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The purpose of this journal is to assemble researched and documented ideas that help drive successful learning and motivate students to learn. The intention is to draw ideas from across both methods and disciplines and to create a refereed body of knowledge on innovation in business education. As a result, the primary audience includes business education faculty, curriculum directors, and practitioners who are dedicated to providing effective and exciting education.

We invite you to read about innovations published and apply in your classroom. We also encourage you to develop your original creative ideas, prepare an article, and submit for review.

This particular issue includes a number of interesting classroom innovations in diverse areas such as accounting, operations management, online demonstrations, and project teams.


Peter J. Billington  
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# Effective Strategies for Teaching Intermediate Accounting to Adult Learners

Michael S. Wilson, Metropolitan State University, Minneapolis, Minnesota

## ABSTRACT

Effective strategies for teaching intermediate accounting to adult learners at Metropolitan State University (Metro State) were identified and supported by evidence. This paper focuses on the effectiveness of a strategy that featured multiple take home exams. Evidence supports the approach is effective by comparing the performance of two adult student groups (average age of 32) during their only required intermediate accounting course. The control group was required to complete four independent in-class exams during the fall semester, while the treatment group was allowed a week to work collaboratively to complete the four exams in the spring semester. The groups were evaluated based on their performance on a 35 question comprehensive multiple choice, CPA type exam. The treatment group's average score increased by 14% suggesting the use of multiple take home exams improved the learning of adult students. An explanation for the success is discussed along with additional effective strategies.

## INTRODUCTION

Metropolitan State University (Metro State) is a public university with campus locations in Minneapolis and Saint Paul, Minnesota. There are over 9,000 students enrolled with an average student age of 32. Approximately 25% of the student body is students of color. The mission is to serve the underserved population of the Twin Cities of Minneapolis and Saint Paul and Metro State features include a diverse student body, working adults, and night courses. The majority of courses are four-credit semester courses. In designing the accounting curriculum, Metro State acknowledged the findings of the Accounting Education Change Commission (AECC) in 1992 that many students taking their first accounting course were not accounting majors. The AECC recommended, and Metro State, adopted a financial analysis approach. Consequently, the introductory financial accounting course is presented from the user's perspective – a change from the traditional approach of a preparer's orientation.

To enroll in intermediate accounting (financial reporting), students are required to complete the accounting prerequisites that include an introductory financial accounting course (ACCT 210) presented from a user's perspective, and an accounting cycle "knowledge" requirement. Since the knowledge requirement is not based on earned credits, many students enroll in intermediate accounting with limited understanding of the accounting cycle, as the knowledge requirement is difficult to enforce and relies on students to self-report their deficiencies.

Metro State recognizes intermediate accounting as Financial Reporting (ACCT 310). The course is one of the six courses that allow students to graduate with 24 upper division courses in the accounting. Other courses in the curriculum include Management Accounting (ACCT 320) and Cost Accounting (ACCT 520), Accounting Information Systems (ACCT 340), Advanced Accounting (ACCT 510), Tax (ACCT 530), and Audit (ACCT 512).

Intermediate accounting is a challenging subject for all learners. Metro State students have additional challenges because many work full-time and have limited time to prepare for the amount of content that is covered in each class. For working adults, weekly classroom sessions that last over 3 hours after a full day at work can be unproductive because of the large content, and lack of experiences that promote the transfer

of cognitive understanding. In addition, knowledge based classes may not contain the elements needed to develop critical thinking skills in students because these courses often emphasize rote knowledge (Kimmel, 1995). Many accounting programs are interested in promoting higher order thinking skills in undergraduate education, reflecting business appeals for flexible and creative employees who can look beyond the numbers (Bonk & Smith 1998).

According to Kimmel (1995), critical thinking skills promote investigating a question to arrive at a conclusion that can be convincingly justified. Skills necessary to practice accounting have been recognized as requiring the most advanced stages of intellectual development (Kimmel, 1995). Accounting academics have become increasingly concerned about the importance of supporting higher order thinking skills in undergraduate education (Bonk & Smith, 1998).

The objective of this study was to build critical thinking skills in financial reporting class through classroom lectures, exercises, and exams.

## **PREVIOUS RESEARCH**

Transfer of learning is widely considered to be a fundamental goal of education. When students cannot perform tasks only slightly different from those learned in class, or when they fail to appropriately apply their classroom learning in settings outside of school, then education is deemed to have failed. There is a long history of research literature on transfer of learning that includes many reports of failure (Mariani & Genereux, 1995).

Transfer of learning involves prior learning affecting new learning or performance. Basic elements include the learner, the instructional tasks (including learning materials and practice problems, the instructional context (the physical and social setting), the transfer task, and the transfer context. According to Marini and Genereux (1995), there are at least three major considerations in promoting the transfer of learning.

First, there is a need to consider the extent of transfer that we expect to occur. Can we expect students to transfer their learning to very different tasks and concepts, or should we only expect transfer to similar tasks and contexts. This concept is known as near or far learning. Contemporary views reflect a broad range of opinions. At one end of the spectrum are those who believe that a multitude of subareas of expertise exist, each with its own unique set of required knowledge and strategy. They argue that only a near transfer of learning is possible, where test problems closely mirror the instruction problems. At the opposite end are those that believe that there are some generally transferable items that can be taught and applied across many contexts.

Second, the question of what to teach should be considered. To promote the transfer of learning, important considerations include content knowledge, procedural knowledge, and the appropriate disposition. Content knowledge includes the basic facts, and the core concepts. Procedural knowledge includes the understanding of the steps involved in solving a problem. Various dispositions are conceivable including openness to new ideas, and the desire to perform well, for example.

Finally, the question of how we should teach should be considered. An important consideration is whether we should teach for automatic transfer or effortful processing. One can consider the choices as being between the low-road approach of extensive practice and the high road approach of deep and explicit understanding of the tasks. There are claims that the low road approach promotes the fast attainment of transfer, while the high road approach that results in slower attainment, but more extensive in nature.

Knowles (1980) developed the theory of andragogy which proposed there is an art and science of helping adults learn. Andragogy is distinguished from pedagogy, teaching children and youth. The central thesis of andragogy is that adults in crucial respects are different than young people in how they learn and a different teaching approach is needed, as a person matures (1) the self-concept moves from dependency toward self-direction, (2) the reservoir of personal experiences becomes a resource for learning, (3) the readiness to learn increasingly is oriented to social roles, and (4) the orientation towards learning moves from subject-centered to problem-centered. Amongst considerable debate, the difference as between andragogy and pedagogy was simplified as self-directed learning vs. teacher-directed learning (Davenport & Davenport, 1985).

Grow (1991) found students have varying abilities to respond to self-directed learning, and rejected the notion that adult learners should automatically be taught using self-directed strategies. By borrowing from management theories on situational leadership, Grow proposed fitting teaching strategies to stages of a learner's self-direction, with dependent learners in need of coaching with immediate feedback, drilling, and information lectures designed to overcome deficiencies. Teaching for self-directed learners should reflect the instructor as a consultant, and delegator.

Grow (1991) advocated teaching strategies for dependent adult learners of immediate application of knowledge, utilization of life experiences, and problem centered learning. As adult learners progress through their accounting education the role of the teacher can build self-directed learning by moving towards motivating, facilitating and ultimately consulting students to explore the topic through self discovery.

Kimmel (1998) developed a critical thinking framework for accounting education that included (1) an affective components representing the emotional foundation that enable critical thinking, (2) a cognitive component that details the thought process involved in critical thinking, and (3) a behavioral component that reflects the actions necessary for critical thinking. These skills were supported by the work of Block and Smith (1998) who found less successful learners failed to self-question, spent minimal time representing problems, and characterized problems by computational representations reflecting an accounting curriculum focused on correct answers to specific problems (Block & Smith, 1998).

Kimmel (1995) proposed critical thinking elements of the accounting knowledge base should be assigned to specific accounting courses. Kimmel advocated the introductory course as one to welcome divergent views, and employing precise terms. According to Kimmel (1995), the role of intermediate accounting should be (1) to build affective abilities by to approaching a problem with an open mind, tolerating ambiguity, and recognizing personal biases; (2) to build cognitive skills by defining the problem accurately through independent thought and resistance to over-generalization, and (3) to build behavioral ability by problem solving actions and applying knowledge to new situations.

