

2006-1104: PROMOTING ACADEMIC INTEGRITY THROUGH AN ONLINE MODULE

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PROMOTING ACADEMIC INTEGRITY THROUGH AN ONLINE MODULE

Introduction

Academic integrity is not a new concern and faculty members address it in their courses often, but the rise in academic dishonesty cases indicates an alarming national trend. According to Lathrop and Foss², a 1998 survey by the publisher of *Who's Who Among American High School Students* indicates 83% of students polled admitted that “almost everybody does it” (“it” meaning cheating). Academic dishonesty has far reaching consequences beyond the classroom. Whitley and Keith-Spiegel³ cite a number of reasons as to why educators should be concerned about academic dishonesty. The reasons include “reputation of the institution” and “public confidence in higher education” as evidenced by numerous corporate scandals in recent years. The social consequences of academic dishonesty are far more damaging as Cizek¹ points out students who cheat and plagiarize are more likely to do the same in work or in their family situations due to the “habit forming nature of cheating and plagiarism.”

Academic dishonesty is not limited just to cheating and plagiarism, but also includes falsification and fabrication of information, contributing to the violation of course policies and procedures, and sabotaging the work of others. It is not just the failing students who commit academic dishonesty. In some instances top students also cheat for a variety of reasons including pressure to keep their GPAs up, lack of time to do their school work due to work and family commitments, poor writing skills, and most importantly the attitude that they are somehow above rules and regulations because they are “good students.” In engineering disciplines, some students genuinely may not know what constitutes plagiarism and what its consequences are. Some have never had a formal exposure to the definition of plagiarism, citation styles, techniques for paraphrasing, and strategies for avoiding plagiarism. International students are especially susceptible to false accusations of plagiarism as viewpoints on intellectual property can sometimes vary across cultures.

Faculty members have a difficult time educating students on academic integrity and also keeping up with academic dishonesty incidents. The use of various hand-held and online technologies has added to the difficulty of dealing with academic dishonesty. Faculty not only have to learn and keep up with the latest technology tools, but also have to be more vigilant on how students use technology tools to violate course policies.

Almost every academic institution has policies on academic dishonesty on the web, and some also have educational materials, tutorials, and online modules on academic integrity. The educational materials online on academic integrity fall under three categories: (1) policy information on academic dishonesty (numerous universities), (2) simple tutorials on academic integrity with examples and quizzes (York University, Penn State University, Indiana University, Virginia Tech, University of Southern California, Radford University) and (3) multimedia tutorials with audio, stills, and interaction (Rutgers University, University of Guelph).

The quality of educational materials on academic integrity available online and their accessibility to a wider audience vary. Many of the online tutorials are electronic page-turners that do not engage students actively. The multimedia tutorials available from a few institutions are either available only to their students online or have to be purchased by other institutions. The instructional soundness and quality of some of these products are also debatable as many of them are not interactive to engage students. These simple tutorials on academic integrity with online quizzes are mostly accessible to anyone online, but many of them do not address academic integrity issues that are unique to engineering students. Engineering students also have to know about plagiarism issues related to the proper use of equations, figures, tables, charts, data, software, experimental procedures, multimedia files, etc. The following sections describe the design, development, implementation and evaluation details of an online module that faculty can assign students to go through online to promote academic integrity in their courses.

Module Needs and Requirements

For the purpose of scoping the needs and requirements of the module, faculty in engineering and other disciplines at Northern Illinois University were interviewed, and the Director of the Student Judicial Office who handles academic dishonesty cases and the Ombudsman who handles students' complaints on unfair accusations by faculty were also consulted. Students' inputs were also solicited on the design, interface, and activities of the module. The general consensus was that the module should be for students and should promote academic integrity, but not cover writing or citation styles or address the possible penalties for academic dishonesty as covering those issues in the module could make it too long to be easily viewable by students within an hour or so. The needs analysis resulted in the following major objectives for the module:

1. increase students' awareness of cheating, plagiarism, and their consequences,
2. offer strategies to help students avoid academic dishonesty situations and protect themselves from unintentional accusations by faculty, and
3. provide faculty with an educational resource to supplement their classroom discussions on academic dishonesty issues.

