Directions and Dimensions in Managing Cheating and Plagiarism of IT Students

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Abstract
The problem of cheating at university is a widespread and long-standing issue. There are a variety of strategies that are used to address the problem which broadly fall into the areas of education, prevention, detection and consequence. An important consideration when deciding to tackle the problem of cheating is that the effectiveness of methods for addressing cheating are not necessarily the same for the different types of cheating. This paper presents an investigation of cheating practice of undergraduate IT students using a factor analysis to determine categories of cheating behaviour and influences on this behaviour. The implications arising from this analysis for addressing cheating are then examined and recommendations made for strategies which are appropriate for particular types of cheating.

Keywords: cheating, plagiarism, undergraduate students.

1 Introduction
The problem of cheating is a difficult one to address as in many ways it is a negative-sum activity for academics. Time and effort devoted to preventing, detecting and punishing students who have been cheating is time that is not being used to teach and to improve the learning experience for students. It is important therefore for academics to determine a balance in their educational activities so as to reduce the incidence of cheating in their classes, but without distorting or at least minimally distorting the educational experience that is being provided to the students.

In order to achieve this aim, it is necessary to consider a range of issues. Previous work by the authors (Dick et al., 2003; Dick, Sheard, & Hasen, 2008) proposed that activities for managing cheating fall into four main conceptual areas:

- **Education** – primarily focused on activities that educate students on what cheating is and why it is bad for them to cheat, but also educating academics on the issue of cheating and how to address it in their teaching
- **Prevention** – activities which assist in the design of curriculum and assessment tasks so as to minimise the need for, and the benefit to be gained from, a variety of cheating types, and also providing tools for students to manage their studies
- **Detection** – the development of tools and procedures to detect when cheating has taken place and the processes by which these tools are used in teaching
- **Consequence** – the procedures in place to handle cases of cheating, the punishments which are allocated for cheating and to publicise the results of those procedures

The academic needs to make decisions on the level of effort that they allocate to the above four areas. In doing so, the academic has to consider the type of cheating that may occur in their classes. The effectiveness of strategies for addressing cheating are not necessarily the same for the different types of cheating. For example, students are often confused about plagiarism (McCabe, 2005) and strategies which focus on education will probably be the most effective to address this issue; however, education-focused strategies may be quite ineffective in addressing situations where students arrange for other people to sit their exam for them. In that case, a focus on consequence and the potential punishments may be the best strategy to adopt.

This paper builds on the results of a survey undertaken at an Australian University (Sheard & Dick, 2011) by using a factor analysis to determine the commonalities in three areas of the survey: the attitudes towards different cheating practices, the reasons that students indicate would cause them to cheat and the reasons that students indicate would cause them not to cheat. These three sets of factors were then analysed to determine whether there are statistically significance differences in influences on different types of cheating practices between the students who claimed to have cheated and those who claimed not to have cheated. The focus of the analysis is on the undergraduate student cohort of the dataset. A similar
analysis on a postgraduate cohort was conducted by the authors in a previous survey (Sheard & Dick, 2003). The implications arising from the analysis for strategies and focus to be taken to address particular types of cheating practice are then examined.

2 Background

In order to set the scene for the analysis, this section looks at the extent of the cheating problem and the influences on cheating practices as has been discovered in past research, and then examines some of the strategies that have been put forward to address the four conceptual areas. The following is not an exhaustive description of the literature, but does provide a representative sampling of the work in each area.

