Plagiarism in the science classroom: Misunderstandings and models

Lisa Emerson,
School of English and Media Studies
Massey University
L.Emerson@massey.ac.nz
0064-6-3569099 ext. 2601

Bruce MacKay,
Institute of Natural Resources
Massey University
B.MacKay@massey.ac.nz
0064-6-3504423

Malcolm Rees,
Academic Quality Manager
Massey University
M.T.Rees@massey.ac.nz
0064-6-3569099 ext 7674

Abstract

Honesty and academic integrity are key values in science and science education. It is important, however, to recognise that student failings in these areas may be an expression of confusion and poor skills rather than a cynical disregard for academic standards. This study investigates first year science students' understanding of what constitutes plagiarism and, through a compulsory first year science communication course, trials two approaches to teaching skills related to use of secondary sources. Findings show that students overestimate their understanding of what constitutes plagiarism, and that they are insufficiently prepared to use these skills at the completion of their secondary schooling. This study confirms that a multiple-strategy education programme is needed to teach these skills, and that a tutor clinic is a useful part of such a programme. It provides a three-part model by which a College of Sciences (or equivalent) can ensure adequate teaching of these skills for tertiary level science students.

Keywords: plagiarism, science writing, academic integrity, science education, communication

Introduction

Ethical conduct and academic integrity exist at the heart of science education. The implications of a weakening of these values are vast, ranging from questions of integrity in research through to issues of public safety (Kline, 2003). In the United States, the National Research Council (1992, cited in Kline, 2003) saw honesty (including plagiarism) as a core value in scientific ethics, defining misconduct as: "fabrication, falsification, and plagiarism in proposing, conducting, and reporting research." For colleges or faculties of science within the tertiary sector, the question of how to approach issues relating to academic integrity, and particularly plagiarism, is problematic.

Academics often respond strongly to incidents of plagiarism in their students' work. This comment from Kolich (1983, cited in Hall, 2005, p.7) may seem extreme, but anecdotal evidence suggests that it is not an idiosyncratic response:

> I have always responded to plagiarism as a personal insult against me and my teaching....[P]plagiarism cuts deeply into the integrity and morality of what I teach my students, and it sullies my notions about the sanctity of my relationship to students. It is a lie, and although lies are often private matters between two people, plagiarism is never merely private because it breaches a code of behaviour that encompasses my classroom, my teaching, my university, and my society.

Hall (2005, p,2, p. 7) considers this response to be representative of a perspective that plagiarism is: "a crime that offends the basic values of the academic community.... [It] is a cynical act, expressing contempt for the whole academic enterprise" .

While continuing to view student plagiarism as a matter of criminal deviance, others have shown a more measured response These academics focus on re-aligning student values with those of the scientific and academic communities (Malouff and Sims, 1996), categorising offenders (see Cummings et al, 2002; Walker, 1998), and designing policies relating to penalties (Carroll and Appleton, 2001).

There are, however, problems with this normative perspective on plagiarism. In particular this approach to the problem of plagiarism assumes that:

- Students understand what plagiarism is and the value it has for the academic/scientific community.
- They then cynically decide to work outside that value system.
- The point of educating students about plagiarism is to convince them to adhere to academic and scientific values.
- Definitions of plagiarism are constant.

These assumptions have all been challenged in the literature. Soto and McGee (2002), for example, show that even those students in a first year science classroom who think they are familiar with the concepts of plagiarism do not understand its complexities. Hall (2005) shows that students plagiarise for a multitude of reasons, most commonly related to lack of confidence in their handling of academic or scientific language. In these cases, education which aims to convince students of the worth of certain value systems is unhelpful because it does not address the root of the problem. And Price (2002) amongst others has established that definitions of plagiarism are not constant, either through history or across disciplinary boundaries.

Our research was developed in part to consider whether first year science students understand the complex meanings of plagiarism and whether evidence of plagiarism in their work is a result of a cynical rejection of academic and scientific values, or rather a need for more instruction in how to integrate secondary source material into their writing. The purposes of this study, then, were three-fold: to establish whether in-coming first year New Zealand science students understand what plagiarism is; to develop an educational programme for a first year science class to teach these

essential skills and to establish whether face-to-face support makes a difference to levels of plagiarism; and to propose a model for science programmes to ensure students acquire and then sustain essential skills in academic integrity and scientific values, specifically as they pertain to plagiarism.

