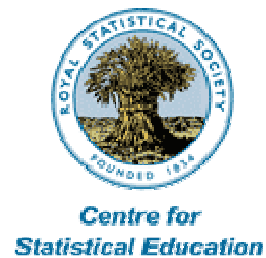


PISA

Plagiarism in Statistics Assessment

Report of a project funded by the HEA Maths Stats & OR Network
and the RSS Centre for Statistical Education



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PISA- Plagiarism in Statistics Assessment

Final Draft Project Report

1 Introduction

There is much concern in British Higher Education Institutions that instances of plagiarism are on the increase. Forms of assessment such as the traditional examination and on-line testing using large question banks and randomly created tests are the least vulnerable to academic misconduct, but these types of testing fail to address some important learning outcomes in Statistics, not least the ability of students to analyse a set of data appropriately and report results effectively without very limiting time constraints. However, the lack of supervision associated with coursework assignments means that giving students the same data to analyse poses a serious risk of plagiarism, either in the analysis, or in the reporting. Group work, which is used to give students opportunities to develop team skills, has its own plagiarism problems.

The RSS Centre for Statistical Education and the MSOR Network jointly funded the Plagiarism in Statistics Assessment (PiSA) project, which aimed:

1. to survey HE lecturers in Statistics to find out what methods of assessment and strategies to deter plagiarism are being employed currently;
2. to identify and synthesise elements of good practice;
3. to disseminate findings widely.

The project team comprised Penny Bidgood (Kingston), Neville Hunt (Coventry), Brad Payne (Nottingham Trent) and Vanessa Simonite (Oxford-Brookes). A copy of the survey proforma may be found in Appendix 1.

In gathering evidence the project team made no attempt to take a random sample of Statistics lecturers. First, the choice of universities surveyed was by geographical clustering, constrained by very limited funding. Second, participation by lecturers was entirely voluntary. Since the project did not aim to assess the extent of plagiarism this should not matter. The aim was to find out about good practice in deterring plagiarism and it is reasonable to assume that those with good ideas were more than happy to disclose them. Although some take the view that lecturers are there to teach and not to police, the majority of those surveyed seemed highly aware of the plagiarism issue and were taking action, however small, to combat it. However, it is possible that others who refused to participate in the survey are “in denial” and doing very little.

Despite the problems, many lecturers felt that the practice of Statistics in both service and specialist modules should involve coursework, reflecting the applied nature of the discipline. Modules where over 40% of the assessment used coursework of this nature were not uncommon. Typical “take-home” assignments consist of analysing data and writing a report on the findings, sometimes involving group work. The project focused on those forms of plagiarism that arise most commonly in Statistics assessment and were mentioned by lecturers in interviews or emails. The forms of academic misconduct mentioned most often were copying and collusion. Data fabrication was mentioned in the context of some assignments and failure to acknowledge sources arose in the context of project work.

2 Summary of Project Activities

- a. A website for the project was established at:
<http://mathstore.gla.ac.uk/cms/index.asp?recno=60>
including a facility for staff and students to express their views.
- b. A Jiscmail discussion list was created at:
<http://www.jiscmail.ac.uk/lists/pisa.html>
- c. A member of the project team attended a workshop at Coventry University on “Deterring, detecting & dealing with plagiarism” given by Jude Carroll of Oxford Brookes University in January 2007.
- d. A member of the project team attended the Netskills workshop on “Detecting and Deterring Plagiarism” at Oxford in February 2007.
- e. A survey was conducted by a combination of telephone, email and personal contact of 50 members of staff at the following 23 universities: Aston, Birmingham, Brighton, Bristol, Cardiff, Chichester, Coventry, Derby, Glasgow, Hertfordshire, Kingston, Loughborough, Middlesex, Northumbria, Nottingham Trent, Oxford Brookes, Reading, Royal Holloway, Sheffield, Surrey, UCL, Warwick, and Wolverhampton.

