

# Eliminating the successor to plagiarism? Identifying the usage of contract cheating sites.

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## Abstract

The paper identifies a growing problem, referred to as contract cheating, considered to be the successor to pure plagiarism. Contract cheating is defined as the submission of work by students for academic credit which the students have paid contractors to write for them. The usage of one particular site, RentACoder, known to be used for contract cheating is manually monitored. RentACoder is a site where computer solutions are written to contract for legitimate uses but can also be used for students to cheat. An exhaustive study shows that 12.3% of bid requests placed on RentACoder are identified as contract cheating. The primary study reported in the paper quantifies and discusses these contract cheaters. Out of 236 identified contract cheaters only 8.1% of these have made only a single bid request. Over half of the 236 cheaters have previously requested between two and seven pieces of work. The paper argues that this shows that this form of cheating is becoming habitual. The primary study identifies that as well as the usual types of individual students using the services of RentACoder non-originality agencies also appear to be working as subcontractors offering to complete student assignments. This adds an extra layer of complexity to methods of tracking cheating students. The paper concludes by advising that more automated detection techniques are needed and advises that assessments and academic policies need to be redesigned to remove the potential for contract cheating to be committed.

## Background

Much reference has been made in the academic literature to the apparent trends for students to copy work from each other or from an external source (Austin & Brown 1999, Culwin & Lancaster 2001). Some reference has been made about the availability of essay banks and Internet cheat sites (Lathropp & Foss 2000). Some commercial anti-plagiarism services claim that they can detect the use of these sites (Turnitin 2006).

The detection methods deployed by such anti-plagiarism services do not identify what could be considered the most important plagiarism related problem of the modern age, the growing use of students submitting work that has been written to order for them. Lancaster and Culwin identified the worrying trend of **non-originality agencies**, commercial companies that produce assignment solutions to order for students that match a provided specification provided (Lancaster & Culwin 2006). Lancaster and Culwin note that it is necessary to detect this style of cheating in order to preserve the

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integrity of the academic awards that are made by our institutions. This is something that the commercial plagiarism detection services do not claim to be able to do.

This paper identifies the use of one particular type of non-originality agency, which here will be referred to as **contract cheating**, the process of offering the process of completing an assignment for a student out to tender. This could be thought of as being the reverse of the Ebay auction phenomenon (Ebay 2006); instead of a seller offering goods to the highest bidder a buyer of contract cheating services places a bid request and sellers bid for the privilege of producing a solution. Often the buyer will choose the seller who offers to complete work for the lowest price, giving the reverse of the auction phenomenon. The buyer might also choose to use the contractor that they feel can most suitably provide services of a quality required, even if the price that they request is higher.

One example of a contract cheating site, which is the one that will be considered during the remainder of this paper, is RentACoder (RentACoder 2006). Figure 1 shows RentACoder in use. The site is advertised as a mechanism to put buyers requiring a computer system or solution in contact with those with the specialist skills to produce it. This is something that in its base form has an apparent appeal and use. Many of those offering commercial services via RentACoder appear to operate from countries where the economic implications favour taking contracted work from overseas. For example Indian and Eastern European contractor companies providing services through RentACoder are commonplace; presumably the motivation for these companies is purely of a financial nature as the returns for completing contracting work are higher than completing similar work within their locality.