2.1 The extent of the cheating problem

The literature on cheating in universities report alarmingly high rates of cheating practice and a problem that is long-standing and widespread. For example, an early study of 5,422 North American undergraduate students in 1963 by Bowers (1964) found that 75% admitted to having committed at least one of 13 specific cheating acts. These ranged from copying a few sentences of material without footnoting in a paper (43%) to taking an exam for another student (1%). Another major study in 1993 of 6,096 undergraduate students by McCabe and Trevino (1993) found that 67% admitted to cheating at least once in their course. Around that time a UK study by Newstead, Franklyn-Stokes and Armstead (1996) found that 88% of 943 students admitted to cheating in at least 1 of 21 cheating behaviours, ranging from paraphrasing material without acknowledgement (54%) to sitting an exam for someone else (1%). More recently, Australian studies have reported similar high rates of cheating. For example, in 2001 Marsden, Carroll and Neill (2005) report a study which found that 81% of 954 students admitted to plagiarism and 41% to exam cheating on at least one occasion. Curtis and Popal (2011) report levels of plagiarism of 81% in 2004 and 74% in 2009.

2.2 Factors influencing cheating practice

Cheating practice varies across disciplines, with IT students along with engineering, science and business students engaging in the highest rates of cheating (Bowers, 1964; Davis & Ludvigson, 1995; Roberts, Anderson, & Yanish, 1997). Focusing specifically on IT students, Sheard, Carbone and Dick (2003) found that 79% of 504 undergraduate students admitted to at least 1 of 16 different cheating practices. Other studies have also reported high rates of cheating in IT courses (Barrett & Malcolm, 2006; Simon, 2005).

Studies have identified a number of factors which influence cheating behaviour. These may be personal characteristics, attitudinal or situational factors. The study of IT students by Sheard, Markham and Dick (2003) found time pressure and fear of failing as the main influences. Similar reasons have been found in other studies. For example, the studies by Newstead et al (1996) and Wilkinson (2009).

2.3 Strategies

As can be imagined, there are many suggestions for strategies to address the cheating problem, often drawn from considering the factors that are believed to influence cheating behaviour. Bennett (2005) proposes that strategies to address cheating should be tailored according to the type of cheating and this research follows that proposal. We now provide an overview of strategies under each conceptual area identified in the Introduction.

2.3.1 Education

Recently, strategies have focused on education about the problems associated with cheating and awareness of policies and possible consequences. A couple of examples of strategies which have been developed for IT students are: an electronic plagiarism tool to educate students about correct use of source material (Barrett & Malcolm, 2006) and a resource to assess IT students’ understanding of plagiarism and help them understand how it can be avoided (Joy, Cosma, Sinclair, & Yau, 2009). McCabe (2005) argues strongly that the emphasis should be on using education to develop a culture of academic integrity. Honour codes have been used for this purpose with reported success; however, these are not possible or appropriate for all contexts. Hutton (2006) makes several recommendations about using education to develop a culture of academic integrity to reduce cheating.

2.3.2 Prevention

An important strategy in addressing the problem of cheating is to actively seek ways to prevent cheating. Carroll (2004) comments: ‘Catch and punish’ approaches are self-defeating in that they absorb huge amounts of staff time, do not lessen the overall incidence of plagiarism, and deflect students from a focus on learning to one devoted to not breaking rules or not getting caught.

Carroll proposes that instead educators should focus on deterrence. McCabe, Trevino and Butterfield (2001) also found that reducing opportunities for cheating was an important tool in reducing academic dishonesty. McDowell and Brown (2001) list a variety of assessment designs that can be used to reduce the opportunity for cheating by students. Davis (1993) provides a useful resource with many ideas for preventing academic dishonesty. Dick, Sheard and Hasen (2008), based on a series of focus groups with 72 IT students, also present a series of assessment design suggestions to prevent and deter cheating by students.

2.3.3 Detection

This area has seen considerable interest over the last ten years with many commercial services being developed such as Turnitin (“Turnitin.com,” 2011) and
Blackboard’s SafeAssign (“SafeAssign,” 2011) along with many individual systems produced by academics and universities to detect cheating, primarily plagiarism. Kohler and Weber-Wulff (2010) have tested the effectiveness of these types of systems to detect plagiarism on several occasions. In the most recent effort in 2010, Kohler and Weber-Wulff tested 47 different plagiarism detection systems. The test found that only 5 of the 47 systems could be classified even as ‘partially useful’, with 9 out of 47 being classified as ‘barely useful’ and the rest as ‘useless’. Nevertheless, their use has become common in many universities with Turnitin claiming to be used in over 10,000 educational institutions around the world.