The study took place at Massey University, New Zealand in 2004-2005. Very few studies have been published on plagiarism in New Zealand universities (Walker, 1998; Goddard and Rudzki, 2004; Emerson et al., 2005), and none of these studies pertain specifically to science education. We have based our research, therefore, on overseas studies and drawn conclusions that may apply to New Zealand science programmes and beyond.

Background

In 2004, as part of Massey University's revision of its academic misconduct regulations, a trial of the plagiarism detection system, Turnitin, was undertaken. Pedagogically wary of the imposition of a simple detection device, we conducted a study of one group of science students' understanding of the issues surrounding plagiarism and trialled a multi-faceted pedagogical approach. The study had three aims. The first was to establish what in-coming tertiary-level science students understand to be plagiarism. The second was to develop an educational package which would be effective in educating students on the complexities of using secondary source material in their assignments. The third was to develop a model of how to deter plagiarism within a tertiary-level science curriculum.

The research was undertaken with a first year communication in the sciences course at the beginning of semester 1, 2004 and 2005. The 13-week course is compulsory for all students enrolled in a science qualification through the College of Sciences. Student numbers in each cohort (the course is offered in every semester and as a distance course) range between 180 and 250, and demographically each cohort is similar and homogenous with an even gender split, and very low numbers (5-12%) of ESOL[1] (English as a Second or Other Language) students. More than 90% of students in the internal course are usually recent high school graduates. The inclusion of a compulsory communications course within a science degree was controversial at the time of development, but senior management of the College have a strong commitment to developing science students' communication skills in the face of stated employer concern about their need for employees with strong communication skills (Anderson, 1995; Gray, Emerson & MacKay, 2005) and designed the course under a writing across the curriculum pedagogy. The course is designed to provide a baseline of essential communication skills and academic writing skills for science students, and referencing skills and use of secondary source material is considered a critical aspect of the curriculum. Prior to the research, the course coordinator had concerns about (unquantified) levels of plagiarism in the course, and hence also the efficacy of her approach to teaching these skills.

[1] Note: ESOL students include international and recent permanent residents. Some Maori students might also identify themselves as having English as another language.

Part 1: The Survey

The aim of the first part of the study was to establish a profile of students' level of understanding of plagiarism prior to the educational programme. A short survey was conducted with the 2004 class. The survey was not repeated in 2005 because cohorts of this class have, historically, not significantly differed demographically. 132 students in the class participated in the survey, a response rate of 92%.

The survey was based on Soto and McGee's (2004) survey of science students, modified to meet a New Zealand context. The survey gathers basic demographic data, particularly pertaining to the students' language backgrounds. It then asks a series of specific questions relating to what is and is not plagiarism, and then a final question establishes whether they were taught these skills at high school and whether they feel clear about how to reference material. Student responses were analysed using SAS (SAS, 2003).

The vast majority of the class (85%) were first year students who had English as a first language (89%). As preliminary analyses did not detect significant differences in question responses between first year and other levels or between ESOL and non-ESOL students, the data were pooled for the subsequent analyses.

The majority of students (69%) rated their understanding of plagiarism as either good or very good. This perceived confidence was in spite of less than 14% of students who were taught how to reference material at secondary school feeling that they understood the principles, and 56% of students reporting that they were not clear about how to reference despite having covered the topic at school. Their answers to the more specific questions further belied their perception of their skills (Table 1). Although most students could correctly answer simple questions about plagiarism irrespective of their own perception of understanding, they had more difficulty with the more complex questions and showed particular confusion over paraphrasing and the distinctions between correct formatting for paraphrasing and quoting. This suggests that students understand the broad definition of plagiarism but are not entirely clear about acknowledging sources.

Most students (over 92%) correctly identified that including copied text without a citation is plagiarism. However, only 12% of students correctly identified that copied material needs to be formatted correctly (in quotation marks) as well as referenced with a citation. When we analysed this further in relation to the question concerning understanding of plagiarism, we found that of those who felt their understanding of plagiarism was good only 11% answered this question correctly, and of those who said their understanding of plagiarism was very good only 19% answered correctly. Of the entire student group, only 54% of students correctly identified all three aspects of paraphrasing.

Table 1. Percentage of correct responses to survey questions according to the students' perception of their own understanding of plagiarism and as a class total.