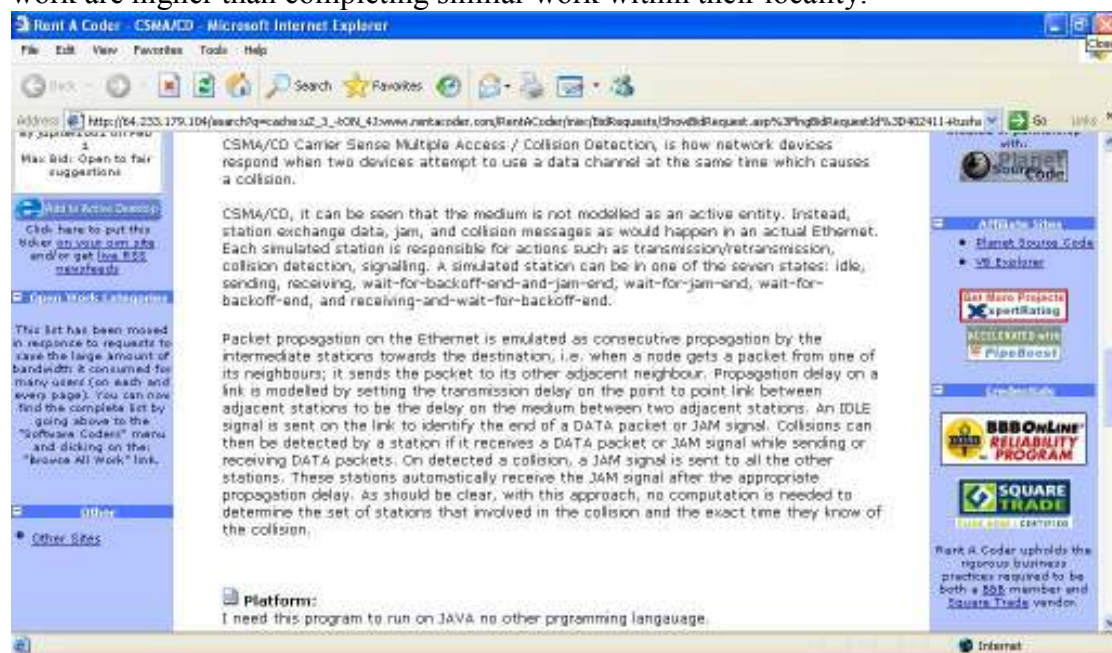


Figure 1: An example bid request on RentACoder.

It is immediately apparent when looking through the bid requests on RentACoder that a notable proportion of the contract work offered is academic in nature. Although there is a plausible reason why a RentACoder site could be used purely for education the phrasing of most bid requests appear to represent academic misconduct. Using cheat sites is also against the computing policies of many academic institutions and where students claim to be using sites purely for research there is a question why they

have not used services available at their own institution. The majority of academic misconduct usage seems to be for assignments requested by students on Computing degrees and other technical subjects. Additionally there are also contract cheating requests from students of other disciplines, for instance those requiring essays.

Although the use of such sites has been previously identified there has been no attempt to study the users of such sites, or to quantify their use. This paper presents the results of initial studies that aim to explore the behaviour of these contract cheaters and discusses the contract cheating trends that have become apparent.

The results of two studies are presented. The first study explores an **exhaustive corpus** comprising of all bid requests placed on RentACoder over a three week period to identify the scale of the contract cheating problem. The second study uses a larger **primary corpus** comprising of contract cheating bid requests collected over two months to identify user types and their trends. High volume users of the services are identified and the motives behind this usage are shown to add an extra layer of complexity to prevention and detection methods.

## **Identifying the extent of the problem**

Two corpora have been collected from the RentACoder site in order to investigate its users and in particular to identify the use made of the site by students to provide solutions to assignment specifications. The first corpus provides the more accurate measure of the extent to which RentACoder is used for contract cheating and is the result of an exhaustive check of all bid requests posted on RentACoder during a three week period, whether contract cheating related or not.

The exhaustive corpus was obtained over a three week period covering late March and early April 2005. The period was chosen as it represented the mid-point of the second semester in many UK and international Higher Education institutions. This could be considered to be a period of typical usage by students, not meeting the end of semester rush for assignments to be completed and neither matching the early semester lull. This exhaustive study was carried out in order to gain an estimate of the volume of submissions of contract cheating bid requests by students.

During the three week period 803 bid requests were posted on RentACoder. The majority of these appeared on investigation to be legitimate business requests. A total of 78 were positively identified as assignments using a majority of detection methods. Such methods will not be revealed here as alerting students to how the detection is made can provide them with the means to modify their future bid requests in order to avoid identification. A further 21 bid requests were considered 'highly probable' by the investigators, meaning that they were clearly academic in nature, but an institutional source could not be positively identified. They might be due to the use of common bookwork questions with multiple possible sources, or because the institution in question holds their assignment specifications in closed databases. Such bid requests will be considered as part of the best calculation of the extent of the contract cheating problem. They are not being used to identify usage patterns of RentACoder during the later study of the primary corpus.

The total of 99 out of 803 contract cheating requests determined represents 12.3% of all of the bid requests on RentACoder. Since there is an inherent likelihood of variance in the use of the site by students at different times of the year it is quite plausible that the real figure could fall within the region of one tenth to one fifth of all RentACoder users. This clearly represents a large proportion of the RentACoder percentage fee based income and makes it clear why the site does not do more to eliminate this unprincipled type of usage of the facilities that it offers.

