Analysis on Test Cheating and its Solutions based on Extenics and Information Technology

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Abstract

By a wide analysis on examination papers within exam cheating, we found that the main cause of test cheating is the paper and the environment which makes exam cheating possible for students. Based on Extenics and information technology, we presented several systemic solutions, one is to design an individual examination paper, its answer depends on individual’s personal information; another is to test on computers with a support of monitor software. Furthermore, we put forward some extension solutions. The applications in Chinese universities have approved its effectiveness.

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1. Introductions

Test cheating has become one of the major problems on many college campuses. With the rise of new examination methods and tools, new cheating methods have been born accordingly. With advanced communications and the rapid development of Internet, more and more cheatings with all kinds of the means happens especially among students. It has shown that the proportion of college students who had cheating experiences is up to 90% [1]. According to the results reported, 95% of students cheated on a test during the school year [2].

With the rise of new examination methods and tools, new cheating methods have been born. In the recent years information technology has been constantly improving its support for teachers with different kind of tools. These tools help teachers organize their courses and exams better. They include various paid and open-source

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Learning Management Systems, modules and other solutions. While developing course and exam materials electronically is an efficient way to improve the way one teaches, not everyone considers the dangers caused by various new cheating methods [3].

In the era of big data and information anywhere, we try to find new methodology to prevent test cheating. In 1983, the article *Extension Set and Non-compatible Problems* was published in *Journal of Science Exploration*, which proclaimed the birth of the new discipline—Extenics. It constitutes of Extension theory, extension methodology and extension engineering is a new discipline for dealing with contradictory problems with formulized models [4-5]. By certain transformation, one thing that doesn't meet our needs can be turned into another thing that meets the needs. Extenics consists of basic-element, extension logic and extension set theory. Extension set can instruct us the transformation paths. Now Extenics based methodology has been applied in various fields [6-7].

The purpose of this paper is to present the potential direction and solutions to teachers so that they can use it to solve the test cheating problems using information technology and Extenics. The rest of the paper is organized as follows: In section 2 we analyze key reasons of test cheating and give a new improving direction. In section 3 we introduce two solutions to prevent test cheating. Section 4 gives a case study and show how the new methods work. In section 5 we conclude the paper and give future research directions.

### 2. Analysis in Causes of Exam Cheating

John Trushell found that students can use information and communication technology including the Internet in cheating behaviors such as plagiarism. The findings would not support the contention that younger students use information and communication technology more frequently or engage in cheating behaviors disproportionately [8]. A study showed that students use both low and high-level innovative cheating techniques when taking examinations, writing papers, with group work, or during clinical practice. Cheating occurs by taking, giving, and receiving forbidden material or information and by circumventing the process of assessment [9].

A structural equation model was implemented on a sample of 416 Italian college students. Results confirmed the posited model, highlighting the pivotal role of academic moral disengagement and peers behaviors in facilitating cheating behaviors, above and beyond the impact of self-efficacy beliefs [10]. Zahra Kalhori did a quantitative research on exploring the relationship between teacher-student rapport and students’ willingness to cheat in English classes of Iranian 17-18 year old high school students in Bandar Abbas [11]. One conclusion from this study is that there is no clear-cut profile of a student who cheats. The decision to cheat and the reasons leading up to the decision are complex and include a variety of personal and situational factors.

Results show that social and economic status, a commitment to discipline and rules and also history of cheating a significant relationship are related with the Possibility of cheating. Factors like education level, age, quantitative study and education of father have a very important role in motivation of cheating according to the Regression logistic analysis. Understanding the reasons for cheating can be direct responses to people, hard materials, and teacher indifferences and at the end of a serious failure to lack of students study noted [2].

