

# A WEB-BASED QUIZ GENERATION TOOL USING ACTIVE SERVER PAGES

Gerald F. Braun

Department of Information Systems, Xavier University  
Cincinnati, Ohio 45207-5161  
braun@xu.edu

Debbie B. Tesch

Department of Information Systems, Xavier University  
Cincinnati, Ohio 45207-5161  
tesch@xu.edu

and

Brian Depinet

MBA Student, Xavier University  
Cincinnati, Ohio, 45207

## Abstract

With the growing popularity of the virtual classroom and student access to computers in the classroom, electronic testing is becoming more common. This paper describes a custom-developed Web-based quiz generation tool that uses Active Server Pages to create multiple-choice exams. The quiz generation tool is proposed as an alternative to assessment products offered with textbook adoptions or as available components of major Web course software. Students take exams using a standard browser. Faculty administer exams and generate reports through a Web browser. The paper describes objectives and procedures for installing and administering the quiz generator.

**Keywords:** electronic testing, online testing, quiz generation

## 1. INTRODUCTION

Online, electronic testing is becoming increasingly popular through the growing demand for virtual classrooms and availability of computers in the instructor-led, traditional classroom. Electronic testing, in the form of computerized test banks available with text adoptions is not new. Most publishers provide tools with the adoption of textbooks. These tools don't necessarily work as advertised and rely on proprietary software and installation on a private server. This can seriously limit flexibility.

Academicians have long been familiar with software that allows for quick generation of objective-based tests. These tests are most frequently administered as paper-based assessments and scored using optical scanners. More recently, as a result of computer availability in the classroom, these computerized test banks have been enhanced for LAN installation, and offer a database administration feature that allows for automatic scoring and reporting. Yet, access is limited to available computing facilities.

The explosion of the virtual classroom and maturation of Web software has led to the promotion of online electronic testing made available through Web browsers and transformed the Internet into a powerful environment for teaching and learning. As the leading provider of Web course software to the higher education market, Washington D.C.-based Blackboard Inc. provides course assessments in the form of a quiz generator and assessment tools to aid the grading, quiz creation, and review process ([www.blackboard.com](http://www.blackboard.com), 2001). Learning Space and WebCT offer similar competitive electronic environments for online education. With these alternatives, objective questions can be generated from an assessment pool of questions and randomized. Tests can be timed and automatically scored with scores placed directly in the electronic gradebook (Zeliff, 2000). For institutions fortunate enough to have licenses for these products, the alternative delivery solution for traditional assessment methods is already in place. However, not everyone has this option.

The availability of online tests offers many advantages in addition to the obvious cost reduction in terms of paper and duplicating costs. Ease of delivery via the Web enables students to take these tests when and where appropriate. As a valuable teaching tool for assessing knowledge, appropriately designed online tests can provide students with immediate feedback (Cardwell, 2000). Students may be given the opportunity to take practice exams in preparation for final assessment and feedback may be specific as to what section or pages of a textbook should be reviewed (Zeliff, 2000). For multiple-choice items, tests can be automatically scored and grades recorded allowing instructors more time for individual instruction (Cardwell, 2000). When exams are offered outside of class, class time can be more efficiently used for instruction (Zeliff, 2000). Furthermore, Web-based exams, which rely on standard Web server and browser software rather than a private network with client software, can provide more flexibility for administration and delivery.

One major disadvantage to electronic testing is access (Cardwell, 2000). LAN dispersed testing environments require access to local lab facilities. This disadvantage is minimized considerably when electronic tests are available online. Recognizing this need, textbook publishers are rushing web-based, often inferior products to course adoption websites. Of additional concern is the apprehension associated with possible system failure during testing as well as the additional stress that the non-technologically oriented student may face (Zeliff, 2000).

For instructors wary of being tied to textbook adoption products and for whom commercial products are not available, a third alternative is to build your own software using existing tools. The development process should consider criteria identified by Berger and Garcia

(1999) for use in selecting online testing packages. These criteria include the types of questions available, use of graphics/multimedia where applicable, types of feedback to students, ways questions are handled, issues of security, and means to report and track tests (Zeliff, 2000). The following sections describe the development of a rudimentary "quiz machine" built using active server page technology. In its current form, the product offers faculty the opportunity to generate multiple choice quizzes accessed through a Web browser. Questions are presented and scored interactively with immediate feedback on each question. The course administrator can add, modify, and delete questions maintained in an Access database. Once refined, this tool, along with appropriate documentation, will be made available to the academic community.