### **The primary contract cheating corpus**

The exhaustive corpus has proved useful in establishing the scale of contract cheating on RentACoder but the number of confirmed contract cheating bid requests in it makes it limited as the basis for a more complete usage study. A larger data set has been compiled to allow more conclusive results about individual contract cheating users to be produced. Content for this corpus was collected over a longer two month period. This corpus will be known as the primary corpus.

The primary corpus was collected over the two month period of March and April 2005. The corpus was largely the result of the authors' attempts to alert academics at other institutions when assignment specifications that they had produced were identified on RentACoder. As such the monitoring process used to compile the primary corpus was not so complete as that for the exhaustive corpus. Only those submissions that could be clearly identified as contract cheating attempts, where the originating institution could be discovered and notified, are included in the corpus.

During this period 360 bid requests were identified as traceable contract cheating attempts from which an institution could be identified. These 360 bid requests form the primary corpus from which results are derived for the remainder of this paper.

It is worth noting that there is an overlap between the primary and exhaustive corpora due to the time period of the study and the attempts of the authors to notify as many tutors as possible when their intellectual property was discovered on RentACoder. The overlap does not invalidate the results presented as it is only the primary corpus that is under consideration within the remainder of the paper. The primary corpus could be considered to be 'mostly exhaustive' but it is not complete. This sampling process should not make the results obtained any less reliable.

### **Evaluating the types of student assignments posted on RentACoder**

The types of student assignment specifications placed onto RentACoder give an immediate indication of the types of students behind them. It should come as little surprise to learn that the substantial majority of these contract cheating bid requests are placed by computing students. This might be due to the explicit advertising of RentACoder as a service for solving computer problems or could be because such students are the ones most aware of the new cheating opportunities available to them.

Some details of the types of computing assignments found in the primary corpus is included here for the subject specialist, although the understanding of this material is not necessary in order to appreciate the remainder of this paper. The majority of the

requests are for the writing of short programs; immediately tallying with the 'Coder' section of the RentACoder title. These compare closely with the programming languages identified as the most used in UK Higher Education (Culwin et al 2001), such as Java, C++ and Visual Basic. A small number of lesser-used languages such as the functional language Miranda and the logical language Prolog are evident. There are also a few non-programming computing requests, such as for the derivation of database Entity Relationship Diagrams, or for Unified Modelling Language class designs.

Most of the computing assignments appear to be at the lower undergraduate level, but there are some at a higher level. These include essays required to be at a Master's degree level and the request for main components of complete final year degree projects to be produced.

It would be unrepresentative to claim that all of the RentACoder bid requests are the results of computing assignments. During the study there were three requests for essays on social aspects of medicine to be written 'from a feminist perspective'. All of these requests were posted, completed and paid for.

### **The international distribution of RentACoder contract cheaters**

It is of immediate interest to identify where the institutions from which contract cheating attempts have been identified on RentACoder are based. This enables the international prevalence of contract cheating to be investigated.

Table 1 shows the locations associated with each of the 360 assignment requests from the primary corpus. In each case the institution for which each assignment specification is related has been analysed and the relevant country found. This might be different from the contract cheater's registered country, as found on their profile, for instance where an international student is registered at their home address not their institutional address.

The relevant institutions have been found to be distributed in four main countries. The number of bid requests within these countries is shown sorted into descending order. A few bid requests from other countries were successfully identified but the numbers unsubstantial enough to be shown on their own. These are all shown grouped together in Table 1. It appears that the use of RentACoder is becoming more prevalent in some institutions than others since there are many institutions that are seen to be the source of multiple bid requests. To show the influence of this the total number of institutions within each country from which requests have been made is also shown. The final table column shows the mean number of bid requests per affected institution, intended to give a more localised model of the scale of the contract cheating problem in each country. The mean values are rounded to two decimal places.

<b>Country</b>	<b>Number of bid requests identified</b>	<b>Number of institutions from which bid requests were identified</b>	<b>Mean number of bid requests per country</b>
United States of	200	113	1.77

America			
United Kingdom	102	46	2.22
Australia	24	14	1.71
Canada	22	9	2.44
Others	12	8	1.50
Totals	<b>360</b>	<b>190</b>	<b>1.89</b>

**Table 1 – RentACoder represented submissions and institutions by country**

Perhaps the most apparent indication from the results shown in Table 1 is the completeness of westernised English speaking countries. One reason for the choice of language might be as follows. RentACoder is operated from within the USA. All postings on the site are in English. This would imply that English-speaking countries would be the most dominant users of RentACoder.

