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Student Self-Efficacy and Performance in a Business Lab Classroom

Kristin Stowe*, Lisa A. Schwartz, and Michael T. Geier
Wingate University

Self-efficacy is directly related to academic success. This study asks whether completing coursework in a business computer lab classroom contributes to growth in technology self-efficacy. Pre- and post-course surveys were distributed to students in 100 (introductory)- and 400 (advanced)-level courses. Overall, students' own perception of their computer self-efficacy rose through each semester. Their perception also rose with progress through the curriculum from introductory to advanced courses. Students in 400-level advanced courses both started and ended with higher ratings of their technology self-efficacy than did students in 100-level introductory courses. Gains during the semester largely accrued to male students. Female students did not change in self-efficacy, even though their grades in the computer-intensive courses were no different from the grades of male students.

Keywords: Self-efficacy, Academic Performance, Gender Differences, Computer Labs, Business Education

Disciplines of Interest: Accounting, Economics, Finance, CIS

INTRODUCTION

“Whether you think you can, or you think you can’t—you’re right.” — Attributed to Henry Ford Business educators are forward-looking, with goals of preparing students for success not only in the current class, but in subsequent courses and then in the workforce. Students enter a class with different sets of background skills, and students with similar skills often have very different assessments of their own capabilities. Faculty may wonder whether these different self-assessments impact a student’s subsequent academic performance, and whether the self-assessments are malleable.

*(Contact author): Kristin Stowe, Wingate University, 704.233.8136, kstowe@wingate.edu.
Lisa A. Schwartz, Wingate University.
Michael T. Geier, Wingate University.

Self-efficacy has been investigated in numerous academic settings. While self-confidence is broad and is a judgement of worth, self-efficacy is specific and a judgement of capability (Valentine, DuBois, & Cooper, 2004). Self-efficacy involves “the conviction that one can successfully execute the behavior required to produce the outcome” (Bandura, 1977, p. 193). In academics, this may translate into a student’s perceived ability to solve a problem, to learn a concept, to perform well on an exam, etc. Self-efficacy expectations differ in magnitude, generality, and strength.

Self-efficacy is relevant beyond the classroom. It impacts the successful functioning of groups (Bandura, 2001) and is positively correlated with job performance and job satisfaction (Judge & Bono, 2001; Schyns & von Collani, 2002). High self-efficacy is prosocial, rather than selfish, and is characterized by cooperativeness, helpfulness, sharing, and interest in others’ welfare (Bandura, 2001).

If self-efficacy matters in the workplace, it is relevant for business students. The purpose of this study is to explore student self-efficacy as it pertains to the use of computers and other technology to solve problems. It will look for changes in self efficacy by targeting specific technology-heavy courses. This study will investigate students’ self-efficacy across the curriculum by comparing their responses in the introductory 100-level courses to their responses in the advanced 400-level courses to see if they gain self-efficacy as they progress through their studies. The paper will also measure self-efficacy changes from the beginning to the end of the semester in the individual courses. The study includes an assessment of prior experiences (e.g., previous exposure to technology) to see if these have an influence on a student’s self-efficacy. Furthermore, gender differences will be analyzed to see if males’ and females’ self-efficacy changes similarly from the beginning to the end of the semester and from introductory to advanced courses

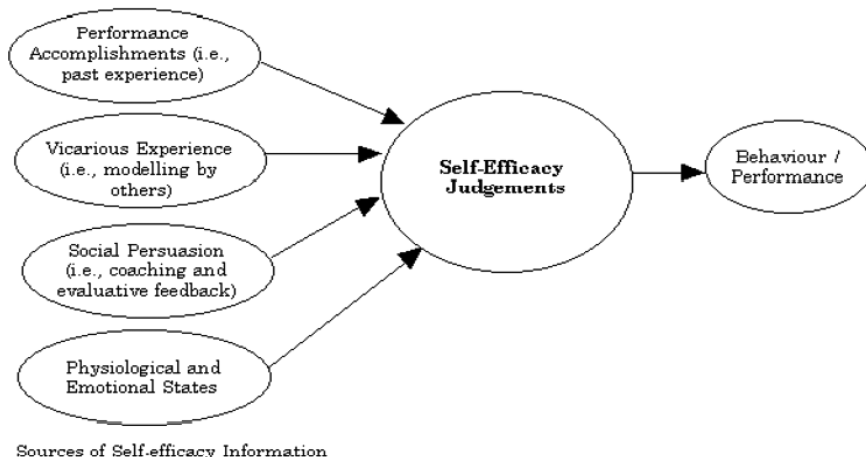
LITERATURE REVIEW

Development of Self-Efficacy

Self-efficacy is not a fixed measure (see Figure 1 for an overview of sources of self-efficacy information). Bandura’s (1977) seminal work identified four sources of self-efficacy: performance accomplishments from one’s own previous experience and performance; vicarious experience from watching other’s experiences; verbal persuasion from suggestions or exhortations by other people; and emotional arousal from one’s own emotions, including relaxation or anxiety.

Self-efficacy can be increased with direct intervention (Bresó, Schaufeli, & Salanova, 2011). Self-efficacy can also be influenced by instruction, whether the medium is face-to-face or online (Beile & Boote, 2002). Performance feedback impacts self-efficacy ratings, which impact task

Figure 1. Sources of Self-Efficacy Information (Staples, Hulland, & Higgins, 1998)



engagement and performance (Ouweneel, Schaufeli, & Le Blanc, 2013). Student self-efficacy is lower when students are told they face a difficult assignment and higher when told they face an easy assignment, even if the assignment is the same (Ackerman & DeShields, 2013). Pedagogical techniques involving collaborative learning, question and answer (Q&A) sessions and conceptual problem assignments are positively related to self-efficacy scores (Fencl & Scheel, 2005). For first-year students, both social capital and faculty mentoring contribute to self-efficacy and study success (Brouwer, et al., 2016).

Self-Efficacy and Academic Outcomes

Many studies have looked at the relationship between self-efficacy and academic outcomes. Does a student's own self-assessment impact subsequent academic performance? Does a student's self-assessment of his or her own capabilities change over time? Research indicates that academic self-efficacy and effort in school are positively related (Usher & Pajares, 2008). Efficacy expectations determine effort and persistence (Bandura, 1977). Students with low self-efficacy may struggle, as low self-efficacy generates a negative mindset in which tasks are perceived to be threats rather than challenges (Chemers, Hu, & Garcia, 2001; Yusuf, 2011). Low self-efficacy is linked with lower goals (Yusuf, 2011) and with stress and apprehension (Pajares, 2002). People avoid stressful situations that exceed their self-perceived capabilities (Bandura, 1977).

Students with high self-efficacy may fare better. Self-efficacy is positively correlated to grades, beyond the predictive value of past academic performance (Elias & MacDonald, 2007). Problem-solving self-efficacy predicts motivation and exam performance (Ramos Salazar & Hayward, 2018). Problem-solving self-efficacy and intrinsic motivation are linked to one another and to academic performance (Cassidy & Giles, 2009). Self-efficacy is a stronger predictor of grades than is stress (Zajacova, Lynch, & Espenshade, 2005).

Self-efficacy and effort are linked in the learning process (Ariani, 2016). Students with high self-efficacy take deep, strategic approaches to studying, while low self-efficacy is linked to surface studying. (Prat-Sala & Redford, 2010). Self-efficacy influences deep processing, and deep processing influences academic performance (Diseth, 2011; Fenollar, Román, & Cuestas, 2007; Phan, 2010). Critical thinking self-efficacy is a mediating variable in students' development of a self-identity as a critical thinker (Celuch, Kozlenkova, & Black, 2010). Self-efficacy may even affect curricular choices, as high self-efficacy students are better able to understand course descriptions and have more positive attitudes toward the descriptions (Lancellotti & Thomas, 2009). Students with high self-efficacy have more optimism about their future studies (Lindblom-Ylänne, Haarala-Muhonen, Postareff, & Hailikari, 2017). There may be reinforcement, as prior academic achievement predicts both self-efficacy and subsequent academic achievement (Diseth, 2011).

Self-efficacy is particularly relevant for new college students. First-year students may struggle with the transition into a college learning environment that expects initiative, self-regulation, and independence (Brinkworth, McCann, Matthews, & Nordström, 2009). Academic self-efficacy is positively related to the ease of the transition and to grades (Chemers, Hu, & Garcia, 2001; Hsieh, Sullivan, & Guerra, 2007). Self-efficacy scores in a science course were correlated with ACT scores and math background (Fencl & Scheel, 2005). Overall, self-efficacy is a stronger predictor of grade point average (GPA) for first-year students than either academic background or demographics (Zajacova et al., 2005). Self-efficacy is linked to persistence and social integration among Latino students (Torres & Solberg, 2001).

Self-Efficacy and Gender

Much research has found differences in self-efficacy by gender. In academics, differences are moderated by subject area, with meta-analysis finding females to be stronger in language arts and males to be stronger in mathematics and computing (Huang, 2013). Students tend to rate their self-efficacy higher than their actual performance on information technology skills assessment, with the self-efficacy highest among males (Kaarakainen et al., 2018). There may be no overall differences overall between male and female self-efficacy among first-year accounting students (Byrne, Flood, & Griffin, 2014),

although males tended to rate themselves higher on outcome efficacy (e.g., passing both accounting modules on the first attempt) while females tended to rate themselves higher on effort efficacy (e.g., drawing up a study plan).

Since this study focuses upon business students in a lab classroom, we explore computer self-efficacy. Female students have less computer knowledge, less prior computing experience, more anxiety about using computers, and lower computer self-efficacy (He & Freeman, 2010). Females feel less comfortable with computers (Beyer, 2008). Females are either less likely to have computer systems experience (Taylor, 2004) or equally likely (Atan et al., 2002; Venkatesh & Morris, 2000). Females have shown lower computer self-efficacy scores than males in studies over time (Karsten & Schmidt, 2008).

Perhaps society's gender expectations and perceptions of technology use are learned by individuals, who adapt behavior accordingly (Srite & Karahanna, 2006). Prior research indicates that computer work has become masculinized, like the field of mathematics (Agosto, 2004; Gilbert, Lee-Kelley & Barton, 2003), although male students may be more likely to perceive computers as a male domain than female students do (Young, 2000). Male students rate their level of confidence higher in some, but not all, computer or technology skills. These tend to be technical or more mathematical in nature. For example, confidence on using a spreadsheet differs but that of using a word processor does not differ (Shotick & Stephens, 2006).

Lack of experience is the mechanism through which there is lower aptitude and more anxiety (He & Freeman, 2010). Although computer efficacy differs, females do not underperform males in class (Ballou & Huguenard, 2008), and female computer science majors have higher computer self-efficacy than female nonmajors (Beyer, 2008).

Differing Findings on Self-Efficacy

Not all research agrees that self-efficacy is a consistent driver of student performance. Ouweneel, Schaufeli, and Le Blanc (2013) found that self-efficacy is linked to study engagement but not to GPA. Self-efficacy and exam scores were more closely linked for the first exam of a term than for subsequent exams (Ackerman & DeShields, 2013). Conversely, among first-year students, academic performance and persistence were related to self-efficacy beliefs at the end of the first semester but not at the beginning, perhaps because self-assessments for incoming students were high. (Gore, Leuwerke, & Turley, 2005).

Comparisons of studies on self-efficacy are complicated by diverse methods of measurement and categories of self-efficacy: academic, problem-solving, computer, communication, self-regulating, etc. Researchers who differentiate among the types may have varying results. For example, Choi (2005) found that neither general self-efficacy nor academic self-efficacy was a significant

predictor of grades. A study of economics students found that academic self-efficacy was a predictor of expected grade, while problem-solving self-efficacy was a predictor of actual test grade and of motivation. Neither measure of self-efficacy predicted all of the outcomes (Ramos Salazar & Hayward, 2018).

Faculty need to consider whether changes will improve learning as well as improve self-efficacy. A meta-analysis of 60 samples found that the relationship between self-beliefs and academic achievement was significant but not large, after controlling for initial achievement. Those research results did not justify interventions solely for the sake of self-efficacy improvements (Valentine, et al., 2004).

METHODS

This study specifically investigates links between student self-efficacy concerning computer-based learning, grades, and gender. Unlike some other studies, individual students were surveyed at two different times during the semester to provide a before-and-after comparison. Because of this, students had time to build skills. Also, the study examined student groups at two different points in the curriculum, using 100-level and 400-level classes. The students were engaged in a computer lab rather than a traditional classroom. The outcome measured was actual course grade rather than student projections of grade.

Sample

This was a cross-sectional study utilizing a convenience sample. The data was collected at a small private university, located in the southeastern United States, from spring 2018 through fall 2019. The classes were two types in the School of Business, a 100-level course (Excel business applications) and three 400-level course (all finance). The classes had the selection criterion of being held in a controlled computer lab, which consists of 28 computers that are utilized only for courses. Active learning is utilized, as students are engaged throughout every class meeting by working on assignments using Excel and other business applications; for example, Capital IQ and Morningstar are used in advanced finance courses.

Participants

Students were asked to complete two surveys, one at the beginning of the semester and one at the end of the semester. A total of 184 students completed both surveys. Students were informed that completion of the survey had no impact on course grades. Students could leave any number of questions blank with no penalty. Records with missing survey data were removed from the

data set, as recommended by Sekaran and Bougie (2011), leading to a final sample of $N=163$. The overall response rate was 66 percent, which was determined using $N=163$ and 246 potential participants. The student class standings were 39.09 percent freshmen (first year), 20.03 percent sophomore (second year), 11.00 percent junior (third year), and 28.08 percent senior (final year). The sample consisted of 68.01 percent males, which is typical at this business school. All students were in the traditional 18- to 23-year-old range. This is not necessarily limiting, as Staddon (2020) found there is no difference in attitudes regarding technology between mature and nonmature students, despite different usage rates. Older students use technology less for personal purposes than do younger students, although the use of technology for academic purposes is similar.

Data Collection Procedure

The data was collected using paper surveys during class time, administered by the instructor. The first survey was administered at the beginning of the semester (week 1 or 2). The second survey was administered at the end of the semester (week 15 or 16). Both surveys consisted of the same measures, and the order in which the measures were presented remained the same across all participants. This enables comparisons before and after the course. The surveys were distributed at the beginning of class with no specific time limit to ensure students did not feel rushed. Students took about 20 minutes to complete each survey. The survey included an informed consent, a question about if students had taken a previous technology class, a question on how friends rate their technology skills, and a generalized self-efficacy survey. Names were recorded to match self-assessments. The grades were obtained from the course instructor, with necessary permission. Course grades were on a plus and minus grading system and were coded accordingly (see Table 1).

Measures

Self-Efficacy

The general self-efficacy scale consists of 10 items (Schwarzer & Jerusalem, 1995), and nine were used. Sample items include “I can always manage to solve difficult problems if I try hard enough,” and “I can usually handle whatever comes my way.” The item “If someone opposes me, I can find the means and ways to get what I want” was omitted, as it did not apply to this study. For the assessment, participants were asked to rate how true each statement was using a 4-point Likert scale from 1 (“not at all true”) to 4 (“exactly true”). Each respondent’s answers were aggregated to create a self-efficacy score. Cronbach’s alpha at the beginning of the semester was 0.82, and at the end of the semester it was 0.83. The overall Cronbach’s alpha was 0.88, as reported in Table 2.

Table 1. Coding of the Grades

Grade	Code
A	12
A-	11
B+	10
B	9
B-	8
C+	7
C	6
C-	5
D+	4
D	3
D-	2
F	1

Technology

Four technology-related variables were assessed. Based on the nature of the variables, there was one question per variable. Students were asked “Have you taken a class focused upon technology before?” The possible responses were “yes” or “no.” Another question was “How do your friends describe your technology skills?” Participants were asked to rate the question using the following 5-point Likert scale: 1 (“beginner”), 2 (“elementary”), 3 (“intermediate”), 4 (“proficient”), or 5 (“advanced”). Students were asked to “Rate your familiarity with technology.” Participants were asked to rate the statement based on their familiarity using a 5-point Likert scale from 1 (“not at all familiar”) to 5 (“extremely familiar”). To assess previous exposure, students were asked “Do you think your previous exposure to technology prepared you well for this class?” Participants were asked to rate their agreement with the question using a 5-point Likert scale from 1 (“strongly disagree”) to 5 (“strongly agree”).

Control Variables

Based on prior literature, the control variables were student class standing, gender, and course level. Student class standings were coded as 1=*freshmen*, 2=*sophomore*, 3=*junior*, and 4=*senior*. Gender and the class level (i.e., 100-level and 400-level) were dummy coded.

Analyses

All data analyses were performed in IBM SPSS Statistics 24. Descriptive statistics were calculated and included means, standard deviations, correlations

Table 2. Means, Standard Deviations, Alpha Coefficients, and Correlations

Variable	Mean	Median	Std Dev	1. SCS	2. Gender	3. CL	4. SE_B	5. SE_E	6. PTC	7. FRTS	8. FT	9. PET	10. CG
1. SCS	2.29	2.00	1.26	–									
2. Gender	–	–	–	.00	–								
3. CL	–	–	–	.83***	–.06	–							
4. SE_B	3.23	3.22	.38	.10	–.28**	.14	(.82)						
5. SE_E	3.30	3.25	.38	.16*	–.22**	.21**	.57***	(.83)					
6. PTC	.67	1.00	.47	.10	–.12	.06	.06	.03	–				
7. FRTS	3.71	4.00	.68	.07	–.21**	.17*	.41***	.34***	.22**	–			
8. FT	4.01	4.00	.73	.05	–.10	.12	.30***	.31***	.21**	.65***	–		
9. PET	3.75	4.00	.86	.18*	–.19*	.16*	.32***	.31***	.31***	.56***	.50***	–	
10. CG	9.45	11.00	2.91	–.06	.08	–.09	.10	.19*	–.13	.15	.13	.03	–

Notes: N=159. SCS, Student Class Standing; CL, Class Level; SE_B, Self-Efficacy at Beginning of Class; SE_E, Self-Efficacy at End of Class; PTC, Previous Technology Class; FRTS, Friends’ Rating of Their Technology Skills; FT, Familiarity with Technology; PET, Previous Exposure to Technology; CG, Course Grade. The values in italics represent Cronbach’s alpha. Gender is a dummy variable. **p*-value < .05. ***p*-value < .01. ****p*-value < .001.

(Sproull, 1995), and reliability of the instruments (Sekaran & Bougie, 2011). A normality check of the data was performed using an Anderson-Darling (AD) test (Razali & Wah, 2011). The test revealed that the data were not normally distributed. Based on the results of the AD test, inferential statistics employed nonparametric statistics. For data that are not normally distributed, the average alone is not a good indicator for the center of the data, and hence the median should also be reported, as it is a better indicator of the center of the data. The nonparametric Wilcoxon signed-rank test (paired/repeat measure sample) and the Mann-Whitney U test (independent sample), used to compare the mean of two distributions not normally distributed (Fagerland & Sandvik, 2009), were utilized. Furthermore, for testing of a statistically significant relationship, non-parametric linear regression was performed according to Cohen, Cohen, West, and Aiken (2003).

RESULTS

Descriptive Statistics, Correlations, and Reliabilities

Table 2 displays the means, standard deviations, and correlations of the variables included in this study. Overall, student self-efficacy is perceived as higher at the end of the semester ($M=3.30$; $Mdn=3.25$) than at the beginning ($M=3.23$; $Mdn=3.22$). A Wilcoxon signed-rank test was performed to determine if the mean rank difference is equal to zero (null hypothesis). The result of the test rejected the null hypothesis and inferred that the means are not equal ($z = -2.863$; $p\text{-value} < .01$; $N=163$), suggesting that there is improvement in self-efficacy over time.

Student computer self-efficacy has a significant, positive correlation with friends' feedback and with the students' own familiarity with technology and previous exposure to technology. Correlations include the control variables. The control variables that have a significant correlation with the dependent variable were included in regression analysis.

Assessment of Self-Efficacy across the Curriculum

The study investigates whether students strengthen technology self-efficacy during their time in college by comparing students across the curriculum in 100-level and 400-level courses. For class level 100 ($N=113$), a Wilcoxon signed-rank test was performed to evaluate if the mean rank difference of students' self-efficacy at the beginning of the course ($M=3.20$; $Mdn=3.22$) and that at the end of the course ($M=3.25$; $Mdn=3.22$) is equal to zero (null hypothesis). The result of the test allowed rejection of the null hypothesis and inference that the means are not equal ($z = -1.853$; $p\text{-value} < .10$; $N=113$),

suggesting that self-efficacy is higher at the end of the course among level-100 students.

For class level 400 ($N=50$), a Wilcoxon signed-rank test was performed to evaluate if the mean rank difference of students' self-efficacy at the beginning of the class ($M=3.31$; $Mdn=3.33$) and that at the end of the class ($M=3.42$; $Mdn=3.44$) is equal to zero (null hypothesis). The result of the test allowed rejection of the null hypothesis and inference that the means are not equal ($z = -2.469$, p -value $< .05$; $N=50$), suggesting that self-efficacy is higher at the end of the class among level-400 students. It is positive for the curriculum that students at both 100- and 400-levels of the curriculum measured gains during a semester.

