

# Use of a Data Display Device in a Financial Information Systems Course

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## **BACKGROUND**

A portable lap-top computer linked to an overhead projector device offers an easy way to display computer screen output in the classroom. We have used a Data Display® at the University of the Pacific in our financial information systems course (1). Adaptors of this type use a translucent liquid crystal display and are placed atop an overhead projector. They offer the benefits of other computer output devices, and they are highly portable.

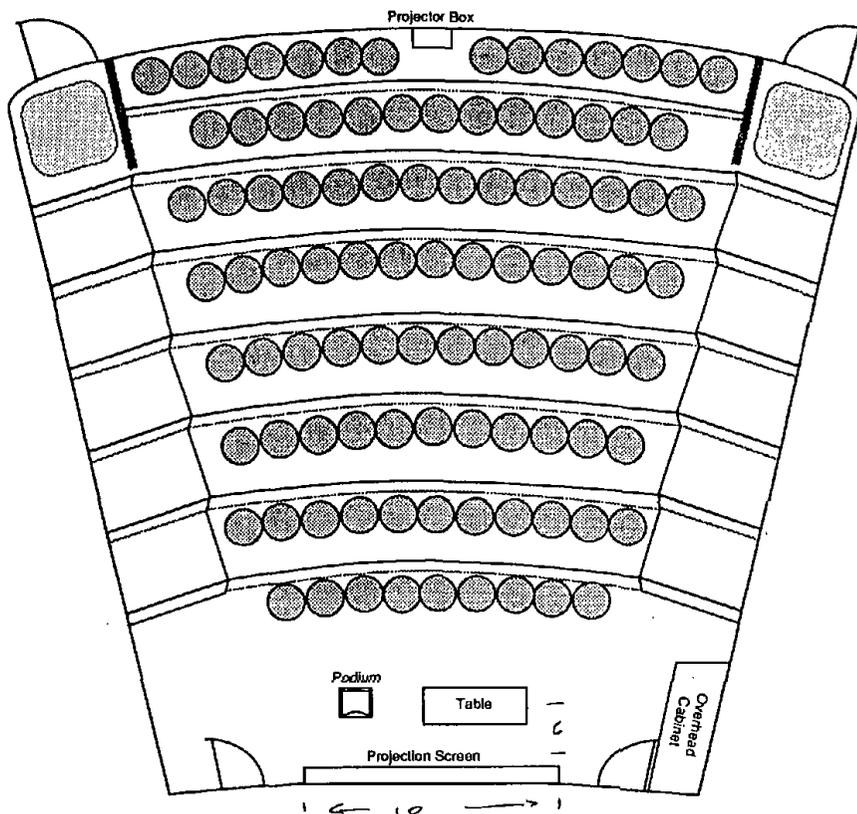
## **DEMONSTRATION PROJECT**

To evaluate the use of a data display device in a classroom setting, the author used a Toshiba® T1000 lap-top computer and a Data Display to present a unit on financial ratios (2). At the University of the Pacific's School of Pharmacy, overhead projectors are located in all classrooms. The faculty are free to use the projectors as they wish. The room in which the evaluation took place is a pie-shaped room which holds 60 students and is approximately 50' wide at its widest point and tapers to about 15' (Figure 1). Students sit in fixed chairs on raised tiers. The front row of chairs is approximately 10' from a chalkboard. A permanently mounted screen can

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FIGURE 1. Diagram of Classroom



be lowered electrically from its recession in the ceiling of the classroom. The screen control and the light controls are conveniently placed on the wall immediately to the right of the screen.

There is a 3' × 5' kitchen-height (36") table in front of the seats. This table is used to support the overhead projector and any other items, such as lecture notes or transparencies, the teacher wishes to use during the lecture. In addition, there is a 4' high moveable podium in each of the rooms.

Two different techniques were used to evaluate the application of the lap-top/overhead adaptor combination. In the first technique, an outline of the lecture was created using PCO® (v. 3.42), a text

authoring software package (3). As the discussion of ratios progressed, various levels of the outline were alternately expanded and collapsed to show the overall logic of the discussion (Figures 2a-2c), as well as the details of financial statement analysis (Figure 3).

In the second application, a template was created using Plan Perfect® (Figure 3) (4). When a discussion of the flow of information from events in the pharmacy to the financial statements was conducted, the spreadsheet displayed in Figure 3 was used. Numbers were entered in cells *B8* and *B11*, and equations in the cells that were affected by the transaction were calculated.

### **OBSERVATIONS**

The use of the lap-top/projector adaptor was an unacceptable method of displaying the text from PCO for both the instructor and the students. Because of the large number of keystrokes needed to operate the outlining program, the author was forced to be seated at the computer. As lecturing while seated was foreign to the instructor, the lap-top/projector adaptor combination was considered unacceptable.

To use the lap-top/projector adaptor combination, the instructor had to dim the room lights to a level students found unacceptable for notetaking. Although no measurements were made of the light level in the room while the devices were being used, the light level of the room was approximately the same as that of a typical display area of department stores where television sets are sold. While the instructor was presenting the material, several students raised their hands and asked that the room lights be turned up.

In an attempt to allow a higher ambient light level, the instructor moved the table described above and the projector closer to the screen. While moving the projector increased the light intensity and did not make the image too small for reading, it did result in an out-of-focus image. At the minimal focusing distance, the intensity of the image on the screen was too low for the ambient light level to permit notetaking.