## **CLASSROOM ACTIVITIES**

There were a number of andragogical features used in the study to promote critical thinking. The initial class started with a review of the conceptual framework to promote the understanding and application of principles, assumptions and constraints. Lectures were designed to provide a brief overview of the main learning objectives, followed by a short demonstration solving exercises tied to key learning objectives. An emphasis focusing on the conceptual understanding of the material was encouraged, with the use of summary pictures and graphs. Interaction with students during lectures includes probing, posing contradictory information, and encouraging students to describe their understanding. In addition thought provoking questions from real life experiences were posed at the end of the lecture to encourage student

engagement and arouse curiosity. Wedge issues were presented without clear right answers to emphasize the judgment that accountants must use. Mock debates are developed by assigning roles is used to build a sense of community and encourage participation. Short exercises are reviewed in class, in lieu of lengthy problems, to pinpoint the basic accounting knowledge.

The instructor found through survey, that a majority of students preferred instructor led illustration for solving the exercises even with solutions available to students on-line. Afterwards real life applications were used to illustrate key points. Throughout the semester periodic discussions focusing on student reflections were used to highlight learning.

Grades were based on four exams, worth 60% of the total grade, a conceptual case presentation presented in pairs worth 10%, and a comprehensive multiple choice final with 35 questions covering learning main objectives worth 20% of the final grade. Classroom participation was worth 10% of the total grade.

## STUDY DESIGN AND PARTICIPANTS

The researcher's use of a theoretical perspective as a guide during the study has an important impact on all stages of the project, from the initial design to the formulation of the question. My perspective is taken from the theoretical assumptions of a quasi-experimental design, the ideal of comparing the final exam results of a control group and a treatment group.

The two groups represented students taking intermediate accounting during the 2005-2006 academic year during the fall and spring semester. The fall semester group included 51 students who completed the course and took the final exam in two classes, one day and one night class. The spring semester group included 51 students who completed the course and took the final exam in two classes, one day and one night class also. The primary difference in the two groups was the test preparation with the fall semester group being required to take 4 exams in class independently, while the spring semester group was allowed to complete 4 take-home exams where collaboration with other students was encouraged.

## ANALYSIS

Test results indicate student performance increased on the comprehensive multiple choice exam when students were given take home exams in lieu of in-class exams over the course of the semester. Overall, it is evident that the use of take-home exams resulted in improved performance on the final comprehensive exam based on a t-Test evaluation assuming equal variances. The p-value score of .0003 indicates the results were significant at the 2.5% level. The variance of scores was significantly higher for the treatment group. This finding however is not addressed. Overall, statistical results were as follows:

### t-Test: Two-Sample Assuming Equal Variances

	<i>Control</i>	<i>Treatment</i>
Mean	16.80392	20.88235
Variance	25.56078	44.26588
Observations	51	51
Pooled Variance	34.91333	
Hypothesized Mean Difference	0	
Df	100	
t Stat	-3.48552	
P(T<=t) one-tail	0.000365	
t Critical one-tail	1.660234	
P(T<=t) two-tail	0.000731	
t Critical two-tail	1.983971	

The results were consistent with expectations. Students were given one week to complete the take home exams. The extended time frame helped students to avoid cramming. The use of take home exams also allowed more class time to discuss concepts and practice exercises, as no classroom time was used for exams, except the comprehensive in-class final. In addition take home exams allowed for more challenging exams both in length and topics. Students were encouraged to discuss the exam with their fellow students. Students with good command of the concepts often engaged struggling students. The dynamic of a student becoming teacher, and a learner hearing another perspective helped both students, which is consistent with Montessori education.

In both groups, the use of four exams over the course of the semester chunked up difficult material for easier digestion. The use of 4 exams allows students to receive more immediate feedback.

One unexpected surprise was the observation of students who were reluctant to share ideas with the entire class were more comfortable discussing their understanding with small groups, creating a more participative environment.

### **SUBSEQUENT DEVELOPMENTS**

San Francisco State University also adopted the recommendations of the Accounting Change Commission with a focus on the user approach in their introductory financial accounting course. However, they later required students to either pretest out of a one-credit remedial course or complete the class. Haung and Wright (2005) performed a study on student performance with and without the remedial course. Their findings were students who passed the pretest accounting cycle screen performed significantly better than students who failed the prerequisite or did not take the prerequisite. At Metropolitan State University the de-emphasis of the accounting cycle was recognized as having the potential for negative consequences for performance financial reporting. As a result, a one credit accounting cycle course is being negotiated to be delivered as part of the required curriculum.

Further developments after the study was completed included the requirement that students complete a quiz prior to discussion of a new topic. Students were required to complete a conceptual 10 question multiple choice to ensure students were reading the material. As a result, students were more prepared for classroom discussions and helped to engage students. The weekly quizzes also promoted conceptual understanding. Finally, the class further developed to require communication skills. On assignment requires students to make a professional oral presentation based on conceptual case studies found at the end of each chapter. These cases are presented with the purpose of helping students build their communication skills.

Plans for further development of the class include for students to consider a short accounting case, and research accounting standards to write a persuasive recommendation. In addition, short reflection papers will be collected at the class break to help identify student understanding.

### **CONCLUSIONS**

Based on the data collected, it appears offering multiple exams, and allowing exams to be collaborative problem solving exercises increased student understanding and ability to transfer learning on a challenging final exam. In addition further improvements were made with students required to complete quizzes prior to the lecture discussion. Reflection papers will help to identify difficult conceptual concepts during class, so additional time can be used to further understanding of key points.



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# Statistical Quality Control: Using M&M's® to Develop Attribute Control Charts

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## ABSTRACT

An experienced-based mini-demonstration can be used to facilitate student learning of attribute control charting. The mini-demonstration offers an inclusive, participatory experience that involves everyone in the class while effectively using minimal classroom time. The statistical quality control charting M&M's® mini-demonstration, which may be used in academic and non-academic settings, has been very well received by 808 graduate and undergraduate students at an AACSB-accredited college with 94.95% favoring the experience. The mini-demonstration, which focuses on statistical quality control tool development, may be extended to include computer integration, involves little instructor preparation, and can be used with small or large class sizes.

## INTRODUCTION AND INNOVATION

The key to motivating operations management students is to actively involve students in the learning process and to create an effective teaching approach (Krajewski, 1998). Experienced-based learning, which includes mini-demonstrations, has proven to be a very positive method to assist teaching (Brown et al., 1997, 1998; Heineke et al., 1995; Fish, 2001). Although the quality movement in the United States occurred over 25 years ago, quality management remains as an important, basic operations management concept to teach students – in the traditional academic setting and in company instructional programs. Perhaps the most famous quality demonstration, Deming's Red Bead Experiment shows the natural and special variation that exists in any process and highlights the managerial aspects to statistical quality control (Latzko & Saunders, 1995). Typical quality management controls taught in quality instruction include statistical process control charts – both variable and attribute. While the Red Bead Experiment includes the '6 willing workers', the mini-demonstration that follows offers any instructor the ability to actively involve the entire class in developing an attribute control chart and discovering natural versus special variation. This mini-demonstration can, and has been, used in academic and company-sponsored quality courses. By including everyone in the mini-demonstration, it encourages student participation and learning. Since the mini-demonstration only requires 10-15 minutes of instructional time, it gives the instructor an efficient and valuable tool for teaching statistical quality control. Fortunately, as we outline below, little instructor preparation is required and the mini-demonstration can be included in or follow the traditional lecture material. Computer quality control software, such as EXCEL or POM/QM for WINDOWS (Weiss, 2003), may be included. Fortunately, the mini-demonstration can be used with small or large class sizes.

## INITIAL INSTRUCTOR PREPARATION

Prior to using this mini-demonstration, the instructor must obtain individual bags of M&M's® – enough to cover the class size. (M&M's® is a registered trademark of Mars, Incorporated) The 2008 cost for a 13.30 ounce bag containing approximately 18 individual bags of M&M's® is roughly \$2.50. (Note, M&M's® not individually bagged may also be used; however, are not promoted here for health reasons as each student must sample the M&M's®.)