Students enter 400-level classes with slightly higher self-efficacy ($M=3.31$; $Mdn=3.33$) than that of those entering 100-level classes ($M=3.20$; $Mdn=3.22$). A Mann-Whitney U test was performed to evaluate if the mean rank difference of level-100 students' self-efficacy and level-400 students' self-efficacy at the beginning of the class is equal to zero (null hypothesis). The result of the test allowed rejection of the null hypothesis and inference that the means are not equal ($U=2,374$; p -value $< .10$; $N=163$), suggesting that self-efficacy is higher for 400-level students at the beginning of the class than that of 100-level students at the beginning of the class.

A Mann-Whitney U test was performed to evaluate if the mean rank difference of level-100 students' self-efficacy ($M=3.25$; $Mdn=3.22$) and level-400 students' self-efficacy ($M=3.42$; $Mdn=3.44$) at the end of the class is equal to zero (null hypothesis). The result of the test allowed rejection of the null hypothesis and inference that the means are not equal ($U=2,090$; p -value $< .01$; $N=163$), suggesting that self-efficacy is higher for 400-level students at the end of the class versus that for 100-level students at the end of the class. Students in both 100-level and 400-level classes increased their self-efficacy, with students in 400-level classes beginning and ending the semester at a higher perceived level.

Assessment of Self-Efficacy across the Semester

The above results show that students' self-efficacy increased in both 100-level and in 400-level courses. The next question is whether the gains in self-efficacy were evenly distributed. Prior research has found that males tend to have higher levels of computer self-efficacy than females (Beyer, 2008). A Mann-Whitney U test was performed to evaluate if the mean rank difference of male students' self-efficacy ($M=3.29$; $Mdn=3.33$) and female students' self-efficacy ($M=3.11$; $Mdn=3.22$) at the beginning of the course is equal to zero (null hypothesis). The result of the test allowed rejection of the null hypothesis and inference that the means are not equal ($U=2,191$; p -value $< .05$;

$N=163$), suggesting that self-efficacy is higher for males at the beginning of the course.

Next, a Mann-Whitney U test was performed to evaluate if the mean rank difference between male students' self-efficacy ($M=3.36$; $Mdn=3.33$) and female students' self-efficacy ($M=3.18$; $Mdn=3.11$) at the end of the course is equal to zero (null hypothesis). The result of the test allowed rejection of the null hypothesis and inference that the means are not equal ($U=2,088$; p -value $< .01$; $N=163$), suggesting that ending self-efficacy is higher for males.

The next question is whether there was growth in self-efficacy for students of both genders. For males ($N=111$), a Wilcoxon signed-rank test was performed to evaluate if the mean rank difference of students' self-efficacy at the beginning of the course ($M=3.29$; $Mdn=3.33$) and the mean from the end of the course ($M=3.36$; $Mdn=3.33$) is equal to zero (null hypothesis). The result of the test allowed rejection of the null hypothesis and inference that the means are not equal ($z = -2.616$; p -value $< .01$; $N=111$), suggesting that for male students, self-efficacy is higher at the end of the course than at the beginning of the course.

For females ($N=51$), a Wilcoxon signed-rank test was performed to evaluate if the mean rank difference of students' self-efficacy at the beginning of the class ($M=3.11$; $Mdn=3.22$) and the mean from the end of the class ($M=3.18$; $Mdn=3.11$) is equal to zero (null hypothesis). The result of the test did not allow rejection of the null hypothesis and allowed inference that the means are equal ($z = -1.285$; p -value = *ns*; $N=52$), suggesting that self-efficacy is not changed for female students. These results indicate that males not only begin a semester with higher self-efficacy but also gain more during a semester than do females.

Assessment of Prior Experiences

The next survey questions explored whether previous technology classes, friend's rating/perception of students' technology skills, students' perception of familiarity with technology, or previous exposure to technology influence the students' self-efficacy at the beginning of the class. These variables are positively correlated, as shown earlier in Table 2. Stepwise regression indicates that friends' rating/perception of students' technology skills was the only main variable that had a significant relationship with self-efficacy at the beginning of the class. The control variable of gender was also significant. The results of the stepwise regression are displayed in Table 3.

Further regression analysis explores whether the self-efficacy students possess at the beginning of the class influences the class grade. The investigation was broken down into the following three parts: (a) overall, (b) by gender, and (c) by class level. There was no control variable. The results of the linear regression are displayed in Table 4.

Table 3. Parameters of the Stepwise Multiple Linear Regression Analysis

Variable	Self-Efficacy at Beginning of Class	
	Model 1	Model 2
Control: Gender	-.22**	-.15*
Previous Technology Class		-.08
Friends' Rating of Their Technology Skills		.29**
Familiarity with Technology		.05
Previous Exposure to Technology		.14
<i>F</i> value	8.737**	8.044***
Adjusted <i>R</i> ²	.05	.18
ΔR^2		.13***

Notes: *N* = 163. Relationships are standardized beta coefficients. **p*-value < .05. ***p*-value < .01. ****p*-value < .001.

Table 4. Parameters of the Linear Regression Analysis

	Self-Efficacy at Beginning of Course				
	Overall (<i>N</i> = 163)	Males (<i>N</i> = 111)	Females (<i>N</i> = 52)	100-Level (<i>N</i> = 113)	400-Level (<i>N</i> = 50)
Course Grade	.10	.20*	-.02	-.01	.43**
<i>F</i> value	1.692	4.321*	.016	.003	11.086**
Adjusted <i>R</i> ²	.00	.03	-.02	-.01	.17

Notes: Relationships are standardized beta coefficients. **p*-value < .05. ***p*-value < .01. ****p*-value < .001.

Overall, self-efficacy at the beginning of the class had no significant relationship with class grade. For males, self-efficacy at the beginning of the class had a significant relationship with class grade. Self-efficacy at the beginning of the class, for females, had no significant relationship with class grade. Self-efficacy at the beginning of the class, for class level 100, had no significant relationship with class grade. However, for class level 400, self-efficacy at the beginning of the class had a significant relationship with class grade.

A supplemental analysis was performed to explore if there was a difference in grades by gender. A Mann-Whitney *U* test was performed, and results of the test suggested that there is no difference in grades based on gender (*U* = 2,522; *p*-value = *ns*).

Finally, the study explores whether the self-efficacy students possess at the beginning of the class or the class grade influence the students' self-efficacy at the end of the class. A stepwise multiple linear regression was performed, and the results are shown in Table 5. Self-efficacy at the beginning of the class showed a significant relationship with self-efficacy at the end of the class, and class grade also revealed a significant relationship with self-efficacy at the end of the class. None of the control variables (i.e., gender, student class standing, or class level) showed a significant relationship with class grade.

DISCUSSION

In summary, this study found that student self-efficacy is dynamic. Students in the 400-level classes had higher levels of self-efficacy than the 100-level students. The gap was found at both the beginning and the end of term. This implies growth through the curriculum, consistent with research showing that self-efficacy can be increased through intervention (Beile & Boote, 2002; Bresó, Schaufeli, & Salanova, 2011). However, the measurement is tempered by the fact that this was a cross-sectional rather than a longitudinal study. Different students were in the courses.

In all courses, student self-efficacy increased within the semester. The growth occurred largely among male students. Computer self-efficacy did not significantly change among female students. Male students began the semester with a higher mean level of self-efficacy, and the gap remained. This persistent gap is consistent with past work by Kaarakainen et al. (2018), Marshman et al. (2018), Colson (2016), He and Freeman (2010), Beyer (2008), Karsten and Schmidt (2008), Taylor (2004), and others.

Beginning self-efficacy predicted grades for male students but not for females. Females had lower self-efficacy throughout, although there was no difference in mean end-of-course grades. Overall, both beginning self-efficacy and work during the semester (as reflected in grades) did positively predict ending self-efficacy. Felder et al. (1995) found that active learning may aid female student learning but not self-efficacy. Females in science, technology, engineering, and mathematics (STEM) classes may see small groups and active learning activities as a chance to have the material explained to them rather than as a chance to take a lead role. The students participating in this study were enrolled in courses requiring active use of Excel and other business apps throughout class time. Subtle gender biases by faculty may worsen female self-efficacy (Moss-Racusin et al., 2012). While grades are not affected, career choice may be affected. For example, males are more likely to consider mathematics as a career than females because males perceive themselves to be better at math, not because their skills are measurably better (Correll, 2004).

A next step is to examine the trajectory of changes in self-efficacy as individual students mature academically from 100-level into 400-level courses. At

Table 5. Parameters of the Stepwise Multiple Linear Regression Analysis

Variable	Self-Efficacy at End of Course	
	Model 1	Model 2
Control: Gender	-.21**	-.11
Control: Student Class Standing	-.01	-.01
Control: Course Level	.21	.16
Course Grade		.16*
Self-Efficacy at Beginning of Course		.51***
<i>F</i> value	5.188**	18.939***
Adjusted <i>R</i> ²	.07	.36
ΔR^2		.13***

Notes: *N* = 163. Relationships are standardized beta coefficients. **p*-value < .05. ***p*-value < .01. ****p*-value < .001.

the same time, results could be strengthened by adding controls for baseline levels of knowledge or academic achievement, perhaps using SAT/ACT scores for freshmen or GPA for upperclassmen. Research could control for cultural background and ethnic group and investigate whether self-efficacy is different for first-generation college students than for others. Consistent with Bandura's (1977) seminal work, verbal persuasion was found to be relevant. Friends' assessment of a student's technology skills was a predictor of beginning self-efficacy. The role of peer feedback could be further explored. This may be complicated, as individuals with low general self-efficacy were less responsive to positive persuasive messages when completing an assigned task (Wilde & Hsu, 2019). Staples, Hulland, & Higgins (1998) illustrate a framework.

Another question is whether the gains in self-efficacy would have occurred in a traditional (non-lab) class. Future research could compare gains in different classroom environments. Future research could also test the sensitivity of results by using different self-efficacy measures or scales and perhaps utilize mixed methods by adding open-ended survey questions and/or interviews.

As measuring techniques are improved, student self-efficacy and competence can concurrently be developed by instructors (Daniels, Mandzuk, Perry, & Moore, 2011; Pollack & Lilly, 2008). The strongest impact on self-efficacy is from one's own performance (Bandura, 1977). A simple start is that faculty can model in class how to acknowledge mistakes gracefully, and treat mistakes simply as fixable events (Pajares, 2002). Practice is relevant for building self-efficacy. Ordering assignments and exams with easier ones first and more difficult ones later in the term may help. Especially for first-generation college students, give guidance for what is coming during the semester (Ackerman & DeShields, 2013). Apply thoughtful design and instructions for assignments,

and build on known skill sets to reduce anxiety (He & Freeman, 2010). Consider computers throughout the curriculum, building student experience through computer-based assignments in core classes. Excel, Access, and even library databases are helpful (Beile & Boote, 2002). Self-efficacy increased after completion of work-learning program by accounting students (Subramaniam & Freudenberg, 2007) and after completion of lectures and a case assignment (Burnett, Friedman and Yang, 2008). Both students and faculty are agents—someone who “intentionally makes things happen by one’s actions” (Bandura, 2001, p. 2). People develop, adapt, and renew themselves over time. Overall, pedagogical changes may impact not only self-efficacy but also learning. This is for faculty to weigh.

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Next Round: The Role of Simulations in Business Education

Neil Granitz* and Chiranjeev Kohli
California State University

Bolstered by technological changes, the traditional lecture is being replaced by participative learning approaches like simulations that can teach application, teamwork, creativity, and problem-solving. There is limited research on how different pedagogical resources, such as simulations, impact satisfaction. We first identify and test factors influencing course satisfaction for undergraduate students using data from multiple sections of a marketing course. Subsequently, we establish Content Coverage and Problem-Solving as the key drivers of satisfaction, and we compare how simulations, lectures, and term projects perform on these key drivers, highlighting the effectiveness of simulations in this case study.

Keywords: Participative Learning, Simulations, Comparative Efficacy of Pedagogies

Disciplines of Interest: Business Education, Marketing Education

INTRODUCTION

According to recent studies, the simulation market is expected to grow from \$7.16 billion in 2018 to \$16.69 billion in 2024, with education being one of the fastest growing segments (Mordor Intelligence, 2019). Advancements in technology and the push towards more realistic, high-impact practices are driving growth of simulations in business education. Popular simulations include Stukent Mimic, MarketShare, Capsim, and Littlefield.

Simulations increase social interaction (Xu & Yang, 2010), teach students how to work as a team (Batko, 2016), increase engagement and perceived realism (Beckem & Watkins, 2012), heighten curiosity and enjoyment, and offer a dynamic environment requiring adaptation and creativity (Baker, Underwood & Thakur, 2017; Pitt et al., 2012). Additionally, simulations require students to use conceptual abilities, analyze data, and problem-solve (Ranchhod et al.,

*(Contact author): Neil Granitz, California State University, 657.278.3646, ngranitz@fullerton.edu.
Chiranjeev Kohli, California State University, 657.278.3796, ckohli@fullerton.edu.

2014). While students perceive simulations to be a highly effective learning method that facilitates the development of business knowledge and skills (Vos & Brennan, 2010), little research has been conducted on how simulations contribute to satisfaction, in comparison to other pedagogical tools. The purpose of this study is threefold:

1. Identify factors that may affect course satisfaction, based on a literature review;
2. Establish factors that significantly impact course satisfaction;
3. Compare three different pedagogies—simulations, class lectures, and class projects—on overall satisfaction and key drivers of satisfaction.

This research is significant for several reasons. First, this study will aid instructors in understanding and verifying the different factors that lead to satisfaction with different course pedagogies. Satisfaction is often the top-level measure in assessing services. In the context of education, research demonstrates that increased satisfaction can enhance positive learning outcomes (Caruana, La Rocca, & Snehota, 2016; Ifinedo, 2017), loyalty (Fornell, 1992), and retention (Schertzer & Schertzer, 2004). Second, many universities are investing heavily in simulations as a way to build students' analytical skills and creativity, and this study can help instructors understand how simulations perform compared to other pedagogical methods on factors impacting satisfaction (and thereby affecting learning and retention). Third, by understanding how pedagogies compare on different components of satisfaction, instructors can optimize their use of the various pedagogies. Finally, this study advances the literature in the domain of satisfaction and business pedagogies.

REVIEW OF PAST RESEARCH AND FACTORS FOR INCLUSION IN OUR STUDY

In this section, we will cover research on simulations, including their benefits and drawbacks, comparison to other pedagogies, and their relation to student satisfaction, with an eye on ensuring that relevant factors are included in our study. See Table 1 for a summary of research related to simulations.

Simulations

Teaching is now multidimensional. The learning paradigm has shifted from passive to active (Wright, Bitner & Zeithaml, 1994), in which faculty must teach core concepts and relevant skills and give students real-world experience (Tanyel, Mitchell & McAlum, 1999). In particular, for relevant skills, the Association to Advance Collegiate Schools of Business (AACSB) recommends

Table 1. Review of Research on Simulations

Simulations	Benefits	Drawbacks	Comparison with Other Pedagogies
Put theory into action and require teamwork and consensus on actions (Beuk, 2016)	Help students develop their abilities in business and marketing (Cadotte, 2016)	Students may participate in simulations without the reflection for deep learning; can be perceived as time wasting (Doyle & Brown, 2000)	Students reported greater levels of enjoyment with simulations (Beuk, 2016; Baker, Underwood, Thakur, 2017)
Requires teams to reflect on their decisions and address failure (Vos & Brennan, 2010; Young, 2002)	Can improve leadership, time managements, strategic thinking, and teamwork skills (Batko, 2016; Cadotte & MacGuire, 2013)	Not suitable for gaining theoretical knowledge, and satisfaction with games can vary (Brennan & Vos, 2013)	Student involvement and commitment is higher, <i>vis-à-vis</i> textbook and lectures (Beuk, 2016; Bobot, 2010; Tunstall & Lynch, 2010)
Students learn in stages, moving from basic understanding to formulating complex strategies (Ganesh & Sun, 2009)	Allow for greater engagement and increased dynamism in decision-making abilities (Pasin & Giroux, 2011; Van Esch et al., 2020)	May not embody the resource constraints of the real world (González Martínez, Martí, & Cervera, 2019)	More practical, and illustrate the interrelationships between decision-making, processes, and outcomes (Bolton, Chapman, & Mills, 2019)
Students can experiment with behaviors they cannot try out in the “real work” (Doyle & Brown, 2000; Pal, Stubbs, & Lee, 2005)	Fascinating to students and offer a complement to other methods of teaching (Doyle & Brown, 2000)		Students find simulations and case studies superior to lectures in developing their problem-solving and decision-making abilities (Cook & Swift, 2006; Farashahi & Tajeddin, 2018)
	Increase cognitive gains and inspire more positive attitudes (Boyd & Murphrey, 2002; Hernandez-Lara & Serradell-Lopez, 2018; Seethamraju, 2011; Vogel et al., 2006)		When moving from simulations to case studies to lectures, there was a decline in student learning (Farashahi & Tajeddin, 2018)
	Build student confidence and help teach skills they have learned (Avramenko, 2012)		Students preferred simulations over cases, but there was no difference in learning outcomes (analysis, communication, and strategic thinking) (Bobot, 2010)
	Students retain concepts from class and apply them in their careers (Bal et al., 2016)		

that students procure creative and analytic skills. Additionally, they should engage with faculty (AACSB, 2020). Many faculty have embraced simulations as a means of meeting many of these challenges, (Smith & Van Doren, 2004).

Simulations provide a structured dynamic environment for learning business skills. Students typically compete in teams, must take actions across several rounds, and are then given market feedback on their actions. Simulations put theory into action and require teamwork and consensus on actions (Beuk, 2016) and, unlike other FORMS OF experiential learning, require teams to reflect on their decisions and address failure (Vos & Brennan, 2010; Young, 2002).

In terms of simulation adoption, a modified Technology Acceptance Model (TAM) holds, with perceived ease of use and usefulness positively influencing students' attitudes towards the simulation (Matute-Vallejo & Melero-Polo, 2019). Students learn a simulation in stages, moving from a basic understanding to the ability to formulate complex strategies (Ganesh & Sun, 2009). They can experiment with behaviors they cannot try out in a "real work" environment (Doyle & Brown, 2000; Pal, Stubbs, & Lee, 2005).

Benefits of Simulations

Simulations help students develop their abilities in business (Cadotte, 2016). They enable skill acquisition in marketing and in soft skills. For example, simulations can improve leadership, time management, strategic thinking, and teamwork skills (Batko, 2016; Cadotte & MacGuire, 2013). They also allow for greater engagement and increased dynamism in decision-making abilities (Pasin & Giroux, 2011; Van Esch et al., 2020). To students, simulations are fascinating, and offer a complement to other methods of teaching (Doyle & Brown, 2000). Students feel that simulations offer realism and give them a chance to learn and apply concepts, master relevant software, develop analytical skills, foster team skills, and cultivate decision-making expertise. Simulations increase cognitive gains and inspire more positive attitudes (Boyd & Murphrey, 2002; Hernandez-Lara & Serradell-Lopez, 2018; Seethamraju, 2011; Vogel et al., 2006). Bobot (2010) finds that simulations allow students to experience the roles and responsibilities of management, emulate environmental uncertainty, and increase involvement.

Students also find that simulations help in several ways once they are in the job market. Simulations build their confidence and allow them to talk about the skills they have learned (Avramenko, 2012). Additionally, they retain concepts from the class and apply them in their careers (Bal et al., 2016).

Drawbacks of Simulations

Canhoto & Murphy (2016) contend that there are several shortcomings to simulations. They may not endow skills such as communication or teach the

exact tools that are necessary for employability. Furthermore, students can participate in simulations without having the reflection necessary for deep learning; and a game can easily be perceived as a time-wasting activity (Doyle & Brown, 2000). Additionally, simulations are not suitable for gaining theoretical knowledge (Brennan & Vos, 2013). Finally, to be realistic, simulations must not present an idealized situation but rather embody the resource constraints of the real world (González Martínez, Martí, & Cervera, 2019).

Simulations versus Other Forms of Teaching

Researchers have found that compared to other pedagogies, students reported greater levels of enjoyment with simulations (Beuk, 2016; Baker, Underwood, & Thakur, 2017). In contrast to textbook and lectures, student involvement and commitment is higher (Beuk, 2016; Bobot, 2010; Tunstall & Lynch, 2010). Simulations are more practical, and they illustrate the interrelationships between decision-making, the ensuing processes, and outcomes (Bolton, Chapman, & Mills, 2019). Thus, students find simulations and case studies superior to lectures in developing their problem-solving and decision-making abilities (Cook & Swift, 2006; Farashahi & Tajeddin, 2018). When moving from simulations to case studies to lectures, there was a decline in student learning (Farashahi & Tajeddin, 2018), although Bobot (2010) found that in comparing cases and simulations, students preferred simulations but there was no difference in learning outcomes (analysis, communication, and strategic thinking). Thus, past research on simulations has compared it to other pedagogies across a variety of criteria, including learning, practicality, and skill building; however, satisfaction—overall and on key drivers—across methods has not been studied.

Satisfaction

Satisfaction is a postdecision construct, a “summary affective response of varying intensity, with a time-specific point of determination and limited duration, directed toward focal aspects of product acquisition and/or consumption” (Giese & Cote, 2000, p. 15). Parasuraman, Zeithaml, & Berry (1988) conceptualized satisfaction as a state in which actual performance meets or exceeds expectations. Satisfaction is also an antecedent that may precede attitude change, behavioral intention, and actual use (Oliver, 1980).

