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A variety of free and commercial software applications designed to detect plagiarism from Internet sources has appeared in recent years. However, their effectiveness and impact on student behaviour has been assumed rather than confirmed. The study presented here explores the responses and perceptions of a group of first year students at an Irish university after their first contact with anti-plagiarism software in the context of peer-reviewed assignments. The results indicate that the use of anti-plagiarism software led to a decrease in Internet plagiarism and to lower grades being awarded in peer reviews. Additionally, students were found to have a positive attitude towards the anti-plagiarism software in the context of peer reviewed assignments. Implications for educators on the use of this software are discussed.

Introduction

The Internet has brought unprecedented opportunities for access to information and for contact with others inside and outside the classroom, but also new challenges for educators to promote critical thinking, independent learning and academic honesty. Plagiarism is far from a new phenomenon, yet claims that the Internet has contributed to its increase are common (Sutherland-Smith and Carr 2005 in Australia; Rawwas, Al-Khatib, and Vitell 2004 and Chapman and Lupton 2004 in the US; Pomfret 2000 in China). Other authors have found levels of self-reported Internet-based plagiarism similar to those of conventional forms of cheating (Scanlon and Neumann 2002), painting a much less alarmist picture of the situation. Epidemic or not, Internet-based plagiarism has received increasing attention largely due to cheating scandals, the proliferation of 'paper mills', and the widespread use of the Internet for learning purposes.

Few investigators have attempted to explore the dynamics that underpin Internet-based plagiarism. Chaky and Diekhoff (2002) found that a slight majority of 'Internet cheaters' in their sample were men. They also noted that those who used the Internet unethically engaged in more cheating justification, which suggests that 'cutting and pasting' from an Internet source is often perceived by students as legitimate 'research'. Scanlon and Neumann (2002) investigated self-reports of Internet plagiarism, students' perception of their peers' behaviour, the ethics of Internet plagiarism and the institutional sanctions associated with it. They suggest that:

> Clearly this is an area that deserves further study … if students perceive that a majority of their peers are going online to plagiarize; they may be more apt to plagiarize themselves. (383)

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Our investigation aims to address the issue of the impact of the use of anti-plagiarism software in the specific context of an assessment methodology based on peer-assessed assignments. We believe this is a relevant and potentially fruitful debate, as some of the most important authors in the literature on plagiarism have highlighted the importance of perception of peer's behaviour as one of the most salient contextual influences on cheating behaviour (McCabe and Trevino 1997).

Anti-plagiarism software

Among the tools that educators are given to deter Internet-based plagiarism there is a variety of free and commercial software (Turnitin, My Drop Box, EVE, WcopyFind, and Word-CHECK). These services usually provide the facility to measure the level of similarity between a student's work and material publicly accessible online. Often they also store a copy of every submission in a common database, which facilitates the detection of plagiarism among peers. Turnitin is currently able to disregard quoted material and bibliographical references from the student submission before rendering an 'originality report'. It is important to note that these systems serve only as an indication of where plagiarism may be happening, by flagging those submissions that show a high percentage of matching text with online sources. Although increasingly sophisticated, no software exists that can distinguish whether a student is being academically dishonest or not. This judgement remains with teachers and is based on their subject expertise, previous experience and knowledge of their students.

The philosophical debate

The plethora of educational institutions that have adopted plagiarism prevention software indicates that its popularity is thriving; for example, Turnitin claims its system has been adopted by over 90% of all the colleges and universities in the United Kingdom (www.turnitin.com). As a result, a debate has emerged on the pedagogic and ethical reasons for and against the use of technological solutions for investigating the originality of students' work. While software suppliers assert that their plagiarism prevention module can enhance teaching by 'deterring plagiarism before it happens' (www.turnitin.com), detractors regard the service as pedagogically inappropriate. Lindsay (2003, 111) alludes to the haziness of the concept of plagiarism, and notes the inefficiency inherent in using search-and-compare programmes if plagiarism is to be understood in a broader context as the appropriation of ideas, and not simply the verbatim use of another's text without acknowledgement. Others regard it as untrustworthy and even unethical. For example, Carbone (2001) denounces the system as a 'pedagogic placebo', that assumes that students have no honour and need be watched, and that teachers are too busy or incompetent to teach students how to write responsibly. Similarly, Sutherland-Smith and Carr (2005) report their concerns that the teachers participating in their investigation often viewed Turnitin as a purely punitive tool. The authors report that some members of staff approved of the notion that:

> Providing students were given 'due notice' that the software was used, the university had discharged its responsibilities. The teachers felt that where students were caught for plagiarism and punished, that would be the educative value of the anti-plagiarism software, as students would be unlikely to re-offend. (6)

Other critics refer to organizational and managerial motivations behind the use of these tools. For example, Marsh (2004, 428) maintains that Turnitin and similar services 'socialize student writers toward traditional notions of textual normality and docility', and (in abstract):

Represent a new phase in the bureaucratization of composition instruction consistent with past administrative practices and reflective of emerging corporate management alliances in higher education.

