An Observational Analysis Of The Range And Extent Of Contract Cheating From Online Courses Found On Agency Websites

Thomas Lancaster

School of Computing, Telecommunications and Networks
Birmingham City University
Birmingham, United Kingdom
thomas.lancaster@bcu.ac.uk

Robert Clarke

School of Computing, Telecommunications and Networks
Birmingham City University
Birmingham, United Kingdom
robert.clarke@bcu.ac.uk

Abstract — **Although online courses can provide access to higher education through e-learning systems which would not otherwise be available for students, they also pose challenges for academic integrity. Paramount to this is contract cheating, where students have been observed paying other people to complete work for them to complete their online courses. This paper analyses attempts by students at contract cheating using Transtutors.com, which is a billed as a site for homework support. A sample of 174 online assignments found on Transtutors.com are analysed and traced back to 17 online universities. Assignments from online institutions are demonstrated to be a particular problem for contract cheating detectives, since notifying staff at those institutions of attempts by their students to cheat has proved to be difficult or impossible. The paper concludes by looking at the wider issues posed by online contract cheating and the opportunities for automated detection within this field.**

Keywords-contract cheating, plagiarism, online course, academic integrity, Transtutors.com

I. INTRODUCTION

The world of higher education appears to be seeing a move from traditional face-to-face courses, to courses that are delivered remotely. Online courses provide advantages for both staff and students. For students, they often allow them to study at times convenient to them and alongside other duties, work and family commitments. They can make learning accessible to those people who are not located near a place of learning and would otherwise be unable to study. For institutions, online courses can take advantage of a remote workforce, without the expense of managing a campus and providing the associated support services needed for face-to-face provision. Online courses of the types mentioned in this paper are usually delivered through an appropriate e-learning environment.

There can be a danger side to widespread use of online courses. This lies within the area of academic integrity, necessary to ensure that the qualifications awarded by the academic institution hold some value. For instance, students on an online course cannot easily be assessed using a traditional paper based examination. This would require to students to travel to a central location and take a supervised test at a set time, which would not be seen as a reasonable request. Whilst online alternatives to traditional examinations have been proposed, such as online multiple choice tests, these may not seem to offer the same academic rigour as the original use of examinations.

This paper focuses on one particular type of academic misconduct which has been observed within online courses, that of contract cheating [1,2,3]. Contract cheating occurs when a student has a piece of original work produced for them, usually through the payment of a fee to an external agency. This original work is then submitted by the student towards the requirements for the successful completion of a course. When compared with the traditional problem of plagiarism, where it may be possible to detect that a student has been cheating since a source document exists, contract cheating does not provide such a source document. Hence, it can be surmised that is unlikely that students who are committing contract cheating will be caught, unless additional steps towards detection are developed.

The paper will provide a brief overview into current research into contract cheating, comparing this in particular with the related problem of student plagiarism. The paper then presents an analysis of the use of one particular online contract cheating service, which students from online universities have been observed using. The intention is to illustrate the range of online courses for which students are outsourcing the production of work. The paper concludes with a discussion of the wider problems posed through contract cheating and which are particularly pertinent towards online courses and e-learning courses. The paper provides suggestions about how software systems could be used to tackle this style of cheating.

II. THE EXISTING RESEARCH BASE ON PLAGIARISM AND CONTRACT CHEATING FOR ONLINE COURSES

An extensive research base already exists into student plagiarism [4,5,6,7]. This is the type of academic misconduct where students take the words or ideas from another source and submit this as it were their own work. The range of sources available for plagiarism is extensive. Some examples include resources from online courses, web sites, textbooks, lecture notes, conference papers and academic journal articles. Students may also collude with one another. In this case, one student could be observed submitting work that shares substantial similarities with others from their peer group. Online cheating groups have been observed where students are able to share solutions and discuss ideas, and it

is likely that more of these cheating groups exist within the world of courses that are delivered entirely online [8].

Much plagiarism is detectable, either through a human-led process or by using automated software [9,10,11]. In a traditional course, a marker may recognise where they have read the same material twice within close succession, which may represent collusion. For an online course, which will likely include vastly greater numbers of students, split across multiple markers, such recognition would appear to be less likely. Further, indicators often used by humans to spot that work is not written by the student, such as the mention of non-local geographical locations, may not be relevant for a course taken on a global scale.

Here, technical solutions to plagiarism, provided they are used consistently, would seem to offer more help. Within the Computing discipline, two freely available tools are often used to find collusion within a batch of source code [12,13,14]. Best known are Measure Of Software Similarity (MOSS) [15] and JPlag [16]. For written work, the commercial service Turnitin [17] leads the market, providing both the detection of collusion, as well as access to a large database of previously submitted work and crawled websites [18]. Turnitin reports returned provide an indication to tutors when work submitted by students is not original in nature.