In the context of education, Elliott and Shin (2002, p. 198) describe student satisfaction as “the favorability of a student’s subjective evaluation of the various outcomes and experiences associated.” Hunt (1977, p. 49) describes student satisfaction as “the favorability of a student’s subjective evaluation of the various outcomes and experiences associated with education,” and at a macro level, it is linked to student retention rates (Hansen, 2008) and input to university rankings and is an important criterion for tenure assessment. Student satisfaction is made up of a complex set of factors, which can vary depending on

the target of the satisfaction (Appleton-Knapp & Krentler, 2006; Porter & Umbach, 2001).

There are many antecedents to satisfaction; however, our goal was to develop a list of those that were relevant to and applicable across different pedagogies. We used multiple sources to create a robust list of factors. First, as they are skills that we are mandated to focus on, we looked at the key skills identified by the AACSB—which different pedagogies may provide—and their relation to satisfaction. Next, we focused on satisfaction variables that were appropriate only at the course format level (creativity, content coverage, etc.). We did not focus on individual elements (such as learning style, values, gender, or grade point average [GPA]) or university program elements (like quality, national ranking, or service). If a factor did not fit in terms of possible differentiation across pedagogies, we did not include it. For additional sources and greater support, we looked at academic literature.

Based on our review, the dimensions of satisfaction that we included are Creativity, Real World, Analytical Skills, Fun and Enjoyment, Problem-Solving Skills, Content Coverage, and Engagement. In the next section, we will cover each of these variables and their relation to simulations and to satisfaction.

Creativity

Alvino (1990, p. 50) conceptualized creativity as a novel way of seeing or doing things to generate new ideas. Creativity has become a core competency and is encouraged in most contemporary organizations and business programs (AACSB, 2020; Amabile et al., 1996; Anderson, Potocnik, & Zhou, 2014). Integrating creativity into business education helps students prepare for a workplace that depends on creativity as a sustainable competitive advantage. Business faculty have incorporated modules that develop student creativity and this has increased student satisfaction (Adams & Turner, 2008; Boulocher-Passet, Daly, & Sequera, 2016; Claxton, Edwards, & Scale-Constantinou, 2006). Satisfaction occurs when the creative environment meets the students' expectations (Jin, 2004).

There is evidence that creativity can be taught (Driver, 2001). Evans (1991) suggested that creating an environment where risks are taken and grade systems reward creativity could enhance the same. Simulations fit this description and have been shown to increase creativity by allowing students to work in more complex situations (Tennyson & Breuer, 2002), control and test the effects of different variables on the outcomes (Tawil & Dahlan, 2017), and stimulate critical thinking, which leads to greater creativity (Eggers, Lovelace, & Kraft, 2017).

Real World

Learning should be authentic (real world) and reflect the complexities of the real world (AACSB, 2020). Satisfaction is derived when faculty teach

students course content that they can use in their careers/the real world (Guevara & Stewart, 2011; Marks, Haug, & Huckabee, 2016). Real-world applications increase satisfaction as students get closer to graduation and once they are in the workforce (Guevara & Stewart, 2011).

After partaking in a social media simulation, students mentioned that the most useful aspect was the real-world experience they gained (Kinsky, 2015). Similarly, after creating a marketing plan in the virtual world, student felt that the main benefit was the practical experience (Tuten, 2009). While simulations are valued for their real-world contexts in a controlled environment (Lainema & Nurmi, 2006), in some cases, simulations have been shown to outperform the actual real-world experience (Finkelstein et al., 2005).

Analytical Skills

AACSB (2020) requires students to master analytical thinking. Business students need quantitative skills to understand their performance and to assess risk (McClure & Sircar, 2008). The growth of information requires business students to be data-ready and to understand basic statistics and modeling. In general, students find that simulations are good for improving their knowledge of analytical methods and skills (Vos & Brennan, 2010). Tied to creativity, problem-solving and analytical skills are antecedents to satisfaction (Franco-Valdez & Valdez, 2018; Anicic & Mekovec, 2016; Oliver, 2007; Ryan, 2008). Students who experienced greater growth in their analytical abilities evaluated their educational experience as more satisfactory (Franco-Valdez & Valdez, 2018).

Fun & Enjoyment

Verkasalo (2008) reported that fun has a positive effect on attitude toward the act. Dabholkar & Bagozzi (2002) demonstrated that fun in education can be considered an antecedent to affirmative attitudes. In an online and blended learning environment, enjoyment has led to satisfaction (Dang et al., 2016; Eom, Wen, & Ashill, 2006; Johnson, Cascio, & Massiah, 2014). In a management information systems (MIS) class, perceived enjoyment had the highest relationship to satisfaction compared to compatibility, usefulness, ease of use, and confirmation (Ifinedo, 2017). In the context of learning management system (LMS) and clicker usage, perceived usefulness and enjoyment lead to satisfaction (Al-Hawari & Mouakket, 2010; Rana & Dwivedi, 2016). In technology adoption (simulation), enjoyment was a predictor of perceived ease of use, usefulness, and attitude (Matute-Vallejo & Melero-Polo, 2019), and fun was more important than utility in predicting the adoption of a self-service technology (Curran & Meuter, 2007).

Partaking in business simulation games resulted in students having a positive attitude and experiencing fun and enjoyment, as well as having a sense of

accomplishment and better opportunities for learning (Ibrahim et al., 2011; Lin & Tu, 2012). Goi (2019) identified fun and enjoyment as a reason why business simulations are important.

Problem-Solving Skills

Jonassen (2004) stressed the importance of students' problem-solving ability by stating that "the only legitimate goal of education and training should be problem-solving" (p. 2). Teaching problem-solving that encourages students to use relevant contexts while conversely helping students link real problems to concepts learned in school is critical (Rittle-Johnson & Koedinger, 2005). Letcher and Neves (2010) demonstrated that obtaining problem-solving skills can lead to satisfaction. DeShields, Kara, and Kaynak (2005) established that students' partial college experience positively affected satisfaction, where partial college experience includes developing skills such as problem-solving.

Simulations have been shown to increase students' problem-solving abilities (Brown, 2015). While engaged in a simulation, students can experience flow, which leads to stronger analytical and computational problem-solving skills (Liu, Cheng & Huang, 2011). In a study of teams performing a management simulation, realism of the simulation was positively associated with problem-solving (Adobor & Daneshfar, 2006).

Content Coverage

Students are satisfied if they learn content connected to their future profession (Parayitam, Desai, & Phelps, 2007). Researchers have found that course content, teaching methodology, and support materials were the primary drivers of satisfaction (Chyung & Vachon, 2005; Hong, 2002). However, some teaching methodologies may be better at conveying the content to students. For example, using a textbook and lecture is efficient for communicating information but is passive. Case analyses take it one step further in that they integrate theory with applied examples. While useful, case analyses do not allow students to see the implications of their decisions. Simulations can increase content knowledge (Chen & Howard, 2010). Business simulations dynamically teach the concepts in the form of rules. Participants must predict the outcomes of their own actions, as well as those of the actions of competitors (Hermens & Clarke, 2009). In a study of simulations, students' content knowledge was significantly correlated with their simulation game performance scores (Ahn, 2008).

Engagement

Engagement is a multidimensional construct with variation in definitions (Fredricks & McColskey, 2012). In view of our study of simulations, we focus on the contexts and relationships that promote engagement, such as support from teachers and interaction with peers.

Interaction is an essential element to student learning (Bean & Eaton, 2001; Patrick, Ryan, & Kaplan, 2007). AACSB (2020) recommends strong learner-learner and learner-faculty interaction. While many antecedent factors have been studied in relation to student satisfaction, the quality and quantity of interaction with faculty and other students has been a consistent factor (Eastman, Iyer, & Eastman, 2006; Hansen, 2008). Students who interact frequently with their instructors earn higher grades, are more satisfied, and are more likely to continue their studies (Marks, Haug, & Huckabee, 2016).

Simulations provide structure for interactions with faculty and peers. First, faculty must ensure that students have the knowledge and can transfer it to play the simulation (Lameras et al., 2017). Second, as simulations are often completed in teams, to be successful, members of the groups have to get to know one another (Birknerová, 2010). Third, in simulations, students are forced to think in more complex ways, which encourages interaction with faculty and peers (Pal, Stubbs, & Lee, 2005; Russell-Bennett, Rundle-Thiele, & Kuhn, 2010). Fourth, students also need to frequently communicate with and persuade their teammates to plan various actions. This interaction can create synergistic knowledge (Xu & Yang, 2010).

METHODOLOGY AND DATA ANALYSIS

We start with an overview of our approach. We measured overall satisfaction with the course and with the individual items. The individual items were then factor analyzed to reduce them to manageable number of factors. We then ran a regression of overall satisfaction with the course on these factors. The respective beta coefficient for each factor shows the relative magnitude of impact of the factors on overall satisfaction. Those that were significant were considered key drivers. Then, knowing how important each factor is, we established how each pedagogical approach fares on these factors. This allows cross-pedagogy comparisons by measuring each of the three pedagogies on the same items (and therefore the factors).

Students in a Principles of Marketing class from a large western university participated in this study. Close to the end of the semester, 216 students were administered an online survey. They were asked to rate their overall satisfaction with the Principles course, as well as their satisfaction on items for all the factors identified earlier, based on the literature review. They were then asked to rate their satisfaction on these same items for each of the three pedagogical tools—classroom lectures, traditional class projects (e.g., marketing plan), and simulations.

Pre-existing scales were used to measure satisfaction and each of these factors across three different pedagogies (Agarwal & Karahanna, 2000; Caruana, La Rocca, & Snehota, 2016; Duke, 2002; Eastman, Iyer, & Eastman, 2006;

Hu, 2010; Karns (2005); McCorkle et al., 2007; NSSE, 2017; Peltier, Schibrowsky, & Drago, 2007; Xu & Yang, 2010). We reworded and added statements to some scales to make the measures applicable and meaningful across pedagogies. However, in light of the multiple sources for these diverse scales, we wanted to refine them. To accomplish this, we ran a factor analysis to establish the components of these factors. Based upon this, specific items for each of the factors were finalized to measure each factor. The average of all items loading on a factor resulted in the factor score. Next, a regression analysis was conducted with the factor scores as independent variables and overall satisfaction as the dependent variable. This was done to establish the factors that had a significant impact on overall satisfaction—a procedure typical of customer satisfaction assessments. Finally, we compared means on satisfaction with each of the factors across the three pedagogical tools. *t*-tests were administered to test for difference between the different pedagogies for each factor.

RESULTS

The factor analysis yielded six well-defined and unique factors with eigenvalues greater than one. These factors were Creativity, Analytical Skills, Fun and Enjoyment, Content Coverage, Engagement, and Problem-Solving. Real World did not materialize as a separate factor, and the items initially identified with it cross-loaded on other factors. As such, these six factors were retained for further analyses, and they captured a respectable 68.07 percent of the variance.

Next, we averaged the scores on individual items to calculate the overall score for each factor (scale). For each of the six factors, Cronbach's alpha was higher than 0.70 (Creativity, 0.80; Analytical Skills, 0.83; Fun and Enjoyment, 0.88; Content Coverage, 0.84; Engagement, 0.84; Problem-Solving, 0.80). The same was true for the dependent factor (scale) used in our study—Overall Satisfaction with the Course (with a Cronbach's alpha of 0.92). Individual items for this scale were as follows:

1. Overall I was very satisfied with the class
2. This was a good class for the Principles course
3. I would recommend this class to others who want to take the Principles of Marketing course

Items for each of the factors (scales) used as independent variables are listed in Table 2. With the exception of the Real World factor, all items initially proposed for each factor were retained.

In the next step, we ran a multiple-regression analysis to test the impact of the six factors on satisfaction with the course. This establishes what factors or

Table 2. Factor Analysis of Satisfaction Variables

Satisfaction Variable	Factor					
	Creativity	Analytical Skills	Fun and Enjoyment	Content Coverage	Engagement	Problem-Solving
Level of creativity required	0.716					
Improved creative thinking	0.691					
Creative solutions rewarded	0.512					
Level of data analysis required		0.636				
Improved data analysis skills		0.762				
Analytic solutions rewarded		0.727				
Enjoyment provided			0.756			
How fun the class was			0.711			
The joy of participating in class			0.759			
Comprehensive coverage of topics				0.671		
Quality coverage of materials				0.749		
Provide in-depth understanding				0.688		
Improved understanding of marketing				0.561		
Work with students outside of class					0.795	
Work with students in class					0.967	
Discuss ideas with students					0.921	
Identify central issues						0.702
Evaluate alternatives						0.611
Correct decisions						0.508

Notes: Only factor loadings of $\geq .50$ are shown.

Table 3. Regression Analysis of Factors on Student Satisfaction

Factor	Beta	Significance
Constant	.892	.035*
Creativity	.018	.891
Analytical Skills	.052	.562
Problem-Solving	.272	.036*
Content Coverage	.399	.000*
Engagement	-.062	.354
Fun and Enjoyment	.127	.126

Notes: $R^2 = 0.26$. Betas significant at $p \leq .05$ are marked with an asterisk.

dimensions drive course satisfaction—the “key drivers” of satisfaction. Two factors were significant, Content Coverage (p -value = 0.00) and Problem-Solving (p -value = 0.04), with Content Coverage having the highest beta of 0.399 (versus 0.272 for Problem-Solving). The regression accounted for 26 percent of variance (see Table 3).

Now that we had established the key drivers of satisfaction, we evaluated how each of the three pedagogical tools performed on these key drivers by comparing the means of the satisfaction scores for the three pedagogies. The satisfaction scores on all items (contributing to the key drivers) for each pedagogy were measured separately in our survey.

Analysis of variance (ANOVA) was used to compare these means. The means were significantly different for five of the six factors, but not for Engagement (Table 4A). Subsequently, wherever the differences were significant, comparisons were made by using t -tests for individual pairs to establish if each pedagogy had a significant difference from the other two.

In Table 4B, the pedagogy with the highest score on each of the six factors is highlighted with italic font, provided these differences were statistically significant.

1. Simulations and lectures shared the highest level of satisfaction across the factors, with simulations being the strongest on three of the six dimensions—Creativity, Analytical Skills, and Problem-Solving. Lectures performed best on Content Coverage and Fun and Enjoyment. As mentioned earlier, differences on Engagement scores were not statistically significant.
2. For the five dimensions that had significant differences, simulations received higher satisfaction scores, compared to projects, on all dimensions—although the difference between simulations and projects was not statistically significant on Content Coverage.
3. Projects did not end up in the lead on any of the factors.

Table 4A. Results from ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Creativity * Pedagogy	Between Groups	32.900	2	16.450	15.856	0.000
	Within Groups	604.824	583	1.037		
	Total	637.724	585			
Analytical Skills * Pedagogy	Between Groups	31.456	2	15.728	16.552	0.000
	Within Groups	553.998	583	0.950		
	Total	585.454	585			
Problem-Solving * Pedagogy	Between Groups	40.371	2	20.185	22.726	0.000
	Within Groups	517.820	583	0.888		
	Total	558.191	585			
Content Coverage * Pedagogy	Between Groups	46.147	2	23.073	24.941	0.000
	Within Groups	539.347	583	0.925		
	Total	585.494	585			
Engagement * Pedagogy	Between Groups	4.588	2	2.294	2.249	0.106
	Within Groups	594.649	583	1.020		
	Total	599.237	585			
Fun and Enjoyment * Pedagogy	Between Groups	42.395	2	21.197	18.719	0.000
	Within Groups	660.193	583	1.132		
	Total	702.588	585			

Table 4B. *t*-Tests of Satisfaction Factors across Different Pedagogical Methods

Factor	Simulation	Lecture	Project
Creativity	<i>3.88</i>	3.70	3.42
Analytical Skills	3.80	3.22 ^a	3.41 ^a
Problem-Solving	3.96	3.82	3.58
Content Coverage	3.79 ^a	<i>4.20</i>	3.73 ^a
Engagement	3.10	3.41	3.30
Fun and Enjoyment	3.70	<i>4.12</i>	3.37

Notes: In any given row, means with the same superscript are not statistically significantly different. The numbers in italics are the highest scores (significant) across pedagogies.

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4. On the two key drivers for satisfaction, lectures performed the best on Content Coverage, while simulations performed the best on Problem-Solving.

DISCUSSION

In the regression analysis, only the Problem-Solving and Content Coverage factors were significant. Additionally, these factors accounted for a respectable 26 percent of variance. This may be due to the fact that noncourse and nonacademic variables beyond the ones measured in this study also play a significant role in satisfaction (Elliott & Shin, 2002; Marks, Haug, & Huckabee, 2016).

Additionally, factors impacting satisfaction can fall into two categories (Hertzberg, 1966). Hygiene factors include such things as security, vacations, relationships, physical conditions, and quality of leadership. Satisfiers include responsibility, recognition, achievements and opportunities for growth. Satisfiers have a greater effect on satisfaction than hygiene factors (DeShields et al., 2005; Dunnette, Campbell, & Hakel, 1967). This may also account for why the factors of Engagement and Fun & Enjoyment were not significant for satisfaction; they lean towards being hygiene factors.

The Analytical Skills factor was also not significant. While this sample included business students from all disciplines, marketing students perceive themselves as possessing poorer quantitative skills than nonmarketing students (LaBarbera & Simonoff, 1999; Newell, Titus, & West, 1996), and students who are most comfortable with quantitative analysis gravitate to accounting and finance (Pritchard, Potter, & Saccucci, 2004). Thus, marketing courses tend to have less focus on analytical skills. If analytical skills are less emphasized—likely true for the Principles course, this factor less likely to contribute to course satisfaction, so this could be an artifact of this study. It could be argued that simulations would be a needed addition to courses in marketing, as simulations scored significantly higher on Analytical Skills, compared to lectures and term projects.

Creativity was not significantly related to satisfaction. This does not contradict previous research which found creativity to be related to satisfaction only when it meets expectations for creativity (Jin, 2004).

In analyzing the pedagogies across the different factors, simulations were significantly higher in satisfaction than projects and lecture across Creativity, Analytical Skills, and Problem-Solving factors. Intuitively, this makes sense, as simulations involve students in complex business decisions in which students receive results and must improve (Beuk, 2016; Vos & Brennan, 2010). Some of the most popular simulations, such as Stukent and Simbound, offer students initial data and analytics, a chance to develop strategies which include creative materials, and then to receive new analytics that they act on in the next round. Additionally, compared to the other factors (Engagement, Fun and Joy, and

Content Coverage), these are the applied factors, where practical experience would be necessary to create satisfaction; the simulation offers that.

In comparing the different modes of delivery, lectures were significantly higher on two factors: Content Coverage and Fun and Enjoyment. Professors typically ensure that content on exams is covered in the lectures. So, it is not surprising that lectures are used to deliver the course content, which is consistent with the findings that lectures score significantly higher on Course Content.

Lectures also hold the highest means among the factors of Fun and Enjoyment. There is not a large body of research on making traditional lectures fun and enjoyable. Some studies indicate that adding in participatory elements such as games, clickers, and small-group breakouts do make the lectures more fun (Frag, Park, & Kaupins, 2015; Mastilak, 2012). For faculty lecturing large classes, performance, such as exaggerated vocals and gestures, becomes more important. Faculty also incorporate media clips to break up the monotony (Saiz, 2014). Thus, while the standard lecture may still comprise a faculty member standing in front of a class, the standard lecture does not exist anymore. Some of the criticisms of the passive nature of lecturing may be negated by the instructor's ability to engage students.

Interestingly, projects were not superior across any of the criteria. This actually leads to the final conclusions that in our study simulations fared better than projects and that they may complement lectures better than projects. As such, this study makes a case for the inclusion of simulations.

IMPLICATIONS

We did a review of the literature to identify factors that drive satisfaction with the course. We wanted to understand the role simulations can play and their effectiveness in enhancing course experience—especially in light of their increased popularity. Our study makes a strong argument in favor of using simulations. It is fair to say that simulations do a better job than traditional class projects, such as business plans. We are not making a case that projects such as business plans be discarded; however, given the time constraints, if a choice has to be made, the evidence favors simulations, which also complement lectures very well. Additionally, at a time where the expense of course materials is coming under increased scrutiny, this study justifies that the increased cost of simulations creates value for students.

While each pedagogical tool offers its own set of merits, lectures remain appealing to students. If well done, they can continue to maintain their attraction. This may come as a big relief; however, plain repetition

of concepts covered in textbooks is unlikely to help. The key to success, therefore, is to add value in the classroom. If students do not see much added value in classrooms, it will be risky for the survival of the profession.

LIMITATIONS AND FUTURE RESEARCH

Our study, although useful in evaluating simulations *vis-à-vis* lectures and traditional projects in a head-to-head comparison, was based on data from multiple sections of one class. As such, its generalizability is limited, although it is arguably a useful case study. For the same reason, it would be useful to replicate the study elsewhere, building further on our findings.

While the present study explores the factors that impact student satisfaction in the classroom, it does not include those factors that create satisfaction outside of the classroom; thus, future studies can take a more comprehensive view. Additionally, the findings indicate that lectures remain appealing to students; however, what constitutes a satisfying lecture can be elaborated in future research. Similarly, how educators can execute simulations to optimize satisfaction among students can be further explored.