A review of existing online modules on academic integrity at other institutions and an analysis of module needs, user, and technology considerations resulted in several requirements listed below:

1. eliminate the need for login or password to access the module,
2. include both content and activities (quizzes, games, cases, etc) to engage users,
3. eliminate the need for supplementary CD, DVD or other media, and be fully web-based,
4. require the module to be independent of platforms and not be a part of a web-course management system,
5. accommodate students with disabilities in reviewing the content, quizzes, and cases,
6. allow the content to be viewed in a reasonable amount of time (say, 30 minutes),
7. prevent recording any data about users or their quiz scores to encourage users to experiment with the module and its features freely,
8. allow the module to be used easily through a variety of connectivities (dialup, T1, DSL, etc.),
9. simplify update and maintenance of the module in the long run,
10. allow users to print a certificate of completion and their quiz scores, if they choose to do so,
11. minimize scrolling of text, and display content in easily readable chunks of information, and
12. require minimal use of plug-ins or players for viewing the module.

The module is not intended to offer strategies for faculty on how to prevent or detect cheating and plagiarism or to find out how students cheat as these issues are beyond the scope of the proposed module. The module is also not intended for certification, tracking student users and their quiz scores, or discussing penalties for academic misconduct at the institution.

Module Design and Development

The module design consists of a multilevel hierarchy of interconnected web pages. Level 1 contains the main page of the module with links to pages on module Overview, Navigation Tips, Certificate of Completion, About the Module, and support resources at the university. The “Get Started” button when clicked opens the content pages in a new window. Figure 1 shows a screen capture of the Level 1 (main page) of the module.



Figure 1. Main page of the module

Level 2 contains the module content organized under the following six major topics that were decided from consultations with faculty, staff, and administrators at Northern Illinois University:

1. Definition of academic dishonesty.
2. Causes of academic dishonesty.
3. Consequences of academic dishonesty.
4. Cheating, Fabrication, Falsification, and Sabotage.
5. Plagiarism.
6. Protecting yourself.

The content for each topic was compiled from existing literature and interviews with faculty and staff at Northern Illinois University. The content for the plagiarism topic was developed primarily by the University Writing Center staff who were able to provide examples of seven types of plagiarism and also develop relevant quizzes for that topic. The content was formatted into easily readable chunks and organized in a series of screens that users can navigate quickly. The focus of the content is not to preach academic integrity or discuss possible penalties for academic dishonesty, but to clarify academic dishonesty, suggest ways for avoiding cheating and plagiarism, and protecting oneself from false accusations. Each screen of the content has been

designed to include either an FAQ (Frequently Asked Question) with a clickable answer or a graphic to engage users. Content screen design includes navigation buttons to allow users to go from one topic to the next easily. Users can also go directly to a topic by clicking on the appropriate link for that topic in the Table of Contents included at the bottom of the content screen. Figure 2 shows a sample of the content design screen.