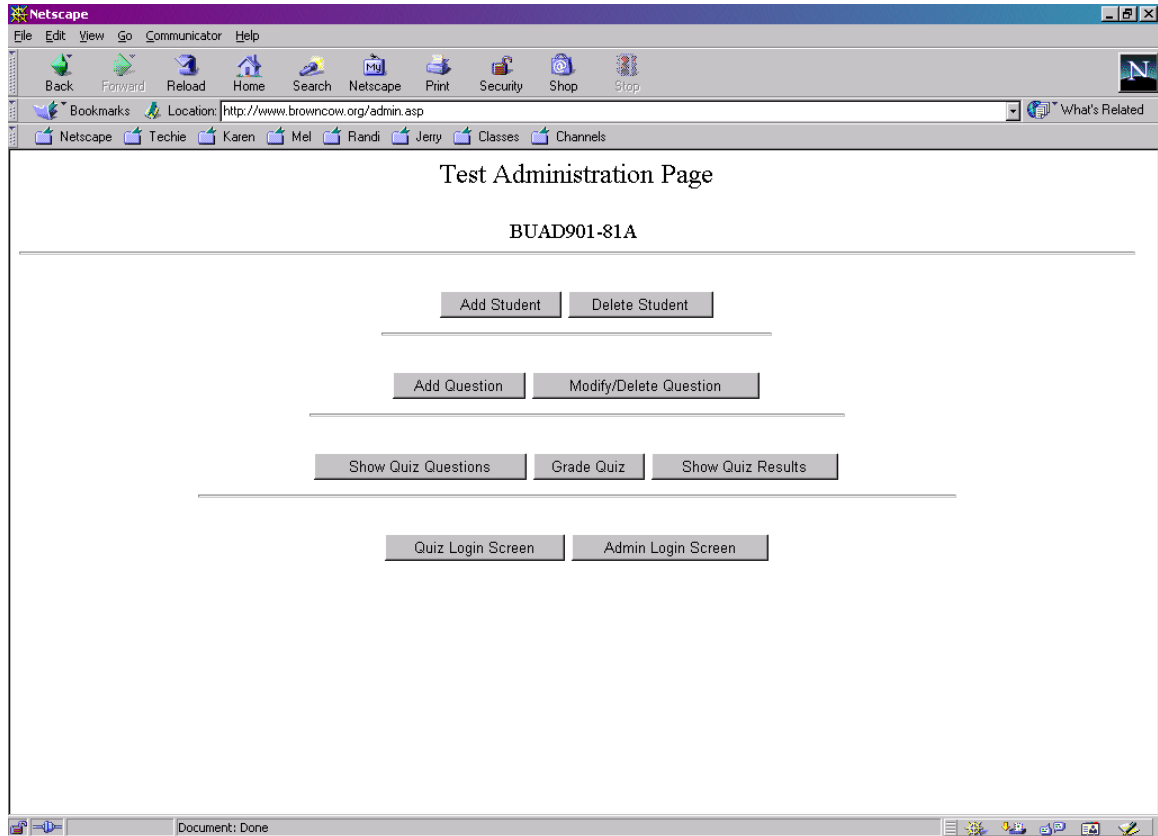
## 2. METHODOLOGY

As with most software development, our primary objectives were flexibility, accessibility, and ease of use. In its current form, the software supports only multiple-choice format. However, this may be expanded to other formats at a later time.

Microsoft Access is used to store a question bank along with correct answers and student responses. ODBC (Open Database Connectivity) standards using standard SQL statements were employed which means that the software could work with other ODBC compliant database tools such as SQL Server, dBase, Oracle, or DB2. Active Server Pages (ASP) using VBScript are used to process the data on a standard Windows NT Web server. While a non-Microsoft server could possibly be used, there may be some compatibility problems.

To administer an exam, the person who is generating the test must log in with a user ID and password to gain access to administrative tools. This is done through any standard Web browser. Students also use a login ID and password to gain access to the exam through their Web browser. The ID could be a sequentially assigned number or part of an existing ID. Individual passwords could be assigned to each student or one password could be used for all students. Student data, including their name, will be captured along with responses.