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Axesstel: An Auditing Case on Revenue Recognition

Charles P. Cullinan and Elena Precourt*
Bryant University

Designed for use in an undergraduate auditing course, this case presents a real-life situation in which a company materially overstated its revenue. The case requires the students to consider the implications of large transactions close to year end, to draw on their knowledge of financial accounting (including a search of the Accounting Standards Codification), to analyze revenue transactions, and to consider how the different aspects of revenue and inventory auditing procedures could help to identify misstatements.

Axesstel was a seller of mobile phone technology to a variety of mobile network operators. Axesstel overstated its revenues close to year end through multiple revenue transactions that created significant uncertainty about the sales. In addition to inflating revenues, Axesstel intentionally deceived its auditors by withholding information about sales and encouraging clients to misrepresent details of the transactions.

Keywords: Revenue Recognition, Confirmations, Inventory Observation

Disciplines of Interest: Auditing

INTRODUCTION

Axesstel (“the company”) was a U.S. developer and distributor of wireless telecommunication equipment and security alert systems. The company was a Securities and Exchange Commission (SEC) registrant based in San Diego, California. The company’s products included mobile phones, mobile network–based alarms systems, wireless/cellular desk phones, and wireless routers. The products were sold to cellular phone service providers and telecommunication distributors, which then sold the products to end users (often bundled with cell phone service). The products reached the end users primarily with the brand

*(Contact Author): Elena Precourt, Bryant University, 401.232.6373, eprecourt@bryant.edu.
Charles P. Cullinan, Bryant University.

name “Axess-tel,” although some phones were marketed to end users under the “Sprint” name in North America.

The largest markets for the company were in Europe (over 50 percent of sales) followed by North America (30 percent of sales) and the Middle East/Africa (16 percent). The company indicated that there were growth opportunities in developing countries in which “landline telecommunications networks are typically limited to densely populated urban areas because the cost of deploying landline telecommunications networks in developing areas has proven economically unfeasible” [Axesstel, 2013, p. 2]. They also indicated that “The transition to wireless communications is evident in developed countries with the advent of mobile products including 3G and 4G phones with increasing computing power and applications” [Axesstel, 2013, p. 1].

In its 10-K report for the year ended December 31, 2011, the company stated, “In order to achieve profitability under our current business model, we need to reach revenues of approximately \$50 to \$60 million annually. . .” [Axesstel, 2012, p. 25]. Its income statement for the year ended 2012 reported revenue toward the top end of that range at \$59.6 million. Management stated in the 10-K: “The combination of strong revenue growth, increasing gross margins and strict control over operating expenses resulted in record operating income of \$4.7 million for the year” [Axesstel, 2013, p. 25] and “[w]e have increased our gross margins through a combination of focused sales into strategic markets . . . and aggressive product cost reductions.” Axesstel’s revenues and operating expenses, as reported in the 10-K for 2012, are presented in Exhibit 1. The company’s revenue recognition policy is presented in Exhibit 2.

THREE TRANSACTIONS CLOSE TO THE 2012 YEAR END

As 2012 was drawing to a close, Axesstel had sold less than \$50 million of product for the calendar year, which was below the level of sales necessary to achieve profitability targets. From December 11 to December 21, 2012, the company engaged in three revenue transactions that increased their reported 2012 revenues by a total of approximately \$10.5 million. Three company executives, the chief executive officer (CEO), the chief financial officer (CFO), and the director of contract fulfillment and sales operations (director of sales), were the originators of these transactions.

Transaction One

On December 11, 2012, a telecommunications distributor in Sweden that had been one of Axesstel’s largest customers ordered 40,000 units of

Axesstel's wireless routers, even though the goods were not currently needed by the distributor. To induce the Swedish customer to purchase the goods, Axesstel's sales personnel had agreed that the distributor could delay payment for the goods until the routers were needed "to match market consumption" and agreed that the Swedish distributor would not be required to pay for the goods "until the devices are actually required" [SEC, 2018, ¶ 26] by the end users (i.e., the distributor's customers). A purchase order reflecting normal sales terms was sent to Axesstel; the agreement to delay payment until the goods were sold was documented in a side agreement, which Axesstel withheld from their auditors. Axesstel reported \$5 million in revenue from this transaction in its 2012 income statement.

Axesstel's auditor sent a confirmation request to the Scandinavian customer for the receivables balance related to Transaction One. The confirmation reply disclosed that the customer's payment for the good was contingent on sales to the end users. These terms were different from those on the original purchase order. When Axesstel's CFO and director of sales heard about this confirmation, they asked the customer to remove the contingency from the confirmation and requested that the distributor send a revised confirmation to Axesstel's auditor.

Transaction Two

On December 19, 2012, a telecommunications distributor in Nigeria agreed to purchase 5,000 phones and 5,000 security systems from Axesstel. The purchase order lacked some basic terms of the sales, such as shipping terms, and the purchase order contained incorrect pricing terms. Axesstel insisted on a letter of credit before shipping the goods, which was not received by Axesstel by December 31, 2012. Axesstel therefore did not ship the product before year end. Axesstel reported \$1.4 million in revenue from this transaction in its 2012 income statement.

Because the goods were still held by the company, Axesstel's director of sales indicated to the sales personnel that the company needed "somewhere to store the product" and "we can't have the product in our warehouse for the year-end audit" [SEC, 2018, ¶ 34]. As part of the 2012 audit of the company's inventory, the auditor performed test counts at Axesstel's warehouse. As part of the inventory observation procedures, the auditor asked for documentation of the shipments to the Nigerian customer, which the company was unable to provide.

Transaction Three

On December 21, 2012, a South African distribution company ordered 35,000 security systems and 5,000 phones for a total of \$4.1 million. The

initial purchase order indicated that payment was due only after the buyer’s “acceptance” of the product. In a side agreement with the customer, Axesstel agreed that payment for the goods would be required only when the goods were needed to fulfill “requirements from the end customers” [SEC, 2018, ¶ 18]. Until the goods were needed by the end users, Axesstel agreed that the “shipments [would be] held in China” [SEC, 2018, ¶ 18].

In January 2013, Axesstel unilaterally increased the price of each product by \$10 for marketing services, which the South African distributor had neither asked for nor agreed to. The company asked the South African distributor to revise their purchase order, which was backdated to December 2012. Axesstel’s CFO had expressed concerns about providing “a clean paper trail” for the auditors and requested the revised and backdated purchase order so that the company’s auditors would not question its validity and the \$4.1 million of revenue recognized from the sale. The company presented only the backdates and revised purchase order to their auditors; the original purchase orders and the side agreement detailing the contingencies were withheld.

THE AFTERMATH

The Swedish customer in Transaction One made a partial payment (based on the products sold through to end users) in April 2013. The remainder of the unsold goods were returned to Axesstel. The Nigerian customer never accepted receipt of the merchandise related to Transaction Two, because they believed the good were defective. The South African customer in Transaction Three never sold any of the goods to the end users and therefore (in accordance with the side letter), never paid for any of the goods.

REQUIRED

a. The three transactions presented in this case all occurred between December 11, 2012, and the end of the 2012. What percentage of the company’s reported revenue for 2012 do these transactions represent? If these transactions were not recognized, how much revenue would the company have reported for 2012? Why would these large revenue transactions close to period end be of particular interest to an auditor? (Be sure to consider the risk factors provided in the PCAOB standards at AS 2401.85.)

b. Prepare a diagram illustrating the channel of distribution from Axesstel to the distributors and then to the end users of the equipment. Indicate on the

diagram when Axesstel recognized revenue in transaction one and when it should have recognized the revenue.

Transaction One

c. For Transaction One to the Swedish distributor, do you think the revenue should have been recognized in 2012? If not in 2012, when (if ever) should this revenue have been recognized? Be sure to reference appropriate generally accepted accounting principles (GAAP) to explain your answer. Although this transaction occurred in 2012, please use the current GAAP (ASC 606) (which yields a similar answer to the rules in place in 2012).

d. Carefully define a confirmation (see PCAOB AS 2310). Assess the quality of evidence obtained via confirmations. Do you think the initial confirmation response from the Swedish customer related to questionable Transaction One was reliable evidence? How should the auditor respond if the confirmation evidence differs from the information on the purchase order?

Transaction Two

e. What is a letter of credit? Why would Axesstel not ship the goods until the letter of credit was received? Do you think the revenue should have been recognized in 2012? If not in 2012, when (if ever) should this revenue have been recognized? Be sure to reference appropriate GAAP to explain your answer. Although this transaction occurred in 2012, please use the current GAAP (ASC 606) (which yields a similar answer to the rules in place in 2012).

f. Assess the quality of evidence obtained via the auditor's physical observation of inventory (see PCAOB AS 2510). What might have prompted the auditor to ask for shipping documentation related to questionable Transaction Two? How should an auditor respond if the client is unable to provide evidence requested by the auditor?

Transaction Three

g. Do you think the revenue should have been recognized in 2012? If not in 2012, when (if ever) should this revenue have been recognized? Be sure to reference appropriate GAAP to explain your answer. Although this transaction occurred in 2012, please use the current GAAP (ASC 606) (which yields a similar answer to the rules in place in 2012).

h. What accounts and assertions were misstated by Axesstel in Transaction Three?

Exhibit 1: Axesstel's Operating Income, as Reported in the 2012 10-K

	For the Year Ended December 31		
	2012	2011	2010
Revenues	\$ 59,656,439	\$ 54,127,742	\$ 45,430,443
Cost of goods sold	44,355,502	41,201,806	37,923,470
Gross margin	15,300,937	12,925,936	7,506,973
Operating expenses			
Research and development	2,410,377	2,287,898	2,448,385
Sales and marketing	3,191,866	3,630,570	4,875,871
General and administrative	4,972,119	4,382,548	5,300,395
Total operating expenses	10,574,362	10,301,016	12,624,651
Operating income (loss)	4,726,575	2,624,920	(5,117,678)

Exhibit 2: Revenue Recognition Policy from Axesstel's 2012 10-K

Revenue from product sales is recognized when the risks of loss and title pass to the customer, as specified in (1) the respective sales agreements and (2) other revenue recognition criteria as prescribed by [GAAP]. We generally sell our products either FCA (Free Carrier) shipping port, or DDU (Delivery Duty Unpaid). When we ship FCA shipping port, title and risk of loss pass to the customer when the product is received by the customer's freight forwarder. When we ship DDU, title and risk of loss pass to the customer when the product is received at the customer's warehouse. If and when defective products are returned, we normally exchange them or provide a credit to the customer. The returned products are shipped back to the supplier, and we are issued a credit or exchange from the supplier. At December 31, 2012 and 2011, there was no allowance for sales returns.

TEACHING NOTES

The objectives of this case study are to learn and apply the fundamentals of revenue recognition, to practice approaches to audit a company's revenue, and to recognize and analyze the basic types of fraudulent. This case can be used in undergraduate auditing courses. The topic coverage spans both misreporting of revenue with overall evidence pointing to misrepresentation and fraud within the company and how an auditor may detect such misstatements, including detailed discussion of the nature and role of confirmations. Students are asked to consider how the nature of the company's costs structure and how revenue misstatements can affect overall profitability.

Table 1. Student Feedback on the Case

Question	Mean Response	Std. Deviation
The Axesstel case helped me understand why assessing inherent risk is an important step in planning an audit	4.133	0.694
The Axesstel case made me more aware of the risk of revenue transactions.	4.244	0.743
The Axesstel case was interesting.	3.867	0.786
The Axesstel case helped me understand the difficulties auditors sometimes have when auditing revenue.	4.318	0.674
The role of accounts receivable confirmations in an audit became clearer because of the Axesstel case.	3.911	0.633
Overall, the Axesstel case enhanced my understanding of the riskiness of revenue recognition and its implications for designing an audit.	4.200	0.661

Number of student respondents: 47.

The case study was offered in an undergraduate auditing class. Students had previous exposure to the material related to revenue recognition. Students were assigned the case with a one-week lead time to prepare their analyses and consider the role of the auditor in detecting misstatements. The case took about 45 minutes of class time to go over, with students being the primary drivers of the class conversation. The class generally began with one student asked to summarize the salient points of the case; then other students responded to the questions posed in the case. Students' performance was evaluated based on their responses and became part of their participation grade, which amounted to approximately 15 percent of overall course grade. To evaluate the case study, students were asked to complete a survey design on the 5-point Likert scale, with 1 point for *Strongly disagree* and 5 points for *Strongly agree*. Majority of students completed the survey. Student feedback regarding the case has been generally positive and is summarized in Table 1.

SUGGESTED SOLUTIONS

a. The three transactions presented in this case all occurred between December 11 and the end of the 2012. What percentage of the company's reported revenue for 2012 do these transactions represent? If these transactions

were not recognized, how much revenue would the company have reported for 2012? Why would these large revenue transactions close to period end be of particular interest to an auditor? (Be sure to consider the risk factors provided in the PCAOB standards at AS 2401.85.).

The total of the three transactions occurring in the last three weeks of the years (\$10.5 million) represents 17.6 percent of the total revenue. If these transactions were not recognized, the company would have reported about \$49.1 million of revenue.

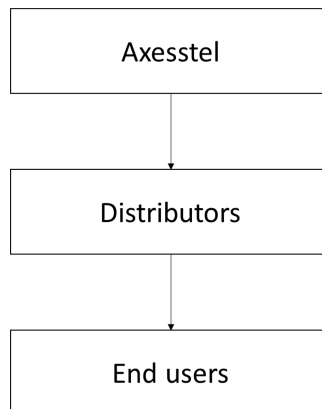
Transactions close to period end are specifically mentioned among the opportunities to misstate financial results in AS 2401.85:

Significant or highly complex transactions or significant unusual transactions, especially those close to period end, pose difficult “substance-over-form” questions.

The transactions presented in the case are significant because of their large size (17.6 percent of the transactions). Transactions close to period end are especially important to the auditor because the client will have better knowledge toward year end of whether they will likely be to achieve their objectives. Management of Axesstel had indicated that they would unprofitable if sales fell below \$50 million, which they would have if the three December transactions had not been reported. Therefore, because (1) the transactions were large; (2) the transactions occurred near year end; and (3) the transactions were necessary for the company to be profitable, these transactions did draw (and should have drawn) incremental scrutiny from the auditors.

b. Prepare a diagram illustrating the channel of distribution from Axesstel to the distributors and then to the end users of the equipment. Indicate on the diagram when Axesstel recognized revenue in Transaction One and when it should have recognized the revenue.

Figure 1. Axesstel’s Channel of Distribution



Axesstel recognized revenue related to questionable Transaction One when the goods were shipped to the Scandinavian distributor. However, recognition of the revenue should have been postponed until the equipment reached the end user because the Scandinavian customer was not required to pay for the goods until the end user had purchased them. The obligation of the Scandinavian customer is therefore contingent on a future event (sales to end users), calling into question whether the buyer has control of the goods, and thus, revenue recognize is precluded until the sales to end users occurs.

c. For Transaction One to the Swedish distributor, do you think the revenue should have been recognized in 2012? If not in 2012, when (if ever) should this revenue have been recognized? Be sure to reference appropriate generally accepted accounting principles (GAAP) to explain your answer. Although this transaction occurred in 2012, please use the current GAAP (ASC 606) (which yields a similar answer to the rules in place in 2012).

Axesstel recognized revenue related to questionable transaction one when the good were shipped to Scandinavian distributor. However, recognition of the revenue should have been postponed until the equipment reached the end user because the Scandinavian customer was not required to pay for the goods until the end user had purchased them. The obligation of the Scandinavian customer is therefore contingent on a future event (sales to end users), calling into question whether the buyer has control of the goods, and thus, revenue recognize is precluded until the sales to end users occurs. ASC 606-10-05-4e requires that the buyer have control of the goods before revenue can be recognized, whereas ASC-606-10-55-79 indicates that control of the goods by the buyer is unlikely to exist if the transaction is a consignment arrangement, and ASC 606-10-55-80 indicates that a sign of a consignment arrangement is that control is contingent on a future event, “such as the sale of the product to a customer of the dealer.”

ASC 606-10-25-1e also requires that “It is probable that the entity will collect substantially all of the consideration to which it will be entitled in exchange for the goods or services that will be transferred to the customer.” For questionable Transaction One, collectability was contingent on a future event (sell-through to the end user), calling into question whether collectability was probable.

The company could have recognized some of the revenue in April 2013 when the goods were sold through to the end user (and at which time Axesstel received a payment from the Scandinavian distributor).

d. Carefully define a confirmation (see PCAOB AS 2310). Assess the quality of evidence obtained via confirmations. Do you think the initial confirmation response from the Swedish customer related to questionable Transaction One was reliable evidence? How should the auditor respond if the confirmation evidence differs from the information on the purchase order?

PCAOB AS 2310.04 defines a confirmation as follows:

Confirmation is the process of obtaining and evaluating a direct communication from a third party in response to a request for information about a particular item affecting financial statement assertions.

Regarding the reliability of confirmation evidence, the PCAOB notes that “It is generally presumed that evidence obtained from third parties will provide the auditor with higher-quality audit evidence than is typically available from within the entity” (PCAOB AS 2310. 64).

The initial confirmation response from the Scandinavian customer was reliable evidence; it was from an outside party and fairly reflected the contingent nature of the transaction. The discrepancy between the confirmation and the purchase order should suggest to the auditor that the purchase order did not fully reflect the terms of the transaction. This discrepancy could signal a weak control process that did not fully capture the terms of the transaction and/or potentially intentional manipulation of the reporting of the transaction.

The response received from the Scandinavian customer revealed the presence of terms of the sale that differed from those in the other evidence provided to the auditor. Unlike management of the company, the Scandinavian customer had no motivation to misstate the nature and terms of the sale. The evidence was thus more reliable than evidence obtained from management.

e. What is a letter of credit? Why would Axesstel not ship the goods until the letter of credit was received? Do you think the revenue should have been recognized in 2012? If not in 2012, when (if ever) should this revenue have been recognized? Be sure to reference appropriate GAAP to explain your answer. Although this transaction occurred in 2012, please use the current GAAP (ASC 606) (which yields a similar answer to the rules in place in 2012).

A letter of credit is issued by a bank to ensure payment by a customer of the bank to a third party. For questionable Transaction Two, the letter of credit would be by issued by a bank guaranteeing payment by the Nigerian buyer for the goods “sold” by Axesstel. Axesstel would not ship the goods until the letter of credit was received because they were concerned about the ability and/or willingness of the Nigerian customer to pay for the goods.

Revenue cannot be recognized in 2012 because the goods have not shipped (i.e., control of the goods has not shifted to the buyer, violating ASC 606-10-05-4e). Even if the goods had been shipped, ASC 606-10-25-1e requires collectability to be probable, which should have inhibited Axesstel from recognizing the revenue even if the goods had been shipped.

f. Assess the quality of evidence obtained via the auditor’s physical observation of inventory (see PCAOB AS 2510). What might have prompted the auditor to ask for shipping documentation related to questionable Transaction Two? How should an auditor respond if the client is unable to provide evidence requested by the auditor?

PCAOB AS 2510.01 indicates that there is a presumption that auditor should physically observe a client's inventory: "Observation of inventories is a generally accepted auditing procedure. The independent auditor who issues an opinion when he has not employed them must bear in mind that he has the burden of justifying the opinion expressed." This type of evidence is considered to be highly reliable because the auditor observes the inventory, and "[e]vidence obtained directly by the auditor is more reliable than evidence obtained indirectly" (PCAOB AS 1105.04).

Axesstel asserted that the sale to the Nigerian customer had occurred on or before December 31, 2012. If the sale had occurred in this time frame, the inventory would have been shipped in 2012 and thus would not be physically present in the client's warehouse at the end of 2012. Thus, it is quite appropriate for the auditor to seek evidence of the shipment, because the goods were still in the warehouse.

If a client is unable to provide evidence requested by the auditor, the auditor should consider whether the client's inability to present the evidence indicates that a misstatement may have occurred. If the shipping documents are not available for Transaction Two, this missing evidence would suggest that the sale did not occur and thus should not have been recognized.

g. Do you think the revenue should have been recognized in 2012? If not in 2012, when (if ever) should this revenue have been recognized? Be sure to reference appropriate GAAP to explain your answer. Although this transaction occurred in 2012, please use the current GAAP (ASC 606) (which yields a similar answer to the rules in place in 2012).

Similar to the Scandinavian customer's obligations, the obligation of the South African customer was contingent on a future event (sales to end users). ASC 606-10-55-80 indicates that a sign of a consignment arrangement is that control is contingent on a future event, "such as the sale of the product to a customer of the dealer."

Also, although the goods left Axesstel, they were not actually received by the South African customer; instead they were shipped to a warehouse in China. This arrangement calls into question whether the buyer has control of the goods. ASC 606-10-05-4e requires that the buyer have control of the goods before revenue can be recognized.

h. What accounts and assertions were misstated by Axesstel in questionable transaction three?

Because the GAAP requirements for recognition of the revenue were not met, Axesstel violated the existence/occurrence assertion of revenue. Axesstel also had a receivable on its books that did not exist. (PCAOB Assertions were used because the company was an issuer.) The company also violated the valuation assertion in questionable Transaction Three by artificially inflating the price per unit by \$10.