## CLASSROOM INSTRUCTION

Prior to using this mini-demonstration, classroom instruction should review the basic terminology to statistical quality control, such as statistical process control, the normal distribution ( $Z$ ), hypothesis testing, random and assignable variation, the control process, control chart limits, averages, and attribute sampling. Particular to this demonstration, the instructor should present the qualitative and quantitative concepts for a proportion defective chart (also known as a p-chart or fraction defective chart). A basic review of these concepts can be found in Principles of Operations Management by Heizer and Render (2008) or another operations management textbook.

## THE DEMONSTRATION: M&M's® & ATTRIBUTE CONTROL CHARTING

Following instructor review of the concepts, each student receives an individual bag of M&M's®. Students are instructed to randomly select 20 M&M's® and set them aside. Once each student has set their sample aside, each student is asked, "How many 'blue' M&M's® he or she has?" Note, the instructor should not ask this question until the students have sampled the bags so that the sampling process will not be tainted. The sampling procedure assumes that the blue M&M's® were defective or of a significant value to monitor. The instructor then polls each student on the number of blue M&M's® in his or her sample and records the information either on the board or in an appropriate computer program. Students may use the student worksheet (Appendix) to record the information (defects equal blue M&M's® for the purpose of this demonstration) and develop the p-chart simultaneous to the instructor. The instructor discusses the level of control that is desired for the control chart, potentially 95% confidence intervals (or  $Z = 1.96$ ). The class then proceeds to calculate the average defective and control limits for the process that produced the M&M's®. Classroom discussion on the calculations, potential computer program integration, and activity discussion as outlined below, ensues.

## ACTIVITY DISCUSSION QUESTIONS

Following the calculations for the average proportion defective ( $\bar{p}$ ), upper and lower control limits, and the control chart, the class discussion focuses on attribute statistical quality control charting and its application. Suggested questions to encourage concept development include, but are not limited to, the following:

- 1) Chart Appropriateness: How should the user decide what type of chart to utilize? What aspects is the customer interested in? What impact does this have on the type of control chart to use? These questions may lead to a discussion of the item of interest to measure. For this product, a discussion on other points of interests to the company, such as chipped M&M's®, and how to appropriately monitor them may occur.
- 2) Sample size: How does the quality manager decide on the sample size? What impact would a larger or smaller sample size have on the control chart? Students are reminded that the larger the sample size, the easier it is to detect smaller shifts in the process, and attributed-based control charts require a larger sample size than variable-based charts. What if the sample sizes were not equal, what charting technique would be appropriate? The instructor may choose to introduce a c-chart.
- 3) Number of Samples: How many samples should be included in developing the control chart? The instructor may remind students that statistically a good 'rule of thumb' is to use a minimum of 30 samples.
- 4) Confidence Levels: How does the quality manager decide what confidence level ( $Z$ -score) he or she should use? The class can discuss the fact that as  $Z$  increases, the probability of defecting a shift in the process average increases, but so does the probability of looking for a cause when the process has not actually shifted.

- 5) Current Process & Adjusting for Outliers: Is the current process in control? The response to this question will depend on the situation. What if data used to develop the control charts is defective, how should the quality manager modify the chart? A discussion on developing the chart and using defective materials in the calculations occurs. Students can visually see the change in the limits if defective samples are included in the class example, or can easily comprehend the impact if the defective data were included.
- 6) The Next Sample - Assignable versus Normal Variation: How many M&M's® would be sampled in the next sample? Twenty M&M's® were used in our example here. What would be plotted on the control chart? The fraction defective found by dividing the number of blue M&M's® by 20 (the sample size). What if the next sample is outside of the control limits? Stop the process and find the "assignable" cause of variation. What if the next sample is inside the control limits? Do not change the process. The process is acting with "normal" variation.
- 7) Strategic Implications relevant to "Blue" M&M's®: In a standard package of M&M's®, blue was the last color added. (Note tan was removed in favor of blue several years ago.) What is the proportion of 'blue' M&M's®? What is the relationship between marketing and operations with respect to this color change? The instructor can tailor the discussion to bridging the gap between customer requirements and operations capabilities.

Also, the integration of an appropriate statistical quality control computer program such as EXCEL or POM/QM for Windows (Weiss, 2003) may be integrated into the discussion.

### SUMMARIZING THE DEMONSTRATION

The instructor should complete the demonstration by summarizing the quantitative and qualitative aspects. Specifically, the instructor should remind students that attribute control charts are used to monitor attributes that are important to the customer, the sample size and confidence levels are determined by management, and defective data should not be included in developing the control chart. While the main purpose of the mini-demonstration is to develop students' understanding of statistical quality control charting, if desired, the instructor can extend the mini-demonstration toward developing a deeper understanding of natural versus special variation as extolled by Deming in the Red Bead Experiment and its impact upon managerial practices. For example, the student who has an abnormally high number of blue M&M's® may be 'yelled at' by the instructor/manager, while the student with an abnormally low number of blue M&M's® may be 'praised'.

### STUDENT FEEDBACK

Since the fall of 1994, this simple, but robust demonstration has been utilized for 831 students (543 undergraduate and 308 graduate students). As shown in Table 1, 808 students (94.95%) favor the continued utilization of the M&M statistical quality control demonstration. Only 13 students (1.53%) did not favor continued use, and 30 students (3.53%) were undecided.

**Table 1.** Do you favor the continued use of the statistical quality control charting of attribute data (M&M's®) mini-demonstrations?

	Yes		No		Undecided		Absent # students
	# students	%	# students	%	# students	%	
Undergraduate Students	519	95.6	8	1.5	16	2.9	11
Graduate Students	289	93.8	5	1.6	14	4.5	9
Total	808	94.95	13	1.53	30	3.53	20

## CONCLUSION

The M&M mini-demonstration is a simple, experiential tool that quality instructors can use to actively engage every student in the classroom. Its purpose is to develop students' understanding of statistical quality control, specifically attribute control charting and natural versus special variation. Instructors and students have found this mini-demonstration to be a valuable and worthwhile classroom experience – and a 'tasty' one too!

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**APPENDIX: STUDENT WORKSHEET: M&M RECORDING  
AND P-CHART COMPUTATIONS**

<b>Sample #</b>	<b>Number of Defective M&amp;M's (Column A)</b>	<b>Sample Size (Column B)</b>	<b>Fraction Defective per Sample (C)</b>
<b>1</b>		<b>20</b>	
<b>2</b>		<b>20</b>	
<b>3</b>		<b>20</b>	
<b>4</b>		<b>20</b>	
<b>5</b>		<b>20</b>	
<b>6</b>		<b>20</b>	
<b>7</b>		<b>20</b>	
<b>8</b>		<b>20</b>	
<b>9</b>		<b>20</b>	
<b>10</b>		<b>20</b>	
<b>...</b>		<b>...</b>	
<b>X</b>		<b>20</b>	
	Total Number of Defects = Sum of Column <b>(A)</b>	Total Number Sampled = X * n <b>= (B)</b>	

Note: X = number of students sampling bags of M&M's  
Chart may be larger for larger class sizes

*Steps:*

- 1.) Student insert the number of defective M&M's (data) into Column A
- 2.) Calculate the total number of defects by summing up Column A (A)
- 3.) Calculate the total number sampled by summing up Column B (B) or by multiplying number of students participating (X) by the sample size (demonstration = 20).
- 4.) Calculate the **p-chart computations:**

$$\text{Center line: Average proportion defective} = \bar{p} = \frac{\text{Total \# defectives}}{\text{Total \# Observations}} = \frac{\text{(A)}}{\text{(B)}}$$

$$\sigma_p = \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

$$\text{Upper Control Limit: } UCL = \bar{p} + Z \sigma_p$$

If the confidence interval is 95%, then Z = 1.96 and  $UCL = \bar{p} + 1.96 \sigma_p$

$$\text{Lower Control Limit: } LCL = \bar{p} - Z \sigma_p$$

If the confidence interval is 95%, then Z = 1.96, and  $LCL = \bar{p} - 1.96 \sigma_p$