The software supports multiple question banks and allows the administrator to modify and select questions for a particular test. As students take the exam, they are given immediate feedback, along with the correct answer for a question. They cannot go back to a previous question once an answer is submitted. A student cannot take the quiz more than once. Once all students finish (or at any time in the process), tests can be graded and reports generated.



**Figure 1. Test Administration Options**

**Form and Function**

Once the exam administrator is properly logged in, she/he has the following options available (see figure 1):

- Add or delete students who qualify to take the test;
- Add, modify, or delete questions for the test bank;
- View the entire test bank; and
- Grade and show results.

The selection of questions from the test bank is accomplished through the “Modify” option by checking a box to make a question either active or inactive. This will also allow the test administrator to change the content of existing questions. Figure 2 gives a sample of a portion of a test bank. Note that as many as 26 response choices (“A” through “Z”) can be posted.

Students who log in to take a test must provide their name, student ID and password along with a class ID and quiz number. This information is used for reporting purposes and to restrict access. As students take the exam, they are presented with one question at a time (see Figure 3) and are given appropriate feedback after each question.

**Installation and Implementation**

The set up consists of three parts. First, a web server supporting ASP and Access must be installed. Then, Web-based Quiz Application files must be copied. And finally, the database must be appropriately connected to the system for access from web requests.

In order to use the software, a web server, supporting ASP must be installed. Either Microsoft (MS ) Personal Web Server (PWS) or MS Internet Information Server (IIS) will host ASP pages. Software vendors have products available for Linux that will allow for ASP page functionality, however the usability of these software packages on Linux have not been fully tested with this product. MS Personal Web Server is designed for Windows95, Windows98 or MS Windows NT WorkStation. Some versions of Window98 and Windows NT have PWS software included but not installed while for others, MS PWS can be downloaded for free from Microsoft and installed once appropriate free service pack upgrades are installed. The Microsoft web site details what free upgrades may be necessary before MS PWS installation for older Windows releases. MS Internet Information Server, designed for and distributed with MS Windows NT Server, is a more flexible Internet server product that can handle a higher number of simultaneous connections, host multiple web

sites, and is overall a better choice for hosting web pages. The Web-based quiz generation tool outlined in this paper will work best when implemented on a MS

Windows NT Server with MS Internet Information Server installed.