In the same vein, Jenson and De Castell (2004) argue that the purchasing of technologically enabled plagiarism detection services by higher education institutions is largely driven by self-interested individualism and private accumulation of knowledge capital.

The practical debate

Despite criticism, anti-plagiarism software systems are likely to remain popular as long as they effectively address the problem of students engaging in extensive 'copy-and-paste' behaviour, using the Internet as a convenient resource. This effectiveness has, however, been assumed rather than demonstrated, and the impact of this type of software on students' behaviour and perceptions remains largely unexplored. Logical thinking would suggest that if students perceive a higher likelihood of being caught they will be less likely to use the internet indiscriminately. Previous research has supported this notion that fear of being caught should discourage academic dishonesty (Diekhoff et al. 1999; McCabe and Trevino 1997; McCabe, Trevino, and Butterfield 2001, 2002). On the other hand, many experts support the claim that students are not likely to respond to policing measures. For example, Franklyn-Stokes and Stephen (1995) found, in their North American sample of students, that fear of punishment or of being found was not given as one of the main reasons for not cheating. This was confirmed again one year later in a large sample in the United Kingdom, where the reasons given by students for not cheating did not include the fear of plagiarism being detected by their teachers (Newstead, Franklyn-Stokes, and Armstead 1996). As noted earlier, the impact that students' perception of their peers' honesty has on their own has been repeatedly stated (McCabe and Trevino 1993; McCabe and Trevino 1997; McCabe, Trevino, and Butterfield 2002). We could therefore expect that plagiarism will be an especially problematical issue in classes where student-led assessment is promoted.

The research questions

In the light of this discussion, this article explores the effect of the introduction of anti-plagiarism software on a group of first year engineering students in an Irish university. Our study addresses a gap that currently exists in the literature on academic dishonesty: lack of investigation into the actual effects of plagiarism prevention software on students and their behaviour in specific contexts (in our case, technology-enhanced peer-reviewed assessment). This article addresses the impact that the use of anti-plagiarism software has on three different areas: the originality of the students' work, their academic performance and their opinions about the use of the software this specific situation.

The experience presented in this article is based on a first year information technology course delivered to a predominantly male, conventional age class within an engineering college at a university in Ireland. As part of the course, students were required to complete six peer-reviewed assignments, four of which were submitted on paper and two submitted using Turnitin anti-plagiarism software. The circumstances were appropriate for academically dishonest behaviours to flourish, as plagiarism has been found to be related to young age (Franklyn-Stokes and Stephen 1995), male students (Chaky and Diekhoff 2002; Underwood and Szabo 2003), and coursework (Ashworth, Bannister, and Thorne 1997). These last authors note that 'the informal context in which coursework exercises are

completed means there is ample scope to cheat through collusion, plagiarism and so on, in contrast to the controlled, invigilated environment of unseen examinations' (199).

The extent to which students engaged in Internet plagiarism during the paper-based peer-reviewed assignments is unknown. But it is possible, using the Turnitin originality reports, to examine the impact that the introduction of the software, and the way that it was dealt with by the lecturer, had on Internet plagiarism. The extent to which students incorporated significant amounts of text from online sources, or from peers, into the first and second assignments submitted to Turnitin is compared. This comparison is relevant and will be explained in the next section. After the first Turnitin submission, the lecturer informed students of their results in terms of the similarity between their assignments and online sources, to stress the importance of academic honesty and acceptable research habits. Based on this, the first research question was:

(1) Are there any differences in the amount of Internet plagiarism between the first and second assignment submitted to Turnitin?

As will be discussed in the next section, there were strong reasons to believe that using anti-plagiarism software to submit and correct the peer-reviewed assignments would help to check for plagiarism, and prevent cheating behaviour (such as self-scoring and friend-scoring) observed in paper-based assignments. Data were analysed to determine if this had an impact on the way that students rated their peers' work. Therefore, the second research question addressed was:

(2) Are there any differences in the grades allocated by students to their peers between those assignments that were submitted and corrected online, and those that were submitted and corrected by hand?

Finally, an investigation of the effects on students' behaviour of the use of anti-plagiarism software could not ignore the students' own perceptions, with reference to their own and their peers' behaviour. As a result, a third research question addresses this:

(3) How do students perceive the use of anti-plagiarism software within the context of peer review?

