A Sales Processing Simulation Exercise And Database For The Accounting Information Systems Course

Nancy A. Bagranoff, (Email: bagranna@muohio.edu), Miami University of Ohio
James Cashell, Miami University of Ohio

Abstract

This paper presents a classroom simulation of a sales processing system, with an interactive database, that was designed to enhance the learning of several important concepts in the introductory accounting information systems course. The experience of actually participating in the business process and interacting with the database can help students achieve a better understanding of business processes, internal control concepts, data modeling, and database software. Educational research suggests that simulations are an active teaching strategy that can be effective in teaching factual course material, and that they help stimulate students interest in the classroom experience. As designed, the exercise illustrates selected system and control weaknesses that should foster critical thinking and discussion. Additionally, the database is built on the REAL model and provides students with a working example as they later learn to design and develop databases themselves.

Introduction

This paper describes a classroom simulation exercise for the introductory accounting information systems course that was designed to facilitate students' general understanding of business processes, internal controls, and database design. In this exercise, students actually participate and experience a sales processing system. In addition, students work with, observe and explore an accounting system database that illustrates the REAL model. The exercise requires only one class period, yet it provides an experiential basis that should help

students understand many of the concepts that are typically covered in an introductory accounting information systems course.

Many students in introductory accounting systems courses lack actual business experience. This makes it difficult for them to relate to and understand such concepts as business processes, data structures, and internal controls. The passive knowledge transfer type of learning stimuli provided by textbook readings and lectures alone is often insufficient to achieve the desired level of understanding of such concepts. However, combining the active, experiential learning experience provided by the simulation with lectures

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and readings, exposes students to multiple learning stimuli which should enhance the learning process.

Much has been written in recent years about the need to improve accounting education. One of the keys to accomplishing this goal is to improve the way accounting is taught. Meyers and Jones (1993) contend that education in all fields of study can be improved by incorporate multiple learning strategies into the process. They note that educational research indicates that there are a variety of ways in which people learn and that learning is an active dynamic process in which the connections are constantly changing and the structure reformatted (Meyers and Jones, 1993, p.5). As a result, they conclude that learning is probably best served by using a variety of teaching strategies, some of which should involve active learning.

There are a wide variety of teaching methods available to accounting educators. These include both passive learning strategies, such as reading and lectures, and active learning strategies, such as case solving and role-playing. Meyers and Jones (1993, p. 17) advocate the inclusion of active learning strategies in the educational process by claiming that active learning enlivens the classroom and significantly improves student thinking and learning capabilities.

In the accounting education literature, the need to incorporate multiple learning strategies into the educational process has been recognized by Bonner (1999, p. 12), wherein she notes that a variety of teaching methods are usually needed to achieve all the desired learning objectives in any given course. Additionally she posits that the potential effectiveness of a teaching method is dependent on the given learning objective and that the educational process can be improved by selecting teaching methods that are most appropriate for the specific learning objectives in a given course. To help facilitate the selection process, Bonner (1999) developed a framework

for appropriately matching learning objectives and teaching methods.

The use of classroom simulations is one active learning strategy that appears well suited for accounting education. According to Bonner's analysis (1999, pp. 26-29), watching and participating in demonstrations, such as simulations, helps describe factual information and facilitates its recall. This position is supported in the educational literature. According to Brookfield (1990, p. 115) good simulations, in contrast to reading or listening, involve the whole person; intellect, feeling, and bodily senses; so that what students learn will be experienced more deeply and remembered longer. Meyers and Jones (1993, p. 89) note that simulations help students bridge the familiar gap between theory and practice and, thus, develop their own critical abilities rather than relying solely on textbook explanations and what the experts preach.

In addition to improving the improving the educational process, simulations have the potential to stimulate students' interest in learning. According to Meyers and Jones (1993, p.89) simulations can rekindle the enthusiasm for learning that some students have lost along the way and provide a welcome relief from much of higher education's prosaic everyday pursuits.