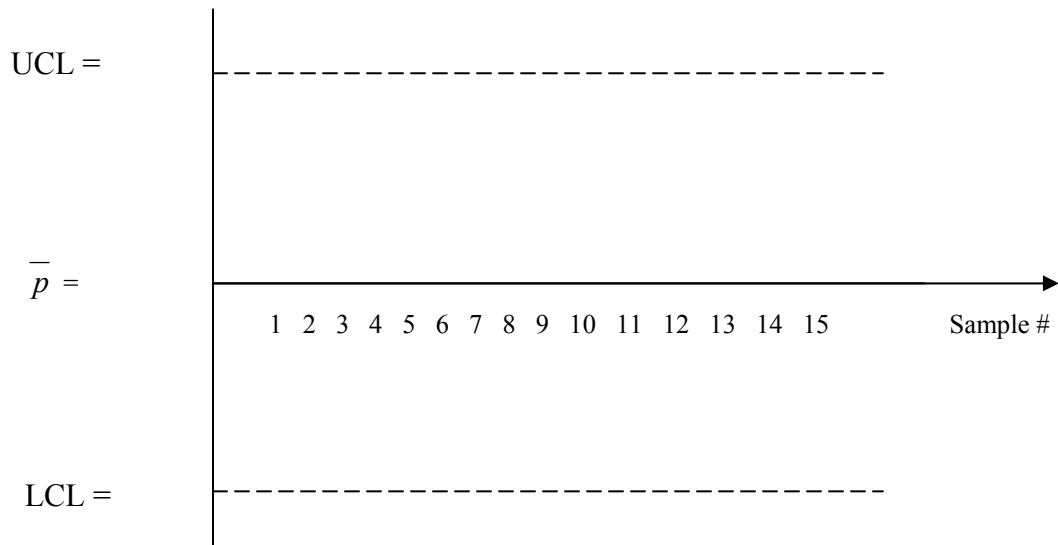
$$5.) \text{ Fraction Defective per Sample (C) = } \frac{\text{Number of Defective M\&M's (per student)}}{20}$$

6.) Develop p-chart.

a.) Insert UCL, LCL, and  $\bar{p}$  from above.

b.) Plot the fraction defective per sample (C) for each student.

**Control Chart**



**Note:** Each student represents a different sample or time that the process was sampled.

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# Course-Specific Online Demonstrations Add Layer of Richness to Instruction

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## ABSTRACT

Often students leave the classroom without grasping all the concepts presented, especially in a technical business course. When the students attempt to complete homework assignments, they need to review examples from class, but often the textbook does not have the same examples as the instructor used. Online demonstrations can be created to replicate in-class examples. This paper will describe how online demonstrations have been used in a business software course using Adobe Captivate and offer suggestions for use in other business courses.

## INTRODUCTION

In most business programs, business students are required to complete a course using Microsoft Office, frequently emphasizing Excel and Access. For the most part, students are well equipped to manipulate software. However when doing homework, they often report that they become confused as to the why and when of what to do, especially when completing calculations. The textbook helps with the overall concept, but does not help the student when confronted with a problem that is not specifically addressed in the text. To help students understand the why, when and how of multiple options, short online demonstrations can be created.

## CREATION OF COURSE-SPECIFIC DEMONSTRATIONS

Adobe Captivate, formerly Macromedia RoboDemo, is an easy to use tool to create simulations, screen captures, quizzes and podcasts. As an instructor, I've invested a significant amount of time in created hundreds of short, to the point demonstrations, and have observed student understanding and success increase as they use these demonstrations. While the instructor must consider the creation time in the process, the time is largely balanced out by the fewer number of student emails and office visits that normally occur when students cannot figure out a problem on their own.

To reduce the cost to students, I have not required students to purchase a textbook with step-by-step instructions for the Microsoft Office class for business majors. The class focuses on business uses of Excel and Access. Students do purchase a projects-only book, CaseGrader: Microsoft Office Excel2007 Casebook with AutoGrading Technology (Crews and Murphy, 2008). Demonstrations were created for all the skills of the projects to replace the explanation that is normally found in a textbook. Before introducing a concept, I worked through each in-class example and each homework problem, looking for places that students might have trouble. Each in-class example demonstration was created in its entirety to allow students to review what was done in class as well as catch up if they missed class. Originally the demonstrations were created for the completely online sections of the course and also were made available for the traditional on-ground students. Quickly I found that the traditional students used them as often as the online students. The examples have sound with verbal explanation of each step as well as textboxes with a text summary of the steps. The demonstrations are available on the course website which is linked through Blackboard for easy access by students.

Lab management software SynchronEyes (SmartSolution Technologies, 2007) is used to ensure students

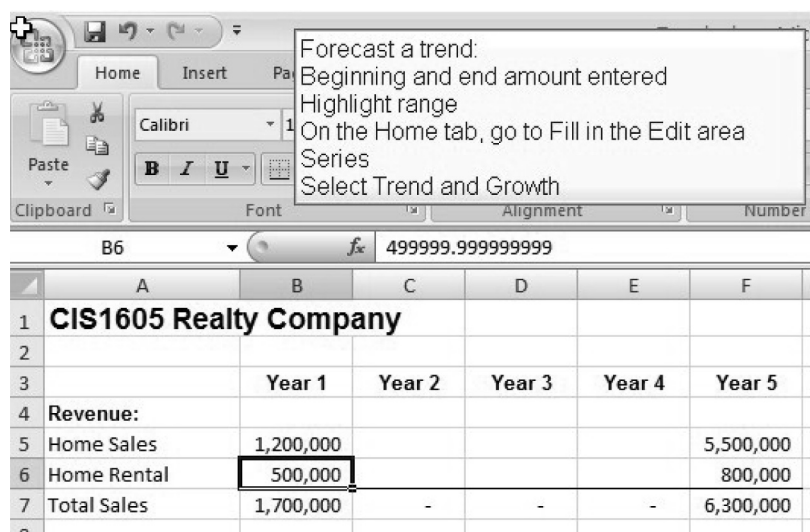


stay on task and cannot be using any software other than what the current task requires. The instructor workstation has a second monitor that displays all student computer screens to allow the instructor to pace delivery of the material. Even though students cannot do anything other than what they are directed to do and I attempt to go at a speed that accommodates most of the students, students still have trouble keeping up and/or retaining the information. The ability to go back and replay the in-class examples has been valuable to student comprehension and retention of how to do the skills and when to use various functions available in Excel and Access. An example is done in class with me demonstrating the steps while students watch, then students do the steps along with me. Later in the week, usually in the middle of the night before the assignment is due to be submitted electronically, students realize they do not remember how to do the skill. They can go to the online demonstration to refresh their memory on how to complete the task.

### STEP-BY-STEP EXAMPLE

To facilitate demonstrating how Captivate (Adobe Captivate 3, 2008) can be used to explain specific concepts, I will show screen shots of each step. This example demonstrates how to create a linear trend in Excel, a task that is not difficult but can be difficult to find. The homework requires students to “project the revenue in years 2 through 4 by interpolating the increase in revenue between Year 1 (\$3,500,000) and Year 5 (\$5,200,000), assuming a growth trend. The resulting five-year revenue projection should fill the range B7:F7 “(Crews and Murphy, 2008). The first step in creating the demonstration is to prepare the example. While one in-class example can cover several skills, it must be set up to allow each skill to be separated into an individual demonstration. Students are more likely to watch and absorb a short (less than 3 minutes), to-the-point demonstration rather than a longer one that combines several skills or tasks. Students usually have sound when using the demonstrations but sound is not available in the campus computer labs unless students bring their own headphones. To make the demonstrations work in any circumstance, an overview of what is to occur is listed in a textbox. Figure 1 shows the textbox that lists the steps that will be used in the demonstration. Students have the ability to pause the demonstration if they need more time to read the text.

Figure 1



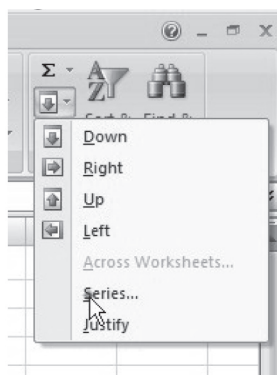
Once the overview has displayed long enough for most readers, the demonstration begins. In this example the students are shown how to set up the linear trend. Figure 2 shows how the range is highlighted. At the same time, the students hear my voice explaining what is going on and why.