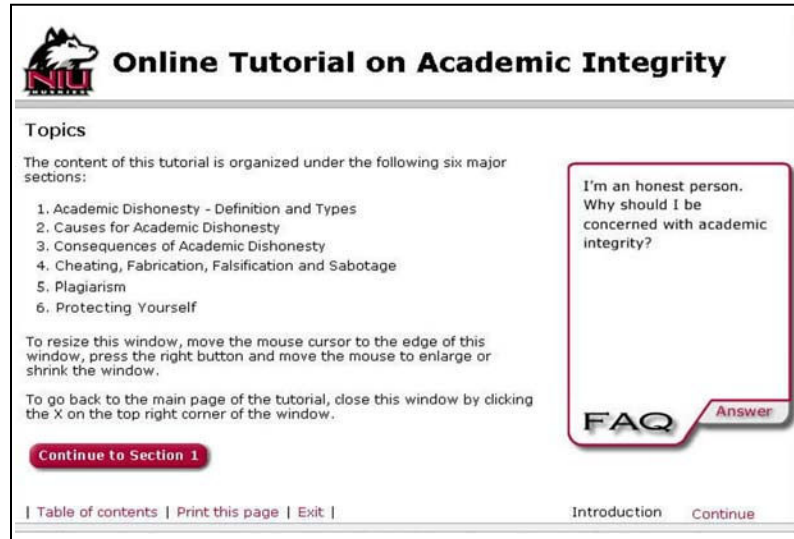


Figure 2. Screen capture of one of the content screens of the module

Level 3 design includes quizzes and games for each topic of the module. Quizzes are linked to the last screen of each topic so that users can view the content first and then take the quizzes for that topic. The quizzes for each topic of the module were carefully designed to test users on the content covered in that topic. The quizzes are either multiple choice questions or true/false questions. After completing 70% of the quizzes correctly, users can print a Certificate of Completion. Games are linked to the bottom navigation bar of the content screens and can be accessed any time. Two types of games have been included with each topic to address two different objectives. The “match game” is designed to test users’ comprehension of academic integrity-related terminology and the “decision game” is intended to test users’ ability to decide between actions that promote and compromise academic integrity. Figure 3 shows a sample screen of a quiz question and Figure 4 shows sample screens of the two games.

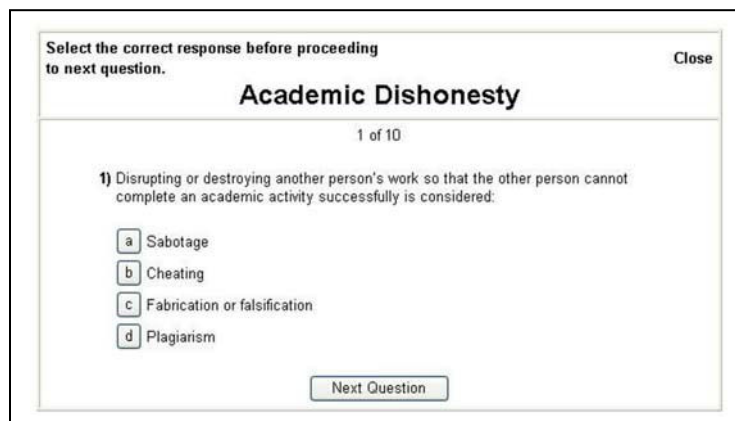


Figure 3. Sample of a Quiz Screen for a Topic

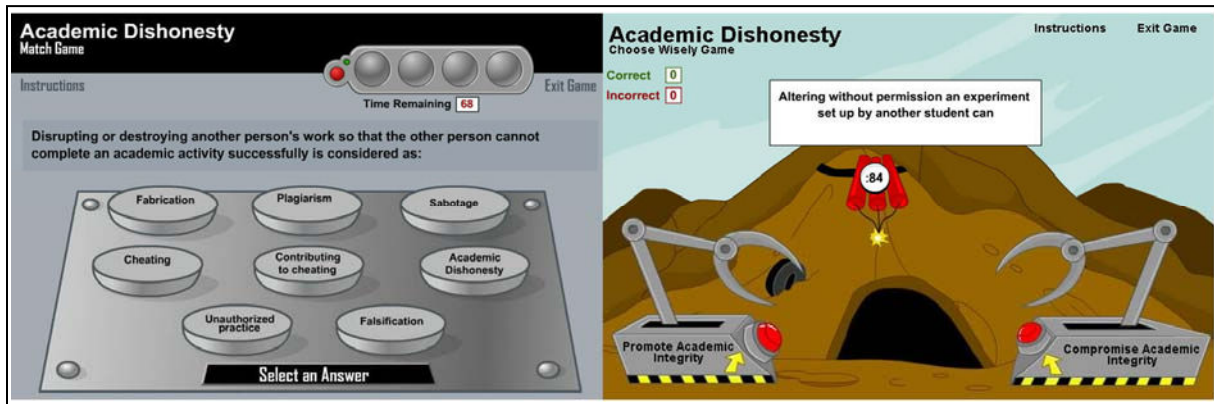


Figure 4. Sample Screens of the Match Game and the Decision Game

Level 4 design includes case scenarios, resources, and features for printing quiz scores and the Certificate of Completion. The case scenarios were designed with the help of the Ombudsman who handles a number of real life academic integrity cases at Northern Illinois University. The cases have been designed as decision-tree structures, which users can traverse through by selecting particular responses and viewing the consequences of those responses. The case scenarios are designed to increase users' awareness of possible sequence of situations they can encounter with respect to academic integrity and how particular responses could lead to negative or positive consequences. The resources section contains web links and references on academic integrity. Figure 5 shows a sample screen of a case scenario.