Contract cheating has been observed to be a related problem to plagiarism, with links evident to the detection methods needed [1,2,19,20]. Here, students may use of a third party to have academic work completed to order for them. The types of third parties vary. These could include another student on the course, or a student who has taken the same material in a previous year. The student could use an existing online service specialising in writing essays or completing assignments. There are many such writing services to choose from.

Most of the academic literature on contract cheating relates to the use of agency websites [1,3,21]. These are services where a student can put up details of the assessed work that they want to have completed and where other people can offer to complete the work for them, often using an auction-like process. The student can then make use of market conditions to attempt to get the work completed in a manner that is cost-effective and which will provide work of the standard that they require. However, it has been found that agency sites do not always deliver work of that stated high standard [22].

The types of agency sites available for contract cheating are wide-ranging. They include sites set up exclusively for the production of student work, and those which also have legitimate commercial applications. For instance, a business may go through a similar process in order to get content written for their website, which would be a perfectly acceptable use of a contract cheating website.

Currently, the site to which most contract cheating research seems to relate is Freelancer.com [23], a site which also has legitimate commercial users. This site acquired the Rentacoder.com website (also known for a time as vWorker.com) on which the initial research studies into contract cheating were based. Freelancer.com also acquired a number of smaller sites and so now appears dominant within the commercial online outsourcing marketplace.

An initial study of Rentacoder.com found that 12.3% of work on that site represented attempts by students at contract cheating [1]. The rest was legitimate commercial work. Contract cheating was seen to be an activity in which students participating regularly, with most students posting between 4 and 7 attempts. A study specific to 910 attempts to outsource computing assignments on Rentacoder.com found work at all academic levels, including undergraduate and postgraduate [3]. This included requests across most academic areas, including programming, databases, mathematical computing and substantial work such as final year projects and dissertations.

Contract cheating has also been observed outside of the computing discipline. A study of the site EssayBay.com [24], a site that is now defunct in its original form, saw 627 attempts by students to cheat, most commonly from the Business Studies discipline [25]. Over $1 million of contract cheating work per year has been estimated to run through agency websites [26]. These figures suggest that contract cheating is now a substantial business, both for the students requiring work, the workers supplying it and the companies who are facilitating this provision in return for a commission.

Some work has been undertaken on the detection of contract cheating [27.28], which is most commonly done using a manual role of a detective [26]. A six-stage model has been proposed, where work placed on known agency sites is scraped and then analysed to see if it represents contract cheating [19]. It has been suggested that wider contextual information may improve such an intelligent and automated process [28].

The issue of the attribution of contract cheating work to an academic institution and a particular student has been stated to be the most challenging part of the detective role [25]. Hence, much contract cheating seems likely to not be being detected, and students may wish to take the risk that they will receive a high mark and escape a formal disciplinary process. The actual extent of contract cheating from the student point of view is currently unknown and would likely prove illuminating were such figures available. Particular challenges within the world of online universities relate to their scale and geographical dispersion. It could be assumed that contract cheating from online universities would be more likely that at institutions where students have to attend because of the greater anonymity available.

The remainder of this paper looks at one particular agency site which has been observed to be used for contract cheating by students at online universities. This provides initial evidence that these students are cheating in this way, allowing the current literature on contract cheating to be extended.

Fig. 1. Homepage of the Transtutors.com [29] contract cheating agency site.

III. THE TRANSTUTORS.COM SITE FOR CONTRACT CHEATING

Transtutors.com [29], as shown in Fig. 1, provides more access for detectives to monitor attempts to cheat than many of the other contract cheating agency websites. The site bills itself as a "homework help" service, thus making the opportunity for contract cheating more explicit to students than some of the agency sites also offering opportunities for legitimate commercial use. They offer a simple question and answer service where solutions can be sold to multiple students willing to pay the fee. The site bills itself as having more than 2 million "satisfied users" and over 20,000 tutors in the United States [29].

Both students and tutors can register an account with Transtutors.com. The site offers multiple services, including what is billed as live tutoring and a simple question and answer service. The analysis in this paper focuses on the traditional "homework help" service where assignment solutions are only provided to a single student and so can be submitted for marking with little risk of detection by the student.

Here, the process follows a variant on the traditional agency model. Students post up the questions, or assignment details, that they wish to receive help for, as well as the amount of money that they are willing to spend for the solution. The details of the work required by the student is then made available to what Transtutors.com suggest is a vast collection of workers. When the student receives an offer to complete the work, they make payment through PayPal. The request is completed by a Transtutors.com affiliated worker. The resulting work is subsequently released to the student for them to hand in for marking as if they had originally created it.