Method

Context of investigation

Teaching within the institution in which this study was conducted is organised in semesters, with a strong focus on modularization and continuous assessment rather than summative student evaluation. The first year module that forms the basis for this study was called 'Manufacturing Integration', and was delivered within the College of Engineering at the institution during the autumn semester 2005. It was one of six modules taken by first year students. One of the learning outcomes for the module specifically addressed the issue of plagiarism: 'On completion of this module students will be able to demonstrate an ability to correctly cite material referenced within the student's own work and thereby avoid plagiarism.'

Student performance was assessed using three methods: 30% for six peer-reviewed assignments; 40% for a laboratory-based computer examination and 30% for an end of semester exam. This case concentrates on the six peer-reviewed assignments. These were graded between 0 and 5, a maximum score representing 5% of the total marks for the module.

All assignments were very similar, typically requiring students to conduct a small amount of research, critically analyse the content and express their opinions in their own words within a two-page report. The reasons for using peer-assignment in this module were communicated to students at the start of the module:

(a) to allow students to learn from each other's successes and weaknesses;
(b) to help students to understand the assessment process;
(c) to generate a high level of feedback on assignments; and
(d) to allow multiple assessments, which otherwise would be impossible to correct within the timeframe available given the large instructor-student ratio (one lecturer and two teaching assistants for 205 students).

In order to familiarize students with the process of peer assessment a paper-based trial run was held during early in the semester. This involved the students submitting a short, one-page assignment that was peer assessed and returned to the lecturer. The lecturer evaluated all the corrected assignments, and returned them to the class along with feedback on how the peer assessment had worked. Students were not graded for this trial run.

Two of the assignments (the third and fifth) were corrected using the peer evaluation module of Turnitin; the other four were corrected manually. In each of the six peer-reviewed assignments, every student corrected two assignments and each student received two grades. These were averaged to get the final assignment grade. The results were then entered into a spreadsheet, and a sample was checked for consistency and accuracy in marking before the assignments were returned to students.

The decision to use the peer assessment module of Turnitin (for assignments 3 and 5) was made for different reasons. Firstly, it was seen as a mechanism to automate the peer-review process, eliminating the need to sort assignments and manually enter results. It also guaranteed papers were anonymously distributed among the whole class, so its use was expected to prevent cheating behaviour observed by the lecturer and her teaching assistants in the two first assignments, where some students corrected their own work or gave high marks to their friends. Finally, the anti-plagiarism software was deployed as a way to examine the level of plagiarism, both from online sources and among students, and to give more exposure to this issue, which we believe can be especially problematic in the context of peer-reviewed assignments.

Before using Turnitin, the software was explained to students during a lecture, and they were given a demonstration of how it works and told that they would get assistance during their lab sessions to set up Turnitin accounts. They were also informed of the penalties that they would receive for plagiarism: they would lose 2.5 marks (out of 5 for each assignment) when the Turnitin originality report identified 50–80% of similarity with an online source or another student's submission, and no marks at all would be awarded when 80–100% similarity was found. This marking scheme was decided by the lecturer on the basis of not being too strict, and did not introduce penalties for up to 50% matching text. The decision that under 50% similarity was deemed to be acceptable was subjective, and based on the expectation that assignments would show a certain level of matching text, corresponding to referencing, quoting and reference listing. Also, the priority was to tackle blatant deception, while maintaining a positive rather than a punitive focus on learning. The peer-review process (both manual and computer based) happened under supervision at all times.

Prior to using Turnitin the issue of plagiarism was addressed within the module in several instances. A lecture was given early in the semester explaining to students what

plagiarism is, why it is a problem and how it should be avoided. Additionally, students were required to read a three-page document written by the university's Dean of Teaching and Learning, that explained why and how students should avoid plagiarism. Also, the lecturer reported back to the whole class the general outcomes of the Turnitin originality reports after the first computer-based submission for assignment 3, and took the opportunity to reinforce the importance of avoiding plagiarism and the penalties that these carry as a consequence.

An incident occurred early in the semester that illustrates how attention to the issue of plagiarism was embedded into the module. In the first week students were asked to write a one-page assignment that was to be peer assessed the following week; this was part of the trial run of the process. The peer assessment ran smoothly and the teacher collected the student's corrected assignments for evaluation. While checking some of the assignments corrected by students for accuracy of marks awarded, it was noticed that two students had submitted identical work. During the third lecture, the class were told that two students had copied assignments and would be penalized. The students in question approached the teacher at the end of the lecture and were told that they would lose 10% of their overall final grade in the module.

Data collection

To address the research questions outlined earlier in this article, data were collected from three sources, namely:

(a) the originality reports for each assignment reviewed through Turnitin;
(b) the students' academic results; and
(c) an attitudinal questionnaire.