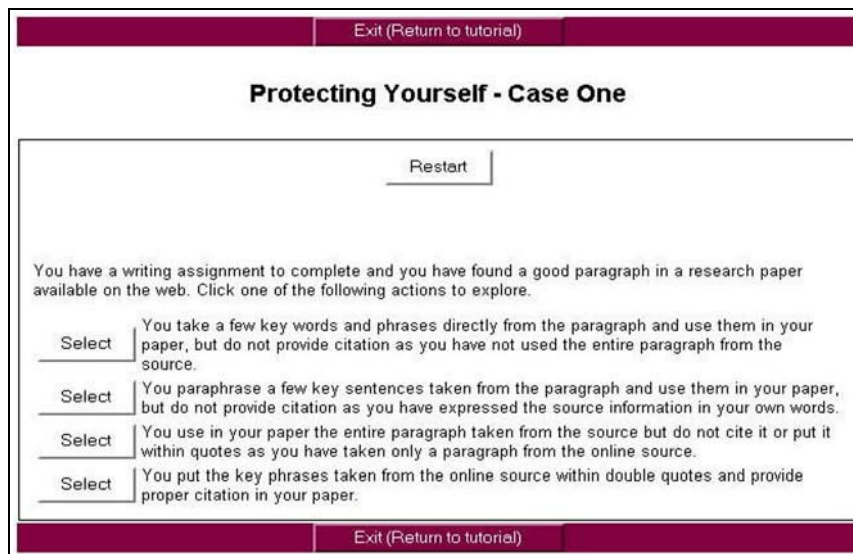


Figure 5. Sample Screen of a Case Scenario

Quiz scores and Certificate of Completion have been designed to be printed after users have completed the quizzes successfully. Figure 6 shows samples of printed quiz scores and Certificate of Completion. The content, quizzes, and games developed for the module were reviewed by faculty and Writing Center staff at the Northern Illinois University and refined as necessary. The module design is flexible such that additional content topics or activities can be easily added and the module can be enhanced to include more levels, if necessary.