**Figure 2**

	A	B	C	D	E	F
1	<b>CIS1605 Realty Company</b>					
2						
3		Year 1	Year 2	Year 3	Year 4	Year 5
4	<b>Revenue:</b>					
5	Home Sales	1,200,000				5,500,000
6	Home Rental	500,000				800,000
7	Total Sales	1,700,000	-	-	-	6,300,000
8						

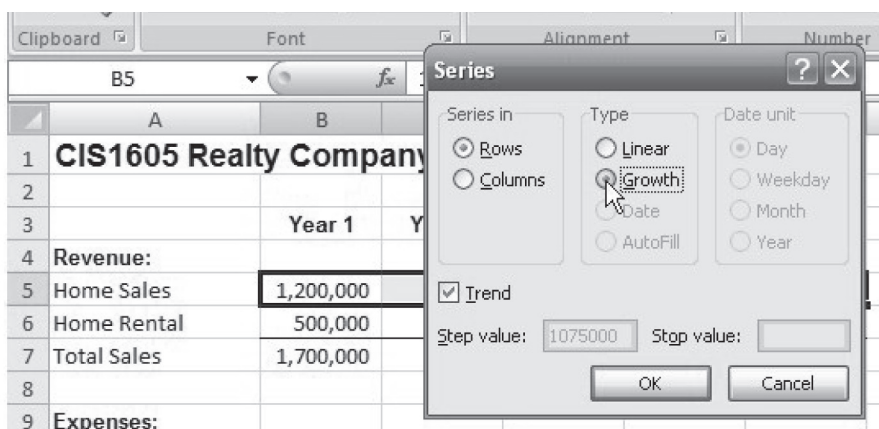
Finding *where* to do something in Excel is often harder than knowing what to do. The demonstration next shows students where to find the place to get to the trend choices. As before, the audio explanation is continuing so students can hear what to do and why to do it. Figure 3 displays what students see to guide them to the right menu option.

**Figure 3**



Once students get to the right place in Excel, they are directed what to do there. Figure 4 shows what boxes and radio buttons are selected to create a growth trend.

**Figure 4**



The last step in the demonstrations is always to show what the finished product should look like. Students must know that they have done the step correctly before they can move on to the next instruction in the homework assignment. Figure 5 not only shows the completed growth trend figures but also shows how the value in cell C5 looks when clicked on giving the students the information that the amounts often contain many decimal places even when the cell is formatted to look as a whole number.

**Figure 5**

		C5				
		fx 1755806.31587873				
	A	B	C	D	E	F
1	<b>CIS1605 Realty Company</b>					
2						
3		<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
4	<b>Revenue:</b>					
5	Home Sales	1,200,000	1,755,806	2,569,047	3,758,957	5,500,000
6	Home Rental	500,000				800,000
7	<b>Total Sales</b>	<b>1,700,000</b>	<b>1,755,806</b>	<b>2,569,047</b>	<b>3,758,957</b>	<b>6,300,000</b>
8						

### **CAPTIVATE FEATURES AND FUNCTIONS**

Adobe Captivate’s strength is in creating simulations, software demonstrations and quizzes. The creator does not need graphic design, multimedia or programming skills. Captivate’s output are Flash-based swf files which can be imbedded in Adobe PDF files, web pages, or uploaded to YouTube using the AVI format. PowerPoint slides can be imported into Captivate. Captivate contains a text-to-speech feature that allows users to click on text and hear the spoken text. Simulations and demonstrations can be customized with the learner user’s name throughout the simulation. Sound can be included with the project whether a simulation, demonstration or quiz. The sound is not difficult to record and sound editing capabilities are included in Captivate.

Interactive quizzes can be created that allow collection of mouse clicks and data entry. The results can be sent to a Learning Management System to report grades. Results can also be sent to a specified email address. The quiz feature is robust enough to allow branching based on quiz answers.

Capturing screen activity is done by opening Captivate and starting a new movie. The window or program to record from is selected, the recording is started and everything that happens within the selected window is recorded. Sound can be recorded simultaneously as the screen activity is being recorded. Any type of program can be turned into a Captivate project as long as it can be shown on the computer screen.

### **DIFFICULTY AND LEARNING CURVE**

Learning Captivate was not difficult however I am aware that I use computers and software more than most. The Adobe Captivate website has tutorials to help the new user and Captivate itself has tutorials built in. My university’s Information Technology and Instruction department holds regular classes to teach faculty and staff how to use programs such as Captivate. Educational pricing is available.

If audio is desired, a microphone must be purchased and as one would expect, the better the microphone, the better the finished result. My department purchased a microphone that was recommended by the Information Technology and Instruction department as a mid-level microphone. If I knew I was going to make so many demos, I would have requested a higher quality device. Frequently an echo can be heard in the sound even though the recording was done in a quiet room. The sound was never bad enough that the listener could not understand what was being said and I felt I had more important things to do with my time than troubleshoot and rerecord the sound. Editing the sound on one specific part of the demonstration was difficult for me and if an error was made, I often redid the entire demonstration rather than editing it.

Although it was not difficult to get started in Captivate, it was more time consuming to edit sound, especially change pause timing. Captivate provides an editor for synching sound and video but I usually found it was faster for me to start over than to edit since my movies were all very short.

Inserting slides from one movie into another was easy and something I did many times especially when I created new videos when the version of the software changed. I would start a new movie using the new Office version interface but once I got into the task, I was able to use material that I had created for the previous version since many of the actions did not change once one gets past the initial menu selection.

Because Captivate provides the ability to capture everything that is happening on the screen, I was able to go through the steps of the exercise and talk through them at the same time, just as I would do in class. The ability to go through the steps and record the audio at the same time was an enormous time savings compared to recording the keystrokes and screen captures and then recording the audio. Doing the steps separately could have created a more sophisticated result, but for my purpose of making a short demonstration to help students with a specific step in their homework, doing the steps together worked well.

## **SUGGESTIONS FOR USE**

Using online demonstrations has worked incredibly well for the business software course in which students have no trouble using the software but frequently do not understand how or why to use a specific function. A similar situation probably exists in other business courses such as statistics, economics and accounting. Students likely understand the basic mathematical principle underlying the problem but do not know when or how to apply it. Creating a short demonstration that is directly applicable to the problem and is done in the same way the instructor wants the problem to be done is valuable for both the instructor and the student. And since many of these classes are taught by adjunct faculty and graduate assistants or are taught in very large sections, having a way for students to return to the material as needed is helpful to all parties.

Business courses use varied software programs and any can be turned into a Captivate demonstration. Demonstrations of accounting software packages, production management systems, computer programming languages, statistical packages such as SAS and SPSS can be used.

Creating course-specific demonstrations that can be accessed online anytime meets the needs of our students who take classes, work and do their homework whenever they can, not at a scheduled time. My university subscribes to Atomic Learning (Atomic Learning, 2008), a product that creates similar demonstrations for many software programs, but their demonstrations are generic for the software. I direct students to the Atomic Learning website for review on how to use the software but create my own demonstrations to meet the specific needs of my course. Semester after semester students praise the demos on their course evaluations and comment that they used them and believe the availability of short, directed demos contributed to their success in the course.

## CONCLUSION

Creating course specific demonstrations using Adobe Captivate has proven to be a successful way to provide additional instructional support to students and have that support available 24/7 through the course website. Using Captivate is not so difficult as to discourage one from attempting use. This practice of creating course specific demonstrations can be used in many business course applications and would give students the additional help they need as well as freeing up instructor office hours for more complex questions than the routine ones that the demos would answer.

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# **Incorporating Industrial Kaizen Projects into Undergraduate Team-Based Business Internships**

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## **ABSTRACT**

Interdisciplinary team internships have the potential to support development of student leadership, hone teamwork skills, reinforce the application of theory, and overcome many of the limitations of traditional student projects and internships. In this article, the authors present the results of a semester-long university/industry pilot project in which a self-directed interdisciplinary teams of business interns managed and executed a Kaizen quality improvement project. For both employer and teams, the results were overwhelmingly positive. To date, recommendations made by the interdisciplinary business internship teams have reduced the operational costs of sponsoring organizations by \$500,000. Recommendations for the development and management of successful interdisciplinary team internships are presented.

## **INTRODUCTION**

As business curricula come under fire for their relevancy Bennis and O'Toole (2005) have indicated that programs are responding increasingly with renewed emphasis on "real-world" education to complement classroom learning. Individual internships and co-ops (defined later), project-based learning, and the use of student team assignments are employed often as pedagogical techniques designed to impart ideals such as (1) integration of theory with practice across different areas, (2) critical thinking, (3) teamwork, (4) leadership, and (5) professionalism. With each of these approaches, benefits accrue to student, university, and sponsor, as do also notable limitations. In this article, we describe the benefits and problems associated with the use of various alternatives of experiential learning and present the feasibility of another methodology – the interdisciplinary team internship - and its potential benefits. We describe the results of a university/industry collaboration which demonstrates the efficacy of the use of interdisciplinary internship teams to meet learning and organizational outcomes. The article concludes with lessons learned and future strategies.