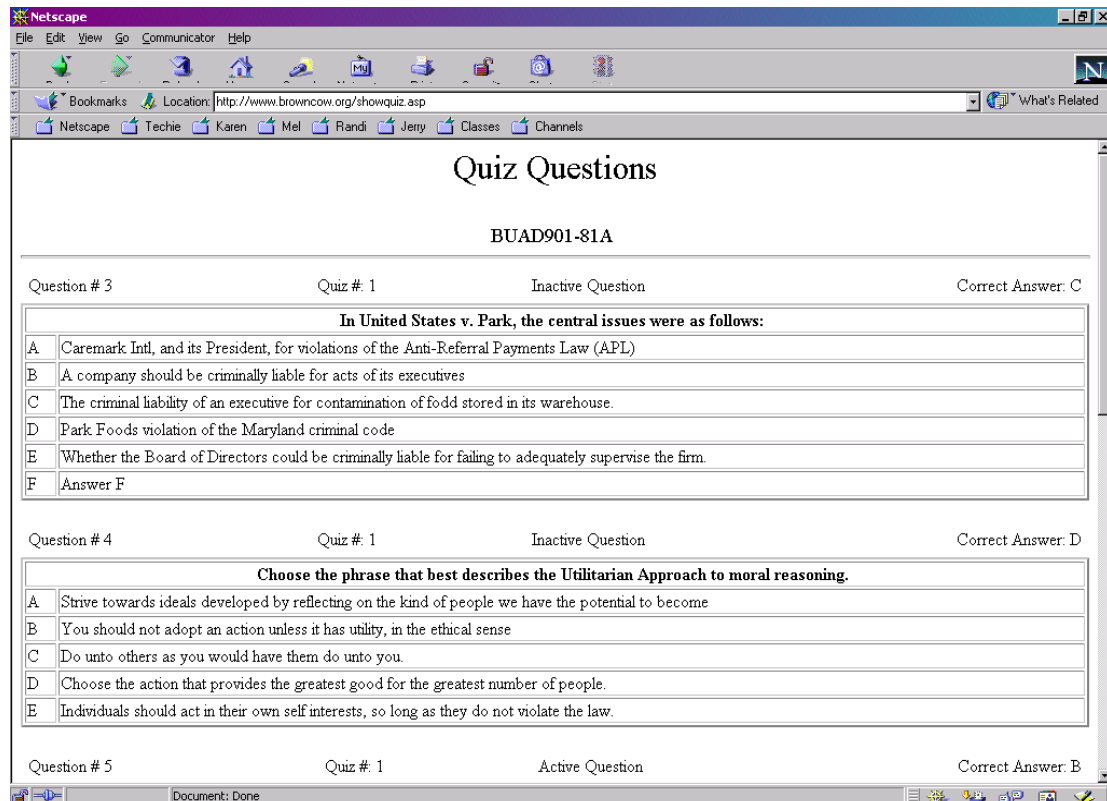


Figure 2. Sample Test Bank.

Once server installation is complete, web-based Quiz Application files must be installed. All files with extensions .ASP and .HTML must be moved into a web directory. For security purposes, create a new directory somewhere else on the server hard drive and place the file quiz.asp from the Web Based Quiz Application files in the new directory. Placing this file in a web hosted directory compromises the security of the database. Note the location where quiz.asp was stored.

Finally, once MS PWS or IIS is installed and the Web-based Quiz Application files are copied, the database must be connected on the server. This can be accomplished through the ODBC Data Sources option on the Control Panel. It is not necessary to have MS Access installed on the server. The Access Driver, as distributed with Microsoft products is all that is needed. No other special setup is required for scripting or ASP, as MS PWS and IIS are both capable of handling ASP pages and scripting in VBScript (and JavaScript). Once all software is installed, the Web Based Quiz Application pages can be accessed from any Web client.

### 3. SUMMARY

Online, electronic testing using objective questions provide one form of assessment for instructors that allow for immediate feedback for students and faculty. In addition, the electronic nature of the instrument allows for continuous generation and editing of assessment questions. When the desire is to measure lower-level cognitive learning online, many alternatives are available, among them textbook ancillaries, Web course products, and available freeware. Faced with the frustration of software that delivers less than promised or when vendor solutions for purchase are not available, this project offers a freeware alternative to quiz generation.

The software, as it is currently implemented, appears to meet the primary objectives of ease of use, flexibility, and accessibility. The product and process has been tested and refined using small quizzes during summer classes. Modifications and enhancements are being made for the future to include a selection count and support for other test formats. This will make the product appropriate for more comprehensive exams.

One main criticism during the initial testing phase was that students were not able to skip a question and come back to it later. This situation is also being addressed for future modifications.

the academic community after final modifications are complete. The Access database and ASP code can be further modified to suit individual faculty needs.

The software, along with comprehensive installation and operational instructions, will be made freely available to