The Westernised nature of the bid requests might also be due to the financial implications of making use of such a site. It could therefore be expected that students from richer countries, such as those that are westernised, are therefore likely to be the primary RentACoder contract cheating customers.

Table 1 shows that the ordering of the number of bid requests and that the ordering of the number of institutions affected is identical. This gives perfect correlation between the two columns. However the ordering of the mean number of bid requests per institution is different. The United Kingdom and Canada both have mean numbers above the norm. It is certainly true from the results collected that more students in the United Kingdom seem to be using the service than could be expected especially when the much greater size and number of students in the United States as a whole is taken into account.

The unexpected relative frequencies of bid requests might also indicate that this contract cheating is a new phenomenon in countries like the United Kingdom and that more students are being detected as they have not yet found ways to disguise their sources. It has also been noticed that the use of untraceable 'book exercises' is prevalent in United States institutions and so successful detection rates of students engaged in this type of cheating could be expected to be lower.

## **Monitoring the RentACoder repeat offenders**

Whilst the geographical location of RentACoder users identifies important traits inherent within them it is perhaps more instructive to consider whether or not these users contain frequent re-offenders. Each RentACoder user, identified to the outside world with a unique pseudonym, has a profile containing information such as their registered home location and a limited history of previous activity, such as other bid requests. This information has been analysed for all the users found in the primary corpus.

The primary corpus of 360 bid requests made included 236 RentACoder users. The remainder of the 360 are duplicate users, e.g. where the same user submitted multiple bid requests within the two month period under consideration. The 236 users cannot be guaranteed to be unique since it is plausible that a creative RentACoder user could employ more than one pseudonym to minimise their likelihood of detection, although one would think that most of these likely are unique. The study has also identified some cases where users have changed their pseudonym. In this case attempts have been made to track the individuals' usage further using their underlying and unique RentACoder identification number, which has remained the same.

For each of these 236 users the total number of bid requests placed by them since their RentACoder profile records began has been calculated. The purpose of this study is to

identify those users who could be classified over the longer term as regular or habitual cheaters but who might have only decided to cheat only once during the two month study period.

No attempt has been made to verify that every bid request by every one of these users represents contract cheating. The numbers of requests made by some users will show that this is an unenviable task without automated checks being available and such checks are not yet known to exist! However it is known that all the users being studied submitted at least one contract cheating bid (i.e. the one or more submitted during the two month study).

Although complete checking of the enlarged corpus of assessments has not been carried out a number of the bid requests from outside the two month study period have been investigated in order to confirm if all the bid requests submitted are assessments. These investigations show that most of this set of users are on RentACoder solely for contract cheating purposes. The results of more exhaustive checking of some of these users is given later.

Table 2 shows the distribution of bid requests made by each of the 236 users, bracketed into ranges judged appropriate based on the data. Within each range the number of users who have posted that number of bid requests and the associated percentages, rounded to one decimal place, are shown.

<b>Number of bid requests by RentACoder user</b>	<b>Frequency of this number of bid requests being made</b>	<b>Percentage frequency of this number of bid requests being made</b>
1	19	8.1
2-4	81	34.3
5-7	41	17.4
8-10	31	13.1
11-13	15	6.4
14-17	12	5.1
18-25	16	6.8
26-50	15	6.4
51-75	4	1.7
76-100	1	0.4
101-200	1	0.4
<b>Total</b>	<b>236</b>	<b>100</b>

**Table 2 – Frequency of RentACoder bid requests by contract cheaters**

Table 2 shows that very few (8.1%) of the identified students have only used RentACoder once, in other words the time they were detected during the two month period. This seems to be smaller than could be anticipated, suggesting immediately that most users are at least occasional contract cheaters. One plausible sounding reason for this could be that new contract cheaters are joining RentACoder all the time, but when they discover its uses they frequently realise that it is worth using again. More investigation would be required to formally verify this hypothesis.

One further important piece of information is also identified in Table 2. This shows that close to 50% of students have made between two and seven bid requests. This



could be considered to be a reasonable estimate of the number of postings made by contract cheaters that could be considered habitual and would suggest that these are using it for most of their assignments throughout their academic careers. The not unsubstantial number of students with a number of bid requests slightly greater than seven might simply be similar habitual cheaters who are further into their academic careers.