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A Deep Dive into the Discounted Cash Flow Valuation Model in Determining the Impairment of Goodwill: An Instructional Guide

Nathan S. Slavin*, Mingzhu Liu, and Jianing Fang
Hofstra University and Kean University

The accounting for goodwill impairment is generally covered in an intermediate or advanced accounting course; however, there is usually little or no attention paid to the valuation techniques and subjectivity of assumptions used in the measurement of the fair value of the reporting unit. In this paper, we attempt to explain the quantitative approach with a focus on the discounted cash flow (DCF) model used in determining the fair value of the reporting unit. We examined six most common variables used in the DCF model and how a slight change could result in a different outcome in valuing a reporting unit.

Keywords: Teaching Goodwill Impairment, Discounted Cash Flow (DCF), Management Discretion

Disciplines of Interest: Financial Accounting and Reporting, Financial Statement Analysis, Pedagogy

INTRODUCTION

As set forth in Accounting Standards Codification (ASC) 350, “Intangibles – Goodwill and Other,” goodwill, an indefinite-lived intangible asset, is not amortized but tested for impairment at least once a year, unless changes in circumstances indicate that more frequent valuations are required [FASB, n.d. a]. For example, the recent COVID-19 global pandemic and related preventive measures, such as social distancing and shutdowns of nonessential businesses, as well as the resulting fluctuations in the stock market, may trigger an examination of the enterprise value for many companies. Current generally accepted accounting principles (GAAP) in the United States do not prescribe

* (Contact Author): Nathan S. Slavin, 516.459.2264, Nathan.S.Slavin@hofstra.edu.
Mingzhu Liu, Hofstra University, annaliuus@gmail.com.
Jianing Fang, Kean University, JFang@kean.edu.

the valuation method to be used in the impairment test [FASB, 2017]. The income approach and the market approach are commonly used valuation methods. The discounted cash flow (DCF) model is widely applied under the income approach [Easton et al., 2018]. This paper focuses on the subjectivity of the variables used under this model, where a slight change in one or more of the assumptions could result in a different outcome of the valuation of goodwill. As “no authoritative guidance exists” on any specific transaction [McNellis and Teets, 2019, p. 64], most accounting textbooks merely provide a general summary of the valuation of a company’s reporting unit without presenting the arduous procedures required. To fill this void, we plan to explore in a series of papers with various other methods that can be used in valuing a company, such as the residual operating income (ROPI) model and market multiples approach.

The objective of this paper is to present the various possible scenarios behind the DCF model for students to understand the estimation uncertainty and the valuation subjectivity on this topic. The first section of the paper will trace the chronology of the U.S. GAAP and controversial debates on the topic through a literature review. The second section will briefly walk through the various methods that are commonly used in the valuation practice. The third section will review the coverage of goodwill impairment in accounting textbooks. The fourth section will demonstrate with several examples the sensitivity of each of the valuation assumptions used in the DCF model. The fifth section will summarize our study and provide the students with an appreciation regarding the complexity of the DCF model and its impact on the potential impairment of goodwill.

LITERATURE REVIEW

Goodwill can only be recognized in a business combination [FASB, n.d. b]. Goodwill generally represents the intangible value within an organization, such as the skills and expertise of the company’s employees, particularly its management team. Visionaries such as Warrant Buffet, Bill Gates, Steve Jobs, and Elon Musk have added immeasurable intangible value to their companies. Additional intangible resources may be manifested in the firm’s research and development, its loyal client base, and its desirable geographic location. There have been earlier attempts in the previous century where proponents of “human resource accounting” advocated to capitalize human capital on the balance [Mirvis and Macy, 1976]. Such intangible value can bring synergies to the combined company in a merger and acquisition. These synergies may be in the form of cost reductions where duplicative positions are eliminated, such as in (areas of) accounting, human resources, and legal services. Both companies may achieve significant increases in sales where their respective products are complementary. Some recent examples include Tesla’s acquisition of Maxwell Technologies, a battery company, and Facebook’s acquisition of Instagram. The old management axiom of synergy is

where two plus two equals five or more as the result of a business combination. Once goodwill is recognized, it is reviewed for potential impairment at least annually. The accounting profession does not directly review the synergies that were achieved in the acquisition but examines the murky projections of the future and the use of finance methods such the discounted cash flow (DCF) and the market multiple approach.

The recent history of the accounting profession's guidance on the valuation of goodwill dates back to 1970 when the Accounting Principles Board (APB) issued APB Opinion No. 17: Intangible Assets (Opinion No. 17) [APB, 1970]. Under this Opinion, goodwill, as an unidentifiable asset acquired in a business combination, should be amortized systematically over the period estimated to be benefited, but not exceeding forty years. Effective June 2001, Financial Accounting Standards (FAS) No. 142 [FASB, 2001] superseded Opinion No. 17 and redefined the standard for the subsequent measurement of goodwill and other intangible assets. FAS 142 supplanted the arbitrary ceiling of forty years for amortization but required the goodwill asset be evaluated at least annually for impairment using a "two-step" process on the reporting unit level. This process begins with comparing the estimated fair value of the reporting unit with its book value (the "Step 1" test). If the reporting unit fails the "Step 1" test, meaning the estimated fair value is less than the reporting unit's carrying value, the entity is then required to derive the implied value of the goodwill asset as if the business is acquired in a new acquisition (the "Step 2" test). The implied hypothetical value of the goodwill asset is then compared to its reported carrying value in the "Step 2" test. An impairment is incurred when the carrying value exceeds the implied fair value of the goodwill asset. The "Step 2" test simulates the purchase price allocation in accounting for a business combination, which often involves various valuation specialists, resulting in significant costs.

We have observed that over the last decade and half, the accounting profession shifted its attention to simplifying accounting standards. The pivotal moment occurred in 2006 when the FASB and the American Institute of Certified Public Accountants (AICPA) organized the Private Company Financial Reporting Committee (PCFRC). The mission of the PCFRC was to accommodate the financial reporting needs of nonpublic companies. In the subsequent years, various organizations have focused on the specific needs of financial statement preparers as well as information users of private companies in the United States. Examples include roundtable discussions conducted by the Financial Accounting Foundation (FAF), which is the parent organization of the FASB in various regions throughout the United States regarding the specific issues concerning private companies. Concomitantly, the AICPA, the FAF, and the National Association of State Boards of Accountancy (NASBA) established a "blue-ribbon" panel (the Panel or BRP) to discuss how accounting standards can best meet the needs of the users of U.S. private company

financial statements [FASB, n.d. c]. The process was finalized in 2012 when the Private Company Council (PCC) was established. Its mandate was to steer the standard-setting process for small-cap and private companies.

Specifically, for the valuation of goodwill, the profession has seen a movement toward simplifying the measuring process. With the input from the PCFRC, the FASB issued ASU No. 2011-08: Intangibles – Goodwill and Other (Topic 350): Testing Goodwill for Impairment, to provide an option of a qualitative screen (the “Step 0” test) prior to the quantitative analysis [FASB, 2011]. Under this pronouncement, companies may elect to value goodwill using qualitative factors, such as the macroeconomic condition, industry and market considerations, costs of conducting business, overall financial performance and/or other relevant market and entity-specific events. If positive factors are present and can sufficiently support that the reporting unit’s fair value is not less than its carrying value, further quantitative analysis is not required. In 2017, the FASB issued ASU No. 2017-04: Intangibles – Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment to eliminate the second step of the “2-step” quantitative analysis of the goodwill impairment test [FASB, 2017]. The pronouncement was intended to simplify the annual measurement of the goodwill asset subsequent to the initial recognition as required by FAS No. 142 [FASB, 2001]. The new pronouncement is not an option but a requirement for all U.S. public and nonpublic business entities (with different mandatory adoption periods). Although the new standard attempts to simplify the measurement process of determining the impairment of goodwill, it may result in a greater write-down. This effect was particularly evident in 2017 where goodwill impairment increased by USD \$3.51 billion even though the economy was experiencing a strong recovery [Duff and Phelps, 2018]. Public companies may assess impairment with a “qualitative” approach or employ a simple “quantitative” approach in valuing the business entity and avoid the tedious and costly procedures of measuring the company’s specific assets and liabilities [FASB, 2017].

Through our review of the “Background Information and Basis of Conclusions” section included in ASU No. 2017-04 published by the FASB, it appears that the recent changes in the standard have yielded diverse opinions among those who supported the simplified approach and those who favored retaining the legacy “Step 2” test as an option. Specifically, four FASB board members who supported the elimination of the “Step 2” test agreed that this change met the objective of reducing costs of the legacy quantitative analysis while achieving the information usefulness for the users of financial statements. Three dissenting board members suggested retaining the legacy test as an option because there could be inconsistent results between the “Step 1” and the “Step 2” analyses. The FASB also acknowledged the possibility that the “Step 2” test could benefit entities where they might fail the “Step 1” test but pass “Step 2” [FASB, 2017]. The FASB also pointed out that users usually do not have an adequate understanding of how the calculation under “Step 2” works [FASB, 2017]; therefore, it is understandable why textbooks do not provide a

comprehensive illustration of the valuation models. This paper provides an opportunity for students to appreciate the complications involved in this process.

REVIEW OF GOODWILL IMPAIRMENT VALUATION METHODS

The U.S. GAAP do not require a certain valuation method used in the impairment test [FASB, 2017]. According to Easton et al., “the most widely used model to estimate the value of common stock is the discounted cash flow (DCF) model” [Easton et al., 2018, p. 13]. Further, in the process of collecting data for this research regarding the valuation methods of goodwill, the authors found that 23 of the 30 Dow companies for fiscal year 2017 [Slavin and Fang, 2018] disclosed the use of the DCF method in the valuation of goodwill. Although there are several variations of the DCF model, the FASB recommends that a simple approach be used:

In more realistic situations, there could be many possible outcomes. However, to apply the expected present value technique, it is not always necessary to take into account distributions of all possible cash flows using complex models and techniques. Rather, it might be possible to develop a limited number of discrete scenarios and probabilities that capture the array of possible cash flows. For example, a reporting entity might use realized cash flows for some relevant past period, adjusted for changes in circumstances occurring subsequently (for example, changes in external factors, including economic or market conditions, industry trends, and competition as well as changes in internal factors affecting the reporting entity more specifically), taking into account the assumptions of market participants [FASB, n.d. d, ASC para. 820-10-55-18].

The AICPA also acknowledges that the valuation “techniques used most often in practice for measuring the fair value of reporting units” in applying the income approach is the DCF method. The DCF model may include the valuation of a company’s equity and debt (enterprise premise) or exclude the company’s interest-bearing debt (equity premise). The AICPA guidance begins their analysis with the enterprise method and deducts the firm’s net nonoperating obligation (NNO) in arriving at the equity value [AICPA, 2019]. We will follow the same approach, which is also used in the Easton et al. textbook, *Financial Statement Analysis & Valuation* [Easton et al., 2018], in developing our demonstration examples. The existing U.S. GAAP does not prescribe the valuation premise to be used in the impairment test [FASB, 2017].

GOODWILL IMPAIRMENT COVERAGE IN ACCOUNTING TEXTBOOKS

Goodwill valuation is generally presented in an intermediate or advanced accounting course where students are introduced to the “qualitative” and “quantitative” options as well as the measurement of an “impairment.” The

presentation of the quantitative option assumes a market value of a reporting unit that includes goodwill on its balance sheet [Hoyle, Schaefer, and Doupnok, 2021, p. 121]. For example, Hoyle reviews the following valuations in their *Advanced Accounting* textbook for a reporting unit named DSM Wireless as of December 31, 2020, as follows:

Goodwill Amount	Fair Value	Carrying Amount
\$155,000,000	\$650,000,000	\$720,000,000

The textbook informs the reader that the impairment of goodwill is \$70 million, which is the carrying value in excess of the fair value, indicating a simplified quantitative approach is taken. The book also introduces the minimum disclosures as required by ASC 350. However, it does not give details on how the \$650 million fair value was derived.

Hamlen [2018] uses a similar analysis in her advanced accounting textbook, where detailed calculations of the fair value of the reporting unit are not provided. However, the textbook does mention the employment of the DCF method using AT&T’s footnote disclosure:

We estimate fair values using an income approach (also known as a discounted cash flow) and a market multiple approach. The income approach utilizes our 10-year cash flow projections with a perpetuity value discounted at an appropriate weighted average cost of capital. The market multiple approach uses the multiples of publicly traded companies whose services are comparable to those offered by the reporting units [p. 142].

Similar to the Hoyle et al. textbook, Christensen et al. [2019] describes the following example in their advanced accounting textbook for a reporting unit that has goodwill with a carrying value of \$100,000:

By summing the carrying amounts of the assets and subtracting the carrying amount of the payables, the net carrying amount of the reporting unit, including the goodwill, is determined to be \$340,000. If the fair value of the reporting unit is estimated to be \$360,000 (or any number greater than the carrying amount), goodwill is not impaired. On the other hand, if the fair value of the reporting unit is estimated to be \$280,000, the \$60,000 difference (\$340,000–\$280,000) represents Reporting Unit A’s goodwill impairment loss and the goodwill’s new carrying amount is \$40,000 (after recording the impairment). Note that the impairment loss cannot exceed the amount of goodwill assigned to the reporting unit [p.19].

As shown in the excerpts above, the authors introduced the relevant accounting standards for goodwill measurement subsequent to the initial recognition. The authors also explained in detail the computation of the book value using the reporting unit’s assets and liabilities as well as how the impairment loss is calculated. However, the textbooks did not get into details as to how the “fair value” of the reporting unit was derived. The next section will unveil the mystery of determining the fair value of a reporting unit with our demonstration examples.

DEMONSTRATION EXAMPLES

(All Dollar Amounts Are in Thousands. All Exhibits Are Prepared in Microsoft Excel with Formula-Driven Calculations; Rounding Differences May Result with Manual Calculations.)

As the synergistic properties are intangible in nature, there are generally no observable inputs that can be quoted in determining the fair value of the goodwill asset. As a result, the accounting guidance prescribes the potential impairment to be determined when the carrying value of the reporting unit exceeds its fair value. The DCF model is a commonly used finance method in measuring the fair value of assets and liabilities as well as an enterprise. Although there are differences in applying the DCF model, we have elected to use the approach covered in the Easton et al. [2021, p. 13–6] financial statement analysis textbook. We found this version of the model concise and easy to comprehend. The formula for the free cash flow in this textbook is:

$$\text{Free Cash Flow to the Firm} = \text{Net Operating Profit After Tax} - \text{Change in Net Operating Assets} \quad (1)$$

Or

$$\text{FCFF} = \text{NOPAT} - \Delta\text{NOA} \quad (1.a)$$

To apply this model, we created a reporting unit based on the financial statements of an actual public company. In developing our hypothetical reporting unit, we selected a listed company from the Securities Exchange Commission's (SEC) EDGAR database that disclosed the variables used in its DCF valuation. The purpose is to create a set of coherent financial information with relevant valuation elements for the demonstration examples. Based on this objective, we modified the income statement and balance sheet reported in the 2017 annual report of Bioanalytical Systems, Inc. [2017, p. 3]. We deliberately selected Bioanalytical Systems, Inc., because of its simple reporting structure, where only one of the two reporting units contained goodwill. The company also disclosed the necessary information of the valuation variables in the following footnote:

The discount rate, gross margin, and sales growth rates are the material assumptions used in our calculations of the present value cash flows that had been used to estimate the fair value of the reporting units when performing the annual goodwill impairment test. Our reporting unit with goodwill at September 30, 2017, is Preclinical Services, which is included in our contract research services segment, based on the discrete financial information available, which is reviewed by management. We use a cash flow approach in estimating the fair value of the reporting units, where the discount rate reflects a weighted average cost of capital rate. The cash flow model used to derive fair

value is sensitive to the discount rate and sales growth assumptions used [Bioanalytical Systems, Inc., 2017, p. 33].

Based on Bioanalytical Systems' 2017 annual report, we created the modified income statement and balance sheet for our hypothetical company (Exhibits 1 and 2). We first present a reference example in Exhibit 3,

Exhibit 1: Statements of Operations

HYPOTHETICAL COMPANY CONSOLIDATED STATEMENTS OF OPERATIONS (In thousands, except per share amounts) For the Years Ended September 30, 2019		
Revenue		24,242
Cost of revenue		16,545
Gross profit		7,697
Operating expenses		6,419
Operating income	C	1,278
Interest expense	C1	375
Other income	C2	5
Income before income taxes		908
Income tax expense	T	24
Net income		884
Net Operating Profit after Tax (NOPAT)	$\text{NOPAT} = \text{C} - [\text{T} + (\text{C1} - \text{C2}) \times 37\%]$	1,117

where the fair value of the reporting unit virtually equals the carrying value. We slightly modified the base year as introduced in Exhibits 1 and 2 above and estimated a set of the relevant variables for the four-year projected horizon period (2020–2023) and a terminal period to create a neutral position before modifying each of the variables of the DCF model. The subsequent exhibits will demonstrate how small changes in each variable will affect the value of the reporting unit and the potential impairment of goodwill. For the purpose of demonstrating the income tax effect on valuation, we have modified Easton et al's [2021, p. 13–18] model by including operating profits and taxes on them in our calculation. The tax rate of 37 percent represents the combined corporate federal and state statutory rate, as used in the Easton et al's model [2018, p. 11–22].

We explain each of the variables and calculations in the reference example for all the projected periods:

Exhibit 2: Consolidated Balance Sheets

HYPOTHETICAL COMPANY CONSOLIDATED BALANCE SHEETS (In thousands, except share amounts) As of September 30, 2019		
Assets		
Current assets:		
Cash and cash equivalents	A1	\$434
Trading securities	A2	5,552
Accounts receivable		2,530
Unbilled revenues and other		615
Inventories, net		913
Prepaid expenses		814
Total current assets		10,858
Property and equipment, net		8,965
Goodwill		38
Lease rent receivable		87
Other assets		21
Total assets	A	19,969
Liabilities and shareholders' equity		
Current liabilities:		
Accounts payable		4,538
Restructuring liability		1,117
Accrued expenses		1,202
Customer advances		928
Income tax accruals		20
Current portion of capital lease obligation		128
Current portion of long-term debt	B1	550
Total current liabilities		8,483
Capital lease obligation, less current portion		69
Long-term debt, less current portion	B2	5,000
Total liabilities	B	13,552
Shareholders' equity		6,417
Total liabilities and shareholders' equity	A	19,969
Net Operating Assets (NOA) = (A – A1 – A2) – (B – B1 – B2) = 5,981		
Net Nonoperating Obligation (NNO) = (B1 + B2) – (A1 + A2) = (436)		

Exhibit 3: Reference

Description/(Legend)		Formula	Projected Horizon Period				Terminal Period
	2019		2020	2021	2022	2023	
Sales (S)	24,242	$S_n = S_{n-1} \times (1 + g)$	24,824	25,420	26,030	26,655	26,922
Operating Profit (OP)	1,278	$OP_n = S_n \times OPM_n$	1,269	1,299	1,330	1,362	1,376
Tax (T)	161	$T_n = OP_n \times t$	470	481	492	504	509
NOPAT	1,117	$NOPAT_n = OP_n - T_n$	799	818	838	858	867
NOA	5,981	$NOA_n = SN/NOAT_n$	8,275	8,473	8,677	8,885	8,974
Delta		$\Delta NOA_n = NOA_n - NOA_{n-1}$	2,294	198	204	208	89
FCFF = (NOPAT – Increase in NOA)		$FCFF_n = NOPAT_n - \Delta NOA_n$	(1,495)	620	634	650	778
							(d)
Discount period (n)			1	2	3	4	
Discount factor (f)		$f = 1/(1 + r_w)^n$	0.9091	0.8264	0.7513	0.6830	
PV of Horizon Period FCFF (H)		$H_n = FCFF_n \times f$	(1,359)	513	476	444	
Cum PV of Horizon Period (J)	74	$J = \sum H$					
PV of Terminal Period (K)	5,902	$K = [d/r_w \cdot g_t]/(1 + r_w)^n$					
Less (plus) NNO	(436)						
Total equity value (EV)	6,412	$EV = J + K - NNO$					
Total book value	6,417						
Difference	(5)						
Impairment	Yes						

Notes: Projected variable value:
Sales growth rate (g) 2.40%.
Operating profit margin (OPM) 5.11%.
Operating asset turnover (OAT) 3.00.
Income tax rate (t) 37.00%.
Discount rate (r_w) 10.00%.
Terminal growth rate (g_t) 1.00%.

1. Sales (S): We use the following formula in estimating sales for the projected horizon period, assuming a sales growth rate of 2.40%:

$$S_n = S_{n-1} \times (1 + g), \quad (2)$$

where S_n is the annual sales, n is the fiscal period, and g is the forecasted sales growth rate. For example, to calculate the 2020 forecasted sales, we use the \$24,242 sales reported in 2019 and arrive at a projected sales of \$24,824 ($24,242 \times (1 + 2.40 \text{ percent}) = 24,824$). We use the same calculation for the remaining projected horizon periods from 2021 to 2023. In calculating the forecasted sales for the terminal period, we substitute the sales growth rate (g), with a terminal period sales growth rate (g_t) as shown in the following formula:

$$S_t = S_4 \times (1 + g_t), \quad (2.a)$$

where S_t is the projected annual sales of the terminal period, S_4 is the forecasted sales of the final year (2023) of the projected horizon period, and g_t is the forecasted terminal period sales growth rate. Thus, the projected terminal period sales of \$26,922 are derived by multiplying the sales (\$26,655) of 2023, the final year of the projected horizon period by 1.01 ($26,655 \times (1 + 1 \text{ percent}) = 26,922$).