Survey question	Perception of understanding				Overall class
	Very good*	Good	Fair	Poor	
Including copied text from a paper or digital source without a citation in an assignment is plagiarism	100	98	85	50	92
Including copied text from a paper or digital source with a proper citation in an assignment is plagiarism	19	11	12	0	12
Including copied text from a paper or digital source within quotation marks with a proper citation in an assignment is not plagiarism	89	80	71	38	77
Including a quote without a citation in an assignment is plagiarism	100	88	76	50	85
Proper paraphrasing involves summarising, synthesising and citing read information in my own words	58	61	38	37	53

* Percentage of students within each perception ranking was 20, 49, 25, and 6% respectively; n=132

This group, then, was insufficiently prepared by secondary school to use secondary sources with confidence. They initially over-estimated their skills, and showed that, while they understood the broad terms, they had insufficient knowledge of the distinctions between paraphrasing and quoting, and of how to acknowledge sources. This survey showed that a large number of first year science students may be insufficiently prepared to use these skills at a tertiary level. Education and training is essential.

Part 2: The Educational programme

A core observation about plagiarism is that it may emerge either from a lack of discipline-specific writing skills (Price, 2002) or from a sense of being alienated from the discourse community in a large class because of lack of personal contact with teaching staff (2005). Our study addressed these issues in a two-stage education programme.

The first stage of Part 2 of the study, which was conducted in Semester 1 2004, involved instigating a plagiarism education strategy prior to a major assignment, a 1200-1500 word report on a topic related to science and ethics. The education strategy included only in-class lectures and exercises as follows.

First, students attended a 50 minute lecture on using secondary sources and APA referencing conventions. Part of the lecture included a definition of plagiarism, reasons why it was ethically unacceptable, scientific values, and how to integrate sources into a scientific text. Ten minutes of the lecture were spent discussing and illustrating the differences between quoting and paraphrasing,

and methods of effective paraphrase. Particular attention was paid to how references are used in scientific writing.

This was followed, in the same week, by a compulsory two-hour tutorial where students worked on APA referencing. This included interactive exercises using science-based texts that were designed to illustrate the differences between paraphrasing and quoting in science writing. During this week tutors talked the students through the purposes of the assignment and answered any queries or concerns. The following week, students engaged in a peer review exercise on the assignment, and some of the questions and discussion focused on each student's use of sources.

Students also had available to them a 10 page chapter in the study guide on integrating sources in science and applied science texts and using APA referencing, and this was referred to in the interactive teaching sessions.

The second part of the study took place for a similar assignment in Semester 1 2005. The education strategy was the same as for 2004, but also included a 10-15 minute individual interview for each student with a tutor to discuss the student's assignment and their use of secondary sources. During the interview, the tutor filled in a tutor review form and asked a series of questions. Questions included: "Have you used any unacknowledged quotations in your work?" and "Do you understand the conventions of APA referencing – is there anything you would like to discuss about this?" Tutors summarised students' responses to these questions on the tutor review form, and each student was required to write a reply to their comments, explaining how they would review or change their assignment if needed.

Assignments for both the 2004 and 2005 cohorts were processed through Turnitin, a system of identifying copy from electronic sources, and the individual reports scrutinised for evidence of plagiarism. Assignments were categorised into four categories: no plagiarism, minor plagiarism (less than six sentences of consecutive or inconsecutive copied material with no form of in-text citation, or quotations treated as paraphrases, i.e. quoted with an in-text citation), moderate plagiarism (six-eight sentences of consecutive or inconsecutive copied material with no form of in-text citation), and major plagiarism (nine sentences or more of consecutive or inconsecutive copied material with no form of in-text citation). Our expectation, based on the findings in Part 1 of the study that students had problems distinguishing between formatting requirements for quotations and paraphrases, was that the amount of minor plagiarism would be substantially higher than the other categories. However, there was no difference between moderate and minor rates of plagiarism across both cohorts (Table 2).

Table 2. Occurrence of students (*n*, %) within three levels of plagiarism for two cohorts in 2004 (*n*=142) and 2005 (*n*=171) for the same assignment.

