Cheating in Exams with Technology

Kevin Curran, University of Ulster, UK
Gary Middleton, University of Ulster, UK
Ciaran Doherty, University of Ulster, UK

ABSTRACT

Traditional methods of detection may no longer be wholly successful in fully preventing cheating in examinations. New strategies need to be considered and employed to better manage the advancement of technology use for illegitimate purposes. This paper investigates technology used to cheat in examinations, how such cheats are carried out, and how to prevent such methods of cheating. To show the full extent of the progression of cheating over the years, this report also documents some of the traditional methods of cheating. The devices which are used to cheat are investigated to see how they can provide an advantage to those who are taking examinations.

Keywords: Cheating, Education, Ethics, Security, Technology

1. INTRODUCTION

The word technology means to study a certain discipline and it comes from the Greek word technologia meaning craft. Technology dates back to prehistoric times, when stone was used to make fire. It comes from the use of natural resources in order to make something useful. Cheating is an act of lying, deception, fraud, trickery, imposture, or imposition employed to create an unfair advantage often at the expense of others. Cheating implies the breaking of rules. Cheating can take place at most levels of society including workplaces, sports and government. A common area for cheating to arise is in examinations (Broeckelman-Post, 2008). Cheating in exams has been occurring since the advent of written examinations but there are new concerns regarding the adoption of technological devices in the modern cheating process (Martin, 1994, 2005). Attempts to gain an advantage are not a new and modern phenomenon or indeed one which educational institutions have been unaware of since test and examinations were first employed (Harper, 2006; Bugeja, 2004; Woods, 2004).

One of the earliest studies carried out into cheating activities by students and the means by which Universities could attempt to combat the problem was conducted by Bowers (1964). The years between 1992 and 2002 were found to highlight the continuing problem of cheating behaviour among university studies and
pointed to substantial increases throughout the latter years of the decade and into the new millennium. The rise in attempted cheating appears to be directly related to a number of important aspects such as the need to succeed in an ever increasingly competitive world and the attitudes which this increased completion elicits. In a recent study investigating attitudes toward cheating behaviour it was found that there was a significant age difference between those who viewed it as acceptable behaviour and those who did not. Younger people increasingly see cheating in general as a viable way to get ahead (Etter et al., 2006; Phillips & Horton, 2000). The advancement of technologies has broadened the ways by which people can achieve the goal of cheating and as far back as back as 2002 it was predicted that it would not be long before we became aware of students using their cell phones to search the web during an exam (Walker, 2002). A U.S. survey found that:

- 80% of the higher achieving secondary school students admitted to cheating in an exam.
- 51% of secondary school students did not believe cheating was wrong
- 95% of secondary school students who admitted cheating said that they had not been caught
- 75% of college students admitted cheating in an exam
- 90% of college students did not believe cheaters would be caught.
- 85% of college students said cheating was necessary to get ahead (Kerkvliet et al., 1999).

The traditional methods of cheating no longer meet the needs of those trying to cheat in exams. The reason for this is that more information is now required for an exam. Technology has made cheating in exams simply easier. This also serves as a temptation for students who might otherwise have been honest when taking the exam. There are also a multitude of sites with step by step instructions and different techniques for cheating (Bambi et al., 2009; Cooper et al., 2010). Examples include schoolsucks.com, cheathouse.com, EZ write.com, Geniuspaper.com, papertopics.com, http://www.teachopolis.org/justce/cheating/cheating_how_to.htm and http://www.videojug.com/film/how-to-cheat-on-a-test. As technology advances, examination boards are finding it harder to keep up with the cheaters (McCabe, Trevino, & Butterfield, 2001; McCabe, 2003).

The amount of penalties handed out for pupils trying to cheat in their GCSEs and A-levels by smuggling in mobile phones in 2009 was over 4,400. This was a 6% rise from the previous year (Williams, 2010). Such increases are seen across the board with all of the techniques used to cheat involved. This in turn has prompted examination boards, schools and moderators to implement measures which will reduce the amount of cheating. This has become increasingly difficult due to the amount of technology available. Devices to stop such technology being used to cheat can be expensive and hard to implement in schools (Minch, 2004; Tatli et al., 2005).