It is worth noting that the more exhaustive corpus formed during the three week study was also examined. The results showed a very similar distribution although they are not included in this paper.

### **Identifying agency usage of contract cheating**

The distribution shown in Table 2 has a surprisingly long tail, outside what could be the likely expected boundaries of the number of assessments that would be needed by a cheating student to complete many degrees. Nearly 10% of the users have posted 25 or more bid requests and these are appropriate for a more in-depth study.

Ten users, each of whom have made a substantial number of bid requests, of 18 or more, have been selected for a more in-depth study. The bid requests, made by these users both within and outside the two month period from which the primary corpus was obtained were manually checked. The manual checks revealed that most of the the bid requests are likely to represent contract cheating attempts. Whether a bid request represents contract cheating or not is something that is usually immediately and intuitively obvious based on the style of the request. It has not been considered to be a sensible use of time to take these checks forward and to comprehensively attempt to identify all the associated institutions. The large numbers of bid requests involved and the likelihood that any older assignments have been long since assessed make this approach untenable.

Details of the total number of bid requests made by the ten high frequency users selected are shown in Table 3. To preserve anonymity the high frequency users have been denoted using a two character alias unrelated to the original RentACoder pseudonym.

<b>Alias</b>	<b>Number of bid requests made</b>
RP	81
SP	66
RC	50
WC	43
LN	36
WD	36
JC	35
HW	31
NP	26
FM	18

**Table 3 – Number of bid requests made by high frequency RentACoder users**

In most cases these users have submitted exclusively or almost exclusively bid requests relating only to contract cheating. There are two exceptions to this. The most

notable exception is WC, who appears to have solely submitted requests of a commercial nature, apart from the single contract cheating request during the two month primary study period. The reasons why WC placed only this sole contract cheating assignment on RentACoder are not clear.

The other exception, albeit to a lesser extent, is FM. The bid requests from this user appear to contain a mixture of both assignment requests and work that might have commercial value. FM could represent a commercial customer who is also studying to gain a qualification.

Out of the ten RentACoder users placing contract cheating requests and shown in Table 3, the remaining eight have been identified as submitting exclusively contract cheating material. Three of these are worthy of being discussed here as their behaviour appear to represent user types that are of particular interest to this study.

LN is likely a standard high volume contract cheater who is having assignments completed for their own benefit. The assignments have been traced to the same online campus and all are posted over a seven month period. This suggests that the student intends to gain an academic award using purely financial methods, rather than demonstrating any competences. This contract cheating user type shows an immediate danger inherent within online campuses where it is impossible to test students in person and also incredibly difficult to track down the tutors who might be responsible for a given assignment.

RC has posted assignments for several different courses at a UK university and some from other universities around the same geographical area. Hence RC appears highly unlikely to represent a single student. It is more plausible to consider that RC is acting as a 'middle-man' of some kind to other contract cheaters, or is perhaps a non-originality agency. Different hypotheses are possible as to why RC might be operating in this way. This might be a student acting for themselves and for other local acquaintances. With a good record of feedback RC's contract cheating user type could place bid requests on behalf of their acquaintances and receive better value offers to complete the work from RentACoder contractors based on their increased usage. RC might alternatively represent a commercial business actively recruiting students to complete work on their behalf. The subcontracting of the assignment specifications provided might not be known to the students concerned.

RP has similar characteristics to RC, but this contract cheating user type suggests a non-originality agency. RP is registered as being based on the Indian subcontinent. However the assignments that RC has posted have been tracked down to a selection of institutions in both the USA and the UK. The geographical discrepancies between RP's physical location and the assignment placement suggest that RP must have international links in place to recruit students as customers. This recruitment is likely to have taken place over the Internet. Again a number of hypotheses about RP's user type are possible. RP might be actively targeting likely students with advertising, or might be watching for students asking for help with homework type questions in forums. One further alternative is that RP might represent an essay writing type service that contracts technical work out to tender.

The trend of non-originality agencies and related user types appearing on RentACoder is one that causes a particular level of concern. These could be considered even more unacceptable than individual students who are using RentACoder to commit contract cheating. The net result of agency use of contract cheating sites will be the loss of some of the tracking information used for detection. The potential marketing model for agencies, that they are actively targeting students to use contract cheating services means that students are increasingly likely to know that such services exist and that detection of their contract cheating is not that likely. A key consequence of this is that the methods through which assessment for academic credit are carried out need to be urgently reconsidered. There is a need to design out the potential for contract cheating, rather than to rely solely on detection.