The results of the originality reports produced for the two Turnitin assignments were compared for each student using paired *t*-tests. This allowed some comment to be made about the impact of anti-plagiarism software on the incidence of plagiarism in the class.

The results that students awarded to their peers on the paper (manually corrected) and Turnitin-based assessments were also compared using paired *t*-tests. This comparison aimed to explore the association between the use of anti-plagiarism software and the grade that students allocated to their peers' work. In other words, the objective was to see if the students' ratings were significantly better in the manually corrected or Turnitin-based assignments.

A web-based questionnaire was administered to students to determine their level of agreement to eight questions about the use of Turnitin, using a 7-point Likert-type scale from 1 indicating 'I strongly disagree', to 7 meaning 'I strongly agree'. The objectives of the questionnaire were to understand the degree to which students were comfortable with using Turnitin and were aware of its benefits. The questionnaire also included an open question allowing students to give additional opinions on the use of the software for peer-reviewing assignments. These responses allowed the authors to obtain information regarding the perception of students of the use of the software.

Participants

The data presented in this article is based on a group of 197 students who completed the module (eight students had left the course or transferred to other modules by the end

of the semester). The students, 90% male and all in their first year and mostly between ages 17 and 19, came from eight different degree courses, including engineering and technology, design and technology teaching among others. While the age profile of the respondents is representative of first year courses in this university and other Irish higher education institutions (Clancy 2001), the large proportion of males is characteristic of engineering studies and must be considered carefully in the interpretation of the results of this investigation. A total of 168 students submitted assignment 3 and 150 submitted assignment 5 using Turnitin (a number of the students who finished this module did not submit all their assignments, losing therefore 5% of the grades for each assignment missed, but completed their laboratory work and took the final examination, obtaining an overall sufficient grade to pass the module). A total of 141 comparisons between each student's originality reports were conducted (cases where one or both submissions were missing were discarded), which represents over 72% of the total sample.

At the end of the peer assessment process, students were requested to complete the questionnaire during one of their computer labs. Attendance at laboratories was required in the module (students were docked marks for missing labs), and was consistently high during the course, so it was expected that this would compensate for the self-selection factor introduced with any survey measure. Students were assured of the anonymity of their responses and the questionnaire included no personal information that could allow anyone to disclose their identity. Each student was seated freely at any computer available in the session: therefore, they also were aware that their responses could not be identified either through the computer address. A total of 158 responses were collected, which represents 80% of the valid sample.

Results

Research question 1

Are there any differences in the amount of Internet plagiarism between the first and second assignments submitted to Turnitin?

A reduction in plagiarism levels is observed between the first and second submission using the Turnitin, this is shown in Table 1.

Parametric paired *t*-tests confirm a statistically significant difference ($t = 3.764$, $p \leq 0.001$) between the average of matching text found by Turnitin for the submissions to assignment 3 (mean = 0.25, SD = 0.27) and assignment 5 (mean = 0.15, SD = 0.19). Figure 1 graphically represents this observed difference, showing the introduction of Turnitin is associated with a significant decrease on the incidence of cases in which more than 25% of the text matched one or more online sources, or the work of another peer in the class.

Table 1. Proportion of matching text for assignments submitted through Turnitin.

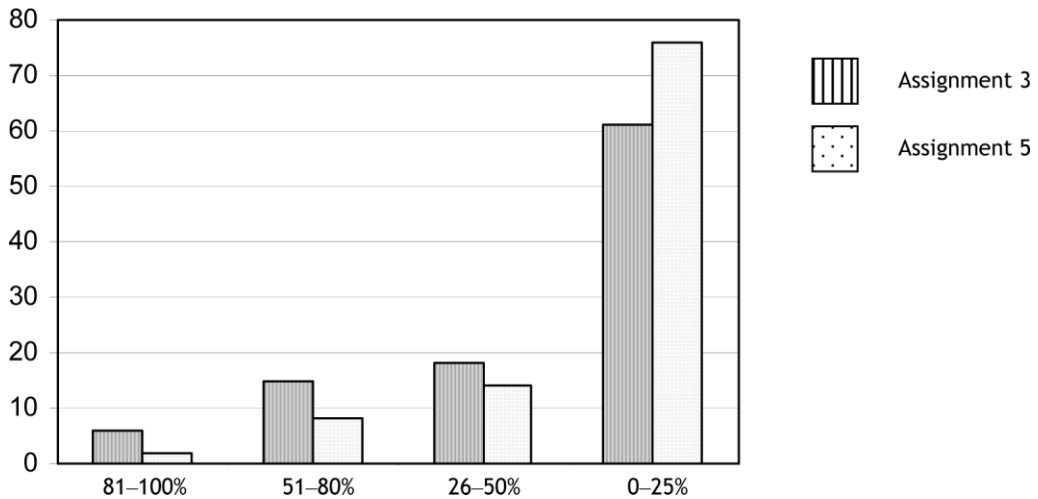| Matching text	Assignment 3		Assignment 5	
	Total submissions	Valid submissions	Total submissions	Valid submissions
81–100%	11 (6%)	11 (8%)	3 (2%)	3 (2%)
51–80%	25 (15%)	18 (13%)	12 (8%)	10 (7%)
26–50%	30 (18%)	25 (18%)	21 (14%)	17 (12%)
0–25%	102 (61%)	87 (62%)	114 (76%)	111 (78%)
Total	168	141	150	141

Figure 1.   Proportion of matching text for both assignments submitted through Turnitin.