In terms of software plagiarism, an area of particular concern to IT academics, a wide range of tools have been developed. Two of the most commonly used are JPlag (“JPlag,” 2011) and MOSS (“MOSS: A System for Detecting Software Similarity,” 2011).

2.3.4 Consequence
Consequence involves two aspects: what types of consequence are useful in deterring cheating and how to develop a system that manages cases of cheating effectively. Bennet (2005), based on the results of an empirical study, claims that punishment is a deterrent to major plagiarism; however, it is not necessarily effective against minor forms of plagiarism. As well, Genereux and McLeod (1995) found that fear of punishment was one of the most important factors in decreasing planned and spontaneous cheating in their survey of 365 US college students.

Carroll (2002, 2004) and Carroll and Appleton (2001) from Oxford Brookes University provides much guidance on the approaches that universities can take to handle cheating and plagiarism processes. She advocates that effective procedures for managing these issues are ones that:

- Staff are willing to use and trust
- Students experience as fair, transparent, consistent and appropriate
- Can be followed without difficulty
- Deliver decisions quickly to (potentially) large numbers of students
- Produce decisions that can be recorded and defended

3 Research approach
Students from selected courses in a Faculty of Information Technology were surveyed near the end of second semester 2010. Courses were chosen at each year level of the undergraduate and postgraduate degrees. For the study reported in this paper only data from the undergraduate students were used.

A paper questionnaire was administered in tutorial classes by one of the authors who was not involved in teaching these classes. Participation was voluntary and to encourage honest responses the questionnaire was anonymous. Most students chose to participate and a total of 117 students from the undergraduate cohort returned completed questionnaires.

Ethics approval for the study was gained from the Monash University Human Research Ethics Committee (MUHREC).

3.1 Survey questionnaire
The questionnaire was developed by the authors and first used for a study in 2000. It was used in the current study with a couple of minor modifications. The questionnaire contained questions to determine:

- demographic information
- students’ rating of the acceptability of various questionable work practices described in 18 different scenarios
- students’ practice and knowledge of others’ practice of each questionable work practice
- factors which could cause cheating
- factors which could prevent cheating

Other questions sought students’ responses to the cheating behaviour of other students, and their opinions of staff and University attitudes to cheating. These results have been reported elsewhere (Sheard & Dick, 2011).

3.2 Questionable work practice scenarios
The questionable work practices and factors which could influence cheating were situations which the authors and their colleagues had experienced or were sourced from other studies of cheating, for example, studies by Maramark and Maline (1993) and Newstead et al (1996). To encourage discrimination in ratings of acceptability, the scenarios ranged from practices that would generally not be considered cheating (e.g. showing assignment work to a lecturer for guidance) to serious forms of cheating (e.g. hiring someone to write an assignment). The scenarios were referred to as “questionable” rather than “cheating” practices so as not to prejudice students’ judgements of their acceptability. Scenarios to gauge student reactions to cheating have been used in other studies of academic dishonesty, for example, studies by Sierra and Hyman (2008) and Stepp and Simon (2010).

3.3 Analysis
Considering the many possible cheating practices that students may engage in, and the different influences on cheating behaviour, cheating is a complex issue. This study used factor analysis to identify categories of cheating behaviours and influences on cheating behaviour. A similar method was used by the authors in a study of postgraduate cheating behaviour in a previous survey (Sheard & Dick, 2003). Factor analysis is an exploratory technique used to find meaningful structure underlying a number of variables. It is used to reduce a set of variables to a manageable number of dimensions or factors. There are typically two stages to a factor
analysis: an *extraction*, which is used to determine the number of factors, and a *rotation*, which is used to obtain a clearer view of the factors thus making these factors more interpretable. The number of factors that are chosen to be interpreted from the extraction depends on whether meaningful interpretations can be placed on the set of factors produced.