## **Looking towards the future**

The exhaustive and primary studies have shown that there is a clear and unarguable usage of RentACoder for the purposes of contract cheating. It must seem highly likely that such cheating is also common on other sites that operate under a similar business model to RentACoder. Such sites might be geared more closely towards providing solutions for potential contract cheaters in non-technical disciplines. The relatively small scale study reported in this paper has allowed an initial subset of contract cheating user types to be identified, including individuals looking to further their own future, sub-contractors acting on behalf of students who might otherwise submit work on their own and non-originality agencies that may be part of larger essay writing firms. There is an immediate need to extend the size of this study to confirm if more user groups exist and to improve the reliability of the data collected, but the amount of labour intensive process required to do so makes this largely prohibitive.

One more anecdotal pattern of usage from the primary study is worth mentioning, although there is insignificant evidence in the corpora collected to data to test if this it is merely a blip in the figures. That is that once a student from a particular institution has posted an assignment as a bid request on RentACoder often within a week several other students from the same institution have also used RentACoder. The student might be through posting the same assignment specification as their peer; this could be to provide them with an equally undetectable and plagiarised solution. Students in this situation have also been observed to post an assignment from another module or course. A wider scale study would allow this usage pattern to be investigated further.

Whether a student who commits a contract cheating offence is detected or not is not only dependent on how well they make their submitted assignment specification untraceable. It is also dependent on whether any checks on recent bid requests are made at an appropriate time; they could be missed due to a lack of labour available for detective work, or due to a request being posted only for a short time scale. It could be argued that such an approach to detection is highly capricious. It is necessary to develop automated methods through which to identify potential contract cheating to ensure that all attempts to cheat are treated equally and that limited human labour can be deployed in a more time effective way.

Solutions to automated potential detection methods for contract cheating have not been widely documented, but some possible solutions that are considered to be worth investigating include:

- automated monitoring of contract cheating sites with text analysis used to identify likely cases. There is likely work available in the plagiarism detection and authorship attribution fields that could be applicable here. Common words and phrases related to assessment, as well as institutions and tutors exist within many assignment specifications as posted on RentACoder and these could be exploited.

- automated monitoring of known non-originality agencies. The final part of the study identified that there are many repeat offenders using RentACoder. Tracking such agencies using the site for contract cheating purposes and hence their customers could mean that their service no longer becomes a profitable business for them to run.

- creating a central repository of assignment specifications against which the contents of contract cheating sites could be monitored. Much pattern matching identification of institutions in order to alert them when the assignment specifications that they have set appear on RentACoder depends on them being accessible through search engines. Institutions whose assignments are kept within closed boundaries are therefore missing out on being able to be alerted in this situation (although sometimes other techniques can be used to track them down). A central repository would be a solution for institutions that want to defend themselves against contract cheating but do not want to release their assignment specifications onto the wider Internet.

The paper has presented several hypotheses about the users and usage of contract cheating sites. It would be useful to be able to talk to some of the contract cheaters, to identify their motivations and to test if these hypotheses are correct. In particular identifying how and why students become habitual cheaters, something that appears commonplace from this evidence, might suggest ways in which this behaviour could be largely eradicated.

There is a serious concern that, unlike plagiarism, academic institutions are not yet fully aware of the potential prevalence of contract cheating and the measures that can be taken to avoid it. It is also not clear that institutions have strong enough ways of penalising students that commit this kind of cheating. One reason for this is that it is often difficult to get a single clear and conclusive piece of evidence as required by many penalisation panels. Educating tutors and getting sensible contract cheating policies into place has to be a major part of the future direction for contract cheating researchers.

From these initial studies it appears that ever increasing costs of student fees and ever increasing numbers of students, some of whom could be considered to be less able, will have drastic consequences. An inevitable one is the use of contract cheating sites such as RentACoder. Many students may look at a degree as an investment rather than an academic endeavour and could consider the purchasing of original work, which could not be caught by traditional automated anti-plagiarism methods, merely a cost effective use of time and money.

It is hoped that this paper has raised awareness of the usage and the users of these sites. It is the need of tutors to ensure that the work submitted by students is their own. Just as assignment methods had to be redeveloped to minimise the impact of plagiarism they now have to be redeveloped to minimise the potential for contract

cheaters to be rewarded. It is hoped that the academic community will take this task to heart and that the value of our academic awards can once again be ensured.

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