

# Blatant cheating detected in an online examination

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**Abstract:** Cheating in various forms is rife among students in tertiary education. Cheating on exams is generally considered more serious than cheating in coursework assignments, and there is some evidence of a belief that cheating is easier and perhaps more prevalent in online courses than in face-to-face courses. We conducted an experiment to detect a particular form of cheating in a remote online exam, and found that a significant number of students cheated blatantly.

**Keywords:** cheating, distance education, online course, online examination, academic integrity

## How many students cheat?

Reports in the literature of academic integrity indicate that extremely high proportions of tertiary students cheat in the course of their studies. In a series of oft-cited anonymous surveys, McCabe and various collaborators have found that up to 70% of college students in the USA admit to having cheated in some way in the preceding year (McCabe, Treviño, & Butterfield, 2001). At a small private university in the USA, Kidwell, Wozniak, and Laurel (2003) found that 75% of their survey respondents had engaged more than once in one or more of the cheating behaviours that they surveyed. Lim and See (2001) came up with an astonishing figure of 94% in a comparable survey at a university and two polytechnics in Singapore, and Pulvers and Diekhoff (1999) found that at two colleges in the USA nearly 12% of students admitted to having cheated in a single specified course.

## Reasons for cheating

A number of studies explore the reasons given by cheats for their behaviour. One school of thought suggests that students will be more likely to cheat if they feel detached from the institution at which they are studying, if they feel no sense of community with that institution (Buckley, Wiese, & Harvey, 1998; Pulvers & Diekhoff, 1999). While this view identifies a situation in which cheating might be considered, it would still not take place without rather more pragmatic considerations. "While there are both individual and situational determinants of academic dishonesty, the historical psychological literature has documented that dishonesty is mostly a function of opportunity . . . rather than a consistency of personality" (Landon, 1999, p441).

Given the opportunity to cheat, a further pragmatic consideration is that of cost and benefit. "Rational Choice Theory . . . states that individuals are rational decision makers and behave according to the potential risks and potential returns inherent in a decision. The decision to engage in unethical behavior is a cost/benefit function, which is rationally determined by the individual" (Buckley et al, 1998, p72). In a review of 107 published studies of college cheating, Whitley (1998, p254) found that "The greater the expected reward for success, the greater the likelihood of cheating. However, one study found that expected punishment for failure led to more cheating than did expected reward for success." Perhaps to the surprise of many academics, the potential risk in cheating appears to be rather low. Ashworth, Bannister, and Thorne (1997, p193) concluded from a student survey of academic dishonesty that "Some cheating is felt to occur through . . . the probability of not being discovered." Hutton (2001, p6) concurs, citing one source who

believes that fewer than 2% of cheats are caught, and explaining “One of the problems with enforcement is that it requires that cheating be observed.” Likewise Landon (1999, p446): “When students believe they can get away with cheating then there will be more cheating than when they think they will likely be caught.”

### **Cheating on exams versus cheating on coursework**

A number of surveys have sought to determine perceptions of the seriousness of various forms of cheating. There is broad agreement, for example, that having a stand-in take one’s exam is far more serious than not citing one’s references properly in an essay.

Franklyn-Stokes and Newstead (1995) listed 22 possible academic misbehaviours and asked both staff and students to rate each misbehaviour in terms of seriousness and of how frequently they believe the misbehaviour takes place. The six misbehaviours perceived as most serious were

- A student taking an examination for someone else or having someone else take an examination for them
- Taking unauthorised material into an examination
- Illicitly gaining advance information about the contents of an examination paper
- Copying another student’s coursework without their knowledge
- Copying from a neighbour during an examination without them realising; and
- Premeditated collusion between two or more students to communicate answers to each other during an examination (Franklyn-Stokes & Newstead, p164).