Unlike many similar services, Transtutors.com does not appear to use a process where students have to verify that they are happy with the quality of the work before the assignment is marked as completed. This is perhaps reflected in the wealth of feedback about Transtutors.com available across the Internet. Such feedback ranges from what could be perceived as very good to very bad. For instance, on one site Anthony E. posted "submitted an assignment transtutors got it done within 24 hrs" [30]. Anthony E. also commented on the "impressive work. By contrary, Alicia F. stated that "I paid then US$60 to do some work. They took the money and gave me garbage". Several other comments suggest that students wanting assignment help may not benefit from the US workers advertised and that the requests may actually be completed by workers from overseas.

A key benefit to studies monitoring Transtutors.com for contract cheating, is that the content of attachments are indexed by Google. This means that a detective wishing to try and attribute contract cheating on Transtutors.com can search Google, rather than the less-efficient task of monitoring within Transtutors.com itself. This also means that the detective can search Google for known keywords that identifies contract cheating that can be attributed, such as the names of universities which are often embedded within assignment specifications. Such access to information also means that Transtutors.com would likely be a suitable site on which to prototype automated searching for assignments. At present, such monitoring is carried out manually by the contract cheating detectives involved.
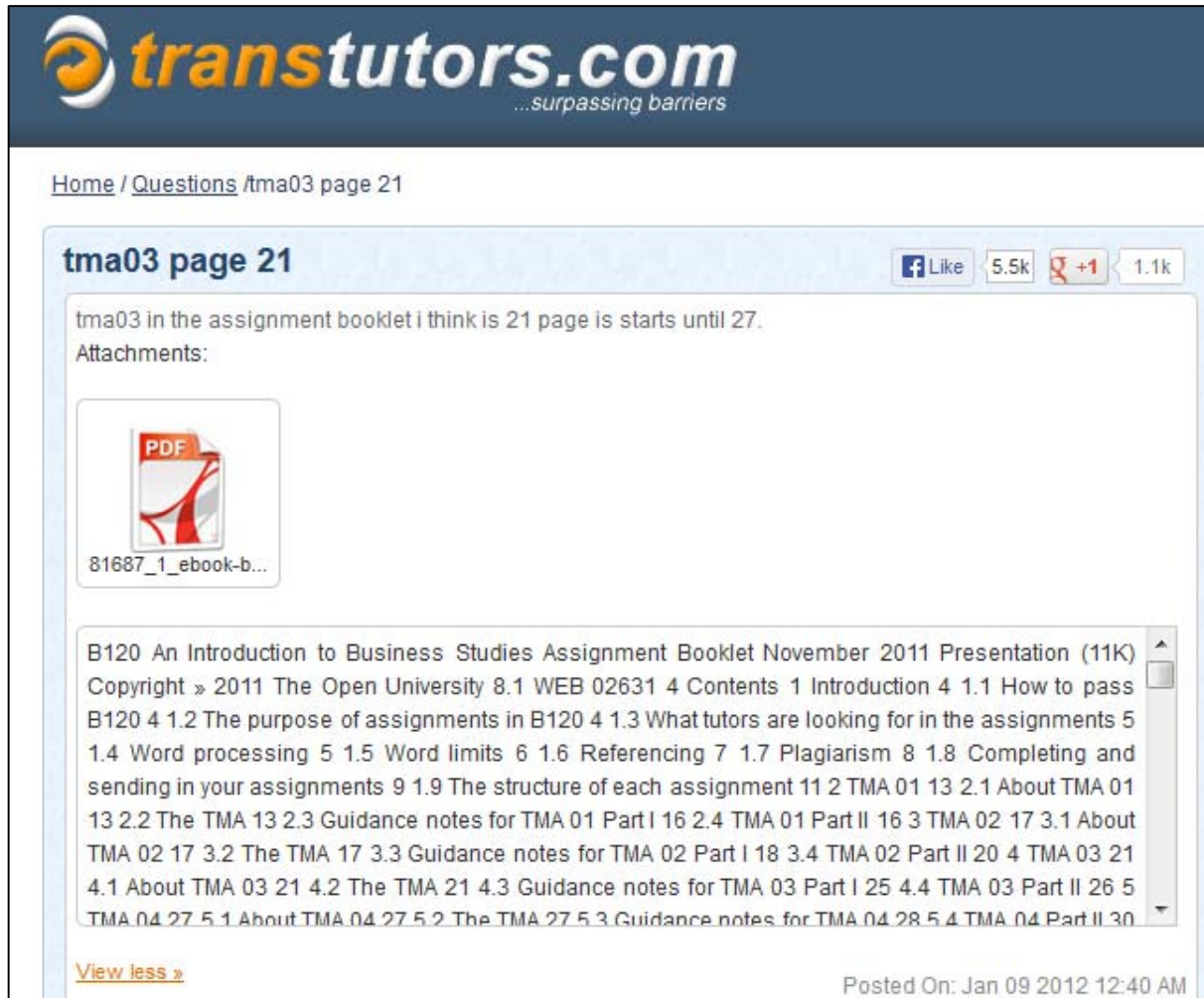
Fig. 2. Example of a post requesting contract cheating for an online university on Transtutors.com.