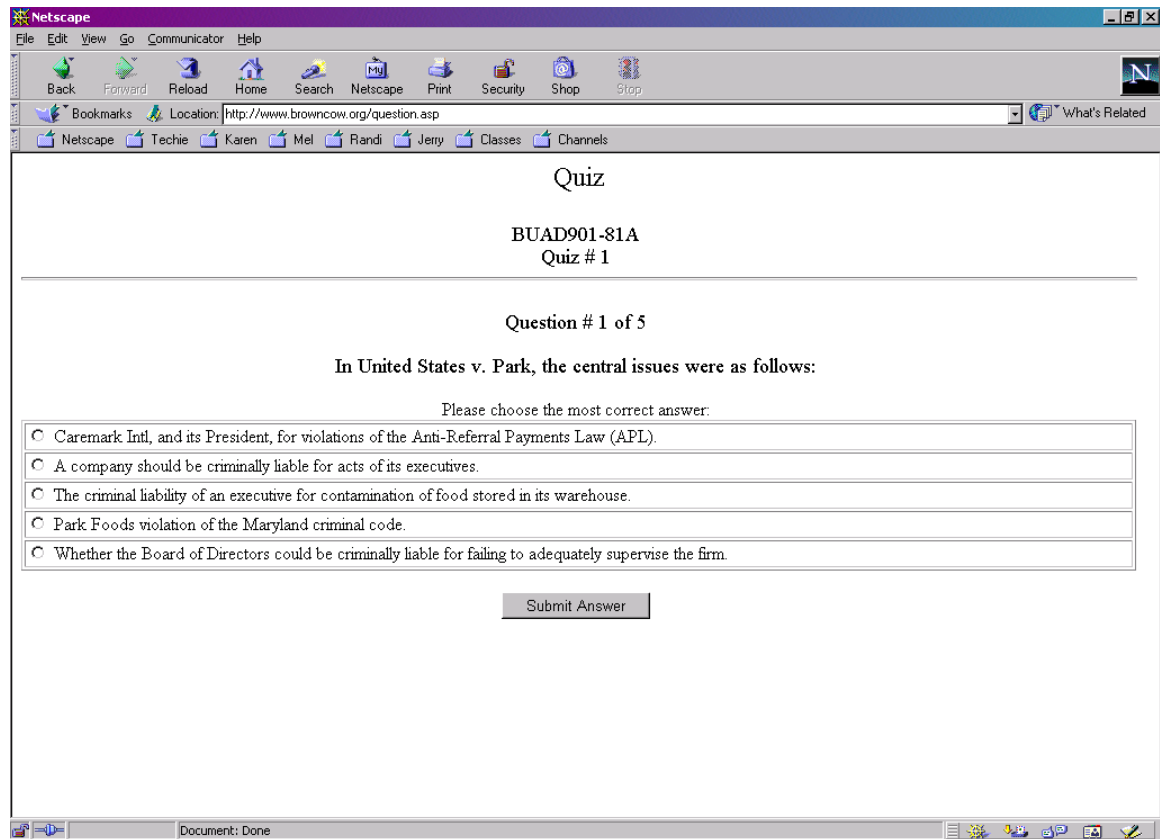


Figure 3. Sample question

#### 4. REFERENCES

Cardwell, K., April 2000, "Electronic Assessment." *Learning and Leading with Technology*, 27(7), pp. 22-26.

Dunn, S. L., March-April 2000, "The Virtualizing of Education." *The Futurist*, 34(2), pp. 34-38.

Gibson, J.W., D. V. Tesone, and C.W. Blackwell, Winter 2001. "The Journey to Cyberspace: Reflections From Three Online Business Professors." *S.A.M. Advanced Management Journal*, 66(1), pp. 30-34.

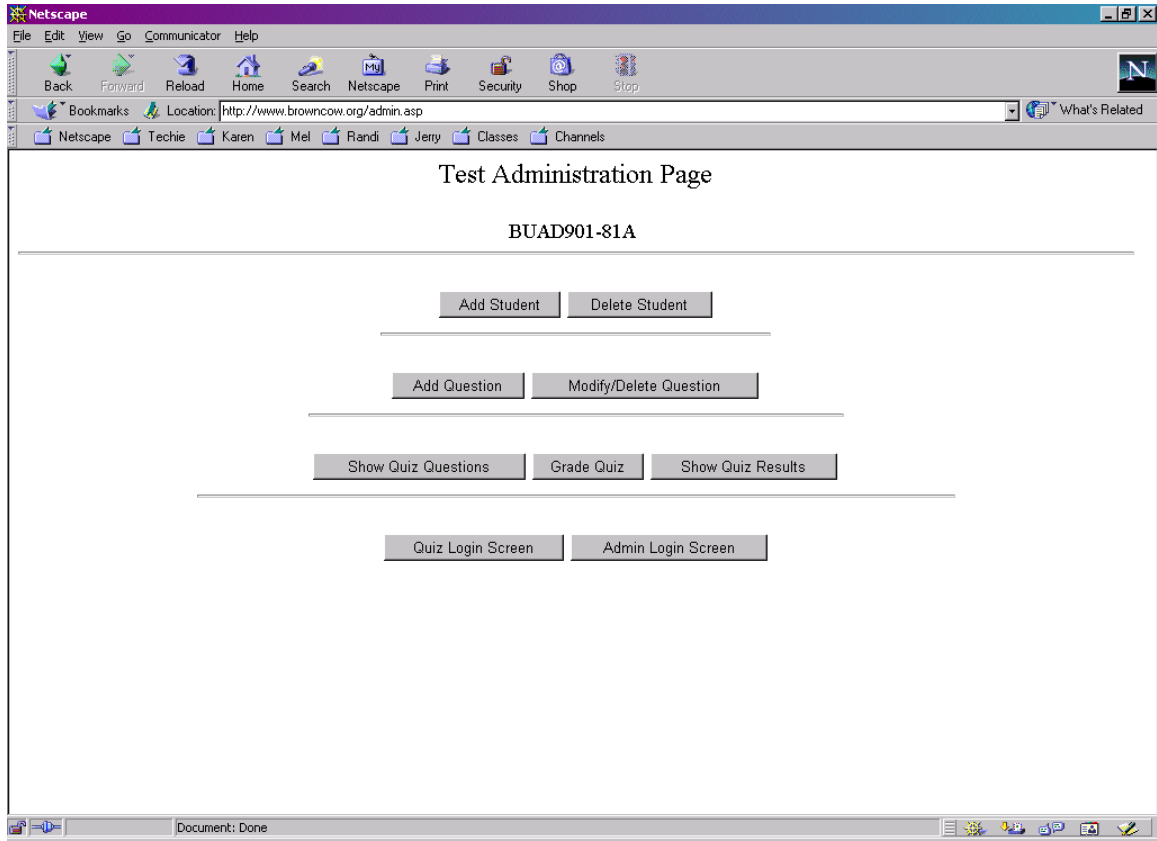
Landolt, S. C., July 1999. "On-line testing." *Credit Union Management*, 22(7), p. 66.