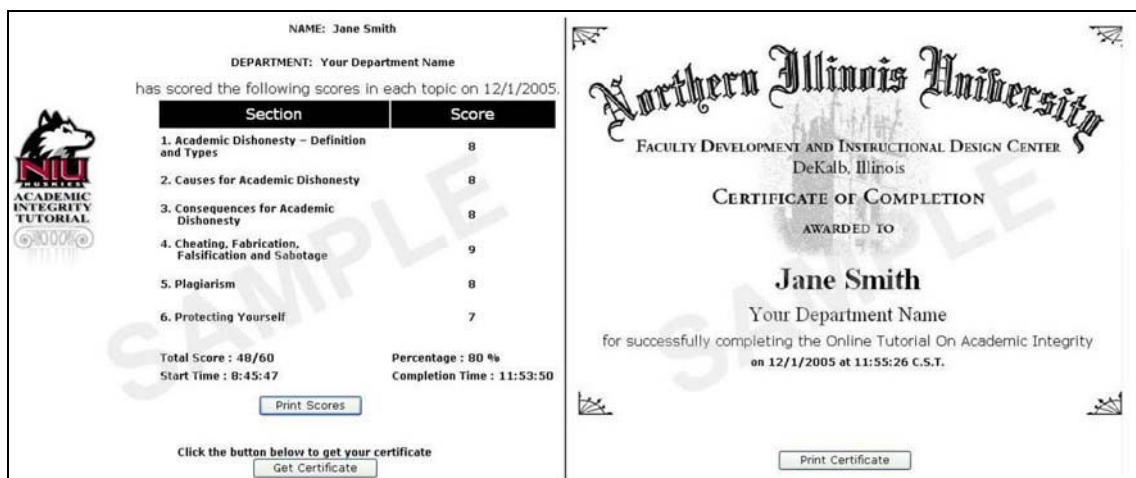


Figure 6. Samples of Quiz Scores and Certificate of Completion

Module Implementation

Module implementation process involved several steps and some of the steps proceeded sequentially and some in parallel. The first step involved designing storyboards of module screens for displaying content and integrating navigation buttons, FAQs and graphics. The storyboards were then reviewed for ease of use, logical display of content topics, and flexible navigation. After the storyboards were finalized, templates were developed for implementing the content information and integrating appropriate navigation buttons, FAQs, graphics, and linking quizzes and games.

For the purpose of implementing module components several software products were explored and accessibility for students with disabilities was the primary consideration in selecting implementation software. Therefore, all the content information, quizzes, and navigation had to be in “screen readable text,” so that automated screen reader software could output the information in audio for students with visual disabilities. Reasonable accommodations, such as “ALT text” or text transcripts, were developed for other components of the module.

Macromedia Studio MX2004 was used to design and develop the module, and HTML, CSS, and Javascript programming language were used for implementing the content, quizzes, case scenarios, FAQs and navigation. Implementation of the quizzes required complex programming in Javascript as the quizzes were designed to include the following features:

1. randomizing quizzes and their responses every time the quizzes are taken online,
2. scoring quizzes for each topic, and maintaining total score of all quizzes,
3. checking total score of quizzes to see if a user correctly answers at least 70% of the questions to be able to obtain a Certificate of Completion,
4. allowing users to retake incorrectly answered quizzes during the same session but not considering the scores from successive attempts for Certificate of Completion,
5. allowing users to print the final scores from all the sections,
6. recording how long a user spent on the module and printing the start and finish times along with the total quiz scores, and
7. eliminating quiz scores from being saved on the website after a session is exited by the user.

The implementation allows users to view the final quiz scores after completing all the quizzes and print the final quiz scores and a Certificate of Completion. The Certificate of Completion is only meant to be an acknowledgment of a user answering 70% of quiz questions correctly, and it does not authenticate if a particular student has really taken the quizzes by himself/herself. A graphics template was designed for the certificate and implemented to prompt users to enter their names and departmental affiliation only after they have correctly answered 70% quiz questions. Adequate instructions have also been included on the opening page of the quizzes.

The games were developed in Macromedia Flash as the animation could be implemented easily in Flash, and the games were exported to Shockwave format for use on the web. The games require a freely available Macromedia Flash player for which a link has been included on the games page so that users can easily download it, if it is not already on their computers. The games are meant to engage users in the module and test themselves on the terminology used and decision making skills with respect to academic integrity situations. The games are scored and timed, but the game scores are not taken into consideration for the Certificate of Completion. The games are not accessible to users with visual disabilities as the screen reader software cannot read Flash screens. But reasonable accommodations have been included to provide transcripts of the games for users with visual disabilities.

The case scenarios were implemented in HTML and Javascript to make them accessible to users with disabilities. Each scenario is programmed with a decision-tree structure and users can follow a particular path based on choices selected at each level and view the consequences. The implementation allows users to go and back forth between levels and view all the choices and their consequences so that users can explore the consequences of various decisions.

The other components of the module such as FAQs included on the content screens and resource pages were implemented in HTML and are accessible to users with disabilities. Adequate ALT text has been included to describe images and graphics. Implementing the module required ten times more time and effort compared to developing the content information, and this was primarily due to the complex programming involved and the need for satisfying the requirements identified during the needs analysis stage. The overall design, development, and implementation of the module and its components required approximately 6 months of full-time (40 person-hours per week) effort with a development team that included the two co-authors and a graduate assistant. The implemented module can be accessed at <http://www.ai.niu.edu/ai/students>.

Module Testing and Evaluation

The implemented module involved both formative and summative evaluation procedures for measuring the progress of the project as well as its outcomes. Formative evaluation helped to evaluate the project while it was underway and in this project it included the following:

1. Periodic review of project progress by the development team.
2. Testing and refinement of the module and its features by developers.
3. Testing and evaluation of the module by faculty from different disciplines.
4. Beta testing of the module by students.
5. Final review and refinement of the module by the development team.