Plagiarism level	2004	2005
severe	5 (3.5)	1 (0.6)
moderate	9 (6.3)	5 (2.9)
minor	9 (6.3)	5 (2.9)
Total	23 (16.1)	11 (6.4)

While it was not possible to determine whether plagiarism rates had fallen as a consequence of the introduction of the education programme for cohort 1, since there had been no quantification of earlier rates, this study clearly demonstrated a change in rates following the introduction of the tutor clinic. The result indicated that the introduction of the tutor clinic had a substantial impact on the rate of plagiarism detected in the class, effectively halving the rates of plagiarism across all categories and having a substantial impact on cases of severe plagiarism.

Two more specific findings also emerged from these results following analysis of the tutor review sheets in the second part of the project. The first finding was that students who experience problems with the less severe forms of plagiarism may be exhibiting errors in the academic writing process, rather than misunderstanding how to use APA conventions. All the students who were identified as having plagiarism problems had attended a tutor clinic prior to submission of their assignment. However, all but one had attended with an incomplete assignment draft and had been identified by their tutors as not having completed in-text citations. Tutors discussed the issue with these students, who assured the tutor that they would attend to the needed in-text citations. The fact that they were identified in this way, and that they did not successfully complete in-text citations, suggests an error not of understanding but of technique. Most writers of academic documents would complete in-text citations, and identify quotations, while writing the document, rather than adding them in after the draft was completed. This finding has implications for the teaching of referencing skills to tertiary-level students.

Second, the tutor clinic appeared to have a substantial impact on the outcomes for ESOL students. Four of the five students classified as having major plagiarism problems in Part 1 were ESOL students, but none of the students in the second cohort showing plagiarism problems of any kind were ESOL students. Instead, ESOL students were more likely to show over-extensive use of quotations. While this over-use of quotations is something that needs to be addressed, since quotations are not extensively used in scientific writing, it is interesting that the introduction of the tutor clinic, rather than the introduction of an educational strategy and detection device, proved to be the decisive factor in almost eliminating plagiarism in our (admittedly small) sample of ESOL students. We were unable to establish, through analysis of the assignments and tutor clinic sheets, why the tutor clinic was successful in addressing plagiarism amongst ESOL students. Two possible

reasons are that tutor-student discussion in tutor clinics addressed ESOL students' understanding of referencing conventions or, that the tutor clinics motivated them to undertake correct identification of source material. Further research is needed here.

Discussion

Soto and McGee (2002) found in their survey of science students' understanding of plagiarism that "most of our students reported that they had developed a basic understanding of plagiarism before enrolling in our courses, [but] their responses to the survey questions indicated that many ...actually did not know what constitutes plagiarism" (p.8). Our findings concurred with these observations. While students did show a basic understanding of some aspects of plagiarism, a substantial proportion felt unsure about aspects of what constitutes plagiarism, based on their secondary school education, and even those who felt they had a good or very good understanding of the key terms showed errors in distinguishing between paraphrasing and quotations, and how to appropriately format types of secondary sources. The problems relating to student understanding of paraphrasing are particularly important for science educators, since scientific discourse primarily incorporates secondary sources through paraphrasing rather than quotations.

Tertiary level science colleges in New Zealand, it may be concluded, cannot assume that students, even those with English as a first language, arrive at university prepared with appropriate academic or scientific writing skills, specifically those related to integrating sources into scientific texts. It is not even safe to assume that they understand what plagiarism is. Soto and McGee (2002), Carroll and Appleton (2001) and Junion-Metz (2000) all state that the only way to reduce plagiarism significantly is to ensure that students understand what the term means and to provide strategies for avoiding this practice. Tertiary-level science programmes need to take this notion seriously, and not make assumptions about students' prior knowledge. In particular, science programmes must recognise the need to teach students about citations and correct form for paraphrasing since this survey suggests that this skill, which is essential in scientific writing, is a specific area of confusion for in-coming students.

As an aside about methodology, this survey has confirmed the findings of Soto and McGee (2002) that simply asking students whether they understand what plagiarism means leads to inaccurate conclusions about their understanding. Students may believe they have an accurate understanding of the term but be mistaken in their belief. This was the case in both the study discussed in this paper, and in the work by Soto and McGee. Specific questions are needed to clarify whether students' perceptions of their knowledge are accurate or not.

In relation to the question of what constitutes an effective educational programme for teaching these skills to science students, part two of the study established some clear results.