Literature from the past 30 years has evinced that student internships are an important part of the job marketplace and co-curricular education. As shown by Artunian (2005), internships can provide a valuable experience for the employer and student employee. Businesses offer internships to college students for many reasons: (1) to enhance recruitment of viable employees, (2) to promote the company, (3) in particular, DeVries (2003) and Schwarz and Kalberg (2003) have indicated to reduce labor costs, (4) to fill temporary employment needs, and (5) to use the internship as a probationary/evaluation period prior to possible permanent employment. Research by Jones (2006) and Cannon and Arnold (1998) have shown students hold several reasons to seek internships: (1) to gain work experience while enhancing interpersonal, leadership, and teamwork skills, (2) to acquire specific technical skills and knowledge related to a specific profession or industry, and (3) to become more attractive to a pool of prospective employers. For some undergraduate programs Carson and Fisher (2006) have shown that a qualified internship experience is a program requirement.

There are many different types of internship programs. The traditional business internship model typically places an undergraduate business student from the junior or senior level into a business organization, government agency, or non-profit organization. Interns are selected through an organized interview process

and chosen to fill specific internship vacancies. At minimum, the student is provided with an introduction to the organization of interest. Specific tasks and goals for the internship are outlined and ratified between the intern and the organizational unit. One or more internship mentor(s) might be provided by the sponsoring organization. In some situations, interns could be assigned to an additional group project for the duration of the internship. Internships can occur during semesters, but are held more typically during the summer break between semesters. Occasionally, internships are a full semester or a semester plus summer in duration.

Rothman's (2003) research has shown complaints from students about their internship experiences can include lack of structure, lack of work or poor planning of work, lack of quality in the project, lack of clarity in communications, and lack of involvement in the larger organization. These issues seem to be consistent with prior research of Coco (2000), Henry (2002), and Rehwaldt and Vineyard (2001) which suggests that a successful business internship should (1) make supervision available, (2) provide feedback, (3) give challenging assignments, (4) provide exposure to the larger organization, and (5) establish a clear understanding of what is to be accomplished.

In the business environment of the traditional internship model, it is difficult to receive full benefit from potential intern contributions. When a student undertakes a traditional internship, the experience can be somewhat isolating. In many internship programs, the student simply performs assigned tasks and is evaluated at the conclusion of the internship. This does not take advantage of an important learning principle offered by Caine et al (2005) that "The brain/mind is social." and the fact that students learn through their experiences and relationships with others. Cooperative learning situations such as team internship experiences enable learning relationships to develop that would support cooperative learning and the sharing of ideas and knowledge.

Another form of experiential learning, although more protracted in length, is a cooperative experience (co-op). A co-op is a partnership between a university and an organization whereby the organization offers multiple periods of employment during the student intern's curriculum. This leads often to an offer of permanent placement within the organization. Cooperative educational programs are found frequently in medicine, law, sciences, and engineering, fields in which rigorous practical training is essential. One significant challenge in the design of a cooperative experience is the implementation of a curriculum which facilitates the completion of academic degrees in that students can spend up to a year away from campus. Such arrangements are conducted on an individual student basis, limiting the number of students to which an organization is exposed at any one time. The advantage of the co-op is the immersion into the workplace and continuity of employment which can facilitate the assignment of more challenging work.

For many years, faculty members have made use of class-based student teams for research projects and production of associated papers in order to encourage cooperative learning and higher-level or active learning. The underlying assumptions are that students must exercise and develop skills with regard to cooperation, team dynamics, communications, and decision-making and that the projects which can be undertaken can be more complex and larger than those completed in an individual format as suggested by McCorkle et al (1999). While collaborative learning can take place, Cox and Bobrowski (2000) and Johnson and Johnson (1990) have indicated that negative issues associated with the use of in-class groups are: (1) lack of team development, (2) perceived lack of clear project goals, (3) perceived lack of relevancy of the teamwork, (4) social loafing, and (5) relevancy and difficulty of performance evaluation.

Related to the use of in-class project teams is Project Based Learning (PBL). Students in a PBL environment deal with real-life problems, the desired outcome of which is acquisition of permanent knowledge. While there

are a variety of methods for implementation, the emphasis of all variations is on student-centered learning which is focused on a specific curricular topic or discipline. In PBL, the role of the instructor changes as s/he becomes a learning facilitator and mentor. Thomas (2000) listed major criteria to be present in order for learning to be called project-based:

- project-based learning projects are central, not peripheral to the curriculum,
- project-based learning projects are focused on questions or problems that “drive” students to encounter the central concepts and principles of a discipline,
- projects involve students in a constructive investigation,
- projects are student-driven to some significant degree.

Research by Danford (2006) has demonstrated that PBL can successfully employ projects as avenues toward learning a specific business topic within the business curriculum. Danford’s work supports prior research which suggests that student projects in a curriculum should be designed with curricular support in mind. Additionally, Laughton and Ottewill (1998) argued that the problem to be addressed by a project determines the content and direction of the curriculum that prepares students for the assignment.

Besides issues of student readiness for coping with the ambiguity and complexity of the situations which they might encounter, there are other limitations in PBL. Because projects are a mandatory part of course pedagogy, all students who are enrolled in a course must be accommodated regardless of their levels of interest. A pre-selected client or a fictitious client project means that the degree to which students and the organization exercise self-selection or direction might be restricted. While the problems which are present in projects might be interdisciplinary in nature, use of a course (in a discipline) as the anchor for the project can limit the extent to which true interdisciplinary thinking by the project participants might be exercised. The scope or complexity of the project also might be limited.

#### **INTERDISCIPLINARY TEAM-BASED INTERNSHIP MODEL**

While no single active learning method is devoid of challenges, the interdisciplinary team-based internship is another method of experiential learning added to the compendium of options and is one which holds the potential to accomplish many of the same objectives as the methods described above, yet avoid some of the pitfalls. In a team internship, a group of students, rather than a single individual, is employed for the duration of the internship period. The team of students is selected by the sponsoring organization through an interview process based on a perceived match with the project or work characteristics. The process encourages the engagement of students across disciplines. A faculty member might serve as a coordinator and consultant on the internship.

The team approach offers many potential advantages for both the student and sponsoring organization. According to Johnson and Johnson (1990), there is persuasive evidence that cooperative teams achieve at higher levels of thought and retain information longer than students who work quietly as individuals. Collaborative learning environments have been shown also to increase critical thinking. The team approach to the internship fosters cooperative and collaborative learning as individuals in the team come together to accomplish the project goals. It becomes a real-life immersion experience of not only increased knowledge, practical experience, and decision-making, but also of social and emotional learning, cooperation, and maturation as a member of a team. Not only does the organization benefit from having more minds at work on selected problems, but each team member benefits from the mutual experience of working and solving problems as a team.



One challenge associated with project teams is the selection of team members. Connerley and Mael (2001) indicate that poorer performance can result when teams are allowed to self-select their membership. In a team-based internship, team composition is determined by the sponsoring organization rather than by the students themselves. While this methodology does not guarantee a perfect match, the self-selection process may increase the motivation of team member and sponsor and eventual commitment to the project and outcomes.

A team-based internship requires that the project be defined in order to determine the skills required of team members. Because the work of the internship is structured in advance, Parker (1990) suggests the likelihood of a successful outcome is increased. This clarity of scope and purpose should increase also the perception that the work is meaningful. Rothman (2003) has demonstrated that perceptions with regard to the “challenge” present in internship work are a strong determinant of commitment to the sponsoring organization. The project format encourages some of the best aspects of PBL for student development. The active learning environment promotes critical thinking, communication skills, teamwork, leadership, and organization and manipulation of non-structured information.

