New Landscapes: Teaching to Avoid Plagiarism in the Web Environment

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ABSTRACT
The adoption of the Web by higher education as a research tool, source of information, and now as a replacement for the classroom itself has been a two-edged sword. While students now have access to vast amounts of information sources through the Internet, it seems that the flood gates have been opened for plagiarism from the Web. While there is no direct evidence that plagiarism is occurring more often since the introduction of the Web into classrooms, anecdotal evidence suggest this is so. Against this background, the credibility of online courses is often questioned, but this phenomenon is not restricted to the online classes only. Indeed the occurrence of plagiarism in online classes is no more evident than in the traditional classroom. While the Internet may provide the means of plagiarism for many, it is in itself not to blame. The Internet is part of a technological evolution we are experiencing in teaching which is forcing us to adopt many new paradigms. With easy access to the Internet, education is operating in a new landscape, and assessment procedures need to adapt to the landscape in order to survive. This paper represents a case study of a number of effective changes made to adapt assessment procedures to the new landscape at Victoria University, Australia.

BACKGROUND
There has always been plagiarism as long as we can remember, but recent discussions seem to indicate that incidents of plagiarism are increasing. The easy access of information via the Internet has been blamed for this perceived rise in plagiarism. However, while there is no direct evidence that plagiarism is occurring more often since the introduction of the Web into classrooms, anecdotal evidence suggest this is so. But is the Internet to blame? According to Tribe and Rendell (Tribe & Rendell, 2003), there were very few publications dealing with plagiarism prior to 1995, although by the year 2000 it seems to have become a very serious problem. Tribe and Rendell provide a number of explanations for this including student commitment, lifestyle, organizational skills and confusion.

INTRODUCTION
It is ironic that Universities have been instrumental in the development of the Internet and Web, and yet that instrument in turn, is precipitating many paradigm shifts back within the academic environment. Online learning is one of the major paradigm shifts to emerge from this new technology. Despite the research into the effectiveness of online learning, its credibility is often questioned because of the opportunities for online plagiarism. However, plagiarism seems to have become one of the more fundamental consequences of the advent of Internet technology into education, and is evident in both online and traditional classrooms. If the evidence suggests a rise in plagiarism over recent years then as academics we may need to take more fundamental steps to address it.

The Internet represents an evolution for information accessibility, and by its very nature, eases the process of accessing an over abundance of information. This can de-value the information retrieved and result in a lack of appreciation of the processes involved to produce it. The ubiquitous nature of the Web and the tools used to access the information greatly facilitate an environment in which plagiarism can emerge. It seems that education in the form of ethics classes and plagiarism awareness procedures do not deter the instances of plagiarism. If education is not the answer, then evolution must be. While detection mechanisms for plagiarism are important, these new frontiers also provide opportunities for innovative approaches to combating plagiarism. We need to redesign course structure, or at least assessment procedures to take into account the new landscape we are operating in.

This paper discusses how this may be achieved using two separate case studies of courses at in the School of Information Systems at Victoria University. In the following sections, some background information is given on plagiarism, followed by two different case studies where innovative techniques are used to combat plagiarism at Victoria University.
university regulations on collusion and plagiarism. This does not seem to
to deter instances of plagiarism. All it does do it to remove ignorance
as an excuse when caught.
Freedman (Freedman, 1998), points out that all great innovations
inevitably have unexpected consequences, and suggests that academic
faculty may be more to blame for the rise in plagiarism than students.
We are now operating in a new landscape of technology and education,
and not adapting to this landscape and anticipating the consequences will
help foster the environment plagiarism thrives in. One of these reported
consequences is that the Internet has bought with it and overabundance
of information which has led to a lack of appreciation for the research
process (D. Evans & Merhout, 2004). This lack of appreciation has
inevitably led to copyright and plagiarism violations.

Given the new educational landscape we seem to be operating in, it is fair
to ask if plagiarism seems to be more prevalent in online classes. This
is frequently one of the many accusations levelled against online classes,
but is often no bases on any evidence. Few comparative studies have been
done, however in one such study, Grijalva, Kirklet and Nowell reported
than in a single online class, plagiarism is no more evident than in a
traditional class (Grijalva, Kerckvilet, & Nowell, 2003). This was
attribute to the design of online courses which in many cases may reduce
some types of cheating such as ‘panic’ cheating.

