

## Chapter 10

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# Use of Turnitin and a Class Tutorial to Improve Referencing and Citation Skills in Engineering Students

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*Accidental and deliberate plagiarism is an issue in higher education internationally, particularly in engineering and science subjects, and is becoming easier to undertake and more time consuming to detect due to the increase in availability of digital sources via the internet. This paper describes a phased approach to educating students about correct citation and referencing practice, through the use of a workshop with examples of good practice and the use of Turnitin text matching software as a formative tool to assist students to develop their writing skills. Students reported that Turnitin was not as effective as a formative tool as the workshop, and perceived the workshop to be most effective when delivered by the course tutor. Interestingly the most significant resource reported by students were examples of good citation and referencing provided by the course tutor in lecture notes.*

### INTRODUCTION

Plagiarism has been a difficult issue to address for a long time in higher education, but recent studies suggest it is on the increase [1, 2]. Issues with students plagiarizing written work have been reported internationally. In a survey of 83 campuses in the U.S. and Canada, 38% of students admitted to paraphrasing or copying without a citation within the previous 12 months [3], while in a similar survey in 2008, 54% of students at 7 US universities and 80% of students at 3 private Lebanese Universities admitted to academic dishonesty [4]. Franklyn-Stokes and Newstead [5] reported that between 54 and 66% of students at a UK university admitted plagiarising at least once as an undergraduate [5],

while Breen and Maassen [6] reported that plagiarism was an “increasing problem” in Australia in 2005.

Plagiarism can be either deliberate, or accidental, perhaps due to a lack of understanding of what plagiarism is, that it constitutes cheating, or how to cite and reference correctly [5]. Proposed reasons for the increase in deliberate acts of plagiarism include:

1. a perceived increase in the social acceptability of plagiarism (everyone is doing it) [7],
2. greater access to digital sources via the internet [8], and
3. an inconsistent approach by staff causing students to believe that plagiarism is acceptable in some instances [6, 7, 9]. For example, some staff prefer to deal with suspected cases on an individual basis, rather than invoking university procedures, resulting in inconsistent penalties, disparity in treatment of similar cases and no way of identifying multiple offences [7] and many staff occasionally ignore suspected plagiarism, as the evidence required to prove an offence has been committed is so onerous [3].

Rates of plagiarism are related to the gender and age of the student and the discipline studied. Bowers (cited in [10]) found that business and engineering subjects were associated with the highest incidents of cheating. Newstead et al. [10] reported cheating behaviours were most prevalent in science subjects, with technology subjects (including engineering) showing the second highest incidence of cheating. In their survey of 130 engineering students Harding et al. [11] found that students who reported that they had cheated in high-school were more likely to consider dishonest behaviour in workplace scenarios. In a later study, also with engineering students, Carpenter et al. [7] asserted that students who cheat are less prepared for the profession, and as academics we have an obligation to intervene and improve academic honesty.

Franklyn-Stokes and Newstead [5] reported that fabricating references, paraphrasing references without proper citation and copying without proper citation were not considered to be serious cheating behaviours by undergraduates at a UK university and Carpenter et al. [7] reported that only 19.1% of engineering students considering “copying a passage out of textbook” to be cheating. This perception that plagiarising is not serious is likely to be (at least in part) due to a lack of understanding of what plagiarism is, and why it is important to avoid it. Franklyn-Stokes and Newstead [5] also found that staff and students perceptions of the seriousness of plagiarism offences differed significantly, with staff believing it was more serious than students. They postulated that the reason for these differences may be due to a lack of communication by staff to students of the unacceptability of the behaviour. Given all of the above, it seems likely that improving communication of staff expectations for correct referencing and citation to students is likely to reduce the amount of both accidental and deliberate plagiarism occurring [6, 9, 12]. Therefore one of the interventions utilised in this study was the introduction of a tutorial to teach referencing and citation skills, which included anonymous details of a previous academic misconduct case.