From the perspective of the employing organization, the advantage of a team approach is that the team might bring to bear different perspectives to the task. Hernandez (2002) has that synergies of group brainstorming and processes of problem-solving are harnessed. Pragmatically, the team approach gives the sponsoring organization opportunity to become familiar simultaneously with several potential employees and to gain insights which might be more difficult to ascertain at the individual level. This type of collaborative effort for work and management is one of the nine needs of business in the future in the “flat world” recently described by Friedman (2006). A team internship is more efficient in that the investment cost in the design of the work has resulted in the ability to examine and utilize the energy of more than one intern. In addition, with a successful avenue of collaboration between university and internship-granting organization, Balakrishnan et al (1995) as well as Laughton & Ottewill (1998) have shown the relationship may expand to include an exchange of current practices, basic research possibilities, and applied research opportunities.

### **The Interdisciplinary Team Internship Experience**

A hallmark of effective internship placement is close communication between sponsor organizations and university programs. The internship experience which will be described was a cooperative effort between the School of Business at Truman State University and a major food manufacturer. The food manufacturer began production in 1986. Since that time, operating space in the facility has been added and remodeled, and the facility now produces a variety of high quality meat products.

The goal of the team-based internship was to conduct a pilot project to determine whether an interdisciplinary team of undergraduate business students could successfully collaborate to address and formulate action improvements for an industrial Kaizen quality improvement project within the food manufacturer’s production facility. The Kaizen philosophy can be interpreted as continuous productivity improvement throughout the organization. More specifically, Kaizen targets may be identified within an organization’s process. Success would be realized at the conclusion of the program if the team were able to make a feasible recommendation and if the recommendation, when implemented, would realize any cost savings, operations improvements, or both.

The team-based internship process entailed two phases—team building and project execution. In the team-building phase, the School of Business and the industry partner ensured the viability of the proposed

Kaizen project and the project's staffing requirements. Team formation and selection were the deliverables of this phase. In the project-execution phase, the interdisciplinary business team investigated the problem, collected and analyzed data, and formulated strategies. During the process, the partners served as mentors or consultants to the team. The deliverables for the second phase were a presentation of findings and a recommendation for continuous improvement to the management executives of the plant.

A detailed discussion of each phase follows.

### **Team-building Phase**

The first step in the processes was to determine the scope of the internship. An initial meeting was held with the manufacturer and faculty sponsor to assess the suitability of several Kaizen projects for an undergraduate business student team (see figure 1.) Key examined characteristics included: (1) size of project scope suitable for a semester effort, (2) level of project scope suitable for an undergraduate student team, (3) availability of appropriate manufacturer's staff for mentoring of the project, and (4) management approval.

The initial Kaizen project involved a focus on continuous improvement. The project scope involved learning and studying the execution of sanitation on the bacon production line. The student team was encouraged to find a way for employees to work smarter, not harder, in the sanitation area of the manufacturer's production facility in order to reduce employee work-effort waste known as Muda. To address Muda issues, the team would need to document current sanitation practices, understand the efforts, suggest changes, and project savings based on their recommendations.

The requirements for project internship team staffing are driven by the nature of the work. Staffing needs in terms of student academic major and background were determined by the industry partner. In this particular case, it was important that the student team members possess a variety of backgrounds. The anticipated consequences of the Kaizen effort would impact the organization financially and organizationally.

Recruitment of potential interns was conducted cooperatively between the School of Business and the manufacturer. An informational session was held on the School campus. Since a team-based internship was a new concept for students in the business programs, the information session was considered to be a key component for successful team recruitment and formation. The information session conveyed:

- the industry partner's local and global background information
- a description of the particular Kaizen project
- a description of the interview process to be used for team selection.

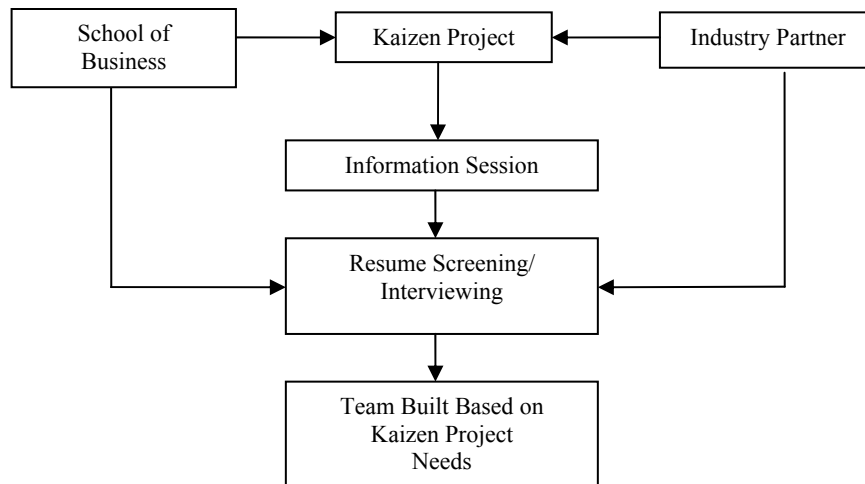


Figure 1

Following the informational session, a week’s time elapsed between the screening of résumés and the selection of student candidates for interviews. The manufacturer routinely uses behavior-based interviews in the hiring process. This process was extended to the hiring of the internship team members to ensure that each candidate would match the needs of the team. At the completion of this phase, the team was assembled and ready to begin work on the project. The team was composed of six junior- and senior-level undergraduate students representing accounting, finance, management, math, and marketing degree areas. Figure 1 outlines the Team Building Phase.

### Project Execution Phase

To initiate the Project Execution Phase, the internship team was formally introduced to company processes and to the staff and line employees (see figure 2.) The introduction session covered most of the issues to which a new employee would require orientation —access and entry process, safety, organizational hierarchy, etc. The visible effort to orient and prepare the interns for the work environment was a key element in gaining employee acceptance of the student team in the industry facility. The approach encouraged current employees to view the student internship team as a bona fide consulting group operating within the production plant.

Subsequent to the orientation session, key operational leaders and designated team mentors explained fully the needs, methods, and expectations of the Kaizen project. Actual work on the project began when the team accepted responsibility for the Kaizen project. Similar to some project-based learning implementations, the team was required to formulate its own problem-solving strategy and task assignments. A vehicle was devised for gathering the necessary data to support a potential solution. Individual team members’ schedules, obligations, and personal skill sets were considered during strategy formation.

The students devised a two-step strategy. Phase one involved direct observation of the production process. Several four-hour sanitation cycles were scrutinized in order to benchmark current processes and outcomes. Interviews were conducted which followed from questions generated out of the observation phase. Actions were evaluated, as were their associated timings in the cycle. Communication with employees and management was deemed essential to accomplish “buy-in” and to facilitate adoption of any changes which would be proposed.

For this particular project, the student team utilized root cause analysis tools and methods from quality control and management disciplines such as time/motion studies, dance charting, and “5-Why” sheets. Team members were effective at communicating specialty information from each of their expertise areas on the project. The recommendation for process improvements was made based on the data collected from the observed current sanitation practices and their analyses. The recommended solution identified shortcomings in employee training in the specific sanitation areas. It was found that additional time spent to refresh employees on the sanitation processes subsequently improved the efficiency of their work and shortened the time necessary to complete tasks effectively. Additionally, the production schedule was reconfigured to increase output productivity as a consequence of the sanitation reconfiguration.

As a requirement of the internship, the team gave a formal presentation of findings and recommendations to the executive plant management. Before the presentation took place, the team’s recommendations were vetted by the company mentors. Upon mentor approval, final recommendations were made to top-level plant management and faculty mentors.

Significant reductions in sanitation process time were achieved through the use of the team’s recommendations. As an added benefit from the team’s work, additional areas of plant improvement that could benefit from a Kaizen effort were identified for later study. Throughout the process, the team was able to rely on company mentors and the academic faculty for technical assistance. Company mentors were the primary contacts for the undergraduate team. On average, the team contacted the mentors weekly to ensure that it was on task and to answer performance-related questions. Faculty members were available on the University campus to clarify any additional questions regarding process or analysis. Figure 2 outlines the described project execution phase.