Information on assessment and associated plagiarism issues was gathered on a total of 96 taught modules. The breakdown by subject discipline was as follows:

Discipline	Number of modules
Maths/Statistics	53
Business/Economics	26
Health Sciences	8
Psychology	6
Biosciences	2
Other	1

- f. Details of the project were publicised on the *allstat* mailing list, in RSS News and in the MSOR Connections newsletter. Information about the project was also circulated by email to HEA subject networks in Business, Economics, Psychology, Geography, Biosciences and Health.
- g. A presentation was given at the ASLU conference in London, May 2007.
- h. A poster presentation of the project was presented at the ISI/IASE Conference on Assessing Student Learning in Statistics in Guimarães, Portugal in August 2007.
- i. A final report on the project was given at the CETL/MSOR Conference at Birmingham University in September 2007.
- j. A copy of the final report has been circulated to each lecturer contacted in the survey, as a matter of courtesy.

3 General plagiarism issues

3.1 Large numbers

It seems likely that the growth in academic misconduct has gone hand in hand with the growth in student numbers. As a student, if you are 1 among 10 you probably think twice before copying from your classmate, but if you are 1 among 500 you must rate your chances of being caught as very small indeed. Also, in a class of 10 you would expect to know the lecturer personally so that any plagiarism offence would be very embarrassing to all concerned, whereas in a class of 500 the lecturer is unlikely to be able to put a face to the name. In fact with anonymous marking the lecturer may only report to an administrator that he believes student 4126 has copied from student 7519!

In this respect, across the sector, there does seem to be a marked difference between specialist Statistics courses, which are typically very small, and very large service modules for non-specialists. It is the latter that pose the greater challenge.

3.2 Plagiarism in group work

Many lecturers reported using group work in statistics assignments or project work. In order to reduce plagiarism and “piggy-backing” it was usual to have small groups of 2 or 3 students working together. Students often had to keep records of meetings and present their findings orally or in a poster presentation when they would have to answer questions on the work. In other cases, although students worked together they had to produce individual reports or were given a test at the conclusion of their work. The onus was on the students to identify non-contributors within their group.

3.3 Cheating by students whose first language is not English

Many cases were reported where international students were clearly employing the services of professionals/friends to either produce or polish their coursework for them. There may be a cultural element to this, where handing in a poorly written piece of work is considered to be unacceptable. Such students are typically at a disadvantage to their English peers with regards to report writing and presentations. Cases were reported of immaculate reports being submitted by students who were unable to construct meaningful sentences throughout the course. There is no suggestion that international students are more likely to plagiarise, simply that they are more likely to be detected.

3.4 Online-cheating companies

On-line cheating companies provide coursework and dissertation writing services at a range of costs depending on the quality, length and urgency of the work. An example of such a company is Elizabeth Hall Associates whose website (www.elizabethhall.com) quite openly boasts:

We give you: Plagiarism proof scripts. Unique, customised writing prepared for you to your specifications. We never re-use work, the copyright is yours. We do not need to offer you a payment guarantee of ‘£1000 if caught’ – we know if you are caught you lose your degree. In ten years our work has never been detected.

Nowadays these companies offer far more than online essay banks. Typically they employ a panel of experts in all kinds of disciplines, who will effectively act as consultants to students who need help with their assignments. The project team considered

employing one of these online services in order to assess the quality of the work supplied, but it was felt to be ethically untenable to spend project funds in this way.

The extent to which these types of services are utilised by Statistics students is unknown. However such services cannot be trusted to provide a unique piece of coursework. A case was encountered where identical coursework had been submitted by two students who had never met each other. When questioned they admitted that they had both independently used such a service but thought that they were purchasing a personalised piece of work. Ironically they felt cheated by the company!

4 Deterring Plagiarism

4.1 Dissemination and enforcement of institutional procedures

The publication of institutional procedures can be valuable both in informing students about what is and is not acceptable and as a strong deterrent to plagiarism. Appendix 2 gives an extract from a student handbook issued to Statistics students at University College London, which gives clear examples of the plagiarism committed by students and the penalties that were applied. Several lecturers said it was their policy to tell students about cases that had been prosecuted in previous years.

A lecturer at Middlesex University uses “early intervention” to prevent plagiarism. Here, students are given a small task, worth about 10% of the total assessment, early in the module. This is marked and any copying or collusion is identified and discussed with the students concerned. Students who are likely to collaborate are thereby identified early and dealt with before it becomes a major issue.