Lazar, J. and J. Preece, Summer 1999. "Designing and Implementing Web-Based Surveys." *Journal of Computer Information Systems*, 39(4), pp. 63-67.

test-and-train.com [www.newarttech.com/tat/about.html](http://www.newarttech.com/tat/about.html)>  
New Art Technologies, Inc., 514 Portside Dr., Edgewater, NJ 07020.

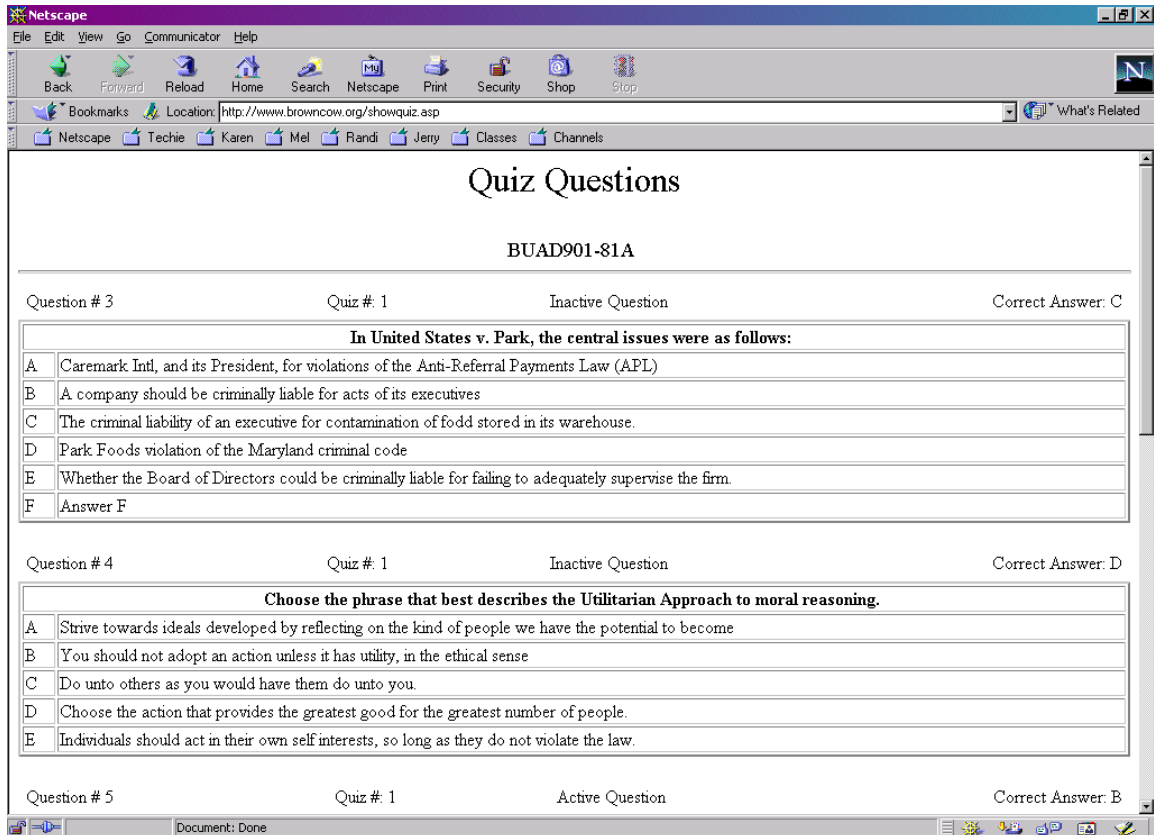
[www.blackboard.com](http://www.blackboard.com)