2. Operating Profit (OP): We now calculate the operating profit for each of the projected horizon period and the terminal period with the following formula:

$$OP_n = S_n \times OPM_n, \quad (3)$$

where OP_n is the operating profit for year n , S_n is the projected sales for year n , and OPM_n is the operating profit margin for year n (see Formula 3.a below). For example, to calculate operating profit of \$1,269 for 2020, we multiply the sales of \$24,824 by 5.11 percent, ($24,824 \times 5.11 \text{ percent} = 1,269$).

Operating Profit Margin (OPM)

OPM used in formula 3 is calculated with the following formula:

$$OPM_n = OP_n / S_n, \quad (3.a)$$

where OPM_n is equal to the operating profit for year n divided by sales for year n . We use a projected operating profit margin of 5.11 percent in forecasting OP for each of the projected horizon period and in the terminal period.

3. Tax (T): We calculate the income taxes for each of the projected horizon period and the terminal period with the following formula:

$$T_n = OP_n \times t, \quad (4)$$

where T_n are the income taxes for year n , OP_n is the operating profit, and t is the forecasted tax rate. For example, to calculate the 2020 forecasted income taxes, we use the operating profit of \$1,269 multiplied by the tax rate of 37.00 percent, which resulted in a projected income taxes of \$470 ($1,269 \times 37.00$ percent = 470).

4. Net Operating Profit After Tax (NOPAT): We compute net operating profit after tax for each of the projected horizon period and terminal period with the following formula:

$$NOPAT_n = OP_n - T_n, \quad (5)$$

where $NOPAT_n$ is the net operating profit after taxes for year n , OP_n is the operating profit for year n , and T_n are the income taxes for year n . For example, to calculate the NOPAT for 2020, we use the operating profit of \$1,269 minus the income taxes of \$470, which resulted in a NOPAT of \$799 ($1,269 - 470 = 799$).

5. Net Operating Assets (NOA): We calculate the net operating assets for each of the projected horizon period and terminal period with the following formula:

$$NOA_n = S_n / OAT_n, \quad (6)$$

where NOA_n is the net operating assets for year n , S_n is the forecasted sales for year n , and OAT_n is the net operating asset turnover for year n . For example, to calculate the NOA for 2020, we use the forecasted sales of \$24,824 divided by the operating asset turnover of 3.00 which results in \$8,275 ($24,824 / 3.00 = 8,275$).

Net Operating Asset Turnover (NOAT): Net Operating Asset Turnover measures the productivity and efficiency of the operating assets used in the business. The greater the OAT, the more efficient the use of the operating assets.

OAT used in formula 6 is calculated with the following formula:

$$NOAT_n = S_n / NOA_n, \quad (6.a)$$

where $NOAT_n$ is equal to the sales for year n divided by net operating assets for year n . We use a projected operating asset turnover of 3.00 in forecasting the net operating assets for each of the projected horizon period and in the terminal period.

6. Change in Net Operating Assets (ΔNOA): In the calculation of the annual change of net operating assets for each of the projected horizon period and the terminal period, we use the following formula:

$$\Delta NOA = NOA_n - NOA_{n-1}, \quad (7)$$

where ΔNOA_n is the annual change of net operating assets for year n , NOA_n is the net operating assets for year n , and NOA_{n-1} is the net operating assets for the prior year. For example, to calculate the annual change in net operating assets of \$2,294 for 2020, we subtract the net operating assets of \$5,981 for fiscal year 2019 from \$8,275 for fiscal year 2020 ($8,275 - 5,981 = 2,294$).

7. Free Cash Flows to the Firm (FCFF): The FCFF represents the cash generated from operations and excludes the cash from investing and financing activities. We calculate the FCFF for each of the projected horizon period and terminal period with the following formula:

$$\text{FCFF}_n = \text{NOPAT}_n - \Delta\text{NOA}_n, \quad (8)$$

where FCFF_n is the free cash flow to the firm for year n , NOPAT_n is the net operating profit after taxes for year n , and ΔNOA_n is the annual change of net operating assets for year n . For example, to calculate the free cash flow to the firm for 2021, we use the NOPAT of \$818 minus the ΔNOA of \$198, which results in a FCFF of \$620 ($818 - 198 = 620$).

8. Discount period (n): The discount period represents the projected horizon period. We use n to denote the fiscal year. In this model, we use a four-year horizon period (2020–2023).

9. Discount factor (f): The discount factor is used to determine the future cash flow in today's value. To calculate the discount factor for each of the projected horizon period, we use the following formula:

$$f = 1/(1 + r_w)^n, \quad (9)$$

where f is the discount factor for each of the projected horizon period, and r_w is the forecasted discount rate, which generally represents the weighted average cost of capital of the firm. The weighted average cost of capital is a composite rate of a firm's debt and capital composition, where n represents the fiscal year for each of the projected horizon period. For example, to calculate the discount factor of 0.8264 for 2021, we first need to calculate the denominator. The denominator is equal to $1 + 10$ percent to the power of 2, because 2021 is the second year of the projected horizon period. We then divide 1 by the denominator [$1/(1 + 10 \text{ percent})^2$].

10. PV of Horizon Period FCFF (H): We compute the present value of the free cash flow to the firm for each of the projected horizon period with the following formula:

$$H_n = \text{FCFF}_n \times f, \quad (10)$$

where H_n is the present value of the free cash flow to the firm for each of the projected horizon period, FCFF_n represents the cash generated from operations and excludes the cash flows from investing and financing activities, and f is the discount factor. For example, to calculate the present value of the free cash flow to the firm for 2021, we use the free cash flow to the firm of \$620 and multiply by the discount factor of 0.8264, which results in \$513 ($620 \times 0.8264 = 513$).

11. Cum PV of Horizon Period FCFF (J): We calculate the summation of the present value of the FCFF for each year of the projected horizon period with the following formula:

$$J = \Sigma H, \quad (11)$$

where J is the sum of the present value of the FCFF for each year in the projected horizon period, Σ is the mathematical symbol for summation, and H is the present value of the free cash flow to the firm for each of the projected horizon period. For example, to sum up the present value of FCFF for the projected horizon period for Exhibit 3, we add all the present value of the free cash flow to the firm for each of the projected horizon period from 2020 to 2023. The total equals to \$74 ($-1,359 + 513 + 476 + 444 = 74$).

12. PV of Terminal FCFF (K): We compute the present value of the terminal period with the following formula:

$$K = (d/(r_w - g_t)/(1 + r_w)^n, \quad (12)$$

where K represents the present value of the terminal period. In Exhibit 3 and in the formula, we use the legend (d) to identify the FCFF for the terminal period. The forecasted discount rate, r_w is the weighted average cost of capital, g_t is the forecasted terminal year sales growth rate, and n is the final year of the projected horizon period. For example, to calculate the present value of the FCFF for the terminal period, we first need to calculate the second denominator used in the formula, which is equal to $1 + 10$ percent to the power of 4, because there are four years in the projected horizon period. In the next step, we need to calculate the first denominator used in the formula, which is equal to the projected discount rate, r_w , minus the forecasted sales growth rate for the terminal period, g_t . Now we are ready to finalize our calculation by dividing (d), the FCFF for the terminal period by the first denominator, then divide the result by the second denominator. We arrive at the present value of the FCFF for the terminal period, which equals $\$5,902 [778/(10 \text{ percent} - 1.00 \text{ percent})]/(1 + 10 \text{ percent})^4$.

13. Net Nonoperating Obligations (NNO): We calculate the net nonoperating obligations using the following formula:

$$NNO = \text{nonoperating obligations minus nonoperating assets}, \quad (13)$$

where NNO is the net nonoperating obligations. We compute this by subtracting the nonoperating assets from the nonoperating liabilities. Therefore, when NNO is a positive amount, it is subtracted. When NNO is a negative amount, meaning the nonoperating assets exceed the nonoperating liabilities, the amount is an addition. For example, the total nonoperating liabilities in Exhibit 2 is \$5,550, which is the current portion of the long term debt of \$550 (B1) plus the long-term debt of \$5,000 (B2). The nonoperating assets are equal to \$5,986, which is the sum of the cash of \$434 (A1) plus the trading securities of \$5,552 (A2). The NNO is equal to the net nonoperating assets of \$5,986 subtracted from the nonoperating liabilities of \$5,550 ($5,550 -$

5,986 = -436). The \$436 is therefore added to the total equity value in Exhibit 3.

14. Total Equity Value (EV): We calculate the total equity value with the following formula:

$$EV = J + K - NNO, \quad (14)$$

which is the total of the cumulative present value of the FCFF for the projected horizon period, plus the present value of FCFF for the terminal period and subtract the impact of NNO. In Exhibit 3, the cumulative present value of the FCFF for the projected horizon period of \$74 plus the present value of the FCFF for the terminal period of \$5,902, plus the negative NNO of \$436 is equal to \$6,412 ($74 + 5,902 + 436 = 6,412$). Note that the total nonoperating assets exceed the total nonoperating liabilities and results in an addition in the total equity value.

15. Total Book Value: The total book value of the firm is equal to the net assets or the shareholders' equity. Refer to the balance sheet (Exhibit 2), the shareholders' equity is equal to \$6,417.

16. Impairment: Referring to Exhibit 3, using the six forecasted variable parameters, we arrived at a projected total equity value of \$6,412, which is \$5 below the firm's total book value of \$6,417. Because the \$5 difference is close to breakeven, we use this set of variable values as a reference point in analyzing potential changes in each of the six variables. The objective of this exercise is to assist the students in understanding management's discretion in determining the fair value of the entity and avoid the potential impairment of goodwill as presented in the following section.

The Independent Effect of Each Variable on the Potential of Goodwill Impairment.

This section demonstrates the effect of each of the six variables has on the total equity value and the potential of goodwill impairment. We will examine the following variables used in this version and the impact of small changes of the variables have on the impairment of goodwill:

Selected Variable Relationship with the Fair Value

- Sales growth rate (g) Direct
- Operating profit margin (OPM) Direct
- Operating asset turnover (OAT) Direct
- Income tax rate (t) Inverse
- Discount rate (r_w) Inverse
- Terminal growth rate (g_t) Direct

These aforementioned directions of the variables are under the assumption of a positive operating profit margin, meaning the company will be generating future cash flows and using its resources efficiently. On an individual basis, variables such as the sales growth rate and the terminal growth rate, along with the OPM contribute directly to the cash flows. Increases in OAT

represents a level of efficiency in using the firm's working capital and resources and producing profit. Conversely, increases in the income tax rate add to the firm's burden in doing business. Although it does not necessarily indicate that the synergistic benefits from the business combination have deteriorated, it does pose a negative impact on the firm's cash flows. Last, the discount rate, which usually encompasses the firm's cost of capital (debt and equity) and business risk factors, has an inverse relationship with the fair value. A higher discount rate represents a higher cost of raising capital and a higher risk of achieving the projected financial goals, hence, lower present value of the projected cash flows.

To elaborate, in Exhibit 4 below, we are showing that a higher sales growth rate results in a higher fair value. This relationship exists only when the operating profit margin is positive, meaning the more the company sells, the more profit it earns; whereas on the other hand, if the profit margin is negative, the more the company sells, the more losses it incurs. This will result in a deleterious effect on the firm's fair value. However, many companies in their formative years, such as Amazon and Tesla, experienced losses but continued to have increases in market value. These increases were mainly due to investors' belief in these companies' upward growth potential.

The underlying logic of the DCF model is to estimate the fair value of an enterprise by discounting the cash flows that its assets and liabilities will generate in the future. The starting point of the projected free cash flows is forecasted sales. Generally, where a company is operating at a positive profit margin (or income from operations before tax), an increase in sales will generate an increase in free cash flow. In Exhibit 4, we increase the forecasted sales growth rate from 2.40 percent to 3.40 percent. Following the demonstration example in Exhibit 3, we ran formulae 1 to 14 with the higher sales growth rate, which resulted in a higher equity value.

Similarly, in Exhibit 5, we lowered the forecasted sales growth rate from 2.40 percent to 1.40 percent, which resulted in a lower equity value and a potential impairment of goodwill.

Variables could interact with each other and collectively have an impact on the fair value of the entity. We examine this interdependent effect in Exhibit 6.

In this example, we are demonstrating a scenario where the increase in sales is offset by a decrease in operating profit margin. This may occur when a company engages in an expansive marketing campaign to become a sales leader in the industry. The increase in operating expenses may offset the gains achieved in the increase in sales volume, which could result in a decline in the firm's fair value. As shown in Exhibit 6, the sales growth rate (g) increased from 2.4 percent to 3.4 percent, whereas the OPM decreased from 5.11 percent to 4.61 percent, resulting in a decline of fair value of the entity from \$6,412 (Exhibit 3) to \$6,398. The fair value of \$6,398 is lower than the book value of \$6,417, causing a goodwill impairment of \$19.

Exhibit 4: Higher Sales Growth Rate

Description/(Legend)		Formula	Projected Horizon Period				Terminal Period
	2019		2020	2021	2022	2023	
Sales (S)	24,242	$S_n = S_{n-1} \times (1 + g)$	25,066	25,918	26,799	27,710	27,987
Operating Profit (OP)	1,278	$OP_n = S_n \times OPM_n$	1,281	1,324	1,369	1,416	1,430
Tax (T)	161	$T_n = OP_n \times t$	474	490	507	524	529
NOPAT	1,117	$NOPAT_n = OP_n - T_n$	807	834	863	892	901
NOA	5,981	$NOA_n = SN/NOAT_n$	8,355	8,639	8,933	9,237	9,329
Delta		$\Delta NOA_n = NOA_n - NOA_{n-1}$	2,374	284	294	304	92
FCFF = (NOPAT – Increase in NOA)		$FCFF_n = NOPAT_n - \Delta NOA_n$	(1,567)	550	569	588	809
							(d)
Discount period (n)			1	2	3	4	
Discount factor (f)		$f = 1/(1 + r_w)^n$	0.9091	0.8264	0.7513	0.6830	
PV of Horizon Period FCFF (H)		$H_n = FCFF_n \times f$	(1,425)	455	427	402	
Cum PV of Horizon Period (J)	(141)	$J = \sum H$					
PV of Terminal Period (K)	6,139	$K = [d/(r_w - g_t)] / (1 + r_w)^n$					
Less (plus) NNO	(436)						
Total equity value (EV)	6,434	$EV = J + K - NNO$					
Total book value	6,417						
Difference	17						
Impairment	No						

*Sales growth rate (g) increased from 2.4% to 3.4%.

Exhibit 7 summarizes the mathematical effect of each of the six variables used in the DCF model. Four of the variables (sales growth rate, OPM, OAT, and terminal growth rate) have positive effects on the total equity value, whereas the other two variables (income tax rate and discount rate) have inverse effects.

Limited Earnings Management in Manipulating the DCF Variables

Our analysis has demonstrated the quantitative effect the six variables have on a firm's equity. Some variables, such as the firm's sales growth rate, may

Exhibit 5: Lower Sales Growth Rate

Description/(Legend)		Formula	Projected Horizon Period				Terminal Period
	2019		2020	2021	2022	2023	
Sales (S)	24,242	$S_n = S_{n-1} \times (1 + g)$	24,581	24,925	25,274	25,628	25,884
Operating Profit (OP)	1,278	$OP_n = S_n \times OPM_n$	1,256	1,274	1,292	1,310	1,323
Tax (T)	161	$T_n = OP_n \times t$	465	471	478	485	489
NOPAT	1,117	$NOPAT_n = OP_n - T_n$	791	802	814	825	833
NOA	5,981	$NOA_n = SN/NOAT_n$	8,194	8,308	8,425	8,543	8,628
Delta		$\Delta NOA_n = NOA_n - NOA_{n-1}$	2,213	114	117	118	85
FCFF = (NOPAT – Increase in NOA)		$FCFF_n = NOPAT_n - \Delta NOA_n$	(1,422)	688	697	707	748
							(d)
Discount period (n)			1	2	3	4	
Discount factor (f)		$f = 1/(1 + r_w)^n$	0.9091	0.8264	0.7513	0.6830	
PV of Horizon Period FCFF (H)		$H_n = FCFF_n \times f$	(1,292)	569	523	483	
Cum PV of Horizon Period (J)	283	$J = \sum H$					
PV of Terminal Period (K)	5,679	$K = [d/(r_w - g_t)] / (1 + r_w)^n$					
Less (plus) NNO	(436)						
Total equity value (EV)	6,398	$EV = J + K - NNO$					
Total book value	6,417						
Difference	(19)						
Impairment	Yes						

*Sales growth rate (g) decreased from 2.4% to 1.4%.

be influenced by the company's management; other variables, such as the change in the corporate tax rate, are externally determined and are not subject to management's discretion. These external variables may not necessarily affect the synergistic benefits acquired in a business combination but may still have an impact on the valuation of a company. In practice, the calculation and supporting documentation of the DCF model would be subject to numerous reviews from the company's audit committee, the firm's independent accounting firm, and the probable engagement of finance and investment specialists. In addition, the Public Company Accounting Oversight Board (PCAOB) now

Exhibit 6: Higher Sales Growth Rate and Lower Operating Profit Margin

Description/(Legend)		Formula	Projected Horizon Period				Terminal Period
	2019		2020	2021	2022	2023	
Sales (S)	24,242	$S_n = S_{n-1} \times (1 + g)$	25,066	25,918	26,799	27,710	27,987
Operating Profit (OP)	1,278	$OP_n = S_n \times OPM_n$	1,156	1,195	1,235	1,277	1,290
Tax (T)	161	$T_n = OP_n \times t$	428	442	457	473	477
NOPAT	1,117	$NOPAT_n = OP_n - T_n$	728	753	778	805	813
NOA	5,981	$NOA_n = SN/NOAT_n$	8,355	8,639	8,933	9,237	9,329
\Delta NOA		$\Delta NOA_n = NOA_n - NOA_{n-1}$	2,374	284	294	304	92
FCFF = (NOPAT – Increase in NOA)		$FCFF_n = NOPAT_n - \Delta NOA_n$	(1,646)	469	484	501	721
							(d)
Discount period (n)			1	2	3	4	
Discount factor (f)		$f = 1/(1 + r_w)^n$	1	1	1	1	
PV of Horizon Period FCFF (H)		$H_n = FCFF_n \times f$	(1,496)	387	364	342	
Cum PV of Horizon Period (J)	(403)	$J = \sum H$					
Pv of Terminal Period (K)	5,470	$K = [d/(r_w - g_t)] / (1 + r_w)^n$					
Less (plus) NNO	(436)						
Total equity value	5,503	$EV = J + K - NNO$					
Total book value	6,417						
Difference	(914)						
Impairment	Yes						

*Sales growth rate (g) increased from 2.4% to 3.4%, and operating profit margin (OPM) decreased from 5.11% to 4.61%.

requires auditors to include in their annual report any area that involves challenging, subjective, or complex auditor judgment as a critical audit matter (CAM) [PCAOB, 2017]. In an extensive study by Huikku, Mouritsen, and Silvola [2017], the measurement of goodwill involves numerous participants and validations to “traces” to transactions. The authors distinguish the participants into internal actors, such as the firm’s entrepreneurial managers and financial accountant, and external actors, such as the firm’s independent auditors, external specialists, and external statistical bureaus. The external

Exhibit 7: Summary of the Variables

Description/ (Legend)	Value	Firm Value	Book Value	Excess/ (Deficit)	Impairment
Sales Growth Rate (g)	3.40%	6,434	6,417	17	No
	1.40%	6,398	6,417	(19)	Yes
Operating Profit Margin (OPM)	5.61%	7,312	6,417	895	No
	4.61%	5,513	6,417	(904)	Yes
Operating Asset Turnover (OAT)	3.50	7,652	6,417	1,235	No
	2.50	4,679	6,417	(1,738)	Yes
Income Tax Rate (t)	38.00%	6,267	6,417	(150)	Yes
	36.00%	6,557	6,417	140	No
Discount Rate (r_w)	11.00%	5,607	6,417	(810)	Yes
	9.00%	7,425	6,417	1,008	No
Terminal Growth Rate (g_t)	1.50%	6,440	6,417	23	No
	0.50%	6,394	6,417	(23)	Yes

actors provide greater reliability to the calculus of the goodwill valuation. The potential for manipulating the variables in the DCF method would be limited due to the numerous checks and reviews of all the participants involved [Huikku et al., 2017].

SUMMARY

Standard setters, such as the FASB and the SEC, have indicated that the calculus of a company's fair value and potential impairment of goodwill is extremely complex and subjective. The current standards provide companies with two options in evaluating goodwill for potential impairment, i.e., the qualitative approach, generally referred to as "Step 0" [FASB, 2011], and the quantitative approach previously referred to as "Step 1" [FASB, 2017]. The quantitative method requires companies to measure the fair value of each of their reporting units and then compare it to the reporting unit's book value. This may involve extensive complex and subjective analyses, such as the DCF model and the market multiples model. These valuation models involve a considerable number of variables and assumptions that are subject to management's judgment.