Many universities require students handing in coursework to sign a declaration that they have read and understood the relevant regulations and are submitting work that is entirely their own. While this does not in itself eliminate plagiarism, it may act as a deterrent and having the declaration does at least make pleas of ignorance untenable.

Since assessment is a key element in the role of a lecturer it was surprising to encounter lecturers who were unfamiliar with their university’s policy on cheating. Several lecturers reported that they had found copying or collusion and dealt with it informally by warning students against future misconduct. A difficulty with an informal warning is that it may not be sufficient to deter some students from future academic misconduct. It was also felt that it depended on the amount of plagiarism. Just a sentence or two in a first year coursework might be dealt with by the lecturer discussing this with a student, whereas copying from published articles would bring the University procedures into action. Another lecturer said that he kept things “low-key” in the first year and did not go through the rigorous academic procedures, except in very serious cases. This apparently widespread informal approach to plagiarism is worrying. Where there is inconsistency and a patent reluctance among staff to prosecute plagiarism offences, students will be quick to capitalise on it.

It seems to be generally accepted that if formal disciplinary procedures are clear, consistently applied, with a graduated scale of penalties, and with minimal bureaucracy, then staff will be inclined to apply them and students will in turn be inclined not to breach them.

4.2 Using headers and footers as a simple deterrent

One lecturer required students to include their student ID number both in the header of every page of their word-processed reports and also within the names of the variables used in their analysis. Another reported that the software used by the students automatically time-stamped the plots produced. Yet another insisted that the student's name and ID number appeared as a caption inside every graph produced. These simple ideas aim to prevent students from simply handing in a photocopy (or doctored photocopy) of a fellow-student's work. Even if a student has access to their friend's electronic document some very careful editing would be needed to correct every instance of their friend's ID.

Another respondent said that they insisted students number the pages of any submission in the format "page x of y" so that they could not produce an additional sheet at a later stage complaining that the lecturer must have mislaid it!

4.3 Organisation of marking

Organisation of the marking of assignments is an important issue. As mentioned earlier, Statistics classes tend to be either very large in service courses or very small in specialist groups. Assignments from the latter can easily be marked by one person but the former often involve an army of research students. In some universities the students on a module are spread over several different campuses and, with modern communications, there is scope for inter-campus plagiarism.

Ideally all students' work should be marked by the same person so that any collusion is likely to be noticed. However, with large classes and an increasing pressure on staff to give prompt feedback, this is often not feasible. One respondent reported that this was the prime reason for switching to assessment by supervised tests. One solution might be for different markers to each assess one part of all students' work. If there are multiple markers one possibility is to allocate marking at random to markers, rather than by tutorial group. This avoids giving colluders the safe option of copying the work of someone in a different group, although some intra-group collusion might then go undetected. On the other hand one respondent thought there was educational benefit in students' work being marked by their own tutor, so that the student would feel comfortable about querying any comments made. One lecturer with a group of about 350 students randomly selects pieces of coursework from each tutor to double mark. This not only acts as a deterrent to plagiarism but helps also to ensure consistency of marking.

Bizarrely it is quite common for people who have colluded to hand their work in at the same time, perhaps on the assumption that the scripts will be sorted in some way before marking. One lecturer reported a case where three students who submitted their work late – and hence were likely to be marked together - had exactly the same errors.

Many lecturers reported that they did not perceive plagiarism as a problem since they taught small groups, knew their students well, marked all the work themselves and hence would be able to detect collusion and copying quickly. One lecturer always required students to submit a report and felt that she could always spot similar phrasing and spelling. Another thought that plagiarism was possible in his first year module, but that he would be able to judge from the interpretation students gave to their results and the way in which they phrased these, whether they had cheated or not. Two respondents said that they looked especially closely at work submitted by students who gained very good coursework marks but did badly in tests.