Some previously published role-play type simulations in accounting include conflict resolution (Craig and Amernic, 1994) and cost allocation (Haskins and Crum, 1985). Both of these examples are fairly lengthy and make use of case studies. According to Bonner (1999), such lengthy role-plays involving case studies may be appropriate for teaching higher-order rules, whereas teaching students concepts and rules such as journal entries and business processes may be appropriately addressed with short, simple role-play activities.

The exercise described in this paper only requires one class period but provides a multi-stimuli exposure to several important concepts

including business processes, internal controls, and database design. The exercise involves two events in the sales process. Students assume the various business roles involved in processing sales orders and shipments. The remaining students are actively engaged by serving as either sales customers or by providing input during the actual execution of the exercise. Through this exercise, students actually experience the various stages of processing the transaction. They also witness the functioning of internal controls and the data collection, processing, and retrieval necessary to complete the transaction. Selected system and control weaknesses are embedded in the exercise to encourage discussion and foster students' critical thinking skills. In addition, during the exercise the instructor can point out features of the database structure and design to reinforce database modeling techniques and database software features.

The remainder of the paper describes the project. The next section provides a detailed description of the exercise and its specific learning objectives. Appendix A provides a complete description of the database used for the exercise, including tables, input forms, queries, and reports, and Appendix B provides the exercise transactions, along with specific teaching notes.

The Simulation Exercise

The exercise entails a sales processing system. Students are the actors and fill the roles of customers, sales clerks, credit manager and shipping clerks. The classroom is set up to illustrate the physical separation of the activities involved in processing a sale. An interactive database, that can be viewed by all students, is used to collect, process, and access the information necessary to complete the sale process. A brief overview of the sales process is as follows:

- A customer places an order with a sales clerk.
- The sales clerk reviews the customer's account to verify the customer's credit worthi-

ness. If acceptable, the clerk accepts the sales order and inputs the appropriate sales order data.

- If the sale would exceed a customer's credit limit, the credit manager is asked to approve a credit limit increase. If the increased limit is approved the sales process proceeds, otherwise it ceases.
- The shipping clerk is notified that a sales order has been approved. The clerk examines the inventory records to verify the availability of ordered items and, if available, packages and ships the merchandise. He/she then updates the accounting records.

It is recommended that this exercise be used early in the semester prior to actually covering business processes and internal controls. Through the exercise, students will naturally experience a business process, internal controls and data management. This experience should help them understand these specific concepts when they are later introduced in the course.

The remainder of this section provides a detailed description of the exercise. The next section describes the advance preparation work needed for the exercise. This is followed by a detailed description of the roles and the actual simulation exercise.

Preparing for the Exercise:

The following tasks should be completed prior to running the exercise:

- Prepare the database. An operating database including initial data is needed. Appendix A provides a full description of the database tables, queries, reports, and forms used for the exercise described in this paper. A working copy of the database with initial data, developed in *Microsoft Access*, can be downloaded from the web site www.sba.muohio.edu/bagranna.
- Become familiar with the database. This helps ensure that the database works prop-

erly during the exercise. Technology malfunctions during the exercise will draw students' attention away from the exercise learning objectives.

- Prepare a set of transactions that will achieve desired business process and internal control learning objectives. Appendix B describes the set of transactions used for the exercise described in this paper. Teaching notes are included to denote certain learning objectives that can be stressed. The transaction set for this exercise begins with transactions that allow the sales and shipping processes to take place with no problems so that students can focus on only the business process. These are then followed by transactions that illustrate specific features and/or weaknesses in the system and internal controls. The set of transactions can easily be modified to stress other learning objectives.
- Purchase the inventory items. For this exercise small candy bars are used. The quantities needed to match the data set used in this exercise are:

6 - Almond Joys
20 - Dark Chocolate Bars
10 - Krackel Bars
34 - Milk Chocolate
11 - Mr. Good Bars
0 - Reese's Peanut Butter Cups
13X - Snickers

- Prepare the classroom. It is recommended that the room be set up so that there is a physical separation of the various business processes of sales order taking, credit management, and stores and shipping. This will help students visualize the actual physical and timing difference between the various stages in the sales process. It is also necessary to use a classroom with computer projection equipment. All the students in the class should have an adequate view of the computer display so they can follow the data access, input, and processing activities that occur as the transaction progresses.