The literature seems to suggest that the way to tackle plagiarism is
through the redesign of curriculum to account for the new landscape, and
to consider carefully the design of assignments and their assessment
(Freedman, 1998; McMurtry, 2001; Tribe & Rendell, 2003). In his article
“Four Reasons to be Happy about Internet Plagiarism”; Hunt argues
that the plagiarism phenomenon due to the new landscape is a
good thing, as it is presenting challenges which we as academics will
be forced to respond to (Hunt, 2002). The result will probably be a
fundamental change in educational direction and assessment.

We outline here two vastly different techniques to combat plagiarism
in two subjects offered by the School of Information Systems Victoria
University, Melbourne Australia. Each take a different approach by
concentrating on the learning required of the assessment tasks and
combating plagiarism at a different phase of the task.

**CASE 1: COMBATTING PLAGIARISM AND IMPROVING VALUE**

This case discusses learning activities in the subject “BCO6653 Manage-
ment of Information Technology,” offered by the School of Informa-
tion Systems, part of the M.Bus (Information Systems). The course
format is a total of twelve subjects, usually taken over three semesters
full time. BCO6653 is a core subject in this course, and one of the first
subjects that students study. Enrolment in this subject ranges from 50
to 80 students per semester. Over 80% of these students are full-time
overseas students. A number of these students do not have any prior
working experience in information technology nor in management.
The purpose of this subject is to introduce students to the issues faced by
the manager of an information technology (IT) department.

Specifically, the subject aims for each student to:

- Be familiar with current research and developments in information
technology management;
- Be familiar with important management issues in managing infor-
mation technology;
- Understand the information management approach, its nature and
importance
- Be able to apply relevant methods and techniques to better manage
information resources;
- Have applied a relevant method or part of a method to an
organisation or part of an organisation and prepared a report;
- Plan and prepare a substantial research paper on a designated topic; and
- Have critically reviewed research papers, presented the evaluations
and lead group discussions on the evaluations.

In order to do achieve these objectives, the subject is based around a
number of major issues that are examined in each of the two major
learning activities (assignments). The number of issues covered varies
slightly from semester to semester. Many of these topics are covered
in other subjects in the course. An important component of this subject
is that it concentrates upon each of the topics in relation to how they
affect the manager of an IT department in an organisation. Students are
constantly reminded of this as they prepare their assessment tasks for
the subject.

How do we facilitate a student’s appreciation and learning of the various
current issues in the management of IT? We design learning activities
around the concept of constructivism. The application of constructivism
in teaching means that a student’s learning is based on the degree to which
the subject content is made meaningful to the student with respect to the
student’s world view; that in order for a student to learn, he/she must be
able to personally construct meaning from the subject content. In other
words, the subject will mean something to the student if the student is
supported in constructing meaning for it. This ‘meaningfulness’ is
evident if students feel a ‘need-to-know’:

*When students feel this need-to-know, they try to focus on underlying
meaning: on main ideas, themes, principles or successful
applications...students needing to know will naturally try to learn
the details as well as making sure they understand. When using the deep
approach in handling a task, students have positive feelings: interest,
a sense of importance, challenge, even of exhilaration. (Biggs, 1999).*

It can be argued that developing this ‘meaningfulness’ involves encour-
aging the student to participate and interact, at an intellectual level, with
the material presented. One way this can be done is through the
structuring of learning activities that pose an IT management-based
question or problem to a student. It is argued here that facing a relevant
problem will motivate the student to look for information that will help
answer the problem. The students then assess the relevance of the
information and communicate what they have found. Applying this
technique can be an effective strategy in facilitating a student’s learning
of ‘management of IT’ issues. The assessment of the subject is divided
into two major learning activities.