The increased availability of information sources through the internet has meant that staff can no longer know many of the relevant sources available to a student. As a result, a number of text matching tools have been developed to allow institutions to detect plagiarism. One of these, Turnitin, is used extensively in the UK [13] and USA [14]. Text

from submitted assignments is compared to web sources and also previously submitted assignments to identify any matching text that can then be assessed by the lecturer to determine whether plagiarism has occurred. In a number of institutions if a sufficiently high percentage of text is found to match existing sources, plagiarism is automatically considered to have occurred [15]. In addition to its detection function, Turnitin is also marketed as a formative tool, allowing students to submit drafts of their assignments to improve their paraphrasing and writing skills [15]. Academic literature to date has focused on the detection aspect of text matching, and not on its formative role, therefore this study also utilised Turnitin as a formative tool to help students improve writing skills.

### **Aims of This Study**

With all of this in mind, the aims of this study were to:

- Develop an approach to reduce incidents of deliberate plagiarism and improve citation and referencing skills in students, including using Turnitin as a formative tool.
- Report the effectiveness of this method through results of assignments and student feedback.
- Survey students to more fully understand their perceptions of referencing and plagiarism.

### **METHODOLOGY**

This study was undertaken during 2009 and 2010 with students undertaking the Contaminated Land I module in the School of Planning, Architecture and Civil Engineering at Queen's University Belfast. The module is a compulsory module for students undertaking the MSc in Environmental Engineering and the MSc in Water Resources Management and is also offered to 3<sup>rd</sup> and 4<sup>th</sup> year undergraduate Civil Engineers and 3<sup>rd</sup> year students studying Land Use and Environmental Management. In 2008/2009, 37 students were enrolled on the module and 69 students were enrolled in 2009/2010.

This study was conceived and implemented using an action research approach. Action research in the pedagogical context is a continual process of (1) reflection on an issue of student learning or support, (2) planning an approach to improve this aspect of learning or support, (3) implementing this plan and (4) observing the outcome after implementation [16]. In this context this study went through 2 complete cycles of action research:

#### **Cycle 1 (2008/2009)**

Following reflection of the observation that (1) deliberate plagiarism was occurring in assignments and (2) that accidental plagiarism was occurring because students did not cite and reference sources correctly, a plan was developed to embed instruction on referencing and plagiarism within the module. The University's Learning Development Service (LDS) were invited to give a workshop on referencing and plagiarism during the first tutorial, and all sources in the lecture notes and handouts were rigorously cited and referenced. The LDS workshop took place during an hour long class tutorial. It consisted of a presentation by a staff member from LDS, which briefly addressed the question of what is plagiarism and why do we reference and then moved on to provide practical

examples and tips of how to reference and cite effectively and a testimony from a postgraduate research student who had gone through disciplinary procedures due to accidental plagiarism. The effectiveness of this initial plan was determined by observing whether citation and referencing performance in assignments had improved (by comparing marks in 2008/2009 with marks in 2007/2008), and gathering information on students' perceptions of (1) plagiarism and what had helped them to reference correctly and (2) the effectiveness of the LDS tutorial.

### **Cycle 2 (2009/2010)**

Reflections on observations in 2008/2009 led to development of a plan to modify teaching further in 2009/2010. In order to further emphasise that correct referencing and citation is not something abstract from module content and assessment, the lecturer presented a summary of the LDS materials and made reference to university policies regarding plagiarism, including referring anonymously to a recent case where plagiarism was identified in a student's work. In addition, the full details of the LDS tutorial, including examples of how to reference correctly, were provided as an online resource and assignments were submitted to Turnitin both to allow students to use it to provide formative feedback during drafting and to establish the quantity of matched text in submitted assignments. The effectiveness of these modifications to the initial plan was observed and reflected upon using similar methods to those employed in Cycle 1.

## **OBSERVATIONS AND REFLECTIONS**

### **Student Perceptions of the Effectiveness of the LDS Tutorial (Cycle 1)**

Thirty-two (32) students attended the LDS presentation in 2008/2009, all of whom completed LDS questionnaires about the presentation immediately after the tutorial. Nearly four fifths of the class (78%) scored the presentation as a 4 or a 5 on a scale where 1 was not useful and 5 was very useful, while 16% (5 students) scored the presentation as 2. None of the attending students indicated they felt the presentation was "not useful". Generally students liked the practical examples and appreciated the handout materials that were given out, and indicated that they would apply the information they had learnt either in assignments within the module, or across all modules on the course.