4.4 Using supervision to validate coursework assessments

As a response to plagiarism problems several lecturers reported a move away from take-home assignments towards supervised “hands-on” practical assessment in a computer laboratory. Typically the student is given a data set and a sheet of accompanying questions which require some form of calculation or analysis using a specific computer package. The computers are monitored to ensure that no other software (e.g. email or web-browser) are accessed. In some cases the student produces hand-written answers, sketching any necessary diagrams or charts. Other lecturers require students to submit their solutions electronically or to send their output to a secure printer. One lecturer reported that feedback from students on this approach had been positive - “Working under pressure is what got me my job”.

Chris Dracup at Northumbria University used to set assignments for which each student received a random sample of some greater population of data. More recently he has adopted the approach of a seen examination rather than an assignment. One week before the examination students are given a numerical question with a small amount of data - just to illustrate the nature of the data and their layout. In the examination proper they receive the full data set (which will be common to all the candidates). Students are given access to SPSS (but no other software) and are required to decide what analysis to perform, and to carry it out. Questions (two on a paper) require students to explain their choice of test, briefly describe their SPSS commands, report summary statistics, and draw appropriate conclusions. Their answers are written by hand in the usual examination answer booklets. Chris reports that this saves a good deal of time and does not seem to have increased student assessment anxiety too much. Clearly, it does not stop students from discussing what they think is an appropriate analysis - but it does ensure that the analysis they present is their own work.

Several variations on this approach were reported by others. Some lecturers issue a published paper for students to review in advance of an examination in which at least one question relates to the paper. Another lecturer issues students with case studies throughout the year, which they are free to discuss with each other, but the assessment on the case studies is in the form of a supervised test.

Reza Oskrochi at Oxford Brookes sets students in an advanced statistics module a coursework assignment in which they analyse (the same) data and write a report. Each student gives a brief presentation to the assessor at which questions are asked and they may be required to replicate some of their analysis. The written report is marked on the spot. As with the above example, students can discuss the assignment with each other but must demonstrate that they personally have achieved the relevant learning outcomes during their presentation. (A drawback to this approach, identified by Lorna Smith from James Watt College, is that students may protest that it is unfair on those whose oral skills let them down.)

Some lecturers expressed concern about lax arrangements for supervised in-class tests. For example, due to resource constraints, tests often took place in crowded lecture theatres with too few invigilators. Not only did this prevent adequate separation of students but it was impossible to move among the students to examine their ID cards or check for any unauthorised material in their possession. It was also reported that on large service modules the same test might be sat by different groups at different times, allowing the possibility of information being passed from one group to another. At one university

the student record system could provide class lists showing student photographs, which the lecturer could take to the test to check for impersonation. Several lecturers reported using multiple versions of a test in the same room, arranged in such a way that adjacent students were given different tests. For ease of administration the different versions would normally be on different coloured paper. There was anecdotal evidence of a lecturer who used different coloured test papers as a distracter when in fact they were all identical!

4.5 Individualised assessments

Considerable effort is taking place among Statistics lecturers to develop ways of personalising assessments. Some of these methods are very simple; others highly technical and software dependent. Undoubtedly there is some duplication of effort.

Several lecturers reported using the assessment tool within their institution's virtual learning environment (e.g. Blackboard) to create randomised computer-marked online quizzes which students must complete on a regular basis. Although these were typically unsupervised, it was felt that each quiz carried such little weight in the overall assessment that the advantages gained by student engagement outweighed any possible risk of collusion. Although this type of assessment fails to address some important learning outcomes for Statistics students, it was seen as a pragmatic response to very large class sizes.

Liz Moores at Aston University goes to the trouble of creating sets of different multiple choice questions each sharing the same list of possible numerical answers. A student who copies the answer from a neighbour is then later to be found protesting of inconsistency in the marking – they were marked wrong but their neighbour got full marks!

Two lecturers reported using the ISCUS (Individualized Statistics Coursework Using Spreadsheets) tool developed at Coventry University. ISCUS enables a lecturer to create an assignment generator spreadsheet into which students enter their ID number to obtain data and/or tasks. Although the data is supplied in Microsoft Excel format there is nothing to prevent students completing their analysis within a different software package (e.g. Minitab).

Mike Rosser at Coventry University employs a simple but highly effective method based on the digits of the student's ID number. For example, if the last two digits are represented by X and Y, students might be asked to calculate a 9X% confidence interval, or to exclude rows X and Y from a given dataset prior to their analysis.