First, our study confirms the findings of Vernon, Bigna and Smith (2001), Junion-Metz (2000), Carroll and Appleton (2001) and Malouff and Sims (1996) that multiple teaching strategies are required to reduce plagiarism rates. We might add to this that the teaching strategies should include material relating both to academic values and academic and scientific writing skills. Furthermore, the pedagogy should include interaction rather than simple static absorption of material through lectures or text-based resources. Two more specific observations about the teaching programme can be made from this study.

The first is that teaching about academic writing skills in relation to plagiarism and use of secondary sources needs to focus on process, not simply on conventions. Our study showed that students who plagiarised made basic errors in the process by which they wrote their assignment, by writing assignments drafts that incorporated quotations and paraphrasing without including citations. This is a fundamental error of process, which leads easily to accidental plagiarism.

The second finding is that the inclusion of a short individual tutor clinic made a substantial impact on rates of plagiarism in general, and eliminated plagiarism entirely from our small sample of ESOL students. We may speculate that the impact of the tutor clinic has two aspects. First, it has an educational benefit: it allows tutors to spend time talking with students about referencing in science writing and addressing their immediate concerns; and it provides an opportunity for students to discuss any issues they don't understand. Second, it acts as a deterrent. Research has shown (Cummings, 2002) that students are more likely to plagiarise if they are in big classes, have little contact with teaching staff, and feel anonymous. It may be easier for a student to hand in a flawed piece of work to a distant teacher with whom the student has no personal contact than to sit in front of someone who is talking about their work and say "there are no unacknowledged quotations in this assignment" when they know there is a problem. Tutors reported several incidents where students, when asked this question, looked worried and said they would check their work again, and then wrote on their tutor clinic sheets that they would address this issue.

Another perspective on the tutor clinic is that individual attention may make a difference to the way a student feels valued within the academic community. Hall (2005) discusses the alienation of students within a discourse community, that students may feel voiceless, and as if they cannot master the language required within this new social context – and how attempts to "fit in" with the discourse community may lead to plagiarism. The tutor clinic, which provides students with one-on-one attention from an academic in a context where the student's voice is valued and attended to, may have a considerable impact on the student's confidence and attitude. This is, however, speculation. Clearly, further studies relating to individual interviews are required to confirm our finding and to clarify the reasons for the impact of the tutor clinic. And, as a pedagogical tool, the costs of such an intervention have to be weighed against the positive outcomes.

A model for teaching core scientific writing skills /academic values

So what are the implications of this study for New Zealand tertiary-level science programmes – or tertiary-level science programmes in general? The results of this study suggest a particular model for developing a comprehensive education and detection programme within a broader science curriculum.

The model proposed suggests a three-part approach to teaching and reinforcing academic and scientific values and skills pertaining to plagiarism within a degree-level science programme (Fig. 1).

The first stage of the model should provide all parties with *information* about expected values and responsibilities. It should take the form of a policy document, which sets out the responsibilities of all parties – the students engaged in a science programme, and the College of Sciences[2] (or equivalent body). The policy should reinforce the importance of academic and scientific values and ethical conduct, and the reasons for these standards. It should outline expectations of students – how they should respect and demonstrate these values in their conduct and assessment. Equally important is that the scientific teaching body should acknowledge its responsibility to teach pertinent skills to enable students to reach the standards required of them. The policy would include details of penalties for contravening the standards outlined in the document, with differentiated penalties for first year students (who can be seen as just learning the required standards) and more senior students who can be expected to have understood these values and learnt the required skills.

Such a policy document:

- Establishes values and standards, and the reasons for these, a factor seen as essential in much of the literature pertaining to academic integrity and plagiarism (Carroll and Appleton, 2001);
- Acknowledges that students will have arrived at the university with insufficient understanding of terms and inadequate skills
- Acknowledges that it is the Faculty/College of Sciences' responsibility to teach these skills;
- Provides students with clear expectations and penalties for not meeting these expectations.

[2] In the discussion of this model, we use the term "College of Sciences" as a generic term to include faculties, institutes or schools, depending on the university structure.