Fig. 2. provides an example of a posting of the style found at Transtutors.com. This represents an assignment traced to a UK online university. In this case, the university is clearly labelled, but some postings require much more work from a detective. The posting also contains a full copy of a booklet issued with the course. This may represent a breach of copyright.

IV. COLLECTING SAMPLE DATA ON CONTRACT CHEATING ATTEMPTS BY ONLINE UNIVERSITIES OBSERVED ON TRANSTUTORS.COM

To collect the data used for this paper, the detectives searched for requests to have assignments completed for online university courses and facilitated through Transtutors.com,

The process used to find this work was as follows.

First, the detectives prepared a list of known academic institutions offering online courses, as observed from their previous database of over 19,000 attempts at contract cheating.

Second, the detectives used Google to search Transtutors.com looking for the names of the known academic institutions offering online courses. A manual check was used to confirm that the assignments identified were indeed from online courses. Where a course was also delivered face-to-face, these assignments were rejected from the resulting sample so as to be sure of the delivery mode. In this case, the attachment information proved useful, as the included submission instructions allowed the confirmation that this was from an online course.

Finally, the assignments were grouped into broad subject area categories. In some cases, multiple subject groups were possible. Examples included assignments on "stats for business" and "IT management". The detective placed these in what they felt was the most inclusive category of study. The name and location of the online university for which the work was requested was also recorded.

In total, 174 requests to have assignments completed were identified, dated between October 2010 and October 2013. This sample was used to illustrate the wide range of outsourced assignments available on Transtutors.com and as the data source for this paper.

V. AN ANALYSIS OF THE SAMPLE OF CONTRACT CHEATING ATTEMPTS BY ONLINE UNIVERSITIES OBSERVED ON TRANSTUTORS.COM

A sample of 174 assignment specifications was identified on Transtutors.com. The section of the paper analyses the subject information and geographical information relevant to the sample.

Fig. 3. shows the country of origin of the institution for which the assignment completion was requested.

The sample data shows that the USA dominates the results as the main source of the online universities for which contract cheating attempts were observed. The USA accounted for 63.2% (110 out of 174) of the sample. This appears consistent with the advertising on Transtutors.com towards the USA market. This also matches the apparently more prolific use of online courses within the USA than elsewhere. Other countries for which assignments from online universities were observed included Malaysia, Pakistan, Sri Lanka, Hong Kong, India and locations in the Middle East.

Fig. 4. provides an analysis of the sample based upon the subject area of the request.

The data collected from Transtutors.com largely supports previous information in the contract cheating literature, which has observed substantial use for both Computing and Business Studies. Requests within Computing and IT make up 23.0% (40 out of 174 requests) from the sample. The figure for Business Studies is identical (23.0%).

If the Business Studies group is taken alongside Business and Finance group to provide a more inclusive definition of Business, this represents 40.8% (71 out of 174) of the requests. This is higher than the figure of 24.5% reported from the study of EssayBay [25], but still continues represent the most common subject group found on sites that directly advertise to complete assignments for students.