Research question 2

Are there any differences in the grades allocated by students to their peers between those assignments that were submitted and corrected online, and those that were submitted and corrected by hand?

As stated before, each of the peer-reviewed assignments was graded between 0 and 5 by two students, and the average for both markings was calculated. The mean and standard deviation for each assignment is shown in Table 2 (note: these scores do not include penalties incurred by students for plagiarism).

To determine whether or not there was a statistical difference between the assignments corrected using Turnitin and those corrected manually, a paired sample *t*-test was conducted between the average student grade received for the four manually corrected assignments (mean = 3.068; SD = 0.997) and the average grade for the two assignments corrected using Turnitin (mean = 2.802; SD = 1.373). The average difference between manually and Turnitin corrected assignments (mean = 0.267; SD = 1.034) was significant at $p \leq 0.01$ ($t = 3.659$). This suggests that students rated their peers' performance significantly lower when Turnitin was used to correct the assignments.

Research question 3

How do students perceive the use of anti-plagiarism software in this context?

Table 2.   Average scores for peer reviewed assignments as marked by students.

Assignment	Mean score	Standard deviation	N
1	3.60	0.70	181
2	3.02	0.80	176
3[T]	3.32	1.00	162
4	3.76	0.66	168
5[T]	3.80	0.72	158
6	4.06	0.55	166

Note: T, assignments corrected using Turnitin.

Table 3. Results of the survey administered to explore the students' perceptions of Turnitin.

Scale items	Strongly disagree				Strongly agree				
	1	2	3	4	5	6	7	Mean	SD
1. I found Turnitin very easy to use.	5.7	4.4	12.0	10.8	15.2	24.7	27.2	5.08	1.80
2. I understand the benefits of using Turnitin.	1.9	2.5	6.3	11.4	22.2	29.1	26.6	5.43	1.44
3. I think that Turnitin is very effective in detecting plagiarism.	3.8	2.5	3.8	16.5	14.6	25.9	32.9	5.45	1.59
4. Turnitin is a very effective way of submitting and correcting assignments.	6.3	3.8	14.6	20.3	18.4	20.9	15.8	4.66	1.70
5. Using Turnitin made me much more aware of plagiarism.	5.1	5.7	10.1	15.2	15.8	20.9	27.2	5.03	1.78
6. Using Turnitin made me feel satisfied that the anonymity of the peer assessment process would be assured.	5.7	3.2	6.3	31.6	20.3	15.8	17.1	4.73	1.59
7. Using Turnitin was better than correcting paper versions of assignments.	10.1	10.8	7.0	19.6	15.2	15.8	21.5	4.53	1.97

Note: Scale scores (% of *n* = 158). SD, standard deviation.

The results of the questionnaire addressing the students' perceptions of the plagiarism prevention software are shown in Table 3.

Taking responses of 5 or more in the Likert scale (i.e., over the expected average point of 4) as an indication of overall agreement with a particular statement, the results show that Turnitin is perceived as easy to use by most (67% of respondents, mean = 5.08). The majority (73.4%) trusted the reliability of the system to detect plagiarism (mean = 5.45), even when they did not actually see their own originality reports. Also, 53.2% of the respondents reported that using the software made them feel assured of the anonymity of the peer assessment process, although 31.6% answered to this item with the average point in the scale, probably indicating that the issue of anonymity was not a crucial one for many of the students given the large size of the class (the paper version of the peer assessment process did not reveal the identity of students either). 52.5% of the students believed that using Turnitin was better than correcting paper versions of assignments (mean = 4.53), and 55% of them agreed that Turnitin is an effective way of submitting and correcting assignments (mean = 4.66). Hence, although unpopular with a minority, the software was generally perceived to be usable and efficient by this group of first year students (this was partially due to the students being guided through the process of creation of their Turnitin accounts, and a trial submission in one of the lab sessions).

Beyond perceived usability and efficiency, an important question is whether the students could see any benefit in using the anti-plagiarism software. In answering this, 78% of the respondents agreed that they understood the benefits of using the anti-plagiarism software (mean = 5.43), and, more importantly, 64% of the students felt that using Turnitin made them more aware of plagiarism (mean = 5.03).