In contrast to the outlining approach, the use of the lap-top/projector adaptor combination to display and manipulate the financial statement was found to be highly acceptable to both the students and the teacher. When it was used to display the effects of transac-

FIGURE 2a. Collapsed Outline

- I. Efficiency ratios
- II. Liquidity ratios
- III. Profitability ratios

FIGURE 2b. Partially Expanded Outline

- I. Efficiency ratios
  - A. Gross margin percentage
  - B. Profit percentage
- II. Liquidity ratios
  - A. Current ratio
  - B. Acid test ratio
- III. Profitability ratios
  - A. Return on investment in inventory
  - B. Return on investment in equity

FIGURE 2c. Fully Expanded Outline

- I. Efficiency ratios
  - A. Gross margin percentage
    - 1. Mathematical representation  
 $100 \times (\text{Sales} - \text{Cost of goods sold}) / \text{Sales}$
    - 2. Interpretation
  - B. Profit percentage
    - 1. Mathematical representation  
 $100 \times \text{Net profit} / \text{Sales}$
    - 2. Interpretation
- II. Liquidity ratios
  - A. Current ratio
    - 1. Mathematical representation
    - 2. Interpretation
  - B. Acid test ratio
    - 1. Mathematical representation  
 $(\text{Current assets} - \text{Inventory}) / \text{Current liabilities}$
    - 2. Interpretation
- III. Profitability ratios
  - A. Return on investment in inventory
    - 1. Mathematical representation  
 $\text{Sales} - \text{COGS} - \text{Expenses} / \text{Inventory}$
    - 2. Interpretation
  - B. Return on investment in equity
    - 1. Also called net profit:net worth
    - 2. Mathematical representation  
 $\text{Sales} - \text{COGS} - \text{Expenses} / \text{Net worth (Owners' equity)}$
    - 3. Interpretation

FIGURE 3. Plan Perfect Template Created to Show the Effects of a Sales Transaction on an Income Statement and Balance Sheet

A	B	C	D
1 Sales	300,000	Cash	10,200
2 Cost of goods sold	195,600	Inventory	25,300
3 Gross margin	104,400	Receivables	5,000
4 Expenses	93,150	Current assets ??	
5 Net profit	11,250		
6			
7			
8 Dr. Cash	1,500.00		
9 Cr. Sales		1,406.25	
10 Cr. Sales Tax/p		93.75	
11 Dr. Receivables	325.00		
12 Cr. Sales		1,406.25	
13 Cr. Sales Tax/p		20.31	

tions on the financial statements, students were able to observe the changes taking place in response to entered transactions. Moreover, the number of keystrokes needed for this particular application was minimal, so the author was free to stand by the projected image during the period of time that statements were being discussed.

The use of the lap-top/projector adaptor combination was successful for another reason: students participated in the process. During the discussion, students were free to suggest values (including negative values for sales, as might happen in a refund situation) to be entered in the various cells, and they could observe the effects of the transaction on the financial statements.

### **SUMMARY AND CONCLUSIONS**

A lap-top/projector adaptor combination was evaluated for use in two classroom lecture settings. In the first instance, the combination was evaluated in a static situation in which an outline was folded and unfolded to reveal text. In the second instance, a dynamic situation, dollar amounts were entered in transactions, and the effects of the transactions were displayed on the screen.

Observation revealed that the use of the lap-top/projector adaptor combination can be an effective method of presenting dynamic financial management information to students in a classroom setting. This combination has the advantage that it is possible and feasible to use these devices to demonstrate multiple or dynamic effects that arise from a single financial transaction. It may also be possible and feasible to demonstrate other managerial as well as clinical dynamic situations using this combination of equipment.

Anyone wishing to adopt the combination under investigation should be aware that the combination has several significant shortcomings. First, programs that require large numbers of keystrokes are difficult to use because the computer must be operated in relative darkness. Second, some types of material, particularly simple text and outlines, are inappropriate for this application.

Third, adoptors of the combination should be aware that, with the equipment available now, it will be necessary to darken the room significantly so that users can see the projected images. This need to darken the room may have been due to the particular equipment selected for the evaluation, or it may be true of projector adaptors in

general. The lack of a variety of equipment to test precluded drawing any conclusions in this regard. One of the shortcomings of the Data Display is that the electronics are embedded in the display crystal and therefore the crystal has a low index of transparency. A rough estimate of the transmission efficiency is less than 50%. Since the school purchased the Data Display in 1988, newer devices have appeared in the market which probably have somewhat higher levels of transmission than the one evaluated.

Fourth, adoptors of the lap-top/projector adaptor combinations should be aware that a number of projector adaptors are only capable of CGA (Color Graphics Adaptor—320 × 200 pixel) resolution. Because of this limitation, any attempt at enlargements of the computer image beyond about 6' × 4' will result in an indistinct image which cannot be corrected by focusing the projector. Several overhead projector adaptors now available are capable of EGA and VGA resolution (640 × 400 pixels) and may permit projection of larger images. Further, the newer technology may be capable of higher transmission efficiency and thus make lap-top/projector adaptor combinations practical solutions to displaying information during class.

In conclusion, lap-top/projector adaptor combinations are viable tools for demonstrating dynamic situations as long as the image to be projected is relatively modest in size, the number of keystrokes necessary to operate the equipment is minimal, and the audience does not need to take notes on the topic being presented. Devices with higher resolution and higher transparency indexes must be developed before the combination is viable for large groups in situations with high levels of ambient lighting. This combination is not well suited to the projection of outlines in which the levels of the outline are expanded and collapsed as the lecture proceeds.

## REFERENCES

1. Data Display® is the trademark of Computer Accessories Corporation, San Diego, CA.
2. Toshiba® is the registered trademark of Toshiba Corporation, Tokyo, Japan.
3. PCO® is a product of Brown Bag Software, Inc., San Francisco, CA.
4. Plan Perfect® is a product of WordPerfect Corporation, Orem, UT.