Use of the Financial Analysis Made Easy (FAME) public sector database is popular at Nottingham Trent University in teaching statistics on the Accounting and Finance degree. FAME is a database that contains information for companies in the UK and Ireland. It contains information on 3.4 million companies, 2.4 million of which are in a detailed format. Students are allocated variables for two different contexts, where no two students have the same sets of variables. Mail-merge is used to construct the coursework for the 400+ students which is then emailed to the students. Seminar tutors are also given paper copies. The important lesson to be learned is that courses of this nature evolve over time. It is not possible to ensure that each student's coursework is of equal difficulty; however this is seen as an acceptable trade-off. Since the FAME database is updated continuously the teacher must ensure the variables used are valid each year.

Where a large data set is available, simple approaches can be used to provide individual assignments: Vince Daly at Kingston advocates allocating each student a different country or a different pair of US States and requiring them to collect their own data on a particular theme. Similarly, Vanessa Simonite at Oxford Brookes uses an assignment in which each student is asked to make comparisons between different sets of subgroups. This approach retains the feature of using real data.

One lecturer reports setting a coursework assignment consisting of a number of questions where the data for each question is randomly chosen from six available datasets. Students would have to go to some trouble to find someone with the same data for one question but the chances of finding someone with the same data for all the questions is very small.

One lecturer at Middlesex University makes students use the Simul8 software to simulate their personalised data, although the students find learning the software quite challenging.

A difficulty with individualised assignments is that if different students have different answers, this can create extra work for the marker. Karen Ayres at Reading University described a sophisticated program for generating and marking individualised problem sheets for students. While this prevented students being awarded marks for copying and was a deterrent to collusion, the assessment was found to use too much staff time, as it was felt unfair to award very low or zero marks to a student who made a mistake early in a problem but used correct methods subsequently though obtained incorrect answers due to their error. To ensure that the marks were awarded in line with this approach staff needed to review students' answers.

Several lecturers have developed their own bespoke web-based facilities that generate random data, either real or simulated, based on a students' ID number. Examples include:

- Maggie Gale at Derby University gives all students the same assignment brief, namely a research scenario and associated research questions. She then uses an online simulator which produces datasets based on the student's University ID number. She has plans to develop the simulator further to make it a more generic tool.
- Rudiger Schack and Laurence O'Toole at Royal Holloway have replaced traditional weekly Minitab exercise worksheets with individualised assessments. With some intelligent question design, they were able to (re)design every worksheet to ask for only numerical answers (including multiple choice questions). Thus, they were able to remove the paper element of submissions entirely by providing each student with a personalised HTML form. Several PERL scripts on the department server are used to process a student's answers in different ways. They can be marked instantly (although currently they store these marks until the current deadline expires at the end of the week), and completely consistently with every other student. Partial marks can be given for answers numerically close to the correct answer, and marks can be awarded for incorrect answers that are nonetheless consistent with earlier submitted wrong answers. Recently, they received the team award in the College's Teaching Prize scheme for their work on this project.
- At Nottingham Trent University the DRUID (Dynamic Resources Using Interesting Data) project allows a lecturer to generate a unique worksheet and data set for each student. Furthermore a solution sheet, with guided instructions, is generated for each worksheet. The worksheets and solution sheets are generic in that any statistical package may be used to perform the analysis. This facility is freely available for others to use.

A system described by Neil Spencer at the University of Hertfordshire has taken the idea of automatic marking one stage further. Individualised problems (same questions, different data) are automatically generated, in the form of spreadsheets, and emailed to students within a virtual learning environment. The answers are all numeric or multiple-choice. Students complete their work on the spreadsheet and submit it via email. A marking program compares the students' answers to the correct answers and to wrong answers that are produced if a 'classic mistake' has been made. The archive of classic mistakes allows partial marks to be given if a student makes an error but then uses the right method from that point onward. Marks and feedback are returned to the student automatically within the VLE. This sophisticated marking program continues to be developed as students are encouraged to discuss their (less than perfect) marks so that 'new errors' can be built into the program. A problem with spreadsheets is that formulae can be copied and this may mean that the benefit of individualised data might be lost, but this system has a design feature which takes this problem into account.