At the end of the module, students were surveyed again to ascertain how important they had found the various resources to be when undertaking their assignments, and details of their responses are given in Table 1. Unfortunately, only 18 students completed this questionnaire, which reduces the statistical significance of the findings. A significant proportion (61%) of students felt the LDS presentation had played a significant or very significant part in improving their citations and references. However 21% of students felt it had no effect. This was very similar to the breakdown of how students felt other resources (including web resources) had improved their citations and referencing. In comparison 64% of students had felt that materials from other courses had assisted their referencing and citations, but only 11% of students had felt these other materials had no effects. Notably, 82% of students had felt that the citations and references in the lecture notes had made a significant or very significant improvement to their referencing, with only 4% feeling that these resources had no effect. This may reflect the observation that poor referencing and citations in lecture notes and course handbooks gives the impression

that paying attention to referencing details is unimportant [12], and demonstrates that easily accessible examples of good practise assist students when preparing assignments.

Therefore, although students initially reported that they had felt the presentation was useful, they did not utilise it any more than resources they had obtained from other modules when writing their assignments. Indeed the most effective resources available to students in 2008/2009 were the citations and references provided in the lecture notes.

	Very significant		Significant		A little		No effect	
	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010
<b>Information obtained on other modules/courses</b>	18%	29%	46%	46%	25%	23%	11%	3%
<b>LDS seminar</b>	18%	-	43%	-	18%	-	21%	-
<b>Presentation of LDS material by lecturer</b>	-	18%	-	53%	-	18%	-	12%
<b>LDS materials available online</b>	-	21%	-	24%	-	29%	-	26%
<b>Citation reports from Turnitin</b>	-	14%	-	39%	-	31%	-	17%
<b>Citations and referencing in lecture notes</b>	14%	36%	68%	44%	14%	17%	4%	3%
<b>Other documents/websites</b>	17%	5%	44%	40%	17%	25%	22%	30%

TABLE 1

STUDENT PERCEPTIONS OF HOW SIGNIFICANT RESOURCES WERE IN IMPROVING CITATION AND REFERENCING SKILLS IN 2008/2009 AND 2009/2010

**Student Perceptions of the Effectiveness of Learning Resources (Cycle 2)**

In comparison, as shown in Table 1, 71% of students rated the LDS materials as playing a significant or very significant part in improving referencing and citation skills when they were presented by the lecturer in 2009/2010. This increase of 10% was surprising as the lecturer presented only a summary of the LDS materials, which did not include interactive examples, as recommended by Carroll and Appleton [9], and suggests that students related more to the content when presented by the course tutor, perhaps because it made it more immediate to the module content, and emphasised the importance of good writing practise in the module. Only 45% of students rated the full LDS materials, available online, as being significant or very significant factors in improving their referencing and citation skills, which is supported by Brown et al. (cited in [15]) who found that only approximately a third of students used online resources. The majority of students (80%) again reported that citations and referencing in the lecture notes had made a significant or very significant positive impact on referencing and citation. Interestingly, only 53% of students felt that using Turnitin as a formative tool improved their citation and referencing skills significantly or very significantly. This agrees with the findings that use of Turnitin as a formative tool and advice and warnings was not as effective as an interactive tutorial [8] and that use of Turnitin formatively improved writing skills, but referencing and citation performance decreased, perhaps because students did not understand how to interpret the Turnitin reports to improve these skills [15].

### Student Understanding of the Reasons for Citing and Referencing Correctly

At the end of the module in 2008/2009, 96% of students recognised the importance of referencing materials properly (21% rating it as important and 75% rating it as very important), with almost all students (>90%) agreeing that it was either important or very important to acknowledge primary sources of information, give credit to original ideas, and ensure readers can find and verify sources. However the breakdown between students categorising these reasons for referencing as very important or important was interesting. Students appeared to value acknowledging intellectual property over being able to find and verify data. Almost two thirds of surveyed students (63%) felt it was very important to give credit to an original idea and 64% felt it was very important to acknowledge original sources of information, whilst only 46% of students thought it was very important that a reader should be able to find the original source of information or that a regulator should be able to verify information. Unsurprisingly, a significantly smaller proportion of students (22%) felt it was very important to acknowledge an author's ability to provide a concise and clear form of words, with 26% of students believing it was neither important nor unimportant. This is perhaps reflected in the fact that many students have difficulties paraphrasing source materials.