As we briefly mentioned, current accounting textbooks do not usually get into the details as to how the quantitative approach works in estimating the fair value of a reporting unit and its related effect on the potential impairment of

goodwill. In the accounting textbooks we examined, the authors explained the computation of an impairment of goodwill with a given book value and a fair value of a company's reporting unit without explaining how the fair value was derived.

Although there are some variations to the DCF model, we leveraged the condensed version introduced in the Easton et al. [2021, p. 13–18] book and took a deeper dive into the model using our demonstration examples. We built the examples on the “equity” premise, which estimates the fair value of a company's equity capital while ignoring the value of its debt capital that would be included under the “enterprise” premise. We focused on explaining six common variables in the DCF model and their relationship with the fair value of the reporting unit. We sensitized each variable separately while keeping the other variables constant and demonstrated how a slight change could swing the outcome of the valuation for testing goodwill impairment. We also considered the interdependent effect of the variables on the fair value of the reporting unit. Management may have some discretion in modifying one or more variables to influence the valuation result. We believe this paper will provide a bedrock resource on the complexity and subjectivity of the DCF model. This work will assist accounting students' understanding of the valuation of a reporting unit and the potential impairment of goodwill, which will also benefit them when they enter the accounting profession where they will need to evaluate the veracity and validity of the parameters of the DCF model. Further, as indicated earlier, we plan to explore some of the other valuation models, such as the ROPI and the market multiples method, in future studies.

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Integrating the Business Community into the Classroom: Three-Course Coordination with Client-Based Projects

Thomas M. Hickman^{*}, Michael Stoica, and David P. Price
Washburn University

This paper reports the design of a two-semester learning experience that integrates classroom knowledge with the business community across three courses to create an actionable marketing plan. Research needs to solve the client's problem are addressed in the marketing research and consumer behavior classes. The output of both analyses are inputs for the marketing plan developed in the marketing management class. Thus, students get a better understanding of real-world business, being exposed to live marketing problems. This approach helps the school of business show meaningful engagement and impact with the local business community, thus further fulfilling its mission.

Keywords: Course Coordination, Client-Based Projects, Collaborative Learning, Small Business Development Center (SBDC), Marketing Plan

Disciplines of Interest: Marketing

INTRODUCTION

Innovation in the classroom has long been considered a hallmark of effective teaching [Banks, 1967]. However, developing stimulating educational experiences is arguably more important now than at any point in the past [Daellenbach, 2018; Matulich et al., 2008; Monova-Zheleva and Zhelev, 2018]. Nisula and Pekkola [2018] contend that business schools must build curricula that allow students to experience multiple course objectives simultaneously in order to better understand the holistic nature of business operations. Cameron and Pagnattaro [2017] suggest that in order to establish successful learning

^{*}(Contact Author): Thomas M. Hickman, Washburn University, 785.670.1308, tom.hickman@washburn.edu.

Michael Stoica, Washburn University, 785.670.1592, michael.stoica@washburn.edu.

David P. Price, Washburn University, 785.670.1308, david.price@washburn.edu.

conditions for the current generation of students, creating engaging assignments that involve social interaction is of central importance. Moreover, it is noted that contemporary students have a strong preference for experiential and collaborative learning that is also highly valued by instructors [Helms and Whitesell, 2017; Roehling et al., 2010; Shanahan et al., 2021].

The approach used in this article is focused on course coordination based on collaborative learning through client-based projects. In this context, course coordination is defined as a harmonized curriculum design throughout three marketing courses: marketing research, consumer behavior, and marketing management. The aim is to coordinate learning objectives for students to apply marketing concepts from each class to solve marketing problems for real clients. The approach requires students and instructors to coordinate with individual businesses to deliver an actionable marketing plan to each client. The method uses the SBDC and local networks to obtain clients. Thus, this process facilitates stronger community relationships with the business school [e.g. Bingham and Quigley, 1991; Roebuck and Brawley, 1996; Preston, 2018]. Using multiple courses for the same client or project has also recently gained traction. For example, Brockman and Soydan [2019] used graduate business students in a supervisory role of an undergraduate business course in their SBDC client-based venture.

The three-course coordination project described in this article was implemented in the marketing department of an Association to Advance Collegiate Schools of Business (AACSB) accredited university in the mid-western United States with a Doctoral/Professional University Carnegie Mellon classification. The research complements Brockman and Soydan [2019] and allows students to have the opportunity to solve business problems for local firms and see the interrelationship of three courses within the marketing discipline. This pedagogical approach also extends the work of Sloan and Lewis [2011], who described a two-course sequence in which students worked in virtual teams across two sequential management classes. Like that of Sloan and Lewis [2011], a motivating factor for in the development of this project was for students in the same major to be able to see how the topics in multiple courses in the major complement each other and how collaboration is needed for improved learning and outcomes to take place.

As a result, the primary contribution of this article is to introduce a novel approach that examines collaborative learning, the use of client-based projects, and an integrated course coordination tactic by faculty. The pedagogical model described spans two semesters, involves three courses, and provides four layers of evaluation that include faculty, peer, mentor, and client-based feedback. Further, this article addresses challenges that students and faculty can expect in the implementation as well as broad guidelines for the adaptation to other fields of study.

LITERATURE REVIEW

It has been argued that traditional approaches to teaching do not provide capable and modern learning environments that focus on learning and collaboration [Averill and Major, 2020; Häkkinen et al., 2017]. The evolving needs and expectations of industries and employers has challenged higher education institutions to become more proactive and innovative in their teaching methods to keep pace with twenty-first century skills required in a global economy experiencing rapid change [Averill and Major, 2020; Voogt and Roblin, 2012]. To address these concerns, the three-course coordination model, based on collaborative learning and client-based projects, will provide part of the solution and act as a framework for future programs. It promotes the student experience because students are, by definition, directly involved in the development of their own learning [French et al., 2020; Bonwell and Eison, 1991].

Collaborative learning can be defined as a set of teaching and learning strategies promoting student collaboration in small groups (usually two to five students) to optimize their own and each other's learning [Johnson and Johnson, 1999]. The advantages of client-based projects are numerous, such as facilitating experiential learning, increasing problem-solving skills, and heightening student motivation [Lopez and Lee, 2005]. However, perhaps one of the most distinctive benefits of collaborative learning and client-based projects is its close relationship between theory and practice, because students must work together to apply concepts from the classroom to the real world [Johnson, Johnson, and Smith, 2007]. In fact, Rohm et al. [2021] document that client-based projects better prepare students for their working careers.

Although the advantages of working with local businesses are numerous, there are drawbacks, such as a high level of faculty involvement and the time required to make an effective impact with clients. Therefore, a sustainable model that fulfills core marketing functions while maintaining positive learning outcomes is required [Shanahan et al., 2021].

Collaborative Learning

Collaborative learning, sometimes referred to as cooperative learning, is an accepted and often-used method of instruction at many levels of education [Johnson et al., 2007]. It is an accepted method of instruction that actively facilitates student–student and student–faculty interaction [Paladino, 2008], and often takes place in the context of group activities, with the goal of completing a specific task [Gillies, 2007]. The extant literature has clearly documented that student collaboration with the small business community has the potential to greatly increase the skill sets of students and make them more workforce-ready [Hynes, Costin, and Birdthistle, 2011]. Perhaps the most vital role of collaborative learning is to expand knowledge through the application of course material.

For instance, Strang [2015] recently determined the power of collaborative learning by demonstrating that standardized exam scores were increased as a result of student cooperation. Further, Healey [1988] notes that stronger positive relationships among students is an expected benefit of collaborative learning as opposed to competitive or individual learning experiences.

Client-Based Projects

Project-based learning is a comprehensive instructional approach that engages students in a sustained and cooperative investigation of phenomena [Bransford and Stein, 1984]. This in-depth emersion allows students to develop critical thinking skills and to implement classroom concepts in real-world scenarios [Barkley, 2009; Canziani and Tullar, 2017]. A client-based project brings unique challenges to faculty leading these classes because students are thrust into a consultative function and local businesses are relying on the students' newly acquired expertise. Nevertheless, completing client-based projects provides students not only with an active learning experience, but also with the opportunity to apply their learning to benefit an organization in their community. In fact, Schaller [2018] suggests that the application of knowledge to the real world gives students the chance to better interpret the actions of organizations as they relate to what they have learned in the classroom. The benefits of these projects are further demonstrated by Tofighi [2021] who empirically demonstrated that students participating in a client-based project performed better on the in-class exams than students who did not complete a client-based project.

Coordination and the Three-Course Model

Course coordination is often thought of as consistency in content across multiple sections of the same course. This unified effort has the potential to yield improved student learning, according to Kelley et al. [2010]. The integration between the marketing research and marketing strategy courses that is described by McCollough and Shook [2017] provides an innovative approach to learning that allows students to understand how marketing research informs a well-structured marketing plan. In this model, the same students work with the client in two consecutive semesters. First, in the marketing research course they work on survey development and analysis, and then in the marketing strategy course they refine their marketing plan. Our approach differs in that the coordination required for our project is across two core foundational marketing courses (marketing research and consumer behavior) and the capstone (marketing management) course. Student teams in the foundational courses provide key marketing research and consumer behavior data to student groups

in the capstone course. Then, these students integrate those findings into their marketing plan, which is delivered to the client.

Our project leverages collaborative and client-based project learning, which are increasingly present in syllabi across the business curricula [Gavin and Coleman, 2016; Gillies, 2007; Preston, 2018; Rohm et al., 2021; Shanahan et al., 2021; Strang, 2015]. Figure 1 details the intersection of these learning approaches for each course and the combined learning methods. The harmonized process allows for the SBDC, clients, instructors, and students across multiple courses to participate in a project that allows students to experience how different components of marketing fit together to solve a client's business problem.

The goal of course coordination is to create uniformity across student experiences through the collaboration of course instructors (Shanahan et al., 2021; Strong and Moskal, 2006). The course coordination matrix, shown in Table 1, contains the objectives, outcomes, assessment information, and client–student interaction for each course associated with this project. The coordinated approach allows for synergy, because many of the objectives and outcomes exhibit cross over, reinforcing the importance of key concepts across the three courses. Figure 2 illustrates the three-course coordination and information flow between the two semesters A and B. It shows the process for client recruitment and information flow between student teams and semesters. The final deliverable is a marketing plan presented to and discussed with the client. Clients, SBDC mentors, and instructors provide feedback, and the assessment process is completed.

Rationale for Course Coordination

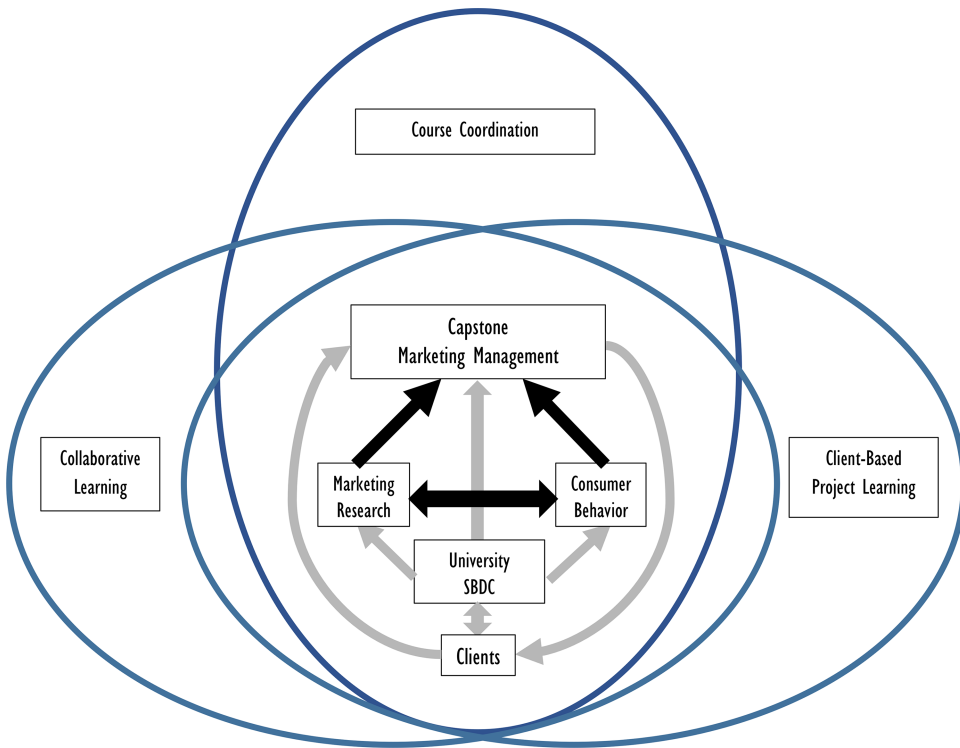
In our case, the adoption of the course coordination approach was a natural evolution because all three courses were already working with clients in their respective courses through their contacts with the SBDC and other businesses in the area. We contend that the integration of the courses via the same client would afford students the opportunity to more fully understand how the several roles of the marketing function were interconnected. This contention is supported by literature that demonstrates the value of course coordination and student learning in the linking of classroom content to real-world application [Bock and Randall, 2014]. Furthermore, AACSB places high value on integration in the business curriculum, and these matters are of central importance in this three-course project [AACSB International, 2016].

METHODOLOGY

Client Selection

Although Harman [2009] reports success in having students find clients for marketing projects, we have found that it is critical for the instructors involved

Figure 1. Course Coordination in a Client-Based Project Setting



in this multicourse project to choose clients prior to the beginning of the semester. The process for screening clients comprises several steps that are outlined in Tables 2 and 3.

The client selection process begins with the SBDC director approaching prospective clients that meet the basic requirements of the project. The prospective client must have a business situation that calls for conducting primary marketing research, profiling the best consumer segments for that business, and benefiting from a marketing plan. Once this has been established, the SBDC director provides an initial screening of the business owner by determining whether the prospective client has interest in working with student teams. If yes, the SBDC director provides a brief overview of the nature of the two-semester project using the three-class coordination model and the necessity for business owners to be willing to work with student teams in three courses across two semesters.

Provided the client expresses interest in the project, the SBDC director arranges for a meeting with the three instructors of the course to further explain the nature of the project. Specifically, clients are instructed that, in

Table 1. Course Coordination Matrix: Objectives, Outcomes and Assessment

Coordination Dimensions	Consumer Behavior	Marketing Research	Marketing Management	Coordination Comments
Course Objectives	<ul style="list-style-type: none"> • Develop students' appreciation of psychological characteristics of the consumer • Analyze a company's existing products and determine its positioning as perceived by the consumer • Develop managerially relevant consumer insights based on the analysis of a company's offering • Prepare and defend a consumer profile report 	<ul style="list-style-type: none"> • Develop the ability to translate a management problem into a feasible research question • Learn essentials of study design, data collection methods, and sampling considerations • Develop the ability to analyze results and convert them into managerial recommendations • Develop an understanding of the impact and limitations of marketing research data • Demonstrate proficiency in written and oral communication in reporting research analysis and recommendations 	<ul style="list-style-type: none"> • Expose students to the concepts and methods of strategic marketing • Learn how to prepare a marketing plan by integrating the concepts and methods discussed • Coordinate activities in teams to integrate information into a harmonized, well blended marketing strategy • Communicate with a client and act as a marketing consultant. Learn how to market yourself and your team • Communicate the findings and recommendations in the plan. Prepare and present the plan 	Coordination of objectives based on previous semester experience
Deliverables and Assessable Course Outcomes	<p>Consumer Segmentation and Profile Report (presented to the Marketing Management Student Team)</p> <ul style="list-style-type: none"> • Oral presentation and defense of research • Class debate with Marketing Management Team • Primary research collection and analysis • Inter-team participation Assess with Consumer Profile Rubric 	<p>Research Report (presented to the Marketing Management Student Team)</p> <ul style="list-style-type: none"> • Oral defense and written report • Class debate, with Marketing Management Team participation • Class participation Assess with Research Report Rubric 	<p>Marketing Plan (presented to the class, client and SBDC mentors)</p> <ul style="list-style-type: none"> • Oral defense and written marketing plan report • Class debate, with clients and SBDC mentors' participation • Class participation Assess with Marketing Plan Rubric 	Outcome coordination based on previous semester experience Common or adapted rubrics

Table 1. Continued

Coordination Dimensions	Consumer Behavior	Marketing Research	Marketing Management	Coordination Comments
Client/SBDC/ Student Team Interface	<ul style="list-style-type: none"> Multiple meetings with the client Mid-term strategic meetings with the SBDC and the client 	<ul style="list-style-type: none"> Multiple meetings with the client Mid-term strategic meetings with the SBDC and the client 	<ul style="list-style-type: none"> Multiple meetings with the instructor, clients and SBDC mentors Midsemester strategic meetings with the SBDC and the clients 	Student logs are used to track meetings
Client/SBDC Feedback and Assessment Tools	<ul style="list-style-type: none"> Peer Evaluation Instructor Evaluation Marketing Management Student Team Evaluation 	<ul style="list-style-type: none"> Peer Evaluation Instructor Evaluation Marketing Management Student Team Evaluation 	<ul style="list-style-type: none"> Client evaluation of the marketing plan and the student team SBDC mentor evaluation of the written report and oral presentation Peer evaluation (inrateam) Class evaluation of the presentation Instructor evaluation of teams and marketing plans Instructor evaluation of debate 	<ul style="list-style-type: none"> All evaluations used for assessment Student evaluations include their perception on the semester work
Closing the Loop	Postsemester meetings of the three instructors and SBDC staff to assess the results → Proposals for improvement → Implement changes			Once per semester

Semester A, they will work with both the marketing research and consumer behavior classes and that visits to each course are required so that students become more vested in the project and more fully understand the nature of the business and the client’s research questions. The instructors advise prospective clients of the potential for student teams to want regular interaction with them throughout the semester as the marketing research and consumer behavior projects are crystalized. Therefore, the interaction with student teams is heavily emphasized in these screening meetings. In the discussion of the marketing research facet of the project, the instructors ascertain whether the client has a database of customers that can be used for data collection purposes. The use of a client database is an ideal scenario, although we have found that it is not frequently the case that such a database exists. In the event that a database does not exist, the marketing research professor discusses, in broad terms, how data collection will need to take place for a successful project. This discussion includes explaining a sample frame and related sampling issues with the client. Next, clients are advised that they must be willing to visit the marketing management class during Semester B to present their business problem. They are advised of continued interaction with the team(s) assigned to their project as

Figure 2. The Model - Course Coordination and Information Flow

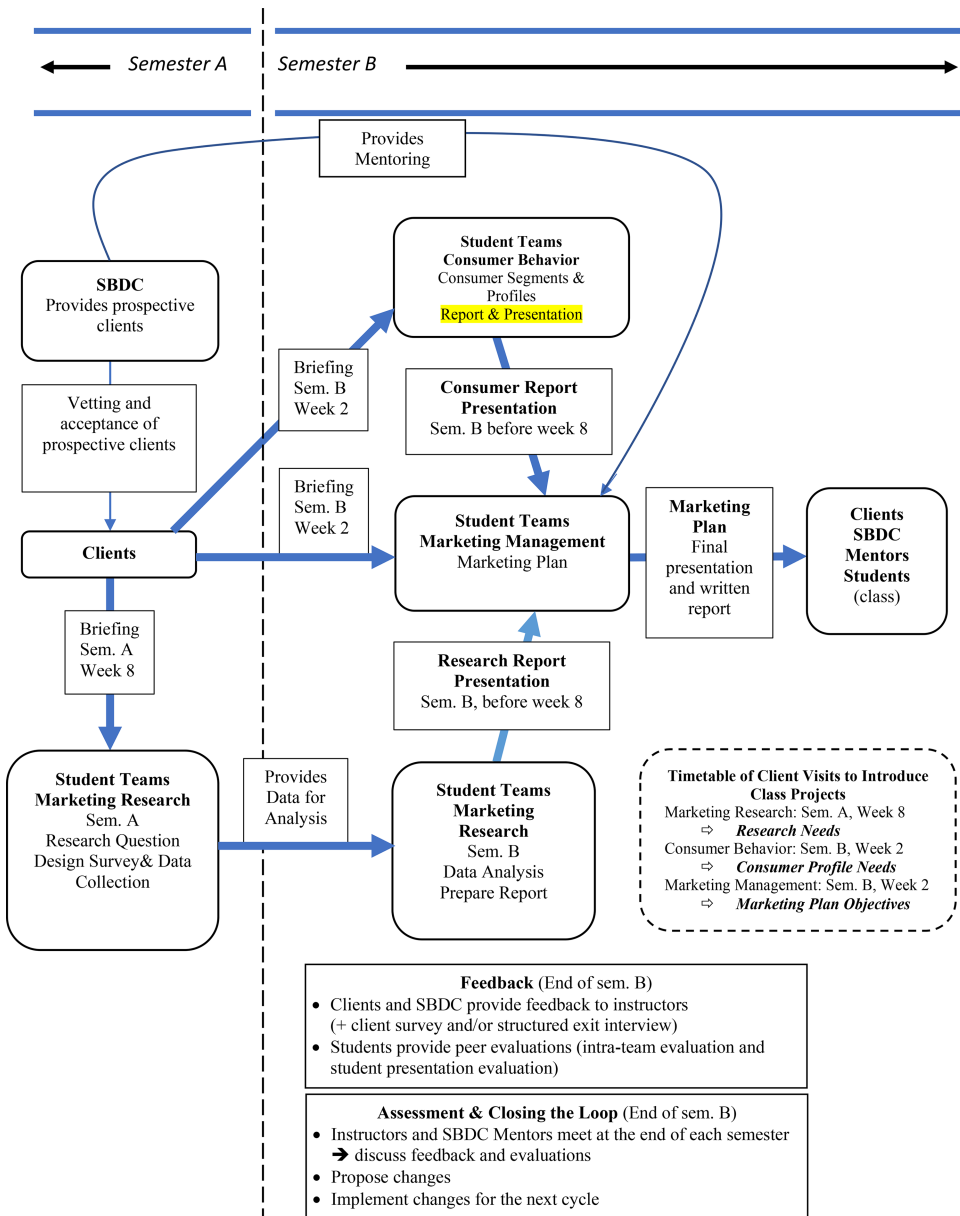


Table 2. Stakeholders' Involvement and Benefits

Stakeholder	Extra Effort	Benefit
Student	<p>Work on projects that require extra responsibility for real clients solving real problems:</p> <ul style="list-style-type: none"> • Desk research—industry analysis • Primary Research—market analysis (consumer analysis, competition analysis) • Interview client • Coordinate with other teams • Multiple visits with the company <p>Develop a real research plan and marketing plan</p>	<ul style="list-style-type: none"> • Resume strength—work as consultant for the university SBDC • Consulting experience—work with a real client on a real business problem • Team work for the whole semester • Learn how to coordinate with other teams • Letter of recommendation • Job offer with the former class client
Client	<ul style="list-style-type: none"> • Prepare and deliver presentations in front of the class • Work with students (accepting their presence in the company) • Gathering information related to the project as required by the student team • Being interviewed multiple times by the students 	<ul style="list-style-type: none"> • Fresh view on the business and alternative solutions • Obtain a full marketing plan that was evaluated and approved by both the SBDC consultant and the marketing faculty • Creative ideas vetted by SBDC consultants and marketing faculty
SBDC	<ul style="list-style-type: none"> • Coordinating between the clients, faculty, and students • Meeting with students • Meeting with the clients • Meeting with faculty • Recruit and vet clients 	<ul style="list-style-type: none"> • Increased number of consulting hours • Help with fresh ideas for their clients • Assistance
Faculty	<ul style="list-style-type: none"> • Course planning to include a semester long field case • Course coordination with the other two courses • Help with recruiting clients • Vetting clients • Establish learning objectives that are coordinated between the three courses 	<ul style="list-style-type: none"> • Job satisfaction • Motivation
School of Business	N/A	New and creative way to accomplish the mission Accreditation

that team works toward completion of the marketing plan and final presentation. Next, it is explained to prospective clients that they will receive a written and electronic copy of the marketing plan that leverages the findings from the marketing research and consumer behavior courses. Despite these requirements, we have found that clients are plentiful and very interested in the key deliverable of an actionable marketing plan that leverages consumer behavior and marketing research insights.

