Customizable Identification Practice Using a Spreadsheet

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Abstract

This paper describes a technique for using a spreadsheet program to create an interactive study aid. This drill type of computer-aided study should be particularly convenient for improving visual identification skills. Pictures and/or text are inserted into cells while an adjacent cell is left blank so students can enter an answer. Corresponding cells containing the correct answer and a random number are hidden off screen. The program can compare the student's answers to the correct answers and display the results. When cells are sorted by the column containing random numbers, the drill can be repeated with images or questions presented in a new order. An instructor can easily construct a customized tutorial of relevant material that can be made readily available to students.

Introduction

Visual identification is a fundamental skill common to a wide range of disciplines. Recognition of plant or animal species, anatomical or morphological features, rocks or minerals, equipment or instrumentation is often an important foundation competency. Although actual specimens are better study materials, pictures sometimes represent the only available means for students to develop visual identification skills. Pictures are durable, storable, can be made readily accessible, and for some subjects, are the only practical option. Studying specimen in the field may be limited due to time, budget, and weather constraints and making review difficult (Seiler et al., 1997). Digital images displayed on a computer screen lack the resolution of photographic prints but have the advantage of being more easily stored, duplicated, and delivered for study. Computer-based display of visual images allows students convenient, individual, self-paced practice identifying any subject that can be captured as a digital image and clearly displayed on a computer screen. Bayraktar (2001) concluded that computer-assisted instruction can have a positive effect on student achievement in learning science.

Student performance is enhanced if students are given immediate feedback when learning (Khine, 1996). While some elegant, well-constructed multi media instruction programs have been created, a significant drawback to systems already created is they often do not address locally important materials or objectives. There are software tools currently available that allow teachers to produce customized tutorials but they often require a large time commitment in training and production by the instructor. In some cases the software required for students to operate the tutorials is not widely available or too expensive to maintain sufficient copies for all students. Many of the limitations of special purpose software can be overcome by adapting widely available productivity tools (Jonassen, 2000). The objective of this paper is to describe how a modern spreadsheet program can be used to quickly produce a custom 'flash card' style tutorial based on images or text.

Tutorial Description And Design

A simple, custom tutorial can be produced using Microsoft's Excel® spreadsheet software (www.microsoft.com/office/excel/default.asp). Digital images of subjects to be identified are imported into cells in the spreadsheet and the correct name of each subject entered into an adjacent cell. The students view a picture in one cell and enter their answer in an adjacent cell in the spreadsheet. By pressing the 'down arrow' key they are presented with the next image. At the end of the exercise, students can activate a macro statement that compares their answers to the correct answers in a column of hidden cells. A statement is printed next to each of their answers either confirming they have the right answer or supplying the correct identification. A second macro statement clears all answers and comments and then rerandomizes the pictures for the next practice session.

Three features in the spreadsheet software are key to the tutorial operation. An 'if - then' function permits comparisons of the student-entered answers with the correct answers. A second key feature is a function that generates random numbers that can be put into a hidden column next to each picture. When the test file is sorted by these random numbers,

pictures are presented in a new order so that students learn to identify the images by their characteristics rather than by their juxtaposition with known pictures. Another important feature is the macro function that allows the instructor to prerecord a series of operations that the student can later execute as a batch. Macro statements make checking answers and rerandomizing cells a simple 'one-click' process for the student.

The 'flashcard' exercise consists of six columns. The cells are formatted with sufficient height so that only one row would show on the screen at a time. Because screen sizes and resolution settings vary, students should be instructed to adjust their display size by entering an appropriate magnification percentage in the 'zoom' box on the toolbar. A function that generates a random number [=RAND()] is copied into the first column of every row containing a quiz item. The correct identification for each image is entered into cells in the second column. The first two columns can be set to any convenient width because once the information is entered they are formatted so they are not displayed [Format > Column > Hide].