While that list includes one coursework misbehaviour, and there are further examination misbehaviours considered less serious (continuing to write after the end of an exam ranked 21st), it was clear to the authors that “items rated least frequent and most serious tended to be examination-related, whereas those rated as most frequent and least serious were, on the whole, coursework-related” (Franklyn-Stokes & Newstead, p165).

Pincus and Schmelkin (2003) conducted a survey of academic staff and subjected it to multi-dimensional scaling, which determines dimensions along which the participants appear to rank items. The principal dimension that emerged was one of seriousness, with a weaker dimension appearing to correspond to the distinction between cheating on coursework and cheating on exams. There were 28 academic misbehaviours listed in the survey. The two that emerged as most serious, sabotaging another student’s work and forging a university document, are seldom considered in the literature of academic dishonesty. The next four in order of seriousness are stealing or copying a test, using crib sheets in an exam, obtaining answers from someone else during an exam, and obtaining a prior copy of an exam. Interestingly, the correlate misbehaviours of giving exam questions to someone who has not yet done the exam and giving answers to someone else during the exam were considered as rather less serious. Perhaps some of the respondents to this survey believe that it takes only one to tango.

### **Cheating in online courses versus cheating in face-to-face courses**

We have already mentioned that the reasons given by students for cheating include feelings of detachment or lack of personalisation. In addition, Whitley (1998, p254) reported a finding that “students were more likely to cheat when they could not see the victim of the cheating”. While these observations were not made in the context of online courses, they would seem to apply to those courses, in which the students are unlikely ever

to meet their teachers or most of their classmates. It might therefore be reasonable to conclude that cheating is more likely in online courses than in face-to-face courses. On the other hand, Smith and Ferguson (2002, p67) argue that “contrary to intuition, current web-based online college courses are not an alienating, mass-produced product . . . Initial feelings of anonymity notwithstanding, over the course of the semester, one-to-one relationships may be emphasized more in online classes than in traditional face-to-face settings.”

Colwell and Jenks (2005) list a number of ways that students might cheat in online tests or exams. These include working in pairs to pass on test content or to help one another take the online tests, and obtaining the help of people not enrolled in the course.

One reason that such behaviours are possible is that while an on-campus exam is conducted at a single specified time and place, an online exam must generally be available for an extended period, with students choosing when in that period they will take the exam. With students from all over the world in a single online course, it would not be possible to constrain them to a single timeslot.

Problems such as this have led some authors to suggest that “current assessment practices in higher education are long overdue for a re-think; they are particularly ill-suited to the digital age” (Mason cited in Ruhe, 2002, p155) and that “the success of online learning is in essence a progressive shift from summative to formative approaches and reaching a balance of both” (Lim, Hung, Wong, & Chun, 2004, p37). The opposing viewpoint is that “a class provided in a distance-education format [must] be fundamentally equivalent to a traditionally provided one” (Christe, 2003, p54), implying that so long as we use examinations in face-to-face classes we should use them in online courses.

### **Conducting exams in online courses**

A number of authors have addressed the problems with online examinations and tests, and many provide tips and guidance for running such assessment events in the online distance context.

There is almost universal recognition (Ashworth et al, 1997; Colwell & Jenks, 2005; Rowe, 2004) that traditional supervised exams greatly reduce the opportunity to cheat. Where such exams are not feasible, authors suggest that “the final exam must be proctored by someone arranged for by the student and approved by the instructor” (McDonald, McDonald, & Dorn, 2003, p9) or that instructors consider requiring students to use a webcam (Landon, 1999), but “recognize the possibility of off-camera student activity that might [contravene] course rules” (Christe, 2003, p57). Unfortunately, when one’s students are sufficiently widely spread, and when one recognises the ease of cheating with either a student-selected supervisor or a webcam, it is clear that a traditional supervised exam is simply not an option. We wonder, too, whether those who suggest webcam supervision have realised that while traditional supervision of a 3-hour exam with 30 students takes about 3 hours, webcam supervision of that same exam would take as long as 90 hours.