Before a factor analysis is performed, it should be determined if the correlation matrix of variables is factorable. This can be determined from the Bartlett’s test of sphericity and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy test. If the Bartlett test of sphericity is significant at $p < 0.05$ and the Kaiser-Meyer-Olkin measure of sampling adequacy is greater than 0.6 then we consider that the correlation matrix is factorable.

The factor analysis performed in this study used a Principal Axis Factoring extraction and a Varimax rotation with Kaiser normalization.

### 4 Results

The analysis of the 2010 survey data to determine influences on undergraduate cheating behaviour was conducted in several stages. First, a factor analysis was conducted on the students’ ratings of acceptability of the questionable work practice scenarios to reduce the set of cheating practices to a smaller number of cheating categories. Next, for each category, the students who claimed they had performed any of the practices in the category were determined. This gave a group of cheating and a group of non-cheating students for each cheating category.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hiring someone to sit an exam for you</td>
<td>.866</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copying all of an assignment given to you by a friend</td>
<td>.832</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking a student’s assignment from a lecturer’s pigeonhole and copying it</td>
<td>.831</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using a hidden sheet of paper with important facts during an exam</td>
<td>.774</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hiring a person to write your assignment for you</td>
<td>.750</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swapping assignments with a friend, so that each does one assignment, instead of doing both</td>
<td>.732</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copying another student’s assignment from their computer without their knowledge and submitting it</td>
<td>.725</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using the answer to a tutorial exercise worth 5% by a class mate if the computer you used has problems</td>
<td>.625</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Submitting an assignment based on a friend’s assignment from a past running of the subject</td>
<td></td>
<td>.769</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copying the majority of an assignment from a friend’s assignment, but doing a fair bit of work yourself</td>
<td></td>
<td>.655</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two students collaborating on an assignment meant to be completed individually</td>
<td></td>
<td>.643</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resubmitting an assignment from a previous subject in a new subject</td>
<td></td>
<td>.452</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copying material for an essay from a text book</td>
<td>.452</td>
<td>.626</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copying material for an essay from the Internet</td>
<td>.539</td>
<td>.612</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtaining a medical certificate from a doctor to get an extension when you are not sick</td>
<td></td>
<td></td>
<td>.649</td>
<td></td>
</tr>
<tr>
<td>Not informing the tutor that an assignment has been given too high a mark</td>
<td></td>
<td></td>
<td>.647</td>
<td></td>
</tr>
</tbody>
</table>

**Table 1: Acceptability of cheating: rotated factor matrix**

Factor analyses were then performed on the reasons for cheating variables and the reasons for not cheating variables, reducing these to smaller sets of *influence* constructs. The mean of each rating was determined within each construct for each student.

Finally, the influence of the reasons for cheating and reasons for not cheating on the cheating behaviour of students within each cheating category was determined by comparing the mean ratings of reasons for each *influence* construct of the cheating and non-cheating groups.

#### 4.1 Categories of cheating

This section explains the process of using a factor analysis to establish a set of cheating categories from the questionable work practices described by the scenarios. For this analysis 16 of the 18 scenarios were used as two scenarios that we do not consider to be cheating practices (i.e. showing assignment work to a lecturer for guidance and posting to an Internet newsgroup for assistance) were not included. For each scenario, the students were asked to rate how acceptable the work practice was using a 5-point Likert scale, where 1 indicates *acceptable* and 5 indicates *not acceptable*. A Bartlett’s test of sphericity was significant at $p < 0.05$ and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy test was 0.894, indicating that the dataset was factorable.
An initial factor analysis of the students’ ratings of acceptability of the scenarios yielded three factors with eigenvalues\(^1\) greater than 1.0. However, the fourth eigenvalue was very close to 1.0 and an examination of the scree plot\(^2\) showed a point of inflection between the fourth and fifth factor, indicating that a four factor solution could be investigated. Examination of the variable loadings within the rotated factor matrix of the four factor solution indicated interpretable results for each factor, and this was deemed more interpretable than the three factor solution.