A total of 39 students (about 25% of the respondents) offered additional qualitative comments on a voluntary basis that add further insight into the students' perceptions. Although these comments cannot be regarded as representative of the whole first year student population at the institution, they offer avenues for further thought and investigation. The first outstanding finding from the qualitative comments is that quite a few students perceived that being asked to submit and peer-assess assignments using anti-plagiarism software had forced them to put more effort into the writing of the assignment:

Turnitin was fast, easy and detected plagiarism (…) it makes us use our own work more and cuts down on plagiarizing. (Student 41)

The only assignments that I felt where some effort was put into were the Turnitin ones. The majority of the other assignments were mostly copied. (Student 6)

(Turnitin is a) very good way of checking plagiarism and getting us to think more about the topic and look up more references. (Student 69)

Also, a number of students claimed that the integration of the software had promoted greater awareness about plagiarism, and made them feel more accountable. Some students denounce other students' unethical behaviour on the paper-based peer assessment process (cheating behaviour like grading their own work instead of handing it for assessment by a peer), and note how using Turnitin helped to avoid this:

Use Turnitin all the time because there is less chance of people correcting their own work. (Student 144)

Finally, one of the students' comments relates to the contribution of using this type of technology to an equalitarian evaluation system for all:

Turnitin was good because those who were copying off the Internet for the hand up assignments had to work; I think it is a much fairer way of correcting. (Student 31)

However, not all students were positive about the use of Turnitin. One of the major drawbacks was that it failed to recognise a lot of Microsoft Word's formatting information. Students found this to be a problem:

The only downfall was the formatting problems. Other than that I think it worked very effectively. (Student 153)

The only problem was the loss of formatting info despite the fact that turnitin.com says they support Microsoft Word documents. (Student 73)

Additionally, some students did not feel that Turnitin offered any benefit over the manual method of correcting assignments:

When your work is corrected in Turnitin you don't get to see were you lost marks while you do with the written corrections. (Student 58)

It is good in the fact that it reduces plagiarism and is very good in having anonymity but I do not feel it is a better option than hand corrected work. (Student 79)

Discussion

This investigation revealed a significant reduction in Internet plagiarism levels between two instances of peer-reviewed assignments submitted and corrected using Turnitin. Arguably, the way the lecturer dealt with the issue of plagiarism with this class may have had a strong and positive influence. After the submission of assignment 3, she communicated the results of the Turnitin originality reports to the class and reminded them that 21% of the assignments would get some or all marks deducted according to the plagiarism policy previously established. Individual students were not pinpointed, but were invited to discuss their results

with the lecturer in private and argue their case, in an effort to promote the use of Turnitin as a learning tool rather than a punitive one. This is probably related to the observed decrease in the number of cases of suspected plagiarism after the second computer-based submission. However, the impact of more than two online submissions was not measured. This being said, the result observed here is a strong indication that the use of anti-plagiarism software in an educational context, that paid positive and proactive attention to the issue of plagiarism, served as a disincentive to use online sources in an indiscriminate way. The impact of using the software over a longer time-scale must be explored further in future research.

This study also found that the use of anti-plagiarism software was statistically associated with students awarding lower grades to their peers. Arguably, this effect may be related to grade inflation occurring when the manual method was used. As mentioned above, there were strong indications (both from anecdotal evidence and from the qualitative comments in the questionnaire) that the students were cheating when assignments were manually corrected, with a number of students correcting their own work or that of their friends. The introduction of the software is likely to have brought greater rigour and accountability into the grading process. Alternatively, it is possible that the work completed by students for the computer-based submission was of a lower quality than that for the manually corrected assignments (which was more likely to have been plagiarized).

The results of the questionnaire showed that a majority of the students in this class perceived the software to be practical as a means of monitoring the originality of their work in the context of peer-reviewed assignments. Most of them claimed to understand the benefits of using such software and to be more aware of plagiarism as a result. Some students claimed to have put a greater effort into the writing of their assignments when the software was used. Also, there were several comments referring to a greater sense of being accountable for one's work. This increased awareness was highlighted during the correction of the fourth assignment. Having already corrected assignment 3 using Turnitin, several students noticed that the work they were correcting didn't look original, and asked for assistance from the teacher in assigning marks. This had not occurred when correcting earlier assignments, and illustrates that the students started paying attention to the originality of other students' work.