Olt (2002) and Christe (2003) recommend tight time limits on tests and exams so that students will not have time to look up all the answers. To combat the passing of tests from one student to another, Rowe (2004 p3) adds that “creating ‘windows of availability’ for assessments . . . helps a little but does not solve the problem unless the windows are on the order of minutes in width, not days”.

Rowe (2004) and others suggest the creation of a large pool of questions, with a number of different tests created from that pool. While this suggestion makes sense for multiple-choice and short-answer tests, it is less applicable to examinations in which the students are asked to analyse or synthesise, as it is harder to ensure that multiple questions of this nature are of comparable difficulty.

Other suggestions include ensuring that students know the rules pertaining to academic behaviour and how they will be enforced (Christe, 2003; Heberling, 2002); and making the exam an open-book one because online students will treat it as one regardless (Christe, 2003; Colwell & Jenks, 2005).

Finally, at least two authors (Christe, 2003; Rowe, 2004) suggest that when everything within reason has been done to discourage cheating, instructors might consider setting a trap to detect any cheating that does take place.

In the single-semester postgraduate courses that this paper deals with, we certainly informed students of the rules and of the consequences for breaking them, but we wondered whether the low likelihood of discovery might still encourage cheating. The global spread of our students completely ruled out a supervised exam. It was also not feasible to conduct the exam at a single specified time – we could not justify a smaller window of availability than 48 hours, taking in both a weekend day and a weekday. Wanting to test analysis and synthesis, we were not prepared to write a multiple-choice or short-answer exam, so we felt constrained to ask exactly the same questions of all students. We specified the exam as being open-book, but wrote it in such a way that students who were unduly reliant on their books would not have time to complete it. The time limit for the exam was to be strictly enforced: an automatic e-mail would tell the instructor when the student downloaded the paper, and Blackboard™ would indicate when it was returned (the exam mechanism was that students download the question paper, type their answers into that same document, and return it).

While the number of ways of cheating on such an exam is limited only by the students' imaginations, we surmised that these would include students working in groups to do the exam, discussing the questions as they worked, and students doing the exam early in the window of availability and then sending a copy to others who had yet to start it. We decided to “set a trap” to see whether we could detect any cheating of this sort (Simon, 2005a).

### **An experiment to detect one form of cheating**

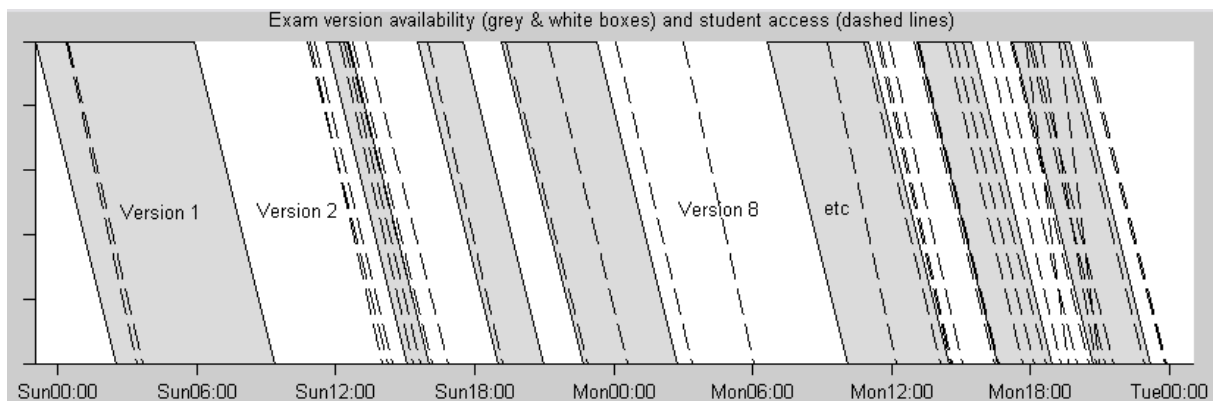
We produced many versions of the exam paper and made different versions available at intervals during the overall exam time. When a student's exam was returned, it was checked to see whether it was the same version that the student officially downloaded. If it was an earlier version, the student must have had access to the exam before downloading it.