The factor structure for the four factor solution is shown in Table 1. This solution accounted for 62% of the total variance. Using a minimum variable loading of \(|0.45|\), fourteen scenarios show a clear loading on one factor. Two scenarios loaded on factors 1 and 3; however, it was decided to include these scenarios only in factor 3, as their loading was stronger on factor 3 and this made an interpretable factor structure.

The interpretation of the four factors is as follows:

Factor 1: Illegal practices (fraud, stealing)
Factor 2: Collusion (involving assignment work)
Factor 3: Copying (from a book or the Internet)
Factor 4: Deception (administrative – not about the assessment task)

The first three factors could be mapped to the four indexes of cheating found by Lipson and McGavern (1993) in their large study of undergraduate cheating.

### 4.2 Extent of cheating

For each cheating category established in the previous section, the percentages of students who had performed at least one of the cheating practices was determined. These results are shown in Table 2.

<table>
<thead>
<tr>
<th>Cheating factor</th>
<th>% students admitting to cheating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illegal practices</td>
<td>10</td>
</tr>
<tr>
<td>Collusion</td>
<td>51</td>
</tr>
<tr>
<td>Copying</td>
<td>13</td>
</tr>
<tr>
<td>Deception</td>
<td>19</td>
</tr>
</tbody>
</table>

Table 2: Percentages of students in each cheating category

### 4.3 Acceptability of cheating

For each cheating category, the mean ratings of acceptability were calculated for each student. A comparison of means between the cheating and non-cheating groups was determined using t-tests. These showed that the students who admitted to have cheated in practices involving collusion or deception found these practices more acceptable than the students who claimed to have not cheating. These results are shown in Table 3.

<table>
<thead>
<tr>
<th>Cheating factor</th>
<th>Mean acceptability ratings non-cheaters</th>
<th>Mean acceptability ratings cheaters</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illegal practices</td>
<td>4.57</td>
<td>4.57</td>
<td></td>
</tr>
<tr>
<td>Collusion</td>
<td>3.80</td>
<td>2.89</td>
<td>5.55*</td>
</tr>
<tr>
<td>Copying</td>
<td>4.42</td>
<td>4.09</td>
<td></td>
</tr>
<tr>
<td>Deception</td>
<td>3.99</td>
<td>3.41</td>
<td>2.90*</td>
</tr>
</tbody>
</table>

* indicates significant difference (p<0.05)

Table 3: Mean ratings of acceptability for non-cheating and cheating groups within each cheating category

### 4.4 Reasons for cheating

This section explains the process of using a factor analysis to establish a set of influences on cheating constructs from the 14 reasons for cheating. For each reason the students nominated the likelihood that the reason would cause them to cheat using a 5-point Likert scale where 1 indicates not at all and 5 indicates highly likely. A Bartlett’s test of sphericity was significant at p < 0.05 and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy test was 0.886, indicating that the dataset was factorable.

An initial factor analysis of the ratings of the likelihood of each reason causing cheating yielded two factors with eigenvalues greater than 1.0. However, the third and fourth eigenvalues were close to 1.0 and an examination of the scree plot showed a point of inflection between the fourth and fifth factor, indicating that a four factors solution should be investigated.