The third column is set at a width to accommodate the images. Cells in that column can be formatted with the same color to give a consistent background around each image [Format > Cells > Patterns > Cell Shading]. Images can be in any of several popular formats (JPEG, GIF, BMP). Pictures should be cropped to an appropriate height : width ratio and inserted into cells [Insert > Picture > From File]. After insertion, images can be sized to fit the cell without distorting the proportions by stretching or pulling the image from a corner. If an image overlaps the cell border, it will not move appropriately when the table is sorted. The fourth column can be made very narrow and simply contains a number for each cell so students will know what item number they are on in the practice set. Column five is left blank for students to enter their answers. It should be formatted with a font and width so the answers will occupy one line in the cell. The final column appears blank initially and is where the correct answers appear at the conclusion of the practice session. It can be formatted with a different background color and font to clearly distinguish it from the student-entered answers.

A “the end” message can be placed in the cell immediately below the last image. The steps of checking answers and providing feedback are recorded in a single macro statement [Tools > Macro > Record New Macro]. After moving to the top of the spreadsheet, an 'If' statement that includes two possible responses is copied into each cell in the sixth column corresponding to an answer. The 'If' statement compares the student's answer in the fifth column with the correct answer in the hidden second column. When the student's answer matches the correct answer, the statement returns the correct answer (copied from column two) into column six followed by the text “is correct” (Figure 1). If the answers do not match, the statement “Wrong:” followed by the correct answer copied from column two is inserted into column six. Finally the cursor is returned to the top of the file so the student can begin reviewing each response. Execution of the macro that checks answers can be simplified for students by attaching the macro to a button. A button can be created in the cell below the student's last answer by dragging an Autoshape from the drawing toolbar into the cell and entering text into the shape to label it as the “check answers” button. By attaching the macro statement to that button, students can activate the macro by clicking the mouse when the cursor is inside the shape. Because the 'If' statement checks for an exact match, a student's answer will be marked wrong if it deviates from the correct answer in spelling or even spaces between words but the program's usefulness for identification practice is not compromised.

The first row of cells can be devoted to general instructions and a button that activates a macro statement for clearing answers and rerandomizing the images. A button labeled “Start” is inserted into the first cell of the fifth column. The macro statement attached to that button first clears the contents of the columns five and six, then selects the first three columns and sorts them by the random number in the first column, and finally returns the cursor to the cell where the student enters an answer. Because the random number function generates a new random number after every action, each sorting produces a different order of the images.

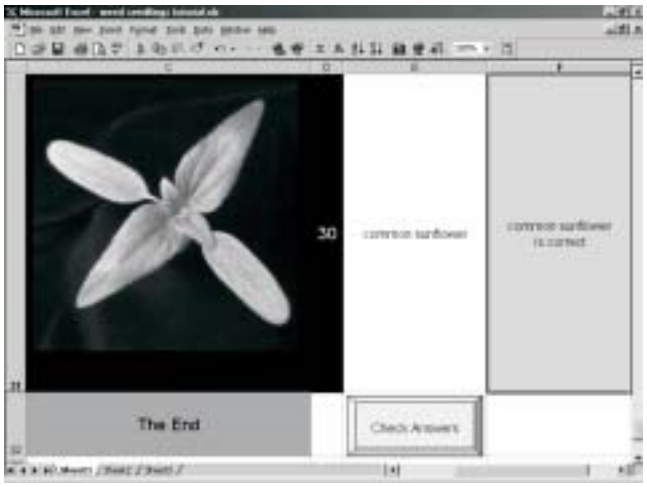

Figure 1. Screen image from a sample identification exercise following execution of the answer checking macro statement.

Summary

Common spreadsheet programs can be used to produce a custom computer-aided study tool. Once prepared, the spreadsheet file can be transferred to and used on any computer with the spreadsheet program. A viewer program that can be downloaded for free will display whatever is in the spreadsheet cells but does not run macro statements so the program would not be interactive. The spreadsheet software is easily adapted to a wide range of applications such as presenting pictures for identification, text as questions with multiple choice answers, or pictures with text questions about the pictures. The study aid is simple to produce, easily distributed, readily changed or edited, and will contain just the content the instructor wishes to include.

Literature Cited

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