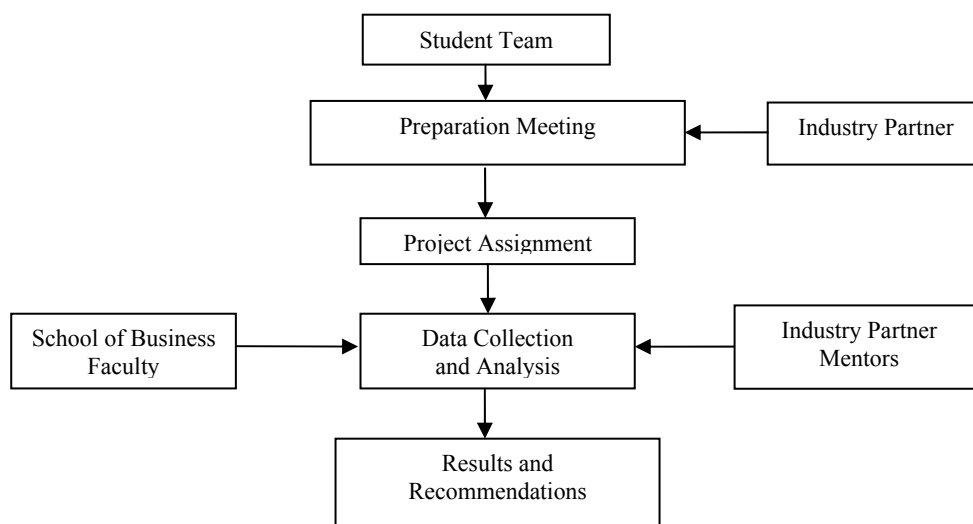


Figure 2

## EVIDENCE AND RESULTS

This section provides evidence of the success of the interdisciplinary team-based internship on student learning outcomes and organizational goals. Qualitative evidence comes from the remarks of students based on their experiences and from the sponsors themselves. Quantitative evidence comes in the form of direct cost savings to the sponsoring firm.

Reflective comments from students include the high performance expectation of the team. The Kaizen project was a serious effort with significant consequences. Additional benefits include the students' realizations that team dependence and leadership were necessary to accomplish the Kaizen project effectively and efficiently. Finally, being able to put learned tools and analytical techniques into actual practice was exceedingly beneficial. The students understood the beneficial nature of having interdisciplinary backgrounds and the experience of effectively accomplishing the Kaizen task. The collaborative efforts provided undergraduate students with real team-based experiences prior to the students' entrances into the job market with earned degrees.

From the perspective of the manufacturer, the initial project was considered to be an overwhelming success. Significant improvement in the sanitation area of the manufacturer's production facility was realized. The team's recommendations were implemented as designed. The total generated cost savings exceeded the plant management's expectations by a significant margin. The gain in output productivity amounted to an annual value of nearly \$500,000 just for this facility. The student team's recommendations were shared subsequently with other facilities of the manufacturer. These plants achieved similar successes and cost savings by employing the techniques, thus multiplying the financial success several fold. Other outcomes include the individual team member's consideration of the food industry as a potential source of employment. (A finance student on this team ultimately was employed by the manufacturer as a materials manager.)

As a consequence of the positive impact of this pilot project, the collaborative effort between the School of Business and the manufacturer has been continued with on-going successes. The employment of additional interdisciplinary teams was requested. The next project involved another Kaizen workplace improvement initiative. The Kaizen tool of "5S+1" incorporates Sort, Set in order, Shine, Standardize, Sustain, and Safety. This tool was applied to the maintenance department of the manufacturer's facility in an effort to reduce significantly its current Muda levels. By improving safety and sustainability in the workplace and by reducing Muda, corporations experience higher output rates, shorter set-up times, increased productivity, and reduction in accidents. Subsequent team-based "5S+1" projects at the manufacturer's facility are being modeled after the successful completion of that in the maintenance area.

### Reflections and Lessons Learned

Contributory elements for success include the narrowly focused nature of a Kaizen project. To be effective, the industry partner needs to craft carefully a needed and valuable project for the student team to undertake. In this case, the work scope was carefully defined in order to be completed within an eight- to ten-week interval. Consequently, the necessary business tools were identified quickly to achieve meaningful results.

It was clear that having high expectations of the team combined with the visible opportunity to achieve significant improvements in efficiency gave rise to team excitement and, hence, effective execution. Company mentors and the University faculty should expect frequent, but not excessive, team consulting time. While the students have learned the necessary tools through the business curriculum, their deployment in an ongoing concern initially might be somewhat intimidating to the team.

At completion of the Kaizen project, the students related that the interdisciplinary team aspect enabled the identification of a variety of perspectives on which to undertake and plan the analysis effort. It was noted anecdotally that students realized an increased effectiveness of communication within the team as compared to prior teams composed primarily of like majors in upper-level classes. Overall, the students experienced traditional team-formation issues but felt that they became effective quickly as a team to accomplish the analysis efficiently. A team size of six members was adequate and likely was optimal for such an undertaking. A formal interview process is vital to match the characteristics of the project to the skills and backgrounds of interns, much as a company would consider the backgrounds of its own personnel to fulfill staffing needs from within.

Promotion by the School of Business and its faculty was deemed critical to the successful recruitment of potential team candidates. Students needed to see both the legitimacy of the team proposal and the available faculty support before they would commit to the additional time and effort required for the project.

On completion, team members had achieved a sense of professional maturity. The team was faced with a real-life challenge. It devised and executed the plan. It made effective recommendations which were implemented. Successful completion of the team effort improved the students' coefficient of employability with the manufacturer and other organizations. Given the substantial financial return accrued to the industry partner, the evidence is compelling that interdisciplinary undergraduate business student team-based internships represent a viable process for businesses to consider.

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  - Innovative class activities and action-learning – games, active learning, problem based
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4. The editor will evaluate the reviews and make the final decision. There are 3 possible outcomes:
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  - o Accept with minor revisions.
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5. Reviews will be returned promptly. Our commitment is to have a decision to you in less than a month. Our goal is to do so in approximately two weeks.
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- Title centered 14 point bold. One line between title and author's name.
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- One line space to heading.
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The specific headlines will be based on the content of the paper, but major sections should at a minimum include an abstract, introduction, conclusion, and references.
- All paragraphs should be justified left and right, single space, in 10 point Times font, no indent on first line, 1 line between each heading and paragraph.
- One line between each paragraph.
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- Page numbering: start with 1, centered bottom of page.
- No headers or footers.

*Example:*

## **Evidence to Support “Sloppy Writing Leads to Sloppy Thinking”**

(14 point bold) (1 line between heading and authors)

Peter J. Billington, Colorado State University - Pueblo, Colorado, USA (10 point)

Terri Dactil, High Plains University, Alberta, Canada

(1 line between authors and abstract title)

### **ABSTRACT (10 point, bold, all capitalized, left justified)**

**(1 line)**

(text: 10 point Times font, no indent, justified, single space, 150 words maximum for the abstract) The classic phrase “sloppy writing leads to sloppy thinking” has been used by many to make writers develop structured and clear writing. However, although many people do believe this phrase, no one has yet been able to prove that, in fact, sloppy writing leads to sloppy thinking. In this paper, we study the causal relationship between sloppy writing and sloppy thinking.

(1 line)

### **INTRODUCTION (10 point, bold, all capitalized, left justified).**

**(1 line)**

The classic phrase “sloppy writing leads to sloppy thinking” has been used by many to make writers develop structured and clear writing. However, since many people do believe this phrase, no one has yet been able to prove that in fact, sloppy writing leads to sloppy thinking. Is it possible that sloppy writing is done, even with good thinking. Or perhaps excellent writing is developed, even with a sloppy thinking.

In this paper, we study the writing of 200 students that attempts to test the theory that sloppy writing leads to sloppy thinking.

### **PREVIOUS RESEARCH**

**(1 line)**

The original phrase is credited to Clon (2006), who observed sloppy writing in economics classes. Further research by Druden and Ellias (2003) showed that there was indeed sloppy writing in economics classes...

### **RESEARCH DESIGN**

**(1 line)**

Two hundred students in two business statistics sections during one semester were given assignments to write reports on statistical sampling results. The papers were graded on a “sloppiness” factor using...

**Data Collection** (Sub-heading, not all caps, 10 point, aligned left, bold, no line after to paragraph)

The two hundred students were asked to write 2 short papers during the semester...

### **CONCLUSIONS**

**(1 line)**

The statistical analysis shows that there is a strong relation between sloppy writing and sloppy thinking, however, it is not clear which causes the other...

### **REFERENCES (title 10 point, bold, align left, one line to first reference)**

**(1 line)**

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All references 8 point, indent second line 0.25 inch.