Over 90% of all 11 to 21 years olds have access to a mobile phone and such phones are seen as “a vital tool for young people’s social lives”. Access to a personal computer was marginally lower than for mobile phones but still high and the teenagers surveyed here used both their mobile phones and personal computers to surf the web and e-mail (Haste, 2005). The importance of these technological developments lies not in the number of digital technology devices currently available but in their ready take-up by the young and in the convergence of functionality of the technologies. This functional convergence means that modern desktop and laptop computers now incorporate the functionality of a communication device and communication devices such as mobile phones are taking on the functionality of a computer (Yoffie, 1997). There is a trend developing where 8 to 12 year-olds are becoming a significant mobile ownership group. The increasing numbers and abilities of the mobile technology, coupled with emerging changes in attitudes toward cheating behaviour provide
cause for concern to educational institutions. In a study commissioned by the Benenson Strategy Group (CSM, 2009), 26% of American students aged 13-18 had stored information on their mobile phones for use in test and examination conditions. 25% admitted to texting their friends during exams for the purpose of exchanging answers. 20% searched the Internet during exam time to gather information for use in their test responses. 50% reported these actions as being serious cheating offences but 20% viewed them as being not serious and therefore something which they would consider as a viable means when sitting future exams.

Umarji (2005) found there were 182 South Korean students caught using text-messaging to cheat on the national college entry examinations and other students were identified at various Universities worldwide. The increase in these activities has additionally been highlighted in a report from the Qualifications and Curriculum Authority which found that over 1000 students were caught taking a mobile phone into an examination (0.06% of the total examination population (Paton, 2010). This was a 6% increase in a year.

2. TRADITIONAL METHODS OF CHEATING

Figure 1 shows a typical examination hall. The red circles represent the moderators/staff and the other circles represent those sitting the exam. The light grey squares are the tables and the long rectangle is the exam moderator’s table. The moderators walk around the tables keeping a look out for any cheating. This in turn has ruled out a lot of cheating methods and has paved a path for the use of technology as it is easier to hide and harder to detect. For the sake of completeness, we highlight some of the more traditional methods here.

Pencil Case

It used to be that students could keep their pencil case on their desk. Cheaters in this case could hide notes within their pencil case to aid them during the examination. A pencil case was also used in other ways. The “graffiti” pencil case method was also used in the past. This is where the cheater writes messages and draws all over a pencil case, leaving small areas empty. In those areas they can write formulas which will help them in the exam. This method no longer works in many cases as students are no longer allowed to leave pencil cases on the table.

Hiding Notes

Students can also hide notes on their person. This could be in their school jacket or even in their socks. When the exam moderators are not looking, they could then take a peek at their notes. This method is one of the most difficult to pull off as when a person moves within an examination hall, this immediately draws attention to them. This method has proven to last the test of time however as it is still used (Williams, 2010). A total of 1,897 penalties were handed out in 2009 for students sneaking...
dictionaries/study guides and calculators into the exam hall. This is up 8% from the previous year. Smuggling study aides into the exam hall is still very common (Williams, 2010).

Writing on Arms/Hands

Here the student writes notes on the inside and back of their arms & hands. This has faded away a little. It is also difficult to disguise in the exam hall and there is limited space on the body to supply the information required.

Notes on Ruler

When students were prohibited from leaving their pencil cases on the desk while taking the exam, they were only allowed to leave the necessary items such as a pen, pencil, ruler and sharpener. The idea of hiding notes behind the ruler has been going around for a long time. As the ruler is long and thin, it provides limited space for students to write notes on.

Leaving the Room

A student could ask to go to the toilet at anytime where they can then look at notes and return to the examination hall. This method obviously had a downfall, this being that it is not possible to go to the toilet frequently.

3. CHEATING USING TECHNOLOGY

The previous section has highlighted traditional methods of cheating which are being replaced with miniaturised technology which can hold larger amounts of information. We now highlight these technologies in this section.