Both major learning activities/ assignments involve students selecting
one of the major topics and investigating it at some depth. Students
prepare a paper for the first learning activity. The paper is based upon
‘theory’ and ‘practice’. For ‘theory’, the students have to search the
online databases (such as ABI Inform or Business Source Premier) for
materials to prepare a ‘mini’ literature analysis. At this stage they have
had the value of selecting ‘peer reviewed’ journals over web sites found
using a search engine explained to them. For the ‘practical’ component,
each semester the students have to relate what they have discovered in
their literature analysis with a ‘real’ application. In recent semesters
these have included the use of case studies in each of the major areas or
reference to materials gathered from ‘online’ magazines for IT manag-
ers (such as www.CIO.com). In this way the students are introduced to
the notion of gathering the best research in the area from peer-reviewed
publications and comparing it in some way to actual practice. The
students are tutored in researching materials, preparing literature
reviews and case studies using a school website set up to encourage these
practices within the school, Figure 1.

It is important that students are encouraged to access these materials
from wherever is convenient (Home, school, work or even an Internet
cafe). To us it seems easier to embrace these technologies rather than
try to avoid or restrict them. To avoid plagiarism, we modify the
particular ‘practical’ task to be performed each semester. This way,
students are unable to use work from previous semesters, or even
download ‘typical’ papers from the Internet as they never exactly
match the topic being covered. In addition, we require students to only
include material of the highest quality (from peer reviewed journals) in
the assignment. We even supply them with a template that requires them
to list the registration number of the article from the particular online database they are using (eg Business Source Premiere or Emerald). If students wish to use other materials (such as books or even other Internet sources) they are required to get permission from one of the lecturers. If they suggest a site which is unsuitable (for instance, a proprietary site) the limitations of such a selection are explained. When a student submits an assignment that includes online references that are not approved those sections of the assessment are assessed as if there is no supporting reference at all. Most students soon get the idea and stop using Google as their first port of call for assignment research!

The second learning activity involves students conducting interviews with IT managers on selected issues – but also involves a literature analysis. By this time of the semester, the standard of literature analysis submitted is quite high, being original work based upon high quality references and well crafted.

CASE 2: COMBATING PLAGIARISM BY TESTING SPECIFIC TASK KNOWLEDGE

This case discusses learning activities in the subject “BCO3345 Object Oriented Systems” offered by the School of Information Systems as part of the undergraduate Bachelor Business (Information Systems). BCO3345 is an elective subject which primarily focuses on Object Oriented programming in Java. For assessment, the subject has a final exam component worth 60% and an assignment component worth 40%, which is earned by the accumulative score of three semester assignments. The subject is usually taken by a mix of part-time and full-time students, with the full-time students accounting for approx 80% of the numbers. At least 50% of the students are usually overseas students where English is not the first language. Due to the Faculty and School prerequisite regulations, this subject can be undertaken with only an introductory programming concepts subject having been previously undertaken.

Plagiarism on the assignment work has always been a problem, partly due to the lack of English skills of many of the students, and partly due to the lack of programming background due to the course structure. Plagiarism occurs mostly between the students in the same class, but also often enough from available sources on the Internet. When detected, plagiarism is dealt with, however, not all cases are detected (or can be conclusively proven). Anecdotal evidence suggests that assignments scores are artificially high in many cases. We needed a method which allowed the students to work together on the assignments (particularly the overseas students) and yet, which allowed us to test the individual learning from the assignment itself.

In Semester 2, 2001, we trialed a method for three consecutive semesters which helped us to achieve these goals. The students were given 3 assignments each semester, with each assignment requiring them to build software using particular techniques to achieve desired goals. The students were instructed that they could work individually or with others, but the assignment was not to be submitted. Instead, after the due date for the assignment had passed, the students would be given a small multiple choice test in the next class after the due date. These tests were specifically designed to test the knowledge the student should have gained during the course of doing the assignment.

For example, in one assignment, the purpose is to create many objects during the course of running a small simulated banking system. The objects were all to be stored in one Java Vector and then a mechanism constructed to retrieve specific objects from that Vector. In Table 1, a sample question is shown from the assignment test.