Examination of the variable loadings within the rotated factor matrix of the four factor solution, using a minimum variable loading of \(|0.45|\), indicated interpretable results for each factor. Two variables loaded on both factors 1 and 3; however, it was decided to include these scenarios only in factor 3, as their loading was stronger on factor 3 and this made an interpretable factor structure. One variable “Everybody does it” did not load on any factor. The factor structure is shown in Table 4. This solution accounted for 65% of the total variance. The interpretation of each factor is as follows:

Factor 1: Workload pressure
Factor 2: External pressure
Factor 3: Avoiding failure
Factor 4: Altruism/compensation

The first and third factors which described pressure of workload and concerns about failure were similar influences to those found in studies of undergraduate students by Newstead et al (1996).
Everyone does it
To help a friend
health
Missed classes due to ill
Afraid of failing
Can’t afford to fail
Exams are too hard
Assignments are too hard
For monetary or other reward
Lazy
Parental pressure
Need to get better marks
Will fail otherwise
Not enough time
university
Too great a workload at

Significant at \( p < 0.05 \) indicates that the reason would cause them to not cheat using a 5-point Likert scale where 1 indicates not at all and 5 indicates highly likely. A Bartlett's test of sphericity was significant at \( p < 0.05 \) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy test was 0.797, indicating that the dataset was factorable.

A factor analysis of the ratings of the likelihood of each reason preventing cheating yielded three factors with eigenvalues greater than 1.0. Examination of the variable loadings within the rotated factor matrix, using a minimum variable loading of 0.45, indicated interpretable results for each factor. This factor structure is shown in Table 6. This solution accounted for 57% of the total variance. The interpretation of each factor is as follows:

Factor 1: Valuing learning
Factor 2: Personal integrity
Factor 3: Fear of consequences

The first factor which describes pride and ownership of work have been found to be the main factors in preventing cheating in studies of undergraduate students (Newstead et al., 1996).

<table>
<thead>
<tr>
<th>Reason for cheating</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too great a workload at university</td>
<td>.883</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not enough time</td>
<td>.733</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will fail otherwise</td>
<td>.669</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Need to get better marks</td>
<td>.737</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental pressure</td>
<td>.670</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lazy</td>
<td>.665</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For monetary or other reward</td>
<td>.536</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignments are too hard</td>
<td>.638</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exams are too hard</td>
<td>.575</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can’t afford to fail</td>
<td>.507</td>
<td>.563</td>
<td></td>
</tr>
<tr>
<td>Afraid of failing</td>
<td>.509</td>
<td>.551</td>
<td>.861</td>
</tr>
<tr>
<td>Missed classes due to ill health</td>
<td></td>
<td></td>
<td>.940</td>
</tr>
<tr>
<td>To help a friend</td>
<td></td>
<td>.521</td>
<td></td>
</tr>
<tr>
<td>Everyone does it</td>
<td></td>
<td></td>
<td>.551</td>
</tr>
</tbody>
</table>

**Table 4: Reasons for cheating: rotated factor matrix**

For each influence on cheating factor, the mean ratings of likelihood of causing cheating were calculated for each student. Comparisons of means between the cheating and non-cheating groups were determined using t-tests. These showed that the students who admitted to having cheated found all types of reasons more likely to cause cheating than the non-cheating students. These results are shown in Table 5.

<table>
<thead>
<tr>
<th>Reason for cheating factor</th>
<th>Mean likelihood ratings</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workload pressure</td>
<td>2.16 3.27</td>
<td>-5.04*</td>
</tr>
<tr>
<td>External pressure</td>
<td>1.46 1.93</td>
<td>-2.72*</td>
</tr>
<tr>
<td>Avoiding failure</td>
<td>2.05 2.94</td>
<td>-3.66*</td>
</tr>
<tr>
<td>Altruism/compensation</td>
<td>1.79 2.65</td>
<td>-4.10*</td>
</tr>
</tbody>
</table>

* indicates significant difference (\( p<0.05 \))

**Table 5: Comparison of means of ratings of influences on cheating between the non-cheating and cheating groups**

4.5 Reasons for not cheating

This section explains the process of using a factor analysis to establish a set of influences on preventing cheating constructs from the 10 reasons for not cheating. For each reason the students nominated the likelihood that the reason would cause them to not cheat using a 5-point Likert scale where 1 indicates not at all and 5 indicates highly likely. A Bartlett's test of sphericity was significant at \( p < 0.05 \) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy test was 0.797, indicating that the dataset was factorable.

