset: An example of TH-positive cells in a colony stained with DAPI to show cell nuclei</p>

One example each from (1) patchwork (2) cut & paste plagiarism and (3) inappropriate paraphrasing from the first submission is given in the left hand column. Their improvements in re-submissions are given in the respective right hand column. Additional information is given in the middle column.

the commonest open access websites used by the scientific community, from students to researchers. In the case of sentences taken from published scientific books or even recently published articles, the performance by the software is even lower. Turnitin[®] failed to identify any of the material plagiarised from the books. Consequently allowing students to access the report may result in them finding these “holes”. However, this can be addressed by limiting the opportunity of students, to check the Turnitin[®] reports to one attempt. Moreover, it should be noted that the final submission is still going to be checked by the academics. As long as the academic “wisdom” and manual checking is applied, any attempts to cheat the system can be minimised. In fact this would give a strong message to the students that their reports are carefully scrutinised not only electronically but also manually checked—a better deterrent against plagiarism.

Considering the student misconceptions, it is clear that they are confused about the differences between (a) patchwork; (b) paraphrasing; and (c) quoting. Although these were addressed with relevant examples in the anti-plagiarism workshops, perhaps they did not grasp the subtle differences and need to learn by making these mistakes. Opportunities to check their submissions would definitely enhance their understanding.

By matching the sentences, Turnitin is actually showing the students that they have copied and therefore makes them think whether they have achieved the learning outcomes.

At least it would help the students understand that a properly acknowledged (and/or quoted paragraph) may not be considered as plagiarism; but has still not fulfilled the learning outcomes (and would therefore attract low marks). Using these examples, academics can effectively enhance their students’ reflective learning and also make them learn to attribute ideas in context with the research question.

Conclusions

The data from this study suggest that Turnitin[®] can be used as a teaching tool to enhance reflective learning, provided the process is controlled properly by the academics. It is also clear that the exercise should be linked with anti-plagiarism workshops and/or personal tutoring systems to assist the students’ understanding and therefore helping them learn from their mistakes.

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