During the alpha testing process, the development team was able to identify a number of problems and correct them, and during the beta testing process the team was able to refine the module further as per the recommendations made by faculty and students who tested the draft versions of the module. The problems identified and corrected by the development team were mostly related to the complexity of programming the Certificate of Completion and keeping track of quiz scores during a session, but these were resolved quickly. Other minor problems identified during alpha testing were related to incorrect navigation links and improper display of images, and these were also corrected fully. The content topics, quizzes and games were also fully reviewed by University Writing Center staff for any typographical, grammatical, and punctuation errors and their corrections have already been implemented.

The summative evaluation focused on evaluation of the module by faculty, staff, administrators and student users, and review of module objectives and outcomes by the project team. For the purpose of summative evaluation, the relevant objectives and measures were defined, and the necessary strategies were developed and implemented. Appropriate criteria were identified for the measures. For example, measuring instructional soundness included criteria such as content correctness, coverage, clarity, and organization, and module usability included criteria such as ease of use, accessibility, technology feasibility, etc. Faculty and staff who reviewed the module provided feedback on many of these issues, and their recommendations were implemented in the module. Two tests were designed to obtain students' responses before and after reviewing the module and these tests were implemented online. Table 1 below shows a sample of evaluation objectives, measures, strategies and outcomes applied in this effort.

Table 1. Sample of Evaluation Objectives, Measures, Strategy and Outcomes

Evaluation Objective	Measure	Strategy	Outcome
Project progress	Status of tasks	Review by developers	Task completion
Instructional soundness	Feedback from faculty	Faculty feedback form	Confirmation of module quality
Module usability	Feedback from students	Student feedback form	Confirmation of module usability
Awareness of issues covered	Scores from quizzes, and pre and post tests	Self-test quizzes, and pre and post tests	Effectiveness of the module
Project completion	Completed tasks	Review by development team	Module completion
Dissemination	Website hits Requests for module	Web counter Request counts	Availability of module to users

Evaluation of the module by students involved completing the pre-test, reviewing the module and answering all the quiz questions for each topic, and then completing the post-test. During fall 2005, students from three classes were requested to participate in the evaluation process and provide suggestions for improving the module. Out of the 140 students participated in this process, 55 students completed both pre and post tests designed for evaluation purposes. Out of the 140 students, 72 students also completed all the self-test quizzes included with each of the six topics of the module and submitted their quiz scores also for comparison. It should be clarified here that the self-test quizzes are included in the online module with the topics, but the pre and post tests were designed and administered separately for evaluation purposes.

Students who participated in the evaluation process were asked to indicate how long it took them to review the module and complete the quizzes, and their own estimates ranged from 24 minutes to 45 minutes, with the average at 37 minutes for all three classes. The time students spent on the module was also recorded in the quiz score sheet that they printed and submitted. The score sheets indicated that the students spent anywhere between 17 minutes to 29 minutes, with the average at 25 minutes for the three classes. This difference between students' own estimates of how long they spent on the module and the actual time spent on the module recorded on the quiz score sheets is understandable as students might have felt they had spent longer than they actually did. The average time of 25 minutes spent on the module by students satisfies the requirement of students spending not more than 30 minutes on the average on the module.

The data from the pre and post tests, and the quiz scores were analyzed with the help of the Office of Testing Services at Northern Illinois University. The pre and post tests included 15 questions out of which 14 of them were on issues covered in the six topics of the module. The 15th question required students to rate themselves on various academic integrity issues before and after reviewing the module. A simple comparison of correct answers for the 14 questions in the pre and post tests indicated that students performed better overall after reviewing the module. This can be easily seen from the data presented in Table 2. For only question 2, the percentage of correct responses was 6% higher for the pre-test than the post-test, but it can be attributed to any number of factors including the design of the question or lack of clarity of content related to that question. The self-ratings by students for the 15th question were higher in the post test compared to the pre-test. This was anticipated as students were asked to rate themselves on their comprehension of academic integrity issues before and after reviewing the module.