Mobile Phones

Early mobile phones had less features meaning that a cheater was limited to what they could do. A student could use a mobile phone to text someone on the outside to get the answer. This would be difficult in a typical exam hall although many students would be able to text without looking at the mobile phone. The person sitting on the outside would be at a computer to quickly look up the answer and text the student back. The person cheating could then write this down. Nearly all mobile phones now have a built in camera therefore one is able to take a photo of notes at home and then look at the photo in the exam hall. A student is also able to take a photo of the actual question and send it to someone on the outside to which they can then send the answer back as an image or a text message. This is less risky than writing a text message as it is quicker to do and the mobile phone does not have to be out as long. Other features which can be used include a calculator on the mobile phone and conversion features which allows the user to convert currencies, weight, liquids and numbers. Many mobiles also typically come with an email feature as well as a built in mobile web browser. Email can be used by cheaters in many ways. A student could email notes to himself the night before the exam. They could then access these notes in the exam hall using the email feature of his mobile phone. This in turn could be used to email questions out of the exam hall to an outsider sitting at a computer. The outsider could then look up the answer to the question and email it back instantly.

The web browsers can also be used directly by cheaters in an exam. This method is very risky as it requires the student to type information into the phone and also navigate. Figure 2 shows some of the latest phones and how they compare to each other, with regards to browsing speeds. If someone were to use, for example, a Nokia N86 to browse with, they could successfully display google.co.uk in 1.3 seconds and wikipedia.org in 3.2 seconds. This is quite fast and would not impact on the usual time restraints associated with a written examination.

Calculator

Scientific calculators can store formulas, fractions and text. An example of a calculator which can do this is the TI-84 Plus (Figure 3). This calculator is quite advanced and can be used by students for exams which require a calculator
although such calculators can often be prohibited. The TI-84 Plus for instance provides preloaded periodic table (highly advantageous for students taking science exams), a history feature which would allow a cheater to look back on calculations that they made at home and exam answers can also be loaded directly onto the calculator via USB.

A calculator of this specification can provide a cheater with a quick and easy method to get the answers. This piece of technology can be harder to detect by the exam moderators as in some cases a calculator is allowed to be used.

**MP3 Players**

An MP3 player such as the iPod shuffle is easy to disguise as it is small and the lead of the earphones can be hidden below clothing. An MP3 player is prohibited from examinations at all times. A student could use an MP3 to cheat by recording themselves at home speaking answers. Some MP3 players can store images and videos. This can also be used to cheat. The student could take a picture of notes at home and then look them up in the exam hall. If two students both have iPods, then they can use a chat application and communicate with each other trading information.

**Wireless Receivers**

A wireless microphone can also be used to cheat in an exam (Figure 4). This device is combined and used with wireless earphones. To cheat using the microphone, the student would have to whisper the question into the microphone. This would then be picked up by someone outside of the exam hall who would look up the answer and then say it into a microphone which would be broadcast into the earphones of the student. The earphones are limited to a specific range ~100 metres. The transmitter can be in their pocket or in their school bag.

*Figure 2. Browsing speeds of various phones for visiting popular websites (in seconds)*

<table>
<thead>
<tr>
<th>Site</th>
<th>T-Mobile G1</th>
<th>Apple iPhone 3G</th>
<th>Nokia N97</th>
<th>Nokia 5800</th>
<th>Nokia N86</th>
<th>iPhone 3GS</th>
<th>Traveler 137</th>
<th>Opera Mobile 9.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>google.co.uk</td>
<td>4.2</td>
<td>3.8</td>
<td>1.4</td>
<td>1.4</td>
<td>1.3</td>
<td>2.1</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>theregister.co.uk</td>
<td>14.2</td>
<td>13.6</td>
<td>13.6</td>
<td>11.5</td>
<td>12.3</td>
<td>7.4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>theguardian.co.uk</td>
<td>47.4</td>
<td>24</td>
<td>22.7</td>
<td>22.8</td>
<td>19.2</td>
<td>10.4</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>digg.com</td>
<td>37.9</td>
<td>35</td>
<td>33.6</td>
<td>28.9</td>
<td>30.6</td>
<td>15.4</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>techreport.com</td>
<td>13.3</td>
<td>17.3</td>
<td>10.7</td>
<td>7.9</td>
<td>7.9</td>
<td>6.75</td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>bbc.mobil</td>
<td>3.7</td>
<td>3.4</td>
<td>3.4</td>
<td>3</td>
<td>2.8</td>
<td>3.4</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>en.wikipedia.org</td>
<td>11.2</td>
<td>8.4</td>
<td>10.6</td>
<td>10.1</td>
<td>7.6</td>
<td>3.2</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>nytimes.com</td>
<td>23.7</td>
<td>23.9</td>
<td>16.4</td>
<td>14.9</td>
<td>12.5</td>
<td>11.8</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>timesonline.co.uk</td>
<td>20.8</td>
<td>18.6</td>
<td>15.1</td>
<td>14.3</td>
<td>12</td>
<td>9.9</td>
<td>5.1</td>
<td></td>
</tr>
<tr>
<td>youtube.com</td>
<td>24.2</td>
<td>20.5</td>
<td>9.3</td>
<td>8.1</td>
<td>7.1</td>
<td>7.9</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 3. Programmable calculator*
Pocket PCs can open notes and look up information on the web. The iPhone may also have ‘an app for that.’ If the examination was a history exam, the student can download an app which has dates stored and a description of the events which happened. A feature which is particularly useful within the iPhone is that it provides an instant messaging application allowing a student to communicate with friends instantly.