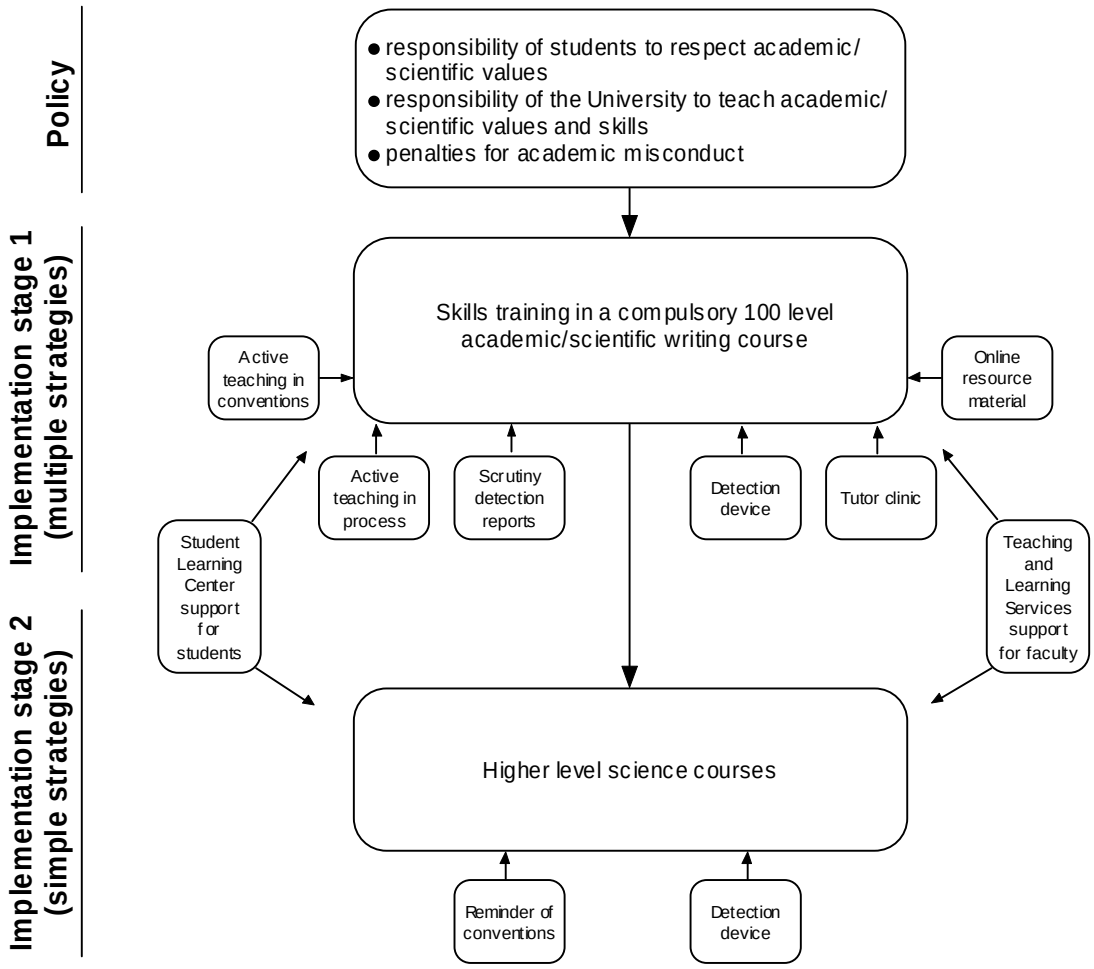

Figure 1. Proposed model for plagiarism policy in a tertiary level science programme.

The second stage of the model comprises *effective education* for students at entry. The ideal form of this stage of the model is a compulsory first year science writing paper which includes a teaching programme addressing plagiarism and use of secondary sources as outlined in this study. The purpose of this part of the model is to ensure that all students receive effective tuition (not just information) in both values and skills, and in conventions and academic/scientific writing processes when they begin their science programme. The course should be offered in the first semester of each academic year as a compulsory programme for all incoming students. Multiple teaching strategies should be employed, including a tutor clinic for an early assignment, and a detection device such as Turnitin used to deter plagiarism and to collect reliable data.

The third stage of the model comprises *reinforcement*, and includes all subsequent courses in the degree programme. These courses should employ only simple strategies such as a statement in course outlines and study guides that refers to College of Sciences' policy on plagiarism and the penalties imposed on senior students. A detection device such as Turnitin might be employed (either for student submission and checking, or for detection by staff) and penalties imposed according to the College policy.

This three part model - information and responsibility, education, and reinforcement – would provide support for new first year science students, and reassurance for scientists and science educators, that science students are learning the values of the academic and scientific community, and the skills and practices they need to master to become members of that community.