An analysis of the number of institutions per country from which contract cheating has been observed in the sample is also illuminating. This is shown in Fig. 5.
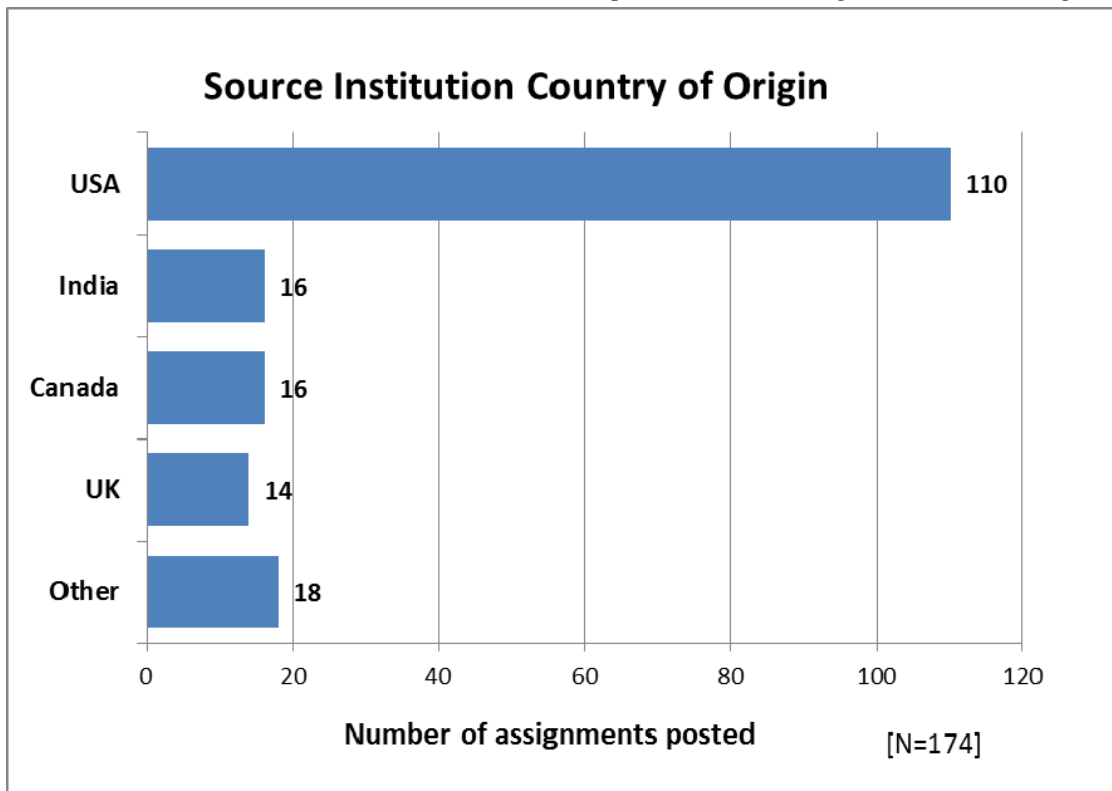