- Select students for the various roles. It is recommended that a different set of students be used for each transaction to actively involve the most students possible. For the exercise described in this paper, the identified players (students) were notified of their role just before each transaction. This was done to keep them alert to all the roles. The specific roles include customers, sales clerks, credit manager, and shipping clerks. Each of these roles is described in more detail below.

Exercise Roles

As noted above, it is recommended that exercise involve as many different students as possible. The exercise described in this paper had 25 student participants. The specific roles are as follows (with the number of players used in each role shown in parentheses):

Sales clerks (8 students)

- Takes customer's order.
- Verifies credit worthiness and requests credit limit increases when appropriate.
- Inputs sales order data.

When a customer places an order, the sales clerk opens the sales order file. Once in the sales order file, the clerk accesses the customer's record using a pull-down menu box. The clerk reviews the customer's record for credit worthiness (all sales are made on credit). Credit is approved if the sale does not cause the customer's account to exceed the customer's credit limit. If credit is approved, the clerk inputs the sales order data. If credit is not approved, the clerk asks the credit manager to consider increasing the credit limit.

Shipping clerks (8 students)

- Packages and ships merchandise to customers.

- Inputs shipment data into the database.

Once the sales order has been completed, the shipping clerk is told to process the shipment. In a real company, this could be done via e-mail or by an Open Orders Report. The shipping clerk first verifies that the proposed shipment would not exceed the credit limit. (This is a control feature that the instructor should explain. Although redundant with the sales clerk, this procedure is used to detect inappropriate credit approval by the sales clerk.) The clerk then accesses the inventory records to determine the availability of the ordered items. If available, the clerk secures, packages, and ships the ordered items. The clerk then inputs the shipment data. The database is programmed to update the inventory and customer records based on the input data.

Customers (8 students)

Customers initiate all sales transactions by placing orders with the sales clerk. They also receive goods from the shipping clerks. They do not interact with the database.

Credit Manager (1 student)

The credit manager has the authority to approve credit limit increases. When the sales clerk requests a credit limit increase, the credit manager reviews the customer's file and decides whether to increase the credit limit. If the credit manager approves the increase, the sales clerk is notified. The sales clerk then inputs the revised customer credit limit.

Running the Exercise

The classroom should be set up prior to class with a specific location for the sales clerk, shipping clerk and credit manager prior to the class. When the students arrive, the instructor briefs them on the sales process and demonstrates the database operation. The instructor should show the students all parts of the database, including

the tables, input forms, queries, and reports. This portion of the project can be used to provide specific instruction about *Microsoft Access*, if desired. For example, students are often unclear about the use of forms in databases. The exercise database shows how the forms feature is used by businesses. You can also point out other features of *Access*, such as built in input controls, table and screen design techniques, etc. The amount of time spent demonstrating the database will vary, depending on the amount of database instruction students have had previously. Once the database is shown, the instructor can assign the roles and begin the simulation exercise. The customers are each told what to order.

Appendix B provides the information for the eight sales order transactions used for the exercise described in this paper. The transaction set in Appendix B includes teaching notes. Instructors should make a copy of the transactions without the teaching notes for class distribution.

For each transaction, the customer places the sales order with the sales clerk. This order is processed completely through the system. Once the transaction is complete, the next transaction begins. The simplicity of this approach helps avoid confusion. The instructor, however, should inform the students that concurrent processing of multiple transactions is much more common.

For the first transaction, the specific clerk (corrected by the instructor as necessary) at each stage in the transaction explains the process to the class. Additionally at each step, the instructor focuses a short discussion on the specific information needs for each task and what information and files are generated by each task. For example, it is pointed out that the sales clerk needs to have access to the customer's current accounts receivable balance and credit limit. It is recommended that the first two or three transactions proceed in the above manner to help students become familiar with the process and the database.