Some lecturers think that individualising assessments is unnecessarily complicated. They place little weight on the actual calculations involved and much more on the interpretation and constructive criticism of data/methodology. Alternatively some use data and tasks that are so "rich" that there is no good reason why two students should follow the same line of thinking or method of analysis. One lecturer reported that students may have shared SAS code in a data analysis assignment, but that this was not checked as the interpretation of results was regarded as being of overriding importance. Several lecturers spoke of students' discussions as beneficial, as long as they proceeded to write up the analysis independently. In other words, there were some elements of assignments, such as the selection of an appropriate technique, or the production of code, for which discussion was thought by some lecturers as being constructive, or at least less important.

4.6 Student data collection

A very popular technique is to require students to collect their own data, perhaps subject to a specified minimum number of variables/cases. However, it is acknowledged that there is a real risk that a student will choose a dataset for which an analysis is already available, perhaps from the Internet, a textbook, or from a previous student.

Some ideas to defend against this are:

- Well in advance of the submission date the students must inform the lecturer of the source of their data so that it can be checked for suitability.
- Students are told that their data must be the most recently available set for that series. This means that they cannot use the data from someone in a previous year, although perhaps some of the background information could be copied from them.
- Students are each allocated a particular periodical and told that their data/study must be drawn from any issue in the current year.
- Students are each allocated a different broad topic area, e.g. unemployment.

In a medical statistics module at Kingston University there is an individual assignment where students have to find their own example of a medical case study. No two students can have the same study, so there is little scope for cheating. At the same university, in a module on time series, students (in small groups) are required to find their own data from "Economagic". Again, no two groups are allowed to use the same dataset. At Chichester University in a service module to Sports Science students (in groups) collect data on their own fellow students, e.g. on heart rates or use of supplements.

4.7 Ringing the changes

It is generally acknowledged that it is unwise to set the same assignment in consecutive years. Some lecturers set what is essentially the same assignment but which asks for the students' work to be presented in a novel format.

The use of a poster format for assessing Statistics was cited by several of our respondents. The poster is typically produced by a group of students, with each group tackling a slightly different problem or dataset. However, each individual must be present to "defend" the poster at a special session when lecturers (and maybe fellow students) come to view it and interrogate them about it

One respondent requires a written report-style format every year but varies the "client". One year the report must be written as a newspaper article, another year as a research paper, yet another year as a briefing document for the local MP, and so on. It is immediately obvious when a student has copied from one of last year's students!

At some universities, examination papers are re-used each year, albeit with tight security in place to ensure that examination papers do not enter the public domain. Apparently there is no evidence of plagiarism between years – in fact students persistently make the same sort of errors – and there has been no upward drift in the average marks obtained over the years. At other universities this approach is made impossible due to an open-access policy regarding examination papers and scripts.

4.8 Electronic submission

Requiring students to submit an assessment electronically opens up a number of possibilities for plagiarism checking. Some lecturers scrutinise the properties of each student's file, which details the author and location of the file, together with the times of its creation, last modification and last access. These details commonly enable submissions from different students to be traced back to a common source, although more IT literate students are becoming wise to these pitfalls. A particularly dubious phrase from a students' work can be copied into a web search engine such as Google to check whether it is drawn from a source on the Internet. Sophisticated plagiarism detection software may also be used. TURNITIN is the online electronic plagiarism detection software recommended by JISC. At the time of writing it is being used in almost 90% of UK universities. The cost currently is approximately £5000 per annum for a university of 10,000 students.

Many respondents said they had heard of TURNITIN and were planning to use it in the future. Some were under the false impression that it only checked for Internet plagiarism and did not realise that it can be used to check for collusion within a cohort or between cohorts. One lecturer expressed the view that although electronic detection was not in itself very useful, the threat of it was an effective deterrent. Significantly one respondent intended to increase the weighting of coursework in the light of TURNITIN, having confidence in its deterrence effect. Another respondent said that they were not yet using TURNITIN because they do not have the regulations for electronic submission properly worked out at institutional level. They believed that there would be a need for regulations about storage of work for a specified period and feared that their IT systems would not be able to cope.