Fig. 3. Identified location of online universities for which assignment specifications were found on Transtutors.com.
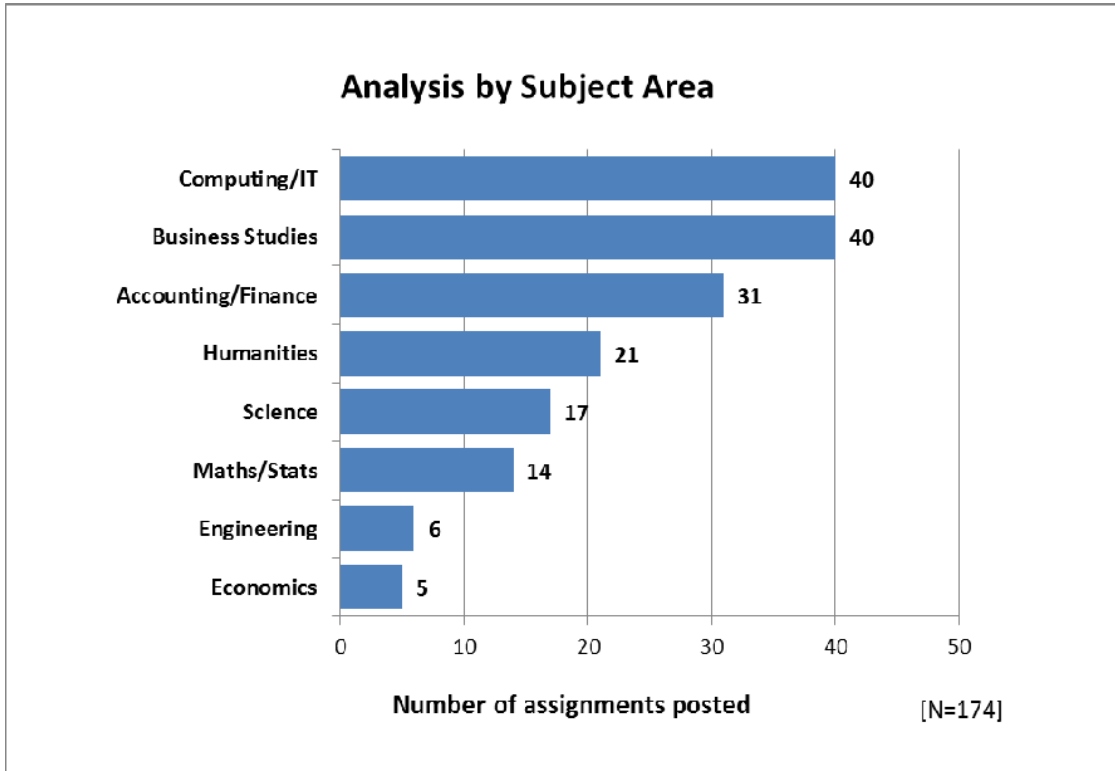
Fig. 4. The subject areas for which assignment specifications were found on Transtutors.com.
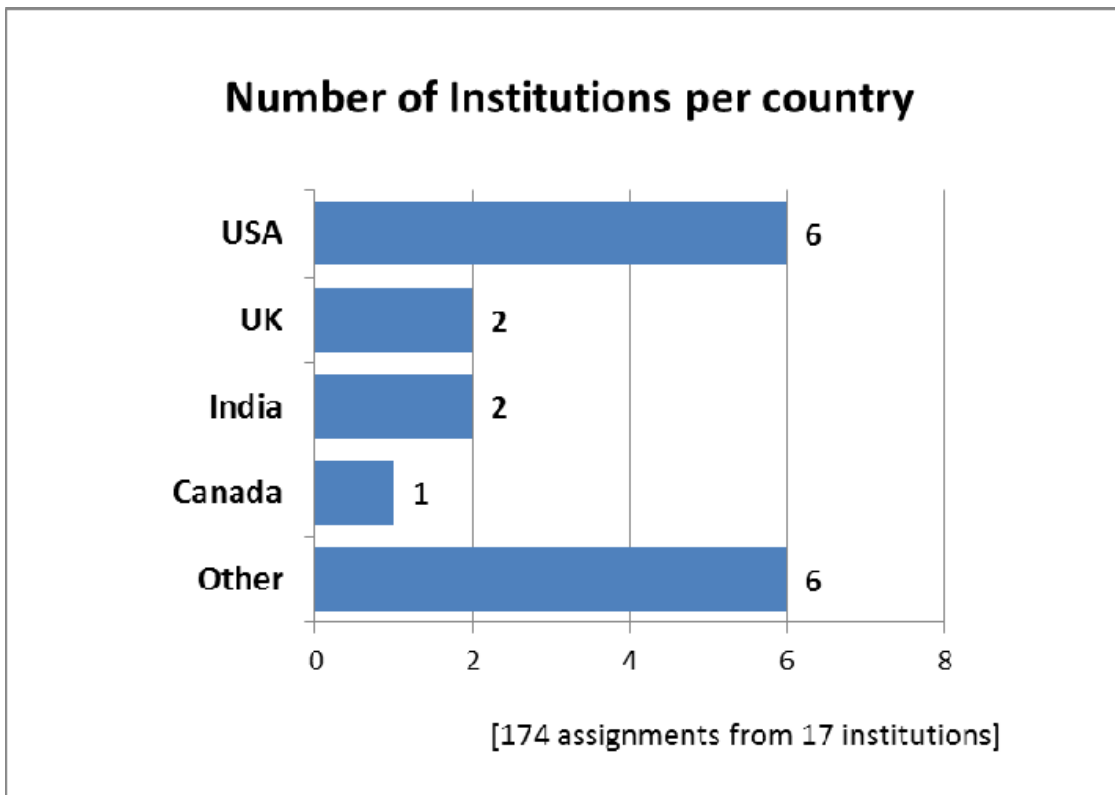

Fig. 5. Number of online universities per country for which assignment specifications were found on Transtutors.com.

The data presented in Fig. 5. largely supports that in Fig. 3. The USA provides the most online universities from which assignment specifications were found, 35.3% (6 out of 17) in total, although it is only the second biggest of the nations represented. The other nations show smaller number of online universities. These observed figures also appear largely consistent with the relative size of the different countries.

Overall, the data that has been collected from Transtutors.com does support the original premise. That is that students at online universities are knowingly using agency websites for contract cheating and committing assessment fraud.

There is certainly scope for further research here, particularly for the implications relating to subjects within the overall Business discipline. Several formal studies, along with anecdotal evidence, have now shown the continued widespread use of contract cheating through agency sites within the Business field. The reasons behind this need further investigation

VI. Addressing The Challenges To Educaton Posed By Contract Cheating Within Online Learning Courses

This paper has identified that contract cheating does pose a challenge for courses delivered online. The observed data likely only represents the "tip of the iceberg" for cheating of this type. The reasoning behind this statement is clear. Only a single site was analysed for contract cheating. Further, there are many more contract cheating agency sites which have not been directly analysed. There are also other methods that students can use to acquire original work for submission, such as having this produced for them using the services of a friend or a private tutor.

The paper has also only focused on online universities. Other courses that are offered through blended methods of learning, or solely through face-to-face attendance, may also afford students with the opportunity to contract cheat.