### Invisible Ink Pens

Invisible ink pens are invisible to the naked eye when writing. When a special light is shone over the text, the writing then becomes visible. When no one is looking, a student could shine the light over the information to make it clear. This device is a cheap method of cheating.

### Wrist Watches

Some wrist watches on the market such as the Triband phone (Figure 5) are miniature PDAs. This allows the storage of sufficient amounts of information. In some ways, this is the ideal technology to use in cheating. A clever student may also perform a hard reset on the watch to erase all information should they feel they have been caught – or indeed in the event of being challenged by the examination invigilators.
Figure 6. Soft drinks fake label

Figure 7. Mobile phone activation detection

Printed Labels

This method involves a little preparation. Firstly a coke bottle or water bottle is purchased. Then from the web, templates for popular drinks such as coke can be downloaded and loaded into a photo editor. Then the ingredients and nutrition sections can be removed and in their place, information about the exam can be inserted.

The label is printed onto glossy photo paper and glued back onto the bottle where it is taken into the exam hall and sits on the student’s desk, enabling them to cheat (Figure 6).

4. PREVENTING CHEATING WITH TECHNOLOGY

It is evident that counter measures are needed in order to combat the growing trend in cheating with technology. There are a number of different approaches that could be used. One is to use a signal jamming device (jammers). Jammers are intended to prevent radio equipment from receiving and transmitting signals relevant to their function. Use of such devices therefore constitutes the specific offence of causing deliberate interference. Such jammers need to be strong enough to block phone signals without interfering with other devices such as electric doors. Jammers are not however legal in regions such as the UK. One similar but legal device which is not as expensive as a jammer is a Faraday Cage. The Faraday Cage is where metal is built into the walls of a room to block electromagnetic waves. Such a measure would mean that mobile phones which are taken into the exam hall would have severely reduced signals (if any at all). This would rule out the use of the mobile phone for texting the questions and answers in and out of the exam hall.

Detection devices could also be implemented in examination halls. Signal detection devices to identify mobile phones that are active do not have the legal question marks of jamming and blocking. There are some cheap devices ranging from under £100, which can
silently detect mobile technology devices as they are switched on or off and when in use. Although these devices have a limited range it is clear that an individual needs to walk round the examination hall. They can also detect any signals that are emitted from the exterior of the examination hall. There is a drawback to this in that the device can only detect devices but not able to fully identify what mobile technology is being used.

Mobysafe manufacture a device which to detect 2G mobile phones in use within a 20-meter radius and 3G mobile phones within a 15-meter radius. Figure 7 shows how it would work in an exam hall. The device has a controllable radial range of between 1 meter and 20 meters. This shows how an invigilator could firstly detect if a phone was being used and then home in on its exact location by using the radial distance controls on the detector.

The use of CCTV cameras within the exam hall is also a method for preventing the use of technology as cameras allows students to be monitored more closely and any offences should be recorded. The presence of CCTV cameras alone might scare many potential cheaters from cheating as they are aware of being watched more closely. To prevent students from cheating using their calculators to store information, the exam moderators should not allow any calculators to be brought into the hall. Only approved calculators should be allowed and these could be handed out at the start of the examination.