Zeliff, N.D., 2000. "Alternative assessment." *National Business Education Yearbook 2000*, pp. 91-102.



**Figure 1. Test Administration Options**

Figure 2. Sample Test Bank.



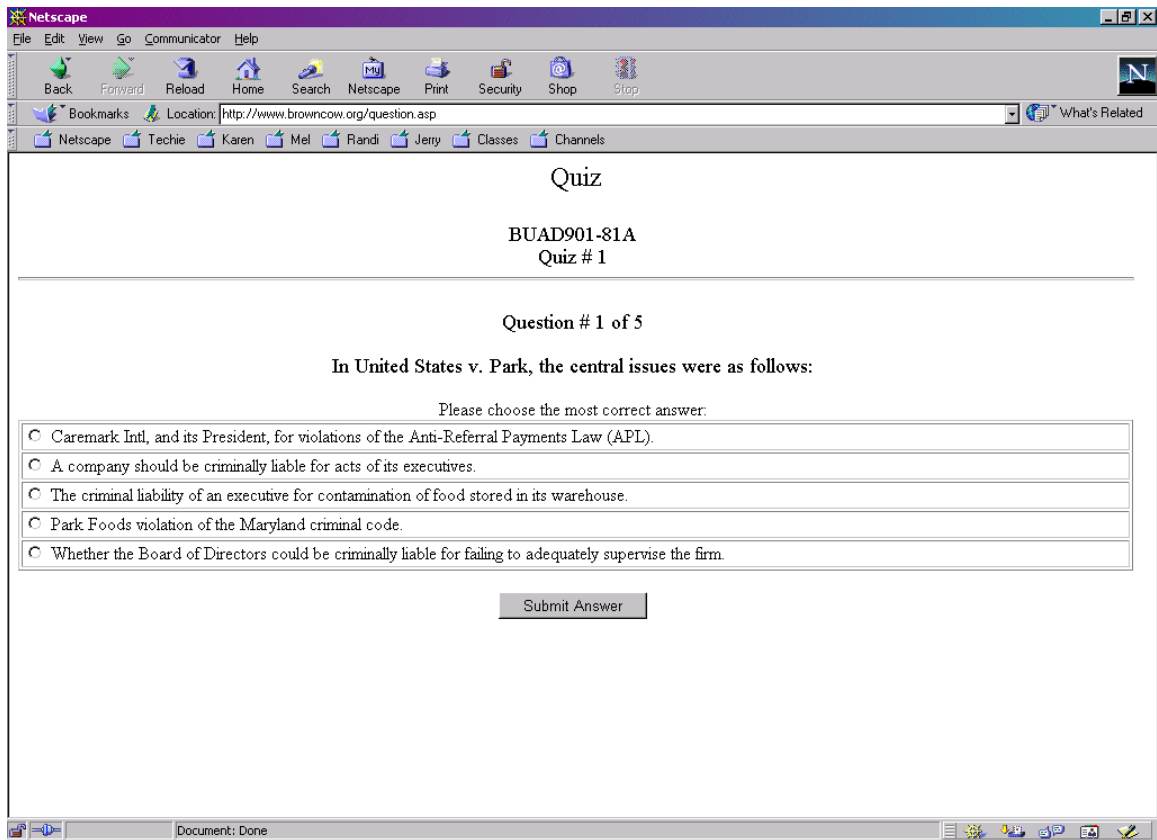


Figure 3. Sample question.