The remaining transactions are processed in order. Most of these transactions are designed to illustrate specific system features, internal controls or internal control weaknesses. The transaction set in Appendix B involve the following:

- Sales Order #3 – The customer's credit limit is exceeded.
- Sales Order #4 – The customer orders merchandise that is out of stock.
- Sales Order #6 – Multiple orders cause a credit limit violation that is not detected because of poor system design.
- Sales Order #7 – A sales order is placed for items not carried in inventory.
- Sales Order #8 – A new customer must be added.

The instructor should encourage the class to discuss each of the above as it occurs. The discussion should focus on both how the system performed and how it might be improved. The teaching notes in Appendix B identify key discussion points.

Follow-up discussion

Once the above exercise has been completed, the instructor can ask the class what other transactions affect and are affected by the sales process. The two areas that the students should easily identify are cash receipts and inventory purchasing. Additional interrelated business processes that could be discussed are sales returns and customer complaints.

For each interrelated transaction, the class is asked what physical and information interfaces are needed between the processing systems and how these interfaces might be achieved. With respect to inventory, for example, the sales system would provide purchasing with information about inventory needs. Purchasing, in turn, would supply information about inventory orders and the inventory items as they are received.

Concluding Comments

We used this simulation exercise and database in an introductory accounting information systems course at our university. One class period was used to demonstrate the database and work through the sales process exercise. The database was then made available to the students on the school's network server. The students were able to refer to it in a later course assignment which required them to develop their own database systems using *Microsoft Access*.

The learning impact of the simulation was not formally assessed. The simulation was just one of the teaching methods used in the accounting systems course. Several other methods, including lectures and readings, were also used. As recommended by Bonner (1999), we use a variety of instructional techniques. The students appeared to enjoy the simulation experience and anecdotal reports were favorable. After teaching the same course with and without the database model, we found that the database projects completed by the students are much better since we have used this exercise and database model. Because there are so many confounding variables (e.g., instructor experience, other teaching methods, students exposure to software and computers), it was deemed impractical to attempt to measure the simulation's sole impact.

Many of the concepts taught in the introductory accounting information systems course are difficult for students who lack business work experience to grasp. Simulations can be useful in helping them to place the concepts they learn in a business environment context. The database and simulation exercise described in this paper accomplish that objective.

References

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Appendix A

The Sales Process Database

The example database supports the sales process. It includes two events: the sales order event and the shipping (sales) event. Consistent with the REAL model (Hollander, Denna, and Cherrington, 2000), the database model includes resources (inventory) and agents (sales clerk, shipping clerk, and customer).

At this point in the course, the instructor may wish to provide students with some prior instruction in *Microsoft Access*. We spend about ½ hour demonstrating the database in conjunction with the simulation exercise and then refer back to it throughout the semester. The working database presents the opportunity to demonstrate many of the software features. These include: the E-R diagram, database tables, forms, queries, reports, drop down boxes, and validation rules or internal controls. (Note: By clicking on the Tools icon in *Access*, and choosing Relationships, you can bring up an E-R diagram. You may wish to arrange it in REAL model format and show students how it parallels the models they see in their textbook or in class.)

Database Tables:

Customer Table

Customer #	Name	Address	City	State	ZIP	Credit Limit
A101	Amanda	Yellow Ln.	Charlotte	NC	7980	\$2.00
B104	Boris	Church St.	Oxford	OH	4505	\$5.00
C100	Carly	Green St.	Dayton	OH	4329	\$10.00
P202	Peggy	White Blvd.	Columbus	OH	4320	\$6.00
S200	Scott	Blue Ave.	Fairfax	VA	2203	\$1.00

Employee Table

Employee #	Name	Employee Type
A36SC	Andy	Shipping clerk
B52SP	Ben	Salesperson
C30SP	Chad	Salesperson
J22SP	Jeff	Salesperson

J23SC	John	Shipping clerk
J98SC	Justin	Shipping clerk
K25SC	Kim	Shipping clerk
K46SP	Kari	Salesperson
L24SC	Liz	Salesperson
M24SC	Matt	Shipping clerk
M24SP	Marc	Salesperson
M76SC	Mandy	Shipping clerk
T200CA	Tim	Credit Approver
V25SP	Valerie	Salesperson
W10SP	Wendy	Salesperson