One of the problems with using TURNITIN for Statistics assessments is that students are encouraged by their lecturers to use standard forms of technical language in their reporting. For example, “the r-squared value shows that 53% of the variation in ..”. This means that almost every student will have a significant percentage of their work reported as plagiarism. With large classes the lecturer may have to set a threshold percentage similarity below which they do not bother to investigate.

TURNITIN greatly assists those lecturers who like students to collect their own data for analysis. The fear is that students will simply download a ready-made analysis from the Internet or will use the work of a student from a previous cohort. Once TURNITIN has been used for several years any collusion between cohorts should be easily detected.

One disadvantage of TURNITIN is that it cannot be used to check for similarities between different spreadsheet files. Some lecturers set assignments where students must construct a spreadsheet to perform certain calculations or to build a model. Even if students submit their spreadsheets electronically it can be very difficult to detect similarities in their construction, particularly if they have been careful to use very different layout and formatting. This is an area where further development is needed.

A specific example of using TURNITIN was provided by Rebecca Lees of Kingston University who teaches a module of 800 students spread over 4 campuses. In the previous year in a group assignment collusion had been detected between 21 submissions out of 104. (They were only detected because one lecturer marked all the reports and recognised similarities in several of them.) As the work was based on an Excel spreadsheet, the electronic copy of the work was easily shared, but this meant that only work where there was little or no modification could be detected. This year, using TURNITIN, only 9 out of 150 submissions showed significant similarity, and some of these were repeat offenders!

4.9 Engagement

The experiences of lecturers who teach on a variety of degree courses indicated that engagement was a key issue, particularly when Statistics was not a core degree subject. A consensus viewpoint was that if the students engaged with the assessment task, whatever form it took, the chances of cheating were reduced considerably. This inevitably involves greater effort in the design and development of the assessment materials. To increase engagement it was suggested that lecturers should be more dynamic and use a variety of assessment methods. It was felt this was not only good for students but also for staff.

4.10 Final Year projects

Typically final year student projects are individual pieces of work which are considered to be the equivalent of one or two taught modules. Given this weighting, the potential for plagiarism needs to be taken very seriously. At several universities, part of the project assessment is for “development” or “ability to progress the project along appropriate lines” or “time management”, as judged by the project supervisor. Thus, in order to do well in this section, students need to show progress in regular meetings with their supervisors. Further, in some universities each student is given a *viva* by their supervisor and at least one other member of staff, which has proved a useful way to detect plagiarism.

5 Key Findings

- 5.1 Plagiarism, or more specifically collusion, is a significant problem within large Statistics service modules and all lecturers need to give serious attention to anti-plagiarism assessment strategies.
- 5.2 The majority of Statistics lecturers are well aware of plagiarism issues and are taking action, however small, to combat it.
- 5.3 It is quite common for Statistics lecturers to fail to apply institutional procedures in “minor” cases of plagiarism. In contrast, some lecturers make every effort to demonstrate how the regulations and penalties might apply to Statistics assessments, giving examples of cases detected in previous years.
- 5.4 Plagiarism often goes undetected on large service modules due to a multiplicity of assessors. It is most likely to be detected when one person assesses all the students.
- 5.5 There is much innovative work taking place in the area of individualised assessment, but also some duplication of effort. There is scope for a further project to synthesise best practice and make it available to the wider community, including those teaching Statistics within other disciplines.
- 5.6 Assessments that require students to collect their own data, either individually or in small groups, are widely employed. Lecturers use a variety of imaginative strategies to try to minimise collusion both within and between cohorts.
- 5.7 Many Statistics lecturers have moved away from take-home assignments to in-class supervised computer-based assessments, often based on a previously circulated data set, case study or research paper.
- 5.8 In some universities, in-class tests are exposed to a high risk of cheating by unsuitable accommodation, inadequate invigilation, failure to check student identities, and naïve organisation.
- 5.9 The TURNITIN electronic plagiarism detection software is increasingly being used and is giving lecturers greater confidence in the integrity of their coursework assessments.
- 5.10 In final year extended project assessments it is good practice to include an element that assesses the student’s working method and, ideally, an oral examination to check that the project is genuinely the student’s own work.
- 5.11 Online cheating companies openly offer an easily accessible, if expensive, way for students to obtain professional individual help with Statistics assignments.