It was crucial to our experiment that all versions of the exam appear identical: few students would be so silly as to return a version of the exam that is obviously different from the one they downloaded. The distinction between versions, which we call an electronic watermark, consists of a number of elements, the most comprehensive of which is the text colour. All the text of each version is in a colour that is visually indistinguishable from black, but distinct from every other version. When students place the cursor into the paper and type an answer, that answer acquires the same colour as the questions. If a student were to copy

and paste answers from an earlier version into the legitimate version, the questions would be in the colour of the legitimate version but the answers would be in the colour of the earlier version. We describe the watermark system in more detail in a more technically-oriented paper (Simon, 2005b).

Figure 1 shows the timeline for the first exam we conducted in this way. The alternating grey and white boxes indicate successive versions of the exam. Looking at the top of the figure, we see that Version 1 was made available at 23:00 on the Saturday and was available until 5:53 on the Sunday. The shift to the right as we move towards the bottom of the figure indicates the 3-hour time limit on the exam. Students starting Version 1 while it was available, between 23:00 and 5:53, would generally be expected to finish it between 2:30 and 9:23 – though of course an earlier finish would be possible.

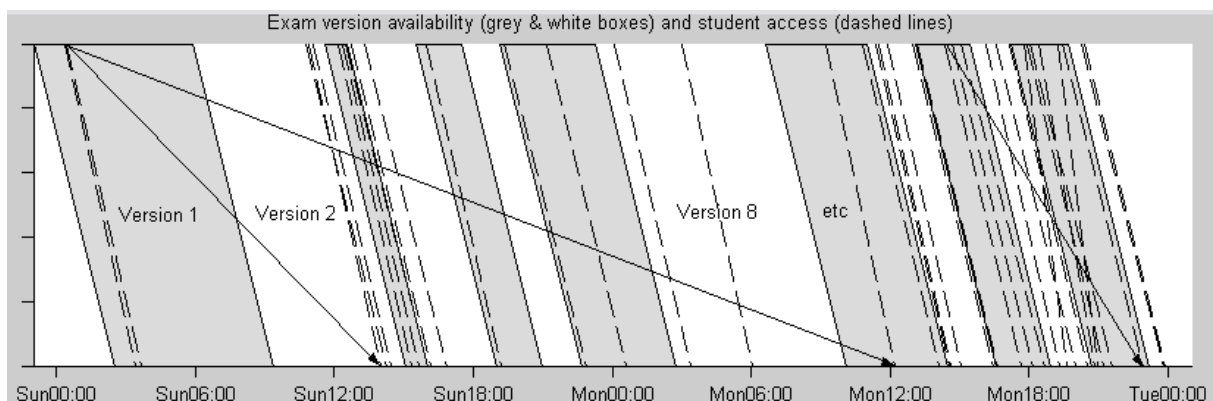
The dashed lines on Figure 1 indicate actual student timings for the exam. For example, the first two students downloaded the exam at about the same time, 0:21 and 0:25 on the Sunday, and returned it at 3:26 and 3:40 respectively. We shall call these students Student A and Student B, and shall extend the notation to the rest of the class.



**Figure 1. Timeline of exam version availability and individual student accesses to the exam**

### Cheating discovered by the experiment

The experiment found three students who returned exams that were partly or wholly earlier versions than they downloaded. We believe that at least three other students were involved in these incidents, but the experiment did not confirm this unequivocally (we had intended to ensure that each student downloaded a unique version, but a problem with our university's e-mail server made that impossible). Figure 2 shows the same timeline as in Figure 1, augmented with arrows showing the three students whose cheating was unequivocal.