Inventory Table

Item #	Description	UnitCost	Sales Price	BegQOH
1400	Snickers	\$0.20	\$0.50	13
1500	Mr. Good Bar	\$0.15	\$0.40	11
1600	Krackel	\$0.15	\$0.45	10
1700	Almond Joy	\$0.25	\$0.60	6
1800	Milk Chocolate	\$0.10	\$0.25	34
1900	Dark Chocolate	\$0.30	\$0.70	20

Sales Order Table

SO#	Customer #	Employee #	Date
1	A101	B52SP	1/1/00
2	C100	W10SP	1/6/00

Relationship Table – Sales Order/Item

SO#	Item #	Quantity
1	1700	3
2	1600	4
2	1800	8

Sales Table

Shipping Notice #	Employee #	Date	SO#	Customer #
100	M24SC	01/06/001	1	A101

Relationship Table - Sales/Item

Shipping Notice #	Item #	Quantity Shipped
100	1700	3

Database Queries:

Query for Quantity Available

Item #	BegQOH	Quantity Available
1400	13	
1500	11	
1600	10	
1700	6	3
1800	34	
1900	20	

Sales Invoice Query

Name	Date	Shipping Notice #	Item #	Quantity	Sales Price	ItemTotal
Amanda	01/06/001	100	1700	3	\$0.60	\$1.80

Database Forms:

Microsoft Access - [Order1]

File Edit View Insert Format Records Tools Window Help

Amanda's Candy Company - Sales Orders

SO# Date

Customer#

Salesperson #

Items Ordered:

Item	Quantity
Item: Almond Joy	3
* Item:	0

Record: 1 of 2

Form View

Close Form

Sales Order Form

Amanda's Candy Company - Shipments

Shipping Notice # SO#

Shipping Clerk # Date

Customer#

Items Shipped:

Item	Quantity Shipped
Almond Joy	3
* Item	0

Record: 1 of 1

Form View

Sale (Shipping) Form

Report:

Amanda's Candy Company

Sales Invoice

Name	Shipping Notice #	Date	Item	Quantity	Sales Price	ItemTotal
Amanda	100	01/06/001	1700	3	\$0.60	\$1.80
Invoice Total						\$1.80

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Ready

Sales Invoice

Appendix B**Transactions for Sales Process Role Play - Instructor Version**

See Customer, Item, and Employee tables (in Appendix A) for data concerning resources and agents.

Sales Order #1 – Amanda (Customer A101) orders 3 Almond Joy bars (Item #1700, Item Total \$1.80) from Ben (Salesperson B52SP). Ben enters the order through the Sales Order form, checking the order amount total against the customer's credit limit. The order proceeds smoothly. Matt (Shipping Clerk M24SC) checks availability by opening the Quantity Available query. Matt also checks the credit limit as he enters the shipping information in the Shipping Notice form (Shipping Notice #100). He then bags the product and gives it to the customer.

Teaching Note: Point out that maintaining the credit limit in two places is an internal control. Also explain that the requirement for the shipping clerk to check quantity available is another internal control.

Sales Order #2 – Carly (Customer C100) orders 4 Krackel bars (Item #1600, Item Total \$1.80) and 8 Milk Chocolate (Item #1800, Item Total \$2.00) from Wendy (Salesperson W10SP). Wendy enters the order through the Sales Order form, checking the order amount total against the customer's credit limit (Wendy will have to calculate the order total.) The order proceeds smoothly. John (Shipping Clerk J23SC) checks availability by opening the Quantity Available query. John also checks the credit limit as he enters the shipping information in the Shipping Notice form (Shipping Notice #200). He then bags the product and gives it to the customer.

Teaching Note: Same controls as with Sales Order #1. Ask students how this information system could be improved to handle this transaction. They should note that this system requires the salesperson to calculate the total amount of the order for comparison against the credit limit.