Finally, some additional comments evolved around their academic environment being fairer as a result of the introduction of Turnitin. Perceptions of anti-plagiarism software as a resource that facilitates fairness between students could be interpreted as a first step towards the development of a conscience of academic honesty, which is based on the belief that educators must treat everyone by the same standards. This being said, the comments gathered here are insufficient to assert that the use of anti-plagiarism software has effectively helped to interiorize values of academic honesty. It could be argued that the differences could represent less citation (fear of plagiarism) rather than greater academic honesty. Nevertheless, there are strong indications that the use of the tool acted as a deterrent to 'copy-and-paste' behaviour from online sources, contributed to greater awareness of plagiarism and its consequences, and was generally accepted in a positive light by students in this class. Also, qualitative evidence gathered in the questionnaire indicated that at least some of the students invested more effort in writing the assignments and felt more accountable.

Further research is needed to explore how plagiarism prevention software is perceived by more mature student populations, women students, and when different teaching and assessment approaches are used. Moreover, the specific institutional and cultural context of this investigation must be considered when attempting to generalise the findings elsewhere, as several studies have emphasized the impact of cultural values on conceptions and incidence of plagiarism (Chapman and Lupton 2004; Gbadamosi 2004; Rawwas, Al-Khatib, and Vitell

2004; Robinson, 1992). Students and instructors in different educational environments are likely to hold different attitudes towards plagiarism, and experience tools like Turnitin in a different light. The findings of this study are likely to be confirmed in educational contexts that, like ours, share the basic four underlying principles of US-influenced education, as defined by Robinson (1992): individualism and competition, equality and informality, pragmatism and reasoning style, and philosophy of education based on values of knowledge ownership.

Conclusion

The results of this study, though based on a convenience sample and pertaining to a specific context, have painted a picture of a group of first year students who perceived the anti-plagiarism software quite positively and accepted the level of control imposed. The use of the software in this particular context was relevant from the students' point of view, and most of them became more attentive to the originality of their work as a result. The use of the tool brought the issue of plagiarism to the fore while dealing with the issue in a collective, rather than individualized, manner. This relates to the strong relationship demonstrated by McCabe, Trevino, and Butterfield (2002) between academic dishonesty and the perception of peers' behaviour. Students gained more information on plagiarism levels in their class, and were provided with the necessary support to avoid it, so they were better empowered to make an informed choice as a result.

However, this does not necessarily imply that academic integrity values were developed in the process. Indeed, students could be more alert just because of fears of being caught at fault. The use of anti-plagiarism software *per se* may involve a risk of reinforcing expectations of control, instead of interiorization of academic values. This and similar tools may be a useful resource for educators, but one to be used in combination with a sound pedagogical design. The possibilities for using the software in ways that are not controlling, positive and proactive are numerous: for example, by allowing students to see their own originality reports, and, with the help of a tutor or mentor, helping them to improve their writing and referencing skills, and express themselves in their own voice. Other suggestions for best practice in the use of a tool like Turnitin which emerged from our experience throughout this study include:

- To notify students in advance that the software will be used, and explain the reason why this is the case. Information should be reinforced both in the syllabus and verbally during the semester.
- To advise students to independently submit their papers, provide some training in doing so, organize an initial trial submission and give effective ongoing support.
- To develop, communicate and abide by an academic integrity policy that includes a definition, conduct guidelines and disciplinary process. The efficacy of such policy statements on changing the views of students on the matter have been supported by previous research (Brown and Howell 2001), and highlight the importance that students are very clear about what constitutes plagiarism.
- To allow students to resubmit their work when a high percentage of matching text has been identified, in order to promote the use of anti-plagiarism software as a learning tool rather than a controlling device.

The results of this investigation have somewhat contradicted previous findings indicating that measures implemented to monitor plagiarism are not likely to be an effective deterrent

(Franklyn-Stokes and Stephen 1995). However, this study supports the view of these authors that:

> At least in the short term, it would seem wiser to concentrate on informing students as to what behaviour is deemed to be acceptable, rather than introducing draconian sanctions. (170)

We strongly suggest that anti-plagiarism software should be approached as an aid to a coherent and positive educational approach to academic honesty, rather than as a quick shortcut to stop plagiarism and cheating. Using this type of software just to police students implies a reactive attitude to the problem of plagiarism, which disregards the reasons that are likely to underpin it, the real intentions of the students, and the actions that may prevent it from happening.

Especially when dealing with younger students, it is important to remember that plagiarism is a concept with which newcomers are not likely be familiar, and that they may lack the knowledge to avoid plagiarising. Getting students to understand the seriousness of academic honesty is an intrinsic part of the process of academic socialisation. This uncertainty about students' views of what is plagiarism and what it entails is strongly supported in a study by Ashworth, Bannister, and Thorne (1997, 201):

> The idea that it is possible to be found guilty of this most cardinal of academic sins even when making an effort to avoid plagiarising was entertained as real by nearly all interviewees. A central element of this fear was the almost unanimous belief that plagiarism can occur by accident, regardless of personal awareness of the university regulations.