A factor analysis of the ratings of the likelihood of each reason preventing cheating yielded three factors with eigenvalues greater than 1.0. Examination of the
4.6 Influences on cheating behaviour

The influences on different types of cheating behaviours were explored using the reasons for cheating factors and the reasons for not cheating factors identified in the previous section.

For each of the four categories of cheating behaviour the mean ratings for the reasons for cheating and reasons for non-cheating were compared. These differences were tested using t-tests for independent groups. The results are presented under the four cheating categories:

Factor 1: Illegal practices (fraud, deception, stealing)

This type of cheating involves cheating in exam situations, stealing work from other students and fraud. These practices were seen as the most serious forms of cheating by the students and were the scenarios that had been practised the least. Despite this, 10% of the students in the study admitted to having practiced one of these scenarios at least once.

The students that had performed these practices indicated that there were a number of influences on their cheating. They indicated that they were significantly more likely than the non cheating students to be influenced by external pressures ($t(110) = -2.86, p < 0.05$), and the need to avoid failure ($t(110) = -3.45, p < 0.05$). However, examination of the factors that could prevent cheating showed that there were no differences between the two groups for these influences. These findings are in line with Bennett’s study (Bennett, 2005) which found that fear of failure appeared to drive major plagiarism.

Factor 2: Collusion, unacceptable assistance

This type of cheating involves cheating on assignment work. For example, collusion between students on assignment work, submitting a friend’s assignment or resubmission of work from a previous running of a subject. This was not seen as a serious form of cheating and 51% of the students admitted to this practice.

The students that had performed these practices indicated that there were many reasons that would cause them to cheat. They indicated that they were significantly more likely than the non cheating students to be influenced by workload pressures ($t(110) = -3.85, p < 0.05$), external pressures ($t(110) = -2.13, p < 0.05$), the need to avoid failure ($t(110) = -2.91, p < 0.05$) and altruism/compensation ($t(109) = -3.84, p < 0.05$). Bennett (Bennett, 2005) also found that minor forms of plagiarism were associated with a wide range of influences.

However, the non cheating students stated that they were significantly more likely than the cheating students to find that personal integrity would influence them not to cheat ($t(111) = 2.56, p < 0.05$).

Factor 3: Plagiarism (copying from a book or Website)

The cheating practices in this factor describe plagiarism where material is taken from books or the Web and not directly from other students. In contrast to the more serious forms of plagiarism described in Factor 2, in these practices the plagiarised material only forms part of the assessment work. The students rated this type of cheating as more serious than the collusion practices in Factor 2 and 13% of the students reported that they had performed one of these practices.

The students that had performed these practices indicated that they were significantly more likely than the non cheating students to be influenced by workload pressures ($t(110) = -2.46, p < 0.05$), external pressures ($t(110) = -3.73, p < 0.05$) and the need to avoid failure ($t(110) = -2.85, p < 0.05$). However, the non cheating students stated that they were significantly more likely than the cheating students to find that personal integrity would influence them not to cheat ($t(111) = 2.23, p < 0.05$).

Factor 4: Deception.

The students that had performed these practices indicated that they were significantly more likely than the non cheating students to be influenced by workload pressures ($t(110) = -2.89, p < 0.05$) and altruism/compensation ($t(109) = -2.53, p < 0.05$). However, the non cheating students stated that they were significantly more likely than the cheating students to find that personal integrity would influence them not to cheat ($t(111) = 2.12, p < 0.05$).

5 Implications for educational practice

The above analysis, especially that of 4.6, gives us leverage in determining where the educator should focus their efforts in terms of our model of the cheating process and in regards to the differing types of cheating. It should be noted that none of these are a ‘silver bullet’ but they are a means to effectively address the relevant problem.