Sales Order #3 – Scott (Customer S200) orders 6 Milk Chocolate bars (Item #1800, Item Total \$1.50) from Chad (Salesperson C30SP). As Chad is entering the order through the Sales Order form, he finds that the amount exceeds the customer's credit limit. He asks Tim (Credit Approver T200CA) for permission to increase the limit to \$2.00. Tim agrees and Chad goes to the Customer table and changes the credit limit. He then proceeds to enter the order. Justin (Shipping clerk J98SC) checks availability by opening the Quantity Available query. Justin also checks the credit limit (now o.k.) as he enters the shipping information in the Shipping Notice form (Shipping Notice #300). Justin packages the goods and gives them to the customer.

Teaching Note: Again ask students how the database system could be improved. They should note that the credit approver's initials or signature should be required for the change in credit limit. In a better information system, the salesperson could not override the credit limit.

Sales Order #4 – Amanda (Customer A101) orders 5 Almond Joy bars (Item #1700, Item Total \$3.00) from Valerie (Salesperson V25SP). Valerie enters the order through the Sales Order form, checking the order amount total against the customer's credit limit. The order proceeds smoothly. Mandy (Shipping Clerk M76SC) checks availability by opening the Quantity Available query. Mandy finds that there are only 3 Almond Joy bars left in inventory. She completes the Shipping Notice (#400) for the 3 that are shipped. She packages the goods shipped and gives them to the customer.

Teaching Note: Ask students how the database system could be improved. They should respond that it is the salesperson who should check for quantity available at the time of the order. There also needs to be a mechanism for maintaining backorder information and alerting purchasing to place an order for more inventory.

Sales Order #5 – Peggy (Customer P202) orders 5 Mr. Good Bars (Item #1500, Item Total \$2.00) and 3 Snickers (Item #1400, Item Total \$1.50) from Marc (Salesperson M24SP). Marc enters the order through the Sales Order form, checking the order amount total against the customer's credit limit. The order proceeds smoothly. Kim (Shipping Clerk K25SC) checks availability by opening the Quantity Available query. Kim also checks the credit limit as she enters the shipping information in the Shipping Notice form (Shipping Notice #500). She packages the goods and gives them to the customer.

Teaching Note: Same controls and issues as with Sales Order #1 and #2.

Sales Order #6 – Amanda (Customer A101) orders 2 Snickers bars (\$1.00 Item Total) from Liz (Salesperson L24SC). Liz enters the order through the Sales Order form, checking the order amount total against the customer's credit limit. While there is no problem concerning the credit limit, Liz wonders if Amanda has placed any other sales orders during this period. She checks the order table and sees that there was another order. She checks the cash receipt table (not part of our database) and finds that the order has not yet been paid. Therefore, the new order will cause the customer to exceed his/her credit limit. Tim (Credit Approver T200CA) determines this customer has a poor payment record and advises Liz to cancel the order.

Teaching Note: The way the database is designed, there is no way for a salesperson to check current accounts receivable balances. Good internal control would provide a cross check of accounts receivable either prior to accepting a customer order, or before shipping the order.

Sales Order #7 – Boris (Customer B104) orders 4 Reese's Peanut Butter cups. Jeff (Salesperson J22SP) begins to enter the order in the Sales Order form and finds that we do not carry this item (although we wish we did). He apprises the customer that we do not carry the item.

Teaching Note: A good internal control in this database is the drop down listing of inventory items. The class might discuss that a company should have open communication between the sales force and the purchasing department. Requests for items not carried in stock should be forwarded to the purchasing department.

Sales Order #8 – Andrew (Customer A100) orders 12 Dark Chocolate Bars (Item #1900, Item Total \$8.40) from Kari (Salesperson K46SP). This is a new customer who must be approved for a credit limit of at least \$8.40. Tim (Credit Approver T200CA) approves the customer for a credit limit of \$10. Kari must enter the new customer in the Customer database (Gray Rd., Richmond VA 23235, limit \$10). She then enters the sales order through the Sales Order form. Andy (Shipping Clerk A36SC) checks availability by opening the Quantity Available query. Andy also checks the credit limit as he enters the shipping information in the Shipping Notice form (Shipping Notice #800). He then packages the goods and gives them to the customer.

Teaching Note: An internal control in this database is the drop down list of customers. The class can discuss the procedure for adding new customers and approving them for credit.