	Very important		Important		Neither important or unimportant		Unimportant	
	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010	2008/2009	2009/2010
Give credit to an original idea	63%	75%	33%	25%	4%	0%	0%	0%
Acknowledge the primary source of information	64%	64%	29%	36%	7%	0%	0%	0%
Acknowledge an author's ability to create a concise and clear form of words to describe an idea/concept	22%	26%	52%	49%	26%	14%	0%	11%
Ensure that a reader is able to find the original source of any information	46%	64%	54%	28%	0%	6%	0%	3%
To allow the reader (e.g. regulator) to verify the source if information is credible	46%	56%	50%	39%	4%	6%	0%	0%
Reference materials properly and accurately	75%	56%	21%	42%	4%	3%	0%	0%

TABLE 2

STUDENT PERCEPTIONS OF THE REASONS WHY IT IS IMPORTANT TO CITE AND REFERENCE CORRECTLY (2008/2009 AND 2009/2010)

Similar results were obtained in 2009/2010, however fewer students (56% compared to 75%) felt it was very important to reference materials properly and accurately, perhaps reflecting the fact that the lecturer summarised the LDS materials and did not give as many examples of correct citations and referencing during the lecture. A greater percentage of students (64% in 2010 compared to 46% in 2009) felt it was very important for a reader to be able to find original sources, again reflecting a change in emphasis by the lecturer. The consequences of not referencing correctly in industry was emphasised

by informing students that it was not uncommon for regulators to delay giving planning approval for schemes because further clarification of source materials was required, as Nienhaus [17] reported that citation performance is improved by making the reasons for citation relevant to students' future careers.

### **Factors Influencing Correct Citation and Referencing**

At the end of the module in both years, students were also asked to rate how significant the following factors were in encouraging correct citation and referencing in their assignments:

1. Referencing correctly is the "right" thing to do
2. The lecturer prioritised correct referencing and citation early in the half module
3. Marks were available for correct citation and referencing
4. Awareness of the university policy on plagiarism
5. Threat of university action if plagiarism is suspected

In 2008/2009, 89-92% of students rated factors 1, 2 and 3 as being very significant or significant, whereas only 78-82% of students rated the university policy of the threat of university action as significant or very significant. In contrast in 2009/2010, 100% of students rated prioritisation by the lecturer as being significant or very significant and the percentage of students rating the threat of university action as very significant or significant increased from 78% to 86%. This indicates that university policies are not as immediately relevant to students as what occurs on the lecture course. In their study, Franklyn-Stokes and Newstead [5] did not find that fear of punishment was a reason for not cheating, allowing them to conclude that providing students with better information about the unacceptability of cheating was more important than imposing punishments. However the increase in the percentage of students rating threat of university action as significant in 2009/2010 may be due to the increased emphasis placed on the case of an anonymous student who was caught plagiarising in previous years, combined with the students' knowledge of the use of Turnitin in the assessment process.

### **Referencing and Citation Performance**

Two assignments were set as part of the assessment for the module, each contributing 30% of the overall marks. Both assignments were originally marked out of 100, with 5 marks being available for correct referencing and citations. A mark of zero was awarded if there were no citations in the text or references, while a mark of 5 was awarded if all citations and references were correctly included. If significant plagiarism was suspected (i.e. the student had deliberately copied significant portions of either assignment and attempted to pass it off as their own work) the case was referred to the School's Academic Offences Panel, and the marks were omitted from the results presented here. The same questions were set in 2007/2008, 2008/2009 and 2009/2010 (with differing scenarios to prevent people plagiarising previous assignments [9]), and the same person assessed all of the assignments that are included in this analysis.