Reviewed on above results, we did a research in several universities about why cheating in exam, and asked more than 120 students, the top 5 reasons are listed as following:
Table 1. Top 5 reasons of test cheating

| Possible reason                                           | Rank | Numbers of agreement |
|-----------------------------------------------------------|------|----------------------|
| No time to prepare test but want to pass the exam         | 1    | 97                   |
| Others cheat, so do I. Otherwise is unfair                | 2    | 70                   |
| My friend want me help him/her                            | 3    | 46                   |
| Need a higher score for honors, study abroad, or keep leadership | 4    | 32                   |
| Prove my skills in information technology, I cheat, no one find out | 5    | 23                   |

Based on game theory, we designed a table on test cheating analysis as shown in Table 2.

Table 2. Game theory analysis on scores in test cheating

| You               | others cheat | no-cheat |
|-------------------|--------------|----------|
| others cheat      | 7, 7         | 8, 5     |
| no-cheat          | 5, 8         | 6, 6     |

From Table 2 we found that cheating is the right choice whether others cheat or not.

After finished the above tables we analyze the reasons based on Extension set and find out more reasons as following:

1) The classrooms can support students use information and communication technology including the Internet in cheating behaviors.
2) The test monitoring and management system is not effective enough.
3) The examination paper and examination questions make cheating possible.

3. Solutions to prevent exam cheating based on Extenics and Information Technology

The study reports that females are significantly more intolerant of cheating than males. Idealism was found to have a significant positive association within tolerance of cheating while relativism reported no association. It is anticipated that the growing admission of women to professional accountancy membership together with educational intervention to increase idealism may improve ethical attitudes and help restore the profession’s reputation [12].
According to the Extension set theory [4] and its division on domains [5, 13], solutions can be explored from 3 paths: elements, rules or criteria and domain of discourse.

3.1. Elements

From the view of elements, we think about the students. All students hope to be happier now and in the future. Let them know that cheating maybe brings a little happy at present, but once be found, it will destroy your future life, and it is not worth to cheating in exam. Be proud of being an honest man all your life.

3.2. Criteria

From the view of criteria, we think about how teacher score students. Mostly teacher give scores to students according to what they write on the exam paper. We can transform to new rules, such as students score each other, score by computers, the teachers make a special exam paper or questions on which students can not cheat, or give students different exam papers but test same knowledge and skills. Instead of scoring in each lesson but score in lesson chains, such as data structure, data base, programming and development of management systems can form a lesson chains, if someone cheated in data structure, he will be found in subsequent lessons, for example, programming.

3.3. Domain of discourse

In the recent years information technology has been constantly improving its support for teachers with different kind of tools. These tools help teachers organize their courses and exams better. They include various paid and open-source Learning Management Systems, SCORM modules and other solutions [3]. Cheating occurs by taking, giving, and receiving forbidden material or information and by circumventing the process of assessment. Faculty need to detect and prevent academic dishonesty by utilizing certain deterrents. We need to use all resources available to develop effective policies and procedures [9].

From the view of domains, we think about how to change the environments of testing. Test in society, companies, or church. Test on the grass with all other students around you and listen to your speech. Test on computers with random questions and check cheating by software or information systems et al.
4. Case Study

In school of management, we try to train the capability of practice on what the students have learned from the class. The criteria of scoring are changing too. The skills to problem solving become more and more important. Reviewing on the exam paper several time, the teacher ask themselves twice: can this question be answered within cheating factors? The best question has 3 characters: 1) test the knowledge mastering and practicing degree scientifically of students; 2) improve the skills during testing; 3) students can not plagiarize. For example, you can not copy other’s resume. Here is an example from the exam paper of information resources management:

List the most proud one of your No.1 Guinness Records, and exemplify in which what kinds of theories and methods of information resources management have been used?

Other testing methods are as following:
1) build an exam data base with 4 times of question to students, answer questions by drawing from the base randomly.
2) Test both on papers and on computers one by one with monitoring by teacher sit beside the student.
3) Write reports or papers in practice and make open reply, every student will be asked randomly in groups.

5. Conclusions and Future Research Directions

Our methods get very good results in 4 majors and 9 classes, the students are interested in the exam and no one do any cheating behaviors in 5 exams. Extenics is a new methodology to help teachers find new solutions to prevent cheating and teaching. There many other methods beside extension set in Extenics, we will try to use transformations method and extension think method to improve the value of students in universities.

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