5.1 Illegal practices

Looking at the first factor of illegal cheating, we find that none of the reasons for not cheating have a significant effect on whether a student performs the practice and we see that the two reasons for cheating are the need to avoid failure and external pressures. In terms of external pressures, there is little that can be done in the context of a single subject to affect these. For need to avoid failure, some elements of this are amenable to change. Overall, it would seem that a focus on prevention would achieve the best outcomes in reducing this type of cheating, as it reduces the opportunity and/or the benefit of cheating, thereby impacting on those students influenced by external pressures. For those students influenced by need to avoid failure to cheat in this way, prevention will work by providing relevant scaffolding in the subject so that students do have the resources (time and capability) to succeed without the need for cheating. As well, some emphasis on detection is also likely to be necessary, as some students, regardless of prevention, will probably attempt this sort of cheating. This is emphasised by the fact that students that practice this type of cheating find it equally unacceptable as non-cheating students, but nevertheless do it anyway.
5.2 Collusion
For the collusion cheating type, the factors identified as impacting on this practice are different to those in the first factor. In this case, the reason for not cheating factor personal integrity has an impact on the performance of these factors. This indicates that the use of education to emphasise the student’s need to maintain their personal integrity will probably be useful in reducing this type of cheating. The fact that students who perform this type of cheating find it more acceptable to perform than non-cheating students also indicates that there is opportunity to educate them on its unacceptability.

All the reasons for cheating factors impact upon the likelihood of a student cheating in this way. This indicates that this type of cheating will probably be the most difficult to reduce. Education will probably be useful in reducing cheating based on the altruism/compensation factor, by raising the issue that helping others to cheat is also considered to be cheating. Again, prevention is also likely to be useful, as is putting in place a scheme by which detection of collusion can be achieved.

5.3 Copying
This factor is very similar to the previous factor, but with the exception that it is not affected by the altruism/compensation factor. As such the emphasis on education relating to altruism/compensation will probably not be of use in reducing this factor. This is reinforced by the result that cheating students are not significantly different in their level of acceptability for these types of cheating practices than non-cheating behaviour. Though as with the previous factor, education reinforcing personal integrity may help. Similarly as with the collusion factor, a focus on prevention and detection will probably be of value in reducing this type of cheating.

5.4 Deception
The final type of cheating is influenced again by the personal integrity factor and the workload pressures factor and the need to avoid failure factor. This implies that a focus on education to emphasise the personal integrity factor would be of value in reducing this type of cheating. It also implies that prevention by designing into the curriculum reasonable workloads and scaffolding to help students avoid failure would also be useful. As well, prevention on the part of the teacher to avoid situations like incorrect marks would also be useful.

5.5 Other implications
An interesting aspect of the results is that the aspect of consequences does not seem to provide much if any leverage for the educator to influence cheating practice. For no cheating type does the reason for not cheating fear of consequences have any impact on the level of cheating, indicating that a focus on consequences such as punishments will not be of value in reducing cheating. Another interesting result was that the reason for not cheating factor valuing learning also did not significantly differentiate between cheaters and non-cheaters for any cheating type, this indicates that cheating practices are probably driven by short-term issues as opposed to a deliberate strategy on the part of students. As such, education based upon valuing learning is unlikely to be effective, in the main, in reducing cheating practices.

In comparison, a similar analysis of a survey of postgraduate students conducted in 2000 showed that valuing learning and fear of consequences influenced the students not to engage in major and minor forms of plagiarism; however, as for the undergraduate students in this study, there were influences found for preventing serious forms of cheating.

6 Conclusion
In this paper, we have used factor analysis to determine the factors arising from a survey of IT undergraduate students in a number of key areas: cheating practices, reasons for cheating and reasons for not cheating. By determining the relationships between these three sets of factors, it has been possible to determine the specific focus an educator may take to reduce the various types of cheating practices in their class.

7 References
based on the IT student perspective. In T. S. Roberts (Ed.), *Student Plagiarism in an Online World: Problems and Solutions* (pp. 160-182). Hershey, PA, USA: Information Science Reference.