As extreme as it sounds, airport style metal detectors are being considered. Placing metal detectors at the entrance to the exam hall should deter students from trying to sneak in microphones and earpieces. When the student walks through the detectors and it bleeps, they then would be searched for any metal devices before taking their seat.

5. CONCLUSION

Methods of cheating have become ever more sophisticated and hard to detect. Increasing miniaturisation of technology along with increased information storage will undoubtedly lead to increases in cheating. All participants need to have an agreed perception of what constitutes cheating. There also needs to be clear and transparent rules and regulations governing academic dishonesty and a clear outline of the punishments to be handed out to anyone caught cheating. Technically feasible solutions such as the use of signal jamming devices raise questions and problems which have yet to be resolved and in the latter case are currently illegal.

REFERENCES


Kevin Curran BSc (Hons), PhD, SMIEEE, FBCS CITP, SMACM, FHEA is a senior lecturer in Computer Science at the University of Ulster. His achievements include winning and managing UK & European Framework projects and Technology Transfer Schemes. He has published over 600 published works to date. He is the Editor in Chief of the International Journal of Ambient Computing and Intelligence (IJACI). Dr Curran is a Fellow of the Higher Education Academy, a Fellow of the British Computer Society and is listed by Marquis in their prestigious Who's Who in Science and Engineering. He is also listed in the Dictionary of International Biography and by Who's Who in the World.

Gary Middleton is an undergraduate student studying Computer Science at the University of Ulster. He is currently working in his placement year in the area of product quality assurance with the New York Stock Exchange (NYSE) in Belfast, Northern Ireland. His research interests include Internet Security, Distributed Systems and the World Wide Web.

Ciaran Harrison is an undergraduate student studying Computer Science at the University of Ulster. His research interests include programming and security.
International Journal of Cyber Ethics in Education

An official publication of the Information Resources Management Association

Mission
The mission of the International Journal of Cyber Ethics in Education (IJCEE) is to provide the latest research on ethical computer use and behavior in all levels of education – from pre-primary to higher education – based on the first-hand experience, observation and knowledge of students and educators in the field. This journal provides significant analysis of computer use, development, impact, policy, theory, and methodology related to ethical use of educational internet and computer applications. IJCEE seeks articles from researchers in all educational settings, including schools, higher education institutions, adult education centers, etc.

Subscription Information
IJCEE is published quarterly: January-March; April-June; July-September; October-December by IGI Global. Full subscription information may be found at www.igi-global.com/ijcee. The journal is available in print and electronic formats.

Institutions may also purchase a site license providing access to the full IGI Global journal collection featuring more than 100 topical journals in information/computer science and technology applied to business & public administration, engineering, education, medical & healthcare, and social science. For information visit www.infosci-journals.com or contact IGI at eresources@igi-global.com.

Copies of Articles
Copies of individual articles are available for purchase at InfoSci-On-Demand (www.infosci-on-demand.com), an aggregated database consisting of more than 31,000 research articles written by prominent experts and scholars in the field of information/computer science and technology applied to business & public administration, engineering, education, medical & healthcare, and social science.

Copyright
The International Journal of Cyber Ethics in Education (ISSN 2155-6903; eISSN 2155-6911). Copyright © 2011 IGI Global. All rights, including translation into other languages reserved by the publisher. No part of this journal may be reproduced or used in any form or by any means without written permission from the publisher, except for noncommercial, educational use including classroom teaching purposes. Product or company names used in this journal are for identification purposes only. Inclusion of the names of the products or companies does not indicate a claim of ownership by IGI Global of the trademark or registered trademark. The views expressed in this journal are those of the authors but not necessarily of IGI Global.

Correspondence and questions:

Editorial: Kadir Beycioğlu
Editor-in-Chief
IJCEE
E-mail: kadir.beycioglu@deu.edu.tr;
beycioglu@gmail.com

Subscriber Info:
IGI Global
Customer Service
701 E Chocolate Avenue
HersheyPA17033-1240,USA
Tel: 717/533-8845 x100
E-mail: cust@igi-global.com

The International Journal of Cyber Ethics in Education is currently listed or indexed in: Cabell's Directories; DBLP; Google Scholar; MediaFinder; The Standard Periodical Directory; Ulrich's Periodicals Directory