Table 3. Role of Faculty, Clients and the SBDC in Course Development and Coordination

Stakeholder	Roles and Activities
SBDC	<ul style="list-style-type: none"> • Select clients a semester in advance. • Vet clients and propose them to the faculty. • Organize the clients' presentations to the classes. • Mentor student teams for the duration of the semester. • Keep the connection with the clients. • Participate in the class debates. • Get the feedback from the clients at the end of the student work. • Grade the teamwork and forward the grades and their feedback to the instructor. • Expand their consulting area and visibility.
Client	<ul style="list-style-type: none"> • Make presentations of the business and their problems to the marketing classes. • Give the student teams the required information on the business, the market, and their strategy. • Help the students to gather any data relevant to the project. • Participate in the class debate. • At the end of Semester B, the client is provided with a marketing plan. • Read the marketing plan and give their feedback to the SBDC and/or faculty.
Faculty	<ul style="list-style-type: none"> • Provide students the opportunity to work with area clients through field cases. • Participate in client selection and vetting (with the SBDC) • Structure the course syllabus and the coordination with the other marketing classes • Explain to the students the requirements and the work to be done • Guide students through their client selection process and define the goals of the marketing plan • Advise student teams during the semester • Organize the class debates for all marketing plans • Assign grades based on client feedback, SBDC grading and feedback, student evaluations • Meet with SBDC and adjust as needed

Table 3. Continued

Stakeholder	Roles and Activities
Students	<ul style="list-style-type: none">• They are exposed to the concepts and methods of strategic marketing: identification of market opportunities and company's competitive advantages, market segmentation and targeting, positioning, planning the marketing mix, implementation of a marketing plan.• They learn how to prepare a marketing plan by integrating the concepts and methods discussed.• They learn teamwork, to coordinate research activities, and to integrate information into a harmonized, well-blended marketing strategy.• They learn to act as a marketing consultant.• Students learn how communicate the findings and recommendations described in the plan.• They prepare to present and present the marketing plan, take questions, and animate discussion on issues related to strategy formulation and to marketing plan implementation.

Student Completion of the Three-Course Sequence

Students complete the courses in the marketing major at differing rates. The prerequisite course for the marketing research and consumer behavior courses is principles of marketing. Although nonmarketing majors are eligible to take these courses, more than 90 percent of students in the classes are majoring in marketing. Students enrolled in these courses are either juniors or seniors. Many students take both courses at the same time, however, that is not a requirement. Therefore, it is possible for a student to work on both the consumer behavior and marketing research projects for the same client during the same semester. Alternatively, students may take these two courses in consecutive semesters. As such, they would work on a project for a separate client for each of the classes. Once those classes are completed, students are advised to take the final class in the sequence, marketing management.

Marketing Research Course

Due to the size and scope of these projects, the project is worth 50 percent of the course grade. Students in the marketing research course work on

projects for two separate clients, as suggested by Figure 2. This is the only course in the sequence where students have two clients because it would not be possible to get the marketing research information to the marketing management class in time for them to be able to effectively use the input for their marketing plan. Students begin the semester by analyzing the data collected by marketing research students in the previous semester. Students focus on finding managerially relevant insights and provide actionable recommendations based on their analysis. Student teams complete a marketing research report and present their findings and recommendations to the student teams in the marketing management class during Week 8 of the semester.

Later, in Week 8, the next client begins their two-semester project by making a presentation in the marketing research course and explains the research questions and overall situation to the students. Student teams work together with the instructor and client to determine appropriate items to include on the questionnaire. A final version of the survey is completed no later than Week 11 of the semester. This schedule gives time for the Institutional Review Board (IRB) to approve the project and for data collection to begin that semester. Data are typically collected through Survey Monkey[®] and, if available, uses the customer database of the client. Depending on the nature of the project, research questions, and client input, students may collect data on site, such as mall intercepts, festivals, and other local events. The full list of objectives, deliverables, and interactions with the client are further detailed in Table 1.

Because the specific survey that is prepared varies by the nature of the research question(s) of the client, it is imperative that the instructor manage the survey design process so that proper analysis for the client's problem (e.g. analysis of variance [ANOVA] and regression analysis) can be completed and course objectives related to data analysis can be met. Items on final client surveys include, but are not limited to, measures that have been used in the marketing academic literature. Examples include three-item measures to assess perceived brand quality [Liu et al., 2014], opinion leadership [Flynn et al., 1996], brand trust [Sheinin et al. 2011], brand loyalty [Davari and Strutton, 2014], and corporate social responsibility motivations [Armstrong Soule and Reich, 2015]. Other variables that are included in the questionnaires are also unique to the research question of the client. Examples include demographic variables, level of experience with a particular product category, and brand awareness measures.

A study recently completed by students used a regional shopping mall as the client. Initially, they were interested in learning which types of stores and entertainment options shoppers would be interested in seeing at the mall. The marketing research course instructor and students worked with the client to develop additional measures that would not only provide value to the client but also provide the necessary measures to complete regression, ANOVA analysis,

and other statistical computations to meet the needs of the course objectives. These constructs included city pride, positive word of mouth, purchase intentions, and other multi-item measures to assess variables of interest to the client. The need for the instructors to work with the client to develop research questions more fully is a common undertaking, as many clients are simply interested in how they can sell more of their products. The data for this client were collected both on site and through Survey Monkey® with a list of customers from the database the mall uses to communicate with its customers. As such, it provided for students to experience mall intercepts as well as gain familiarity with the Survey Monkey® research tool.

Due to the two-semester nature of the project, marketing research students are immersed in data analysis early in the semester as they work to find managerially relevant insights in the data that were collected by students in the previous semester. By starting data analysis early in the semester, the class is able to complete the research report and give a presentation to the marketing plan team at the midpoint of the semester, as shown in Figure 2. An added benefit of having students work on analysis at the beginning of the semester is that the instructor is able to use the weeks prior to the start of the semester to analyze the data and prepare efficient class meetings.

On completion of the research report and presentation, the next client and the corresponding research problem is introduced to the class. Guided by the instructor, students develop a survey that will be used to answer the client's research questions. We have found the two-semester approach to be an overall successful approach that allows students to experience all phases of the marketing research process. Nevertheless, a potential disadvantage of this two-client, two-semester technique is that students in the marketing research class do not see a project through from start to finish. Therefore, it is important to remind students in the survey design and data collection phases that they are providing the foundation for the student work in the following semester.

From the perspective of the students, their work in the marketing research course is completed in the following manner:

- Week 2: The client from the previous semester presents the research question and project to students.
- Week 2: Students become familiar with the questionnaire and data that were collected.
- Weeks 3–5: Students analyze data and find managerially relevant insights.
- Weeks 6–7: Students complete a marketing research report and presentation.
- Week 8: Students submit the marketing research report and give a presentation to marketing management students for use in their completion of the marketing plan for the client.

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- Week 8: The next client presents their research question and situation to the students.
 - Weeks 9–11: Students work with the client and instructor to develop a survey that meets two requirements: The survey (1) answers the client’s research questions and (2) meets course objectives from a data analysis perspective.
 - Weeks 12–15: IRB approval of the project is gained, and data collection begins with Survey Monkey® and/or on-site survey collection.

Consumer Behavior Course

Consumer behavior students begin the semester by completing a consumer profile analysis, which is used by the marketing management teams. The project must be administered early in the semester to provide the marketing management students enough time to use the information effectively. As can be seen in Figure 2, the clients come to class in Week 2 to present their needs and expectations. Students are divided into teams the following week to begin work on the assignment that is due midsemester (Week 8), and the report is presented to the marketing management teams.

The first section of the assignment requires students to define the overall market and gain an understanding of the client’s industry. This process includes a thorough examination and explanation of the industry as a whole, local market conditions, and competitors. Each group must develop at least three different potential market segments, using both secondary and primary research. They must use qualitative research methods, such as interviews with owners and/or customers, focus groups with customers, or observational data at the client’s business location. The segments must reflect a combination of demographic, geographic, psychographic, and behavioral influences, and must use at least two of those variables for each segment. To aid students in this process, a supplemental document that details the segmentation variables and how they are used is provided. Segments are then evaluated for attractiveness based on their ease of identification, ability to be reached, size, profit potential, and responsiveness to marketing communications. Other considerations that are important include homogeneity and heterogeneity of the clusters analyzed, as well as the strategic fit of the firm with the segment and other company goals.

Next, a customer profile or “persona” is created. Personas are often used by firms to gain a stronger understanding of customers and their personal experiences. In turn, this visual tool facilitates effective communication with the segment by creating a snapshot of the typical consumer described in the segment [Marshall et al., 2020]. Persona descriptions in this project must include a picture/photo, name of the typical consumer, demographic variables, and other important segmentation variables; it should also include color and

different fonts and exhibit creative design. They can also include a “day-in-the-life-of” approach for a consumer and list their media preferences and main problems and frustrations.

Finally, the completed consumer profile reports are presented to the marketing management student teams during Week 8 of Semester B as shown in Figure 2. This process allows for a strategic Q&A session between groups, thus enabling the marketing management students to receive additional feedback. The assessment from this project is responsible for 35 percent of their overall grade, which is the heaviest allotment of points for the course.

Although no official reporting is required between Week 3 and Week 8, the instructor receives a progress update in Week 6. The final reports are uploaded digitally to the course website during Week 8, and the marketing management class instructor receives them the same week to be dispersed to the marketing management student groups prior to the presentation.

Class timeline and steps for consumer behavior assignment:

- Week 2: Clients visit class and present their projects.
- Week 3: Students receive directions for the assignment, and groups are assigned.
- Weeks 3–8: Students complete the assignment, including the following activities:
 - Research client and industry.
 - Learn about the marketing environment.
 - Define and segment the market with detailed secondary research.
 - Design and implement primary research.
 - Create final customer segments.
 - Analyze segments for viability.
 - Create a customer profile/persona.
- Week 8: Students submit final paper and make presentation to the marketing management teams.

Marketing Management Course

The project is finalized in the marketing management capstone course with a written marketing plan and oral presentation defended in front of the class with the client and the SBDC mentor present. In total, this project is worth 50 percent of the course grade. Instructions for this phase of the project are contained in the Appendix. These directions include the grading criteria that were determined through consultation with the SBDC director who provided the outcomes valued by the clients. During Week 2 of Semester B, the client, students, and instructor engage in an interactive discussion regarding the project as a first step in developing the marketing plan. Students are advised that they can periodically seek clarification from the client during the semester, but that they are ultimately responsible for their own research-based marketing

plan. Consistent with the objectives of the course, this project underscores key elements of the strategic marketing management process, including planning, implementation, and control. Students have an understanding that marketing strategy is an essential process for gaining a competitive advantage, requiring the active participation of all major business functions in the organization. Therefore, the requirement that students use the inputs they receive from the marketing research and consumer behavior teams to complete the marketing plan provides them with a foundation for cooperating with cross-discipline teams. The project concludes with a formal evaluation process of the marketing plan and presentation by the client, SBDC mentor, and instructor.

The clients, recruited and vetted through a process developed by the SBDC with the participation of the marketing faculty, are invited at the beginning of the semester to present their marketing problem in front of the class. A Q&A session that will help student teams find the best team–client fit follows. Then, student teams select the clients, and the process of data collection, analysis, and writing of the marketing plan begins. Each student team works with the client they selected for the duration of the semester. They are permanently mentored by an SBDC consultant and guided by the marketing management instructor. Teams interview the clients and identify the business model, revenue model, and business strategy. Industry and market analyses set the foundations for determining the target market and developing the 4 Ps. Input from consumer behavior and marketing research teams is received midsemester. Each team prepares a PowerPoint presentation and a written project to be defended in front of the class, the client, and the SBDC mentors. The class debates each project; thus, students have the opportunity to be exposed to a number of field cases. The class discussion goal is to add value to the clients' businesses through an exchange of ideas and an active class interaction.

The assessment of each project is done, considering the feedback from the client, the grade proposal from the SBDC director, the class evaluation, and the peer (inside the team) evaluation. Each student in the class evaluates each member of the team on dimensions that include organization, content, presentation, use of media, and responses to questions. Individually, the team member is assessing the specific contribution and the effort of each member of their team. Although the feedback from the client is usually focused on the ideas and their implementation, the SBDC considers elements such as the team–client cooperation, the frequency of meetings with the mentor and the client, the effort put forth by the team, and the quality of the research and analysis. Actionable recommendations represent an important part of the SBDC evaluation.

Students grouped in teams elaborate a marketing plan for a local company. Teams complete the following activities:

-
- Discuss the type of business, the competitive advantage of the company (elaborate on the strengths and weaknesses), and the opportunities and threats offered by the market.
 - Conduct market research that can help the segmentation and positioning process. Present the main findings and their implications, including:
 - Competition analysis
 - Consumer analysis (receive and integrate the reports from the consumer behavior and marketing research teams).
 - Elaborate on segmentation, target segments, and product positioning. Discuss consumer behavior in the target market (based on the reports received from their colleagues in the consumer behavior and marketing research classes).
 - Write a chapter on product decisions. Stress marketing management decisions.
 - Write a chapter on price decisions. Stress marketing management decisions.
 - Write a chapter on promotion decisions. Stress marketing management decisions.
 - Write a chapter on distribution decisions. Stress marketing management decisions.
 - Write chapter on sales and merchandising efforts (if applicable). Stress marketing management decisions.
 - Stress implementation (or the rollout) of the marketing plan. Financing: Forecasts first-, third-, and fifth-year results—for example, capital costs, sales, market share, operating profits, taxable profits, cash flow, free cash, etc.
 - Write an executive summary for the report.

FINDINGS AND FEEDBACK

The project is structured to allow for a four-way feedback system. At the end of Semester B, each client receives their marketing plan and is invited to the team presentations. The first type of client feedback happens in the classroom during the marketing plan presentations. Over the past five years, 57 clients have reported an average satisfaction of 4.61 (1=poor; 5=very good). In an unstructured format, clients participate in the class debate and make suggestions to the presenters. Additionally, they assess the effort of the student team and complete a grading rubric (see Appendix). Finally, clients are interviewed by the SBDC mentors, and their feedback is used to make changes to improve both the student and client experience in future semesters.

SBDC mentor feedback is collected at the end of each semester. Students are required to maintain a log in which they account for both contact hours (meeting with the client) and preparation hours (desk research and meetings

Table 4. Sample Results: Client, SBDC Mentor, and Instructor Feedback for Fall 2019

Performance Criterion	Client Average Score (Average from all five clients)	SBDC Mentor	Instructor Average Score (Marketing Management)
Organization	20%: very good 60%: good 20%: acceptable	40%: A 60%: B	40%: A 60%: B
Content	40%: very good 60%: good	40%: A 40%: B 20%: C	20%: A+ 20%: A 20%: B+ 40%: B
Team–client interaction Marketing Management–Client	60%: very good 40%: good	2 team: very good 3 teams: good	1 team: excellent 2 teams: very good 3 teams: good
Team-to-team interaction/cooperation Marketing Research; Marketing Management	N/A The client could not observe the student interaction.	N/A	60%: very good 40%: good
Team-to-team interaction/cooperation Consumer Behavior Marketing Management	N/A The client could not observe the student interaction.	N/A	40%: very good 60%: good
Intrateam communication and collegiality	N/A The client could not observe the student communication	Log analysis: All teams reported the meeting hours and the preparation hours on time. Meetings with mentor: 4 out of 5 teams: very good 1 team: average	Intervention: 80% of teams required three or fewer faculty interventions. Communications Mechanics: 80% good or better Cohesiveness: 100% good or better Virtual Meetings: 60% met two or more times weekly. Face-to-face: 100% of teams met weekly.

with both the instructor and SBDC mentor). During the past five years, teams reported an average of 59 hours worked (per client/per semester). Each SBDC mentor collects information and reports results to the capstone instructor regarding team communication, team–client communication, and comments from the clients (interaction, content, recommendations). Mentors give grades on research completed by students on the written report, the recommendations, and the professionalism of the team. Finally, each mentor gives an overall

grade to the project (A=4, D=1). The average grades have increased slightly over the past five years from 3.25 to 3.40. These grades are lower than the average grades given by the clients in the same timeframe of 4.57 to 4.72 (1=poor; 5=very good).

Instructors give their feedback to each student team and assess their work using a method similar to the SBDC and client rubrics. Additionally, instructors receive feedback on three levels: from clients, the SBDC mentor, and the students. At the end of each semester they meet with the SBDC staff to analyze the results of the learning cycle and suggest improvements. Sample results from fall 2019 are shown in Table 4 and include standard dimensions from the rubric such as organization and content of the written reports. The results indicate generally favorable responses of “good” and “very good” across most dimensions that also include team–client interaction, cross-course team-to-team cooperation, and intrateam communication and collegiality.

Note

Data are collected at the end of each semester in the capstone class, marketing management.

Students evaluate each team presentation on the dimensions associated with the AACSB oral communications criteria and the School of Business learning objectives. Average scores (1=poor; 5 = very good) are reported across the past five years: content (M = 4.46), presentation organization (M = 4.27), media use (M = .71), and interaction with the audience during the Q&A sessions (M = 4.02). Findings suggest that overall assessment depends on the presence of the client in the class presentation and debate. Students scored higher if their teams had a client available to participate during presentations (M = 4.65) than if the client was unable to attend (M = 4.35). The probable reason is that clients usually participate in the debate and may answer questions from the class, therefore increasing the level of professionalism.

Each student also evaluates his or her team members on the quality of work performed during the project. The procedure requires students to assign a total of 100 points to each of their team members (including themselves). Findings suggest that students tend to rate themselves higher than the average of the evaluations of her or his team members. Because the number of team members varies from three to five, reporting average ratings would be inconsistent. In other words, students in teams of five divide 100 points across five members, whereas students in teams of three divide the points across just three members. The primary reason for this type of evaluation is to prevent lack of participation or “free-riding” [Le et al., 2018].

The impact of this project has been documented by the SBDC regional director, who has been in this role for 11 years and for the duration of the

three-course coordination project. He notes four key outcomes that are attributed to this project:

- The hiring of several students for full-time employment with businesses they worked with for this project.
- Community discussion in forums, chambers of commerce, and in economic development circles on the relationship and positive experience the businesses had working with the student groups.
- Verbal feedback on how much owners enjoyed the interaction with students in learning new marketing ideas, as well as a consensus they needed to implement more marketing tactics in their business.
- In administering several of the projects, small business owners requested connections to the