Table 2. Comparison of Percentage of Correct Responses by Students for Pre and Post Tests

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Pre-Test n=55	98%	84%	98%	40%	62%	93%	85%	98%	76%	98%	91%	70%	77%	51%
Post-Test n=55	98%	78%	98%	56%	71%	96%	95%	98%	96%	98%	96%	91%	93%	81%

A simple comparison of quiz scores of students from the three classes who completed the quizzes for all six topics of the module indicated that there was very little difference among students from three classes as shown in Table 3 below. The module was designed as a general purpose one to be used by students in any class and not a particular class, and therefore, the results from the comparison of quiz scores from the three classes confirmed that students performed consistently regardless of the class they were enrolled in when taking the quizzes.

Table 3. Comparison of Quiz Scores for Six Topics Among the Three Classes

Quiz Scores		Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6
Class 1 n=47	Mean	9.127	9.766	9.766	8.851	8.957	8.83
	Std. Dev	0.947	0.476	0.52	0.859	1.367	1.185
Class 2 n=19	Mean	9.579	9.737	9.579	9.158	9.053	9.474
	Std. Dev	0.692	0.452	0.682	1.015	0.911	0.697
Class 3 n=6	Mean	9.667	10	10	9.667	9.5	9.667
	Std. Dev	0.816	0	0	0.816	0.837	0.516

Apart from the simple comparison of percentages and means of quiz scores, several statistical analyses were also performed on the pre and post test data, and appropriate conclusions were drawn. First, a paired sample t test was conducted on the data from the 55 students who completed both the pre and post tests. This was the best way to identify if there was a significant difference in the performance of students before and after reviewing the module. As it can be seen from the results indicated in Table 4, there was a significant difference ($p < 0.05$) at 95% confidence level for six of the first twelve pre and post test pairs compared. For two of the pairs (Q3 and Q8), the standard error of the difference was 0. That is, the results were identical for those two questions for pre and post tests, and so there was no point in comparing them. But the six of the twelve questions compared confirmed that the students performed better after reviewing the module. The other six questions were not significant at $p < 0.05$, which can be attributed to any number of factors including that the test questions were not well-designed or module did not adequately clarify the content related to those six questions. Paired samples test were also conducted to compare scores from the 15th question which was a self-rating question by students. The 15th question had 10 items, with a Likert scale for each question, and so overall there were 24 test questions in the pre and post tests. The paired samples t test of these 10 items showed that there was a significant difference between pre and post test scores at 95% confidence, thus indicating that students rated themselves higher after reviewing the module.

Table 4. Results from the Paired Samples t Test

Pairs of Pre Test Question – Post Test Question	Paired Differences					t	df	Sig. (2- tailed)
	Mean	Std. Dev	Std. Error Mean	95% Confidence Interval on the Difference				
				Lower	Upper			
Pair 1 Q1 – Q1	0.000	0.192	0.026	-0.052	0.052	0.000	54	1.000
Pair 2 Q2 – Q2	0.055	0.558	0.075	-0.096	0.205	0.724	54	0.472
Pair 4 Q4 – Q4	-0.164	0.570	0.077	-0.318	-0.010	-2.130	54	0.038
Pair 5 Q5 – Q5	-0.191	0.646	0.087	-0.266	0.084	-1.043	54	0.301
Pair 6 Q6 – Q6	-0.036	0.331	0.045	-0.126	0.053	-0.814	54	0.419
Pair 7 Q7 – Q7	-0.109	0.369	0.050	-0.209	-0.009	-2.194	54	0.033
Pair 9 Q9 – Q9	-0.200	0.447	0.060	-0.321	-0.079	-3.317	54	0.002
Pair 10 Q10 – Q10	0.000	0.192	0.026	-0.052	0.052	0.000	54	1.000
Pair 11 Q11- Q11	-0.055	0.299	0.040	-0.135	0.026	-1.352	54	0.182
Pair 12 Q12 – Q12	-0.218	0.498	0.067	-0.353	-0.084	-3.250	54	0.002
Pair 13 Q13 – Q13	-0.164	0.462	0.062	-0.289	-0.039	-2.267	54	0.011
Pair 14 Q14 – Q14	-0.309	0.540	0.073	-0.455	-0.163	-4.245	54	0.000
Pair 15 Q15.1 – Q15.1	-0.340	1.270	0.174	-0.690	0.010	-1.947	54	0.057
Pair 16 Q15.2 – Q15.2	-0.358	1.482	0.204	-0.767	0.050	-1.761	54	0.084
Pair 17 Q15.3 – Q15.3	-1.132	1.557	0.214	-1.561	-0.703	-5.293	54	0.000
Pair 18 Q15.4 – Q15.4	-1.528	1.728	0.237	-2.005	-1.052	-6.440	54	0.000
Pair 19 Q15.5 – Q15.5	-1.519	1.627	0.226	-1.972	-1.066	-6.734	54	0.000
Pair 20 Q15.6 – Q15.6	-1.226	1.637	0.225	-1.678	-0.775	-5.455	54	0.000
Pair 21 Q15.7 – Q15.7	-1.189	1.557	0.214	-1.618	-0.759	-5.557	54	0.000
Pair 22 Q15.8 – Q15.8	-1.288	1.786	0.248	-1.786	-0.791	-5.202	54	0.000
Pair 23 Q15.9 – Q15.9	-1.019	1.876	0.258	-1.536	-0.502	-3.954	54	0.000
Pair 24 Q15.10 – Q15.10	-1.264	2.030	0.279	-1.824	-0.705	-4.533	54	0.000