**Figure 2. Exam timeline showing 3 students who accessed the exam well before officially downloading it**

Student B's paper, downloaded at 0:25 on the Sunday, shows evidence of having been completed by several people. Apart from a clear difference in writing styles between questions, the watermark for Version 1 is present in some of the answers and absent in others, indicating that the non-watermarked answers were typed in a different document and copied and pasted into this one.

The first arrow indicates Student C, presumably one of these collaborators, who downloaded Version 2 of the paper at 10:48 on the Sunday and returned it at 14:17, one minute short of his deadline. However, the paper he returned was Version 1, which suggests that he acquired it at 0:25 as part of the collaboration. This student therefore had 13 hours and 52 minutes to do the paper, giving him a massive advantage over an honest student.

The second arrow shows Student O, who downloaded Version 9 of the paper at 9:15 on the Monday and returned it at 12:11. The paper he returned was the expected Version 9, but the answers bore the Version 1 watermark, showing that they had been copied and pasted from Version 1. This student therefore submitted the paper 35 hours and 46 minutes after acquiring it.

The third arrow shows Student AG, who downloaded Version 13 of the paper at 19:25 on the Monday and returned a completed Version 11 at 22:56. Four students, U, V, W, and X, had downloaded and returned Version 11. While we have no clear evidence which of these provided the paper in question, we strongly suspect students V and W.

Combining what we can prove unequivocally with what we strongly suspect, we have uncovered two rings of cheats. Students B, C, and O appear to have collaborated to complete Student B's exam, after which students C and O prepared at their leisure before taking the exam for themselves. Students V, W, and AG appear to have collaborated on Students V's and W's exams, leaving Student AG with more preparation time before completing his own exam.

All three students in the second ring are from Singapore, which is perhaps not surprising in light of the Singapore study mentioned earlier (Lim & See, 2001). More interestingly, while Students C and O are also from Singapore, student B is from Hong Kong, suggesting that some serious planning went into this collaborative venture.

When told that he had been caught cheating, Student AG was highly insistent that we divulge the nature of the watermark that had led to the discovery. He was not told, but we suspect that word of the watermark's existence spread among the students, because in several subsequent exams we failed to find any more cheating of this specific kind.

We did find, in subsequent exams, a repeating student who copied one of his answers from his own paper from the previous year. We also found a student who copied one of his answers from the paper of a friend who did the course the previous year. Because the exam is open book, it is not clear that this constitutes cheating. Neither student benefited from the copying: while the questions shared some key words with the

previous year's questions, they were actually asking something quite different, rendering the copied answers worthless.

## **Discussion and conclusion**

Alert to the possibility of a particular form of cheating in remote online exams, we conducted an experiment to detect that form of cheating. Our experiment discovered six blatant cheats in a class of 36, a proportion of 17%. We are aware of other possible ways of cheating, ways that our experiment did not detect, so we assume that these other ways of cheating are also being employed.

We take reasonable measures to try to reduce the motivation to cheat, but we do not believe that these measures can ever completely eliminate cheating. While there is opportunity to cheat and the potential benefit is judged to outweigh the potential risk, some students will choose to cheat.

It is probably easier to cheat on coursework assignments than on exams, if only because students have a great deal more time to work on the former. Therefore we find it easy to imagine a student using unauthorised assistance in every assessment item of an online course. Phillips and Lowe (2003) and Olt (2002) both argue that while a third party might be engaged to sit an exam for a student, it would be far harder to engage somebody to complete all of the assessments in a course. We believe that they underestimate the lengths to which a student might go to attain a qualification without earning it and the lengths to which a non-student might go to earn money or favours.

We appear, then, to have two options. We could set out to persuade our university that online remote courses are by their nature prone to the most blatant cheating, and should not be offered unless this cheating can be curtailed. This option would almost certainly be unending, emotionally draining, and fruitless. Alternatively we could give up, go with the flow, and assess as if everyone were honest. It would certainly be a great deal easier, except perhaps on the conscience.

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