Conclusion

"The principle of honesty is science's most important ideal" (Resnik, 1998, p.115). Most scientists, and science educators, would agree with this statement. Yet, as Resnik also states, we must also distinguish between dishonesty and error since, even when they have the same consequences, they spring from different motives. As this study has shown, first year science students may plagiarise not from a motive to deceive but out of error, or poor process, or because they don't have a sufficiently sophisticated understanding of what plagiarism means or how sources should be formatted and acknowledged, or because they have no-one in the scientific or academic community with whom to discuss their confusions. To treat all plagiarism as a crime, an offence against the academic and scientific community, is a failure of empathy and good judgement (Moore Howard, 1999). It is a failure in the first principle of teaching; to know your students.

This study has shown that first year science students in New Zealand arrive having had insufficient training in using secondary sources to meet the requirements of the scientific community. Colleges or Faculties of Science, therefore, have a responsibility to teach and support students these skills before they enforce penalties on those who contravene the rules of good scholarship. This study has proposed a model of education and prevention that could be used by any science education provider at tertiary level to teach both the skills and values of the academic community. If honesty is our most important ideal, and if teaching involves concern and good judgement, it makes sense that we take the time to teach and support our students in the acquisition of scientific and academic integrity, and in their hesitant learning of academic writing skills.

References

Anderson, R. D. (1995) "Science, technology and education: The challenge to education" *Agricultural Science, 8,* 37-40.

Carroll, J. & Appleton, J. (2001) *Plagiarism, A good practice guide.* Retrieved 28 November, 2004 from www.jisc.ac.uk/uploaded_documents/brookes.pdf

Cummings, R., Maddux, C. D., Harlow, S., & Dyas, L. (2002) "Academic misconduct in undergraduate teacher education students and its relationship to their principled moral reasoning", *Journal of Instructional Psychology, 29*, 286-296.

Emerson, L., Rees, M.T., & MacKay, B. R. (2005). "Scaffolding academic integrity: Creating a learning context for teaching referencing skills", *Journal of Teaching and Learning Practice, 2,* 3a.

Goddard, R., & Rudzki, R. (2004) "The problems of plagiarism and their detection using software", *E-fest conference*, Wellington, NZ, 11-12 October.

Gray, F.E., Emerson, L., & MacKay, B.R. (in press, Dec 2005) "Meeting the Demands of the Workplace: Science Students and Written Skills"*, Journal of Science, Education and Technology.*

Hall, J. (2005) "Plagiarism across the curriculum: How academic communities can meet the challenge of the undocumented writer". In *Across the Disciplines: Academic Perspectives on Language, Learning and Academic Writing*. Retrieved 30 August 2005 from wac.colostate.edu/atd/articles/hall2005.cfm

Junion-Metz, G. (2000) "The e-plagiarism plague", *School Library Journal* 46, 9, 43 - 44.

Kline, R.R. (2003) "Research Ethics, Engineering Ethics, and Science and Technology Studies*" S&TS Colloquium*, Cornell University. Retrieved from the WWW 19th August, 2005, from http://bovay.ece.cornell.edu/sts-ethics-paper-kline.

Malouff, J.M., & Sims, R.L. (1996) "Applying an employee-motivation model to prevent student plagiarism", *Journal of Education Business* 72, 58 -61.

Moore Howard, R. (1999) *Standing in the shadow of giants: Plagiarists, Authors, Collaborators*, Stamford, CT: Ablex,

Price, M. (2002) "Beyond 'Gotcha!': Situating plagiarism in policy and pedagogy", *College Composition and Communication, 54*, 1, 88 – 114.

Resnik, D. B. (1998) *The ethics of science* London and New York: Routledge.

SAS Institute Inc., 2003. SAS/STAT User's Guide. http://v8doc.sas.com/sashtml/

Soto, J.G., & McGee, E. (2004) "Plagiarism avoidance" *Journal of College Science Teaching, 33*, 7, 42-48.

Vernon, R.F., Bigna, S., & Smith, M.L. (2001) "Plagiarism and the web", *Journal of Social Work Education* 37, 1, 193 - 196.

Walker, J. (1998) "Student plagiarism in universities: What are we doing about it?" *Higher Education Research and Development, 17*, 1, 89-106.