Additional statistical tests were conducted to compare the pre-test scores of those students who completed only the pre-test with the pre-test scores of those who completed both the pre and post tests. These tests indicated that the pre-test scores of those who completed both the pre and post tests were better overall compared to those who completed only the pre test. This was an interesting result which showed that the students who completed only the pre-test would be an ideal target audience for the module.

Apart from the quantitative feedback, students who participated in the evaluation process also provided a number of qualitative suggestions for improving the module. The suggestions included redesigning the module navigation to force students to go through the six topics one by one sequentially instead of allowing them to go to any topic in any order, adding more instructions for obtaining the Certificate of Completion, and including a Table of Contents to give users a total picture of the entire content of the module. The flexibility of going to any topic in any order actually confused the students and they could not remember if they had completed a topic and its quizzes or not, and so they preferred a forced sequence for navigating the module content. All these suggestions were implemented at the end of fall 2005, and students from four other classes were invited to participate in the evaluation process at the beginning of spring 2006. The data set from spring 2006 classes was also analyzed statistically and the results were far better compared to the fall 2005 data set, thus confirming the positive impact of the module. But it should be pointed out that no changes were made to the content, quiz questions or the pre and post-test questions, and the only changes were related to module navigation and instructions. The results of the evaluation conducted in spring 2006 will also be presented at the conference.

Conclusions

An online module has been designed, developed and implemented successfully for promoting academic integrity. The implemented module not only covers academic integrity issues, but also engages students to reflect on the issues through quizzes, games, FAQs and case scenarios. The module includes features for students to print a Certificate of Completion after completing 70% of the quizzes correctly. Initial results from evaluation of the module by students during fall 2005 indicate positive impact of the module on promoting academic integrity. After refining the module further, additional evaluations were conducted during spring 2006 semester, and the results from spring 2006 also confirmed the positive impact of the module.

The module is usable by university students at all levels and is easily accessible online without any special login, password, or the use of a web course management system. The module is already being used in many engineering and non-engineering classes at Northern Illinois University. Users do not require any special instructions or training for accessing and using the module. Faculty may be able to supplement their class discussions on academic integrity with the module.

Engineering faculty who assigned their students to review the module expressed positive outcomes on cheating and plagiarism issues in their classes due to their students' increased awareness of the issues. Some of these faculty mentioned that students in their classes have developed a better understanding of proper use of equations, graphs, images, and data from other sources as a result of reviewing the module. Student feedback also indicated that they knew how

to protect themselves better from false or unintentional accusations of cheating or plagiarism. One additional outcome of the module is the realization of the need for a companion module for faculty on designing and administering course activities effectively to prevent cheating and plagiarism. A faculty module is currently being designed by the project team to help faculty promote academic integrity.

Acknowledgments

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