Table 3 displays the average overall mark, and the mark for referencing for Assignment 1 and 2 in all three years. This shows that the mark for referencing in Assignment 1 was significantly higher in 2008/2009 than in 2007/2008 and also was higher in 2009/2010 than in 2008/2009. The significance of these differences was measured using a t-test, and the marks were found to be significantly different at 95%

confidence level in both cases. However the overall marks for Assignment 1 between 2007/2008 and 2008/2009 were also found to be significantly different at 95% confidence level. By contrast no significant difference (at 95% confidence level) was found between the overall and referencing marks for Assignment 2.

		n	Overall mark		Referencing mark	
			Average	Standard deviation	Average	Standard deviation
Assignment 1	2007/2008	23	48.2	15.3	1.7	0.8
	2008/2009	36	60.7	11.5	2.9	1.3
	2009/2010	66	62.3	10.9	3.4	0.8
Assignment 2	2007/2008	23	59.6	13.5	2.3	1.1
	2008/2009	35	58.7	11.6	2.9	1.1
	2009/2010	66	57.9	8.5	3.0	0.7

TABLE 3

AVERAGE OVERALL MARK AND REFERENCING MARK FOR ASSIGNMENTS IN 2007/2008, 2008/2009 AND 2009/2010

Given that the improvement in citation and referencing marks coincided with an improvement in overall mark in 2008/2009, it is possible that the difference in average referencing marks was due to the assessor assessing referencing and plagiarism differently in 2007/2008 than in 2008/2009, however this is unlikely as identical marking criteria were used in both instances. Therefore it is possible that students in 2007/2008 (and to a lesser extent 2008/2009) improved their referencing skills on the basis of feedback from Assignment 1, whereas students in 2009/2010 did not require this improvement, as they had already developed the requisite skills. However further study is required to confirm this.

## CONCLUSIONS AND RECOMMENDATIONS

A review of the literature supports initial observations that plagiarism (both accidental and deliberate) occurs frequently in Higher Education, and particularly in technology and science based subjects, such as engineering [10]. This is, at least in part, due to a perception that plagiarism is less serious than other cheating behaviours [5], and that students do not fully understand the “subtleties of plagiarism” [6].

The literature suggests that instruction on referencing and plagiarism, embedded within the curriculum and related to the potential consequences of plagiarism, could improve students' perceptions of the seriousness of plagiarism and reduce the occurrence of accidental plagiarism. Therefore a number of strategies were implemented over 2 years to determine their effect on student referencing skills and student perceptions of plagiarism for a total of 96 students.

Learning Development Service (LDS) were invited to give a presentation that covered these themes, during the first tutorial of the module. Immediately after the LDS presentation, students reported that the presentation was useful, however they did not utilise it any more than other resources when writing their assignments. Modifications in 2009/2010, which included the lecturer presenting LDS material to emphasise that correct referencing and citation is not something abstract from module content and is something

that is required in their writing and giving a recent example of the consequences for an anonymous student who was found to have plagiarised, resulted in more students rating the material as useful. Introduction of Turnitin as a formative tool in 2009/2010 was not considered by students to be as effective as a tool for improving correct citations and referencing as the LDS materials presented in either year.

Instead, students reported that the most significant resource they had utilised when writing assignments were the citations and references in the lecture notes.

In both years, students perceived correct referencing and citations are important for intellectual property reasons (knowledge and ideas), rather than to allow readers to find and verify data. Disappointingly, a large proportion of students (26%) felt that it was unimportant to acknowledge an author's ability to create a clear form of words, even after introduction of Turnitin as a formative tool to teach students how to paraphrase.

It was difficult to perceive differences in students' reasons for not plagiarising, however a marginal trend suggested that threat of university action was less likely to influence a student than moral reasons (i.e. referencing and citing correctly are the "right" thing to do) or the availability of marks for correct referencing. However, the introduction of Turnitin and a greater emphasis on previous university action did increase students' perceptions of the effect these factors had on correct referencing and citation.

Whilst these findings are likely to be applicable internationally and across different subject areas, further research would be required to confirm this.

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