Online universities need to consider the methods that they are using to assess students and the appropriateness of the said methods. When there is no direct contact with students, it is not possible for institutions to easily observe that students are putting the time in to write work for themselves. There is also a pedagogical disadvantage to this lack of observation, as it is impossible for academic institutions to track that students are improving their writing skills and developing as independent learners. Measuring student performance against these indicators are areas which could be considered core towards the assessment of the overall value of any online course

It may be that assignments are not the best way to assess this work. However, attempting examinations remotely has also proved to be problematic [31]. Even when students are monitored by a webcam and their facial identity checked, these anti-cheating measures can be defeated. For instance, a student could have use the services of a friend stood outside of the view from the webcam. This friend would then verbally provide the student being tested with the correct answers

Some of the current work into tracking student writing styles through stylometrics may show promise [26,32]. This would assess the writing style of the student across a series of written assignments or online tests. This would then identify when this moves outside of acceptable parameters.

An automated approach to look at gathering and attributing work from contract cheating sites is also needed. This would require the development of robust software. It may be that the most appropriate method for providing this software and showing the value of e-learning courses would be for individual online universities to develop and publicise the use of this software.

The challenge of attributing work to the correct online university has also proved problematic for the contract cheating detective. A number of online courses use assignments that are not unique in any form. For instance, these assignments may require the student to answer standard questions from textbooks, or they make take questions from open educational resources. As well as removing the possibility for unique attribution of these assignments by a detective, it is also likely that stock answers to such questions are already widely available across the web.

Even when attribution is possible, most online courses lack any form of contact information that can be used by the detectives, who are not involved on the course. This contact information needs to be much more easily accessible, with named staff listed on the online university websites. Online institutions should also make their own anti-contract cheating processes visible on their websites to increase the external perception that those courses hold any value.

Turnitin could be used much more widely when setting assignments to help detectives to attribute contract cheating to a source location. All that is required is for institutions to upload all of their assignment specifications to Turnitin. These can then be directly matched against those found on a contract cheating site. Further automation of this process would also prove to be a useful development for complex software systems and could incorporate elements of artificial intelligence.

A further recommendation is also needed here. Students at online universities should each receive an individualised and unique version of an assignment specification to work on. This could contain both visible and invisible watermarks. Visible watermarks would include items such as the student name and email address. Invisible watermarks could include unique use of spacing within the assignment specification which could only be traced back to a single student. When contract cheating attempts were then found on agency websites by detectives, such individualisation would make the process by which online universities attribute the student

much easier. Examples of how to generate such individualised assignments have been provided [33].

The largest challenge facing both contract cheating detectives and online universities looks to be the growth of Massive Open Online Courses (MOOCs). These can generate a massive volume of assessment in a manner in which attribution of cheating attempts to an individual may be impossible. In these cases, even attempting such attribution may not be a good use of the time of a contract cheating detective.

It seems likely that an assignment completion service could spring up based around the requirements of different MOOC subjects. Here, a single worker could quickly fulfil the need of many students taking MOOC subjects. That worker would only need to study the material once and could provide solutions using a "conveyor belt" like manner. The opportunity for such widespread cheating may cast doubt on the value of MOOCs for anything more than the development of self-knowledge. Alternatively, it may be that the MOOC business model needs to be reevaluated whilst considering the inherent issues of academic integrity necessary for it to be successful.

Contract cheating for online courses is not a problem that will not go away on its own. As long as it is cost-effective for students to pay someone to complete the work for them, and to walk away with a qualification of value, attempts at contract cheating will continue. The sector needs to come together to discuss the technical and human solutions that will remove the opportunities for contract cheating. The sector also needs to determine how the incentives that exist for students to engage with contract cheating can be removed. Online universities must play a key role in engaging with that emerging discussion.

REFERENCES

[1] R. Clarke and T. Lancaster, "Eliminating the successor to plagiarism? Identifying the usage of contract cheating sites," Proc. 2nd Plagiarism: Prevention, Practice and Policy Conf., JISC, June 2006.

[2] T. Lancaster and R. Clarke, "The phenomena of contract cheating," in T. Roberts, Student Plagiarism in an Online World: Problems and Solutions, Idea Group Inc, 2007.

[3] T. Lancaster and R. Clarke, "Assessing contract cheating through auction sites – a computing perspective," Proc. 8th Annual Higher Educ. Academy Conf. in Inform. and Computer Sciences, HEA, August 2007

[4] M. Austin and L. Brown, "Internet plagiarism: developing strategies to curb student academic dishonesty," The Internet and Higher Educ., vol. 2, 1, 1999, pp. 21-33.