During the course of the assignment, the students could consult with their lecturer, tutor, or work with any other student. The student could even opt to not do the assignment if they wished. However, all students were warned that while they could get help from any source, they should be familiar with all aspects of the assignment solution, as the knowledge they should have accumulated would be tested. Three different copies of each test were made, with the order of the questions and the alternatives for each question different on each test. Each student had a different version that the person on each side of them when it was undertaken. This method was trialed on all three assignments for a period of three semesters and then compared to another three semesters where standard assignments were set then individually graded. The results are shown in Table 2.

The shaded bottom portion of the data in Table 2 represents those semesters where the specific assignment tests were used. In some cases, over the three year period, the total assignment component of the subject was worth a different percentage. All the figures displayed in Table 2 were after the data was adjusted so the total assignment score represented a score out of 40. The Avg. Score represents the student average score out of 40 marks for all three assignments. The Std. Deviation is the standard deviation of the sample, and the Avg. Deviation is the average of the absolute deviations from the mean.

As can be seen from the data in Table 2, most obvious feature is a lower average accumulated score for the assignments administered using the new methodology. We believe that this represents a more realistic representation of the students grasp on the assignment material. The standard deviations and average deviations tend to be higher for the new methodology, indicating more variance in the assignment scores. An analysis of the pass rate for the subjects indicated no significant difference over the two assignment scoring techniques.

The challenge when constructing the test questions is to not include general knowledge questions, but test only specific learning outcomes of the assessment task. Setting the assignment requires no more effort than before, but obviously extra effort is required in constructing the multiple choice test to test the specific knowledge gained in performing the assignment. However, this is then offset by the reduction in time required for grading.

CONCLUSION

The advent of the Internet into higher education has had many profound effects on teaching paradigms and pedagogies. Unfortunately, all great innovations have unwanted side-effects, and it seems that ease of plagiarism is an unanticipated side-effect of the Web. While it’s unclear whether cases of plagiarism have indeed risen since the advent of the Internet, it has increased the ease with which plagiarism can be conducted. Many academics and indeed many institutions concentrate on the detection of plagiarism and follow-up procedures, however simply making students aware of plagiarism and of the penalties does not seem to be the answer.

It seems that an evolution in procedures for assessment tasks may be underway, and as academics we should view the Internet as a tool to be
used rather than an adversary aiding and abetting plagiarists. Plagiarism occurs for many reasons, and there are many things we can do combat this. We are operating in a new landscape and traditional assessment methods are open to abuse in this environment. This paper has discussed two case studies where different techniques were used in the prevention of plagiarism. Both of these thwarted plagiarism during different phases of the assessment task process, and both were successful in their own way. Any required effort to combat plagiarism by concentrating on changing the assessment process is to the benefit of the student and the education process.

REFERENCES

Table 1. Sample Question to Test Specific Assignment Knowledge

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Which of the following do you think best describes the purpose of this method?</td>
<td>a. To see if a Savings object with accountNum field equal to the parameter exists</td>
</tr>
<tr>
<td></td>
<td>b. To retrieve and return a Savings object which has the given accountNum</td>
</tr>
<tr>
<td></td>
<td>c. To return a Boolean value equal to true if the Savings account exists</td>
</tr>
<tr>
<td></td>
<td>d. To return a null value</td>
</tr>
</tbody>
</table>

Table 2. Analysis of Assignment Data from 6 Semesters

<table>
<thead>
<tr>
<th>Subject Run</th>
<th>Avg. Score</th>
<th>Std. Deviation</th>
<th>Avg. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1 1999 (26)</td>
<td>28.700</td>
<td>6.000</td>
<td>4.475</td>
</tr>
<tr>
<td>Semester 2 1999 (28)</td>
<td>28.489</td>
<td>6.715</td>
<td>5.518</td>
</tr>
<tr>
<td>Semester 1 2003 (27)</td>
<td>27.692</td>
<td>6.820</td>
<td>4.915</td>
</tr>
<tr>
<td>Semester 2 2001 (56)</td>
<td>23.616</td>
<td>6.625</td>
<td>4.725</td>
</tr>
<tr>
<td>Semester 1 2002 (36)</td>
<td>23.443</td>
<td>6.429</td>
<td>5.144</td>
</tr>
<tr>
<td>Semester 2 2002 (41)</td>
<td>25.289</td>
<td>7.064</td>
<td>5.522</td>
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