Appendix 1 PISA Survey Form

Interview conducted by						How?			
University					Department				
Lecturer					Module title				
Year (1,2,3)		Service (y/n)?			No. students			% Coursework	
What is the rationale behind the coursework weighting on this module?									
Has it always had this weighting? If not, why was it changed?									
Is there any move to change the weighting in the near future and if so, why?									
Description of Coursework Element			%	Ind / Grp	Person-alised?	No. of Markers	Elec Sub?	Cheating an issue? (explore overleaf)	

Coursework Element	Discussion of cheating issues or anti-cheating strategy

Other comments

Appendix 2 Example of Advice to Students

Below is an edited extract of the advice provided to students by the Department of Statistical Science, University College London, for the 2007/8 academic year (supplied by Richard Chandler).

PLAGIARISM AND COLLUSION

Plagiarism means attempting to pass off someone else's work as your own, while collusion means passing off joint work as your own unaided effort. Both are unacceptable, in particular, in material submitted for examination purposes including exercises done in your own time for in-course assessment. Plagiarism and collusion are regarded by the College as examination irregularities (i.e. cheating) and are taken extremely seriously. UCL has now signed up to use a sophisticated detection system (Turn-It-In[®]) to scan work for evidence of plagiarism and collusion, and the Department reserves the right to use this for assessed coursework. This system gives access to billions of sources worldwide, including websites and journals, as well as other work submitted to the Department, UCL and other universities. It is therefore able to detect similarities between scripts that indicate unacceptable levels of collusion, as well as material taken from other sources without attribution.

What isn't acceptable?

Students sometimes find it difficult to know what counts as plagiarism or collusion. The following list is not exhaustive, but gives some indication of what to avoid. It is based on guidelines developed by Nick Hayes of the UCL Pharmacology Department. You may **NOT**:

- Create a piece of work by cutting and pasting material from other sources (including web sites, books, lecture notes and other students' work).
- Use someone else's work as your own. This includes, but is not limited to:
 - Making notes while discussing an assessment with a friend, and subsequently using these as the basis for all or part of your submission.
 - Phoning another student to discuss how best to carry out a particular piece of analysis.
 - Employing a professional ghostwriting firm or anyone else to produce work for you.
- Use somebody else's ideas in your work without citing them.
- Ask a lecturer in the department for help with assessed work, unless you make it clear to them that the work is assessed.
- Help another student with their assessed work. If you do this, you will be deemed to be guilty of an examination irregularity.

What is acceptable?

The following practices do not constitute plagiarism / collusion:

- Quoting from other people's work, with the source (e.g. book, lecture notes, web site) clearly identified and the quotation enclosed in quotation marks.
- Summarising or paraphrasing other people's work, providing they are acknowledged as the source of the ideas (again, usually this will be via a reference to the book, journal or web site from which the information was obtained).
- Asking the course lecturer for help with difficult material, providing it is clear that the question is in connection with the assessment. The lecturer will be able to judge for him or herself what is an appropriate level of assistance.

Some examples

[Examples deleted here for confidentiality reasons]

How to avoid plagiarism and collusion

If you are found to have committed an offence of plagiarism / collusion, it makes no difference whether or not you intended to do so. Ignorance is no excuse. To avoid committing an offence, a useful rule of thumb is: if in doubt, don't do it. Make sure that any work you submit is your own unaided effort. More specific guidance is as follows:

- Plan your work schedule carefully, to allow enough time to complete each piece of assessment.
- If you do have genuine problems in meeting a deadline, don't take the easy way out and borrow a friend's work. Discuss your difficulty with the course lecturer in the first instance.
- If you are stuck with an assessment, don't ask another student for help. Discuss it with the course lecturer.
- If another student asks you for help with an assessment, or asks to see your work, suggest that they approach the course lecturer instead. Remember: if somebody else copies or uses your work, you will be penalised as well, even if you didn't expect them to use your work in this way.