[5] F. Culwin and T. Lancaster, "Plagiarism issues for higher education," Vine, vol. 31, 2, 2001, pp. 36-41.

[6] F. Culwin and T. Lancaster, "A review of electronic services for plagiarism detection in student submissions," Proc. 1st Annual Conf. LTSN Centre Inform. And Computer Sciences, LTSN, August 2000.

[7] T. Lancaster, "The use of text matching tools for the prevention and detection of student plagiarism," Plagiarism Phenomenum in Europe: Research Contributes to Prevention, in press.

[8] T. Lancaster and R. Clarke, "How to succeed at cheating without really trying: five top tips for successful cheating," Proceedings 9th Annual Higher Educ. Academy Conf. in Inform. and Computer Sciences, HEA, August 2008

[9] K. Ottenstein, "An algorithmic approach to the detection and prevention of plagiarism", SiGCSE Bulletin, vol. 8, iss. 4, 1977, pp. 30-41.

[10] T. Lancaster and F. Culwin , "Towards an error free plagiarism detection process," Proc. 6th Annual Conf. On Innovation And Technology In Computer Science Educ., SiGCSE, August 2001.

[11] T. Lancaster, "Effective and efficient plagiarism detection", London South Bank University, United Kingdom, 2003.

[12] T. Lancaster and F. Culwin, "A comparison of source code plagiarism detection engines," J. of Computer Science Educ., vol. 14, 2, 2004.

[13] T. Lancaster, "A comparison of visual techniques for plagiarism detection in student source code submissions," Proc. Innovation, Good Practice and Research in Eng. Educ., HEA, June 2004.

[14] F. Culwin, A. MacLeod and T. Lancaster , "Source code plagiarism in UK HE computing schools, issues, attitudes and tools," Jisc, 2001.

[15] MOSS, [Online]. Available theory.stanford.edu/~aiken/moss.

[16] JPlag, [Online]. Available http://www.jplag.de.

[17] Turnitin, [Online]. Available http://www.turnitin.com.

[18] F. Culwin, "The efficacy of TurnItIn and Google," Proceeding of 10th Annual Higher Educ. Academy Conf. in Inform. and Computer Sciences, HEA, August 2009.

[19] R. Clarke and T. Lancaster, "Establishing a systematic six-stage process for detecting contract cheating," Proc. 2nd International Conf. on Pervasive Computing and Applications (ICPCA07), IEEE, July 2007.

[20] M. O'Malley and T. Roberts, "Plagiarism in science education: Preventing cheating via online auctions," Proc. of Australian Conf. on Sci. and Math. Educ., August 2011.

[21] T. Lancaster and F. Culwin, "Preserving academic integrity – fighting against non-originality agencies," British J. of Educ. Technology, vol. 38, 1, pp. 153-157, 2007.

[22] T. Jenkins and S. Helmore, "Coursework for cash: the threat from online plagiarism," Proc. 7th Annual Higher Educ. Academy Conf. in Inform. and Computer Sciences, HEA, August 2006.

[23] Freelancer.com [Online]. Available http://www.freelancer.com.

[24] Essaybay.com [Online]. Available http://www.essaybay.com.

[25] T. Lancaster and R. Clarke, "Dealing with contract cheating: a question of attribution," Proc.1st Annual Higher Educ. Academy Conf. in Science, Technology, Eng. and Mathematics, HEA, April 2012.

[26] R. Clarke and T. Lancaster, "Commercial aspects of contract cheating," Proc. 18th Annual Conf. on Innovation and Technology in Computer Science Ed. (ITiCSE), SiGCSE, July 2013.

[27] F. Culwin, "Inverse Authorship Attribution," Contract Cheating Workshop, [Online]. Available http://www-new1.heacademy.ac.uk/assets/Documents/subjects/ics/contractcheating_inverse_authorship_attribution.pdf, March 2008.

[28] T. Lancaster, "The application of intelligent context-aware systems to the detection of online student cheating," Proc, 8th Int. Conf. Complex, Intelligent, and Software Intensive Systems (CISIS), IEEE, July 2013.

[29] Transtutors, [Online]. Available http://www.transtutors.com

[30] Transtutors reviews [Online]. Available http://www.sitejabber.com/reviews/www.transtutors.com.

[31] J. Young, "Online classes see cheating go high tech", Chronice of Higher Education, 3 June 2012.

[32] B. Wieder, "Pace U. researchers work on new way to stop online cheating," Chronicle of Higher Education, 20 May 2011.

[33] T. Lancaster and R. Clarke. "Staff-led individualised assessment – a case study," Proc. 11th Annual Higher Educ. Academy Conf. in Inform. and Computer Sciences, HEA, August 2010.