It is also naïve for educators to uncritically use plagiarism detection software as an antidote to all methods of internet plagiarism, as students can potentially devise means as sophisticated as those deployed to enforce anti-plagiarism rules. But, more importantly, mere policing may result in self-fulfilling prophecies of deceit and fraud. This being said, the tool has several possibilities if used in combination with formative assessment, a sound policy to address plagiarism, and a respectful attitude towards students.

References

Ashworth, P., P. Bannister, and P. Thorne. 1997. Guilty in whose eyes? University students' perceptions of cheating and plagiarism in academic work and assessment. *Studies in Higher Education* 22, no. 2: 187–203.

Brown, V.J., and M.E. Howell. 2001. The efficacy of policy statements on plagiarism: Do they change students' views? *Research in Higher Education* 42, no. 1: 103–17.

Carbone, N. 2001. Turnitin.com, a pedagogic placebo for plagiarism. Bedford/St. Martin's Tech Notes: Technology and Teaching. http://bedfordstmartins.com/technotes/techtiparchive/ttip060501.htm (accessed October 10, 2007).

Chaky, M., and M. Diekhoff. 2002. A comparison of traditional and internet cheaters. *Journal of College Student Development* 43, no. 6: 906–11.

Chapman, K.J., and R.A. Lupton. 2004. Academic dishonesty in a global educational market: A comparison of Hong Kong and American university business students. *International Journal of Educational Management* 7: 425–35.

Clancy, P. 2001. College entry in focus: A fourth national survey of access to higher education. Report for Higher Education Authority (Dublin).

Decoo, W. 2002. *Crisis on campus: Confronting academic misconduct.* Cambridge, MA: MIT Press.

Diekhoff, G.M., E.E. Labeff, K. Shinohara, and Yasukawa, H. 1999. College cheating in Japan and the United States. *Research in Higher Education* 40: 343–53.

Franklyn-Stokes, A., and E. Stephen. 1995. Undergraduate cheating: Who does what and why? *Studies in Higher Education* 20, no. 2: 159–72.

Gbadamosi, G. 2004. Academics ethics. What has morality, culture and administration got to do with its measurement? *Management Decision* 42, no. 9: 1145–61.

Jenson, J., and S. De Castell. 2004. 'Turn it in': Technological challenges to academic ethics. *Education, Communication and Information* 4, no. 2–3: 311–30.

Lindsay, R. 2003. Review of *Crisis on campus: Confronting academic misconduct,* by W. Decoo. *Studies in Higher Education* 28, no. 1: 110–2.

Marsh, B. 2004. Turnitin.com and the scriptural enterprise of plagiarism detection. *Computers and Composition* 21: 427–38.

McCabe, D.L., and L.K. Trevino. 1993. Honor codes and other contextual influences. *Journal of Higher Education* 64: 522–38.

McCabe, D.L., and L.K. Trevino. 1997. Individual and contextual influences on academic honesty: A multicampus investigation. *Research in Higher Education* 38: 379–96.

McCabe, D.L., L.K. Trevino, and K.D. Butterfield. 2001. Dishonesty in academic environments. *The Journal of Higher Education* 72: 29–45.

McCabe, D.L., L.K. Trevino, and K.D. Butterfield. 2002. Honor codes and other contextual influences on academic integrity: A replication and extension to modified honor code settings. *Research in Higher Education* 433: 357–78.

Newstead, S.E., A. Franklyn-Stokes, and P. Armstead. 1996. Individual differences in student cheating. *Journal of Educational Psychology* 88, no. 2: 229–42.

Pomfret, J. 2000. China finds rampant cheating on college test, competition intense for university spots, and success on exam can be ticket to good life. *Washington Post,* August 8.

Rawwas, M., J. Al-Khatib, and S.J. Vitell. 2004. Academic dishonesty: A cross-cultural comparison of U.S. and Chinese marketing students. *Journal of Marketing Education* 26, no. 1: 89–100.

Robinson, J. 1992. International students and American university culture: Adjustment issues. Paper presented at the Washington area teachers of English to speakers of other languages annual convention, October 16, in Arlington, VA.

Scanlon, P., and D.R. Neumann. 2002. Internet plagiarism among college students. *Journal of College Student Development* 43, no. 3: 374–85.

Sutherland-Smith, W., and D. Carr. 2005. Turnitin.com: Teachers' perspectives of anti-plagiarism software in raising issues of educational integrity. *Journal of University Teaching and Learning Practice* 3, no. 1b: 94–101.

Underwood, J., and A. Szabo, 2003. Academic offences and e-learning: Individual propensities in cheating. *British Journal of Educational Technology* 34, no. 4: 467–77.