



A guide to building a university trading room

John C. Alexander Jr.^{a,*}, Charles C. Heck^{b,1}, Robert B. McElreath^{a,2}

^a*Department of Finance, Clemson University, 314 Surrine Hall, Clemson, SC 29634-1323, USA*

^b*Department of Classroom Technology Services, Clemson University, 314 Surrine Hall,
Clemson, SC 29634-1323, USA*

Received 1 September 2001; received in revised form 27 November 2001; accepted 7 January 2002

Abstract

Many business schools are currently considering investing in trading rooms to help educate their students relative to capital markets. This article summarizes the benefits, costs, and alternatives associated with building a financial information or trading room. The benefits include; quick and easy access to a large amount of financial data, increased exposure to real-time financial market activity, and reputational capital for the school. We discuss the current databases available, and introduce software and hardware solutions. We also provide tips on room design, how to raise money, and potential uses of the room. © 2001 Elsevier Science Inc. All rights reserved.

JEL classification: A2; C8

Keywords: Trading room; Computer software; Teaching tools; Investments; Valuation

1. Introduction

Many business schools have expressed an interest in having a “trading room” available to their students. The term “trading room” is somewhat of a misnomer, since in reality these rooms are electronic sources of financial and investment data, and no real trading takes place. The recent interest in these rooms is motivated for several reasons, including availability and accuracy of data, curriculum enhancement, and reputational capital. Offsetting these benefits, are the costs in both dollars and human resources that it will take to build the room. This article provides a discussion of the benefits, and the costs, associated with building a trading room. It also includes insights into resources available for the room,

* Corresponding author. Tel.: +1-864-656-0547; fax: +1-864-656-3748.

E-mail addresses: alexanj@clemson.edu (J.C. Alexander Jr.), chuck@clemson.edu (C.C. Heck), mcelrer@clemson.edu (R.B. McElreath).

¹ Tel.: +1-864-656-3466; fax: +1-864-656-3748.

² Tel.: +1-864-656-2249; fax: +1-864-656-3748.

and items to be considered in the design and construction of the room. In addition, it provides ideas about raising funds for the room, and potential uses of the room.

Several studies address the use of computers and/or electronic data sources in financial education. Clinebell and Clinebell (1995) and Bialaszewski, Pencek, and Zietlow (1993) use a survey approach to examine the level of computer utilization across finance courses. In contrast, Pierre (1996) and Eddy and Swanson (1995) discuss different uses of electronic data sources in financial education. Few studies discuss the available resources and considerations surrounding the construction of a trading room. This article fills that gap.

2. Benefits

Imagine you assign a project that requires your students to do a fundamental analysis of a company. A few years ago, a majority of the time a student spent on such a project would be on data collection and entry. They would go to the library, look up 5 years of financial statement data on microfiche, then transfer that data accurately into a spreadsheet so they could do the financial ratio analysis required. Hopefully, you have only asked them to analyze one company, and not have asked for an analysis of two companies within the same industry. Today, with access to the electronic databases typically found in a trading room, the students can gather 5 years of financial statement items and ratios and save it to an Excel friendly file in under 5 minutes. In the process, they can track the current level of the global financial markets, which is being posted to the data board in the room. Keeping this scenario in mind, lets formalize the benefits that a trading room can provide to students and faculty.

The benefits associated with having a trading room available within your business school are relatively obvious. First, as pointed out in the example, having electronic sources of financial data significantly reduces the amount of time that students and faculty spend collecting financial data on various companies or indexes. As anyone who has used the Internet can attest, being able to search for something electronically, rather than by hand, can save a lot of time and effort. Further, the electronic data sources used in the trading room will have a standardized format, so the mystery of where to look for specific information need only be solved once, rather than for each individual company's financial statements. So the student or faculty can spend much more time using their head to analyze, rather than their hands to collect, which is big benefit in higher learning.

Second, the accuracy of data available through these on-line financial databases may be much higher than you could get through hand collection, or from databases typically used in financial research. More specifically, the on-line databases used within a trading room are often the same data sources accessed by industry. As such, if mistakes are present in the database they are corrected very quickly, as industry notifies the databases of the errors.

Third, these databases contain a lot of information that faculty use in research. So besides the benefits relative to teaching, there can be measurable benefits relative to research. In fact, on-line databases such as Bloomberg, Bridge or Reuters may in some cases be considered competitors to databases that are typically used in financial research, such as Compustat and CRSP. Since the on-line databases update on an intraday basis, they typically have a calendar advantage over Compustat and CRSP.

Fourth, a well funded trading room can bring the activity of the financial markets into the classroom. The intervention of real world content into an academic setting helps provide a strong motivation for learning. Steaming tickers and data boards can monitor markets around the world on a real-time basis. Students can run simulated portfolios on the system. Depending on the software, the students can actually participate in simulated markets, where they can take buy or sell positions on securities held by other students trading within the room.

Finally, the trading room can give the business school a certain amount of reputational capital. In addition to enhancing the classroom experience, providing the students with training on the very same equipment they use in business can give the students a competitive advantage when it comes to placement. Further, the equipment within the trading room is often very upscale. As such, it brings a degree of technological sophistication to the school. Depending on location and design, the trading room can significantly impact the ambiance of the entire school. The high tech nature of the room, the electronic boards, and the excitement of the market, if centrally located and visible, can communicate a lot of very positive things about a business school.

3. Databases service providers

At the foundation of a trading room are the databases. In discussions of trading rooms, we hear such names as Bloomberg, Bridge, and Reuters. These are the “big names” of the stock market database industry, and they are often found in the main offices of banks, manufacturing firms, and brokerages. In discussions of these databases the primary areas of interest are; what securities are covered, the fundamental and price data available, the graphics, the news service, and the cost of the database. Even at academic rates these databases are not inexpensive.

The Bloomberg financial information service includes securities data from all global regions, including equities, indexes, fixed income, money markets, currencies, mutual funds, commodities, foreign exchange, and futures and options. Additional license fees are required to access certain indexes, such as the Lehman Brothers bond indexes. The Bloomberg platform was originally established as a fixed income product, and its reputation is particularly strong in this area. The Bloomberg service provides over 10 years of fundamental data. The database offers sophisticated analytical tools, and the Application Programming Interface (API) allows easy links to Microsoft applications such as Excel. Price data is available on a historical basis going back over 20 years, or for an extra charge, on a real-time basis. The graphics platform can display information over a variety of time periods, from intraday periods such as ticks or minutes, to longer periods such as days or years. The graphics software features a wide array of technical tools, including moving averages, oscillators, trading envelopes, and money flow. News items are provided by over 250 news services worldwide, including Bloomberg and Dow Jones, and can be accessed through advanced search techniques.

The decision to use the Bloomberg service includes both hardware and data service options. The Bloomberg financial information service requires a license for each

workstation. The industry standard for accessing the Bloomberg database relative to hardware is the Bloomberg Flatscreen. This is an Internet based system that presents information through a two-screen monitor using a customized keyboard attached to a regular computer. The annual hardware and license fee is approximately \$8,000 per year. This is about half the business subscription rate. A dedicated data circuit option is available for an additional \$6,000 annually. If the cost of the Flatscreen is too high, the next hardware option includes just the customized keyboard. The least expensive option includes no hardware at all, but simply accesses the data off your existing computer.

The Bridge Telerate Plus service covers equity, indexes, fixed income, money markets, currencies, mutual funds, commodities, energy products, foreign exchange, and futures and options. The Telerate system provides over 5 years of historical fundamnet data. The software also offers a broad array of functions, including sophisticated analytics, customized workspace, elementized data, scrolling tickers, trading alerts, and more. Price data is available on a historic basis reaching back over 20 years, and real-time data can be accessed with permission by the individual exchanges. The charting portion of the software, which is called "Athena," can plot current and historical prices over a variety of time periods, including intraday. It also features many technical tools. The News Watch feature provides advanced news search and filtering of stories from over 180 news providers including several well-known news services, such as Dow Jones, Reuters, and Bridge News.

Bridge Telerate Plus can be accessed either through the Internet or a direct line service. The price point of the Internet service starts at \$30 per month, per user. This price point Internet service does not access all the data on the Telerate Plus. To do so, you must upgrade to the Digital Subscriber Line (DSL) Internet product that has Telerate Plus access. The DSL Telerate starts at \$500 per month per user. However, the DSL service can only support three users being logged on simultaneously. As the number of seats in the trading room grows, the dedicated line service becomes an attractive alternative. The Bridge Telerate dedicated line service is priced very economically to universities, with a large portion of the charge to cover the circuit and server charges that they incur. The current rate is \$2,500 per month for up to 50 users. All users can be on the system simultaneously. Recently, Moneyline has acquired Bridge Telerate. We are unsure what impact this will have on their products and pricing.

Reuters also provides a global financial information service. As with Bloomberg and Bridge, Reuters has a lot of visibility in the applied arena. Relative to the data, the Reuters Plus service is very similar to that of Bridge or Bloomberg. The Reuters Plus Basic service covers equities, indices, commodities, options, and futures. Additional license fees are required to access currencies, treasuries, fixed income, and international exchange data. The Reuters Plus system provides fundamental data reaching back over 5 years. For an additional fee, an optional service referred to as Fundamental Briefs provides the user with over 10 years of financial statement data. The "wizard utility" allows the user to create a multitude of different personalized pages or screen layouts. Each window created on the screen can interact with any Microsoft application. The creation of the appropriate personalized pages can make the system very easy for the beginner to use.

Reuters Plus provides historical price data reaching back 20 years, and real-time for a fee. The standard Reuters graphics, referred to as UltraChart, allows you to graph daily historical data, and includes many technical tools. For an additional fee, UltraChart Plus provides

intraday data, and includes a host of other technical tools. Reuters News Window includes a host of news services, including Reuters and Dow Jones, and it can accommodate sophisticated keyword searching.

The Reuters Plus service is a Web-based system that uses existing equipment, provided it meets some minimum requirements. Besides the Web-based access, you can also get a direct feed, but this is quite expensive, and probably not an option for rooms with less than 15 seats. The Reuters Plus Basic data service has an annual license fee of \$3,540 per workstation. There are additional services available through Reuters that could increase this amount. The Reuters license fee is not an academic rate, but the same rate that businesses would pay.

Comparing the data included in the three services described above, we find a lot of overlap. In other words, a student could get all the information they would typically need on domestic equities from any one of these databases. We find that the basic service of both Bloomberg and Bridge includes some data, such as fixed income, treasuries, currencies, and international exchange data, which are only available from Reuters for an additional fee. This would need to be taken into account when doing cost comparisons. Further, if your school has a need for a specific type of data, this may influence the decision. For example, the Bloomberg platform is very strong when it comes to international data. Finally, when it comes to technical analysis available on the basic services, it appears that the Bloomberg service might offer the largest array of tools. However, additional tools can be purchased on the Reuters service for a fee, possibly giving the upgraded Reuters service the largest array of technical tools.

There are differences in how the various databases allow the student to retrieve data. For example, the Bridge system tends to be command driven, whereas the Reuters system is menu driven. The Reuters system has the wizard utility, which is a nice feature. The Bloomberg Flatscreen accesses information through a keyboard that is specific to their product. Regardless, each database has its own unique nuances in data retrieval, which may be interpreted as either strengths or weaknesses depending on the experience and preference of the end user. If the end user has no experience whatsoever, the Reuters menu driven system may be perceived as the easiest to access, with the Bloomberg Flatscreen system providing the greatest challenge due to the customized keyboard. Keep in mind, all these databases have help lines and on-sight training available.

3.1. Additional thoughts relative to databases

After selecting your database service providers, carefully consider how you will use your facility, and choose a connection method that best fits the use. As you have read, all of the information providers make data available in multiple ways, over the Internet, or dedicated telephone circuits. Some methods allow for connection to your campus network. This can make campus-wide resources available in the facility, as well as make the service available for use in lecture in properly equipped classrooms. However, there are different costs and capabilities associated with each type of connection. Long after the capital improvement part of the project is complete, the operational charges will continue and this is where careful planning may save you money.

In addition to the three databases discussed above, the trading room might be an ideal place to include access to Compustat or CRSP. These two databases contain all the historical data that is included in any of the other three databases. The downside of the Compustat or CRSP database, relative to others discussed, is that the data is not updated as frequently, and it may be more difficult to access.

Regardless of the database chosen, the help manuals continue to be a weak spot across all of them. So be prepared to write a help manual “in house” to supplement the more difficult manuals provided with the databases. We have written 10–15 page manuals for each database. These are not intended to answer all the questions, but simply get students started at retrieving very basic information. These manuals also act as a bridge to the more difficult manuals provided by the databases. As students become more familiar with the databases, we have the database help manuals available in the room.

So why do trading rooms buy licenses for multiple databases, if any of these can provide the data a typical assignment may require? Remember that one of the purposes of the trading room is to give the students a competitive advantage through knowledge of technology that is present in the workplace. From examining the database selection of companies in our area, we found that different companies select different databases. From this standpoint, it is helpful for the students to know how to retrieve data from more than one of these sources. This familiarity does come at a price since these databases are not inexpensive.

Of course to get academic rates on the databases that have them available, the school must ensure that they are not being used by professionals, or for actual trading. One way to handle this is to simply have the room monitored. As with other trading rooms that we have visited, our students must sign a logbook as they enter and leave. The room is never unattended. The logbook gives us an idea of daily activity and which classes are using the room. This information aids in scheduling the hours the room will be open.

3.2. Simulated trading software

Calling a room that can access financial databases a “trading room” may be somewhat of a reach. Granted, many of these rooms look exactly like the real thing, however, no actual trading takes place. In fact, actual trading will violate the academic license for most of these databases. Software to simulate a trading environment is available. OS Financial Trading Software (FTS) offers a Web-based system and can be accessed from any Internet site. The Web-based system has the advantage of allowing students to access the software from any Internet site, at their convenience. This eliminates the need to have a specific room or network to access the software, reducing the infrastructure required to run the software. For schools with trading rooms in place, trading simulations can be restricted by location and time period. The annual license fee is \$7,500 per institution. The number of students or professors using the system is not a factor.

The FTS software has three basic components. The first component is the simulated market/cross discovery component. This component allows the students to understand how a market works, and to place buy and sell orders and immediately see the impact on a simulated market. The second component allows the student to manage a multi-currency portfolio of stocks, bonds, and/or options using actual market prices. This component links

into a data source such as Bridge, Reuters, or the Internet for the price data. The third component is the lesson module, which includes lessons on topics such as equity and bond valuation. The software is very comprehensive, and there are probably more simulations available than the typical professor will use.

4. Hardware that provides the “Glitz and the Glitter”

To make the room look like the typical financial center or trading room, you may want to purchase electronic data boards, streaming tickers, and televisions. These not only make the setting realistic, but also typically get the attention of anyone who passes by the room. Two factors, money and wall space, will determine what you can do. LED panels are expensive, and you need to have some place to install them. Fortunately the panels are modular allowing you to install as many as you can afford, or until you run out of wall space, whichever comes first. When designing the room layout, keep in mind that you may want passers by to see your LED displays. This is the hardware that will set your facility apart from any other location on your campus.

Character cell only LED boards are the most popular and are what is installed in most locations. The Trans-Lux Data Wall is a popular example of a character cell board to display text. The costs of the Data Wall vary by size. For example, a Data Wall that is 64 characters long by 12 lines high (approximately 6 feet × 3 feet) may cost as much as \$30,000. Boards are available that allow display of text and non-text information, such as a graph of the Dow Jones Industrial average over a selected period of time. These “graphing boards” are more expensive than character cell units. A Trans-Lux Picture Wall provides this kind of flexibility. Both the Data Wall and Picture Wall can refresh with multiple pages, with each page reflecting different financial information.

If space is limited there are solutions that use plasma displays. Although not as large as the traditional LED displays, they can be set-up to display the same information. However, LED displays are preferable for text and graphics. Software is available which allows development of Web-based computer applications that “push” information to client PCs in a format that resembles the display of a typical Trans-Lux Data Wall. This could be useful for providing information in offices or other areas where developing an atmosphere might be desired.

A streaming electronic ticker, unlike the data board, displays two lines of scrolling data, with the number of characters on each line being determined by the length of the board. The streaming ticker can be programmed with information from major exchanges and internal sources, and appears very much like the streaming tickers you see at the bottom of the screens on financial television shows or Internet sights. The streaming ticker is much less expensive than the data board, with costs being up to \$15,000 each, but is a less flexible device.

Once you’ve decided on your display type and vendor, you must contact a separate company to buy the software that drives the displays. This software “sits” in between your information display and your information provider and takes the inbound data, formats it, and transmits it to your display panels. The vendors for the displays can refer you to

the software providers. The software typically involves a monthly rental fee, which varies depending on the functionality you chose to implement at your site. Once you have the equipment and software in house, if you have a good team of plant and equipment people and information system people, they may be able to get everything up and working for you. Otherwise, you will have to bear the additional costs of hiring someone from the outside.

Many trading rooms also have televisions that can access the financial news stations or run a video. As the financial news stations have become more sophisticated, practitioners are able to get a significant amount of news and information from these channels. As such, televisions are present in many actual trading rooms or stations as an additional source of current market events. Obviously, if you want to access any financial news stations you will have to get a cable signal running into the room. Further, depending on the size of the room, you may be purchasing one or two televisions along with brackets to hang them. You may want to consider televisions that have built in management functions, which allow restricting the channels to which the set can be tuned, and the maximum volume level that can be set.

5. Facility considerations

All of this has to go somewhere and you generally have two choices one is renovation, the other is new construction. Fortunately the tasks of designing the space are similar between the two options. A Trading Floor is essentially a computer lab, though it does serve a special purpose. As such, design principles used for one apply to the other. Few of us will have blank checks, so you'll be budget driven. The good news is you can spend a surprisingly modest amount, or you can spend the entire annual budget of some third world nations.

The first thing you'll need to do is decide on how the room will be used. Will it have only a few seats and be a research facility, or will it have many seats so you use it for lecture and subsequent research by your students? If your budget is somewhat limited, you may have to limit the seats in the room and you will not be able to conduct a "hands-on" class. Having purposed the space, decisions will need to be made regarding lighting and control, air conditioning, floor coverings, electrical power, furniture, workstations and so forth. If the room is meant to be a showcase facility for your college or department, keep that in mind when making decisions.

Managing ambient light is important in rooms that will rely on video projection as presentation tool for instructors. General class lighting should be directed down, with a minimum of wash on the walls. Perhaps most effective, and least costly, are florescent fixtures. You may want to consider a switching arrangement allowing the lights at the front of the room to be switched independently of those in the rest of the room. This helps control light that bleeds on to the projection screen and washes out the image. This can be accomplished with hyperbolic diffusers that are available in new fixtures or can be retrofitted to existing lights. Other options include incandescent lighting, or a combination of the two. The projection screen should be a matte white surface, not glass-beaded. If your lab will be

used for teaching, it will be useful for the trading room to have a ceiling mounted video/data projector hooked to a workstation at the instructor's lectern.

Conditioned space is critical, not only to preserve the equipment, but to maintain the professional atmosphere desired in a trading room. In the case of renovating existing space you will want to check the noise emitted by any fan coil units when running. Size the unit taking into account the equipment, number of people anticipated, and the location within the building. In order to control noise and provide a professional appearance you may wish to use carpet in your trading center instead of another floor covering. Carpet presents a couple of issues. It generates static, and housekeeping usually does not like it as a floor covering as it takes longer to clean than a tile floor. If you decide to use carpet, you may want to install an anti-static carpet.

As a general rule of thumb you can never have too much power. As you decide on workstations, display panels, video/data projectors and other equipment, have your project manager study the loads presented and recommend a configuration that satisfies your needs and meets electrical codes. If you will be locating servers in your area, specify a dedicated circuit for them, and an isolated ground is a good idea as well. Areas that are particularly lightning prone should consider a power filter or surge protector located at the service panel to protect the room. Electricians will run the conduit for the data connections for the room. The same layout used to determine power requirements will be sufficient for determining data drops as well.

Finally, you will need to purchase a printer for the room. Depending on the number of terminals you have in the room, you may want to make this a high volume printer, as students typically like to print out a lot of information whether they need it or not.

6. How and where to raise money

Building a trading room can be an expensive proposition for a school. Even if the space is available, a room with as few as ten seats can easily cost up to \$150,000, not including re-occurring annual license fees. The best tool for raising funds to build a trading room is to expose the stakeholders to an existing facility. Stakeholders could include school administrators or trustees, and executives from local companies that have a close relationship with your school. Even school library or foundation administrators may be a fertile hunting ground for funding. If a visit is not possible, you should try and obtain pictures of existing facilities, along with faculty input. A visit is the best avenue to take, as it allows a good feel for the vast amount of financial data that can be accessed, and the impact of its presentation. You can get a lot of attention when you access a data service and show a CEO the weighted average capital of their company, or the compensation his or her competitive counterpart is earning.

There are quite a few rooms across the country, easily accessible by an appointment and a short drive. We have accommodated several visits to our room by potential donors, administrators, trustees, local companies, and by colleagues from other campuses. It is our experience that once one is familiar with the potential of such a room, the funding becomes more attainable.

7. Potential uses of the trading room

A trading room provides in great resource for class projects, individual research, hands-on teaching, and trading simulations. Relative to class projects, in our corporate courses, the fundamental valuation of publicly traded companies can go into much more detail. Students can get financial statement items and ratios, and transfer the data onto a computer disk, with a few simple keystrokes. They can easily access items such as the weighted average cost of capital of a company or a company beta. This advantage allows them to spend much more time on analysis and comparisons across firms and industries, and much less time in data collection. In our investment courses, the data not only helps in valuation, but also in stock selection projects or simulations. The students can obtain the same fundamental or technical indicators that a broker could obtain. They can also set-up custom screens to rank and select securities or mutual funds prior to a more in depth analysis. In our international courses, students access a vast amount of international economic or exchange data. With respect to individual research, there is a lot of data on these database service provides that is not available on Compustat or CRSP. Much of the data that would need to be collected from proxy statements, SEC filings, or private subscription services, is available through these database providers, in a format that is standardized across companies.

As the number of seats in the trading room expands, it can go from a project or research related tool, to actually holding classes or trading simulations in the room. The energy that is created through discussing a topic, and then immediately going to a resource used by industry to examine data relative to the topic, is hard to replicate. Instead of telling the students to go look at something, you look at it with them. This really enhances the interaction and learning process. Trading simulations allow the students to better understand the dynamics associated with the market place. Although the simulation software can now allow trading simulations from different locations on campus, there is an added dimension to the simulation when all the buyers and sellers are in the same room.

8. Conclusion

We are proud to say that we were one of the first trading rooms established in our region of the country, and it has been a very positive experience. The benefits we outlined have all come to fruition. The relatively easy access to financial data, and the activity of the financial markets, has improved the quality of our instruction and the level of learning. Further, the comprehensive nature of the data, has given the faculty some fresh ideas about research. Finally, the existence of the room has given the school a certain amount of reputational capital.

The feedback from our constituents has been great. First, the students feel the knowledge of the databases available significantly enhances the class content and their learning experience, and gives them a real competitive advantage in the market place. They have a better feel for capital markets, and they have knowledge of specific tools used in industry. Second, the employers of our students feel the same way, since they typically access one or

more of the databases in their operations. Finally, our alumni are quite proud of the room, and seem to do a good job of advertising it for us. In fact, it is not unusual to have alumni and employers, regardless of academic discipline, request to visit the room while they are conducting business on campus. In summary, this was an expensive learning tool, but well worth it.

Appendix A. Address of suppliers

Mr. Marc Caccavale
Bloomberg Financial Markets
499 Park Avenue
New York, NY 10022, USA
Tel.: +1-212-893-3615
<http://www.Bloomberg.com>

Ms. Michelle Baugh
University Program Coordinator
Bridge Information Systems
717 Office Parkway
Saint Louis, MO 63141-7115, USA
Tel.: +1-800-325-3282, ext. 83489
<http://telerate.com>

OS Financial Trading System
P.O. Box 11356
Pittsburgh, PA 15238, USA
Tel.: +1-800-967-9897
fis@fisweb.com, <http://www.fisweb.com>

Mr. John Gage III
Customer Management Center
Reuters America Inc.
311 South Wacker Drive, Suite 1100
Chicago, IL 60606-6686, USA
(800) Reuters (Option 6)
<http://www.reutersplus.com>

Mr. George S. Lefkowski
Assistant Vice President, Corporate Sales
Trans-Lux Corporation
110 Richards Avenue
Norwalk, CT, USA
Tel.: +1-800-243-5544
<http://www.trans-lux.com>

References

- Bialaszewski, D., Pencek, T., & Zietlow, J. (1993). Finance requirements and computer utilization at AACSB-accredited schools. *Financial Practice and Education*, 3(2), 133–139.
- Clinebell, J. M., & Clinebell, S. K. (1995). Computer utilization in finance courses. *Financial Practice and Education*, 5(1), 132–142.
- Eddy, A. R., & Swanson, H. G. (1995). Innovation in teaching investment analysis: Integrating information sources and security valuation. *Financial Practice and Education*, 5(2), 90–98.
- Pierre, E. F. (1996). Using Bridge information systems in the classroom. *Journal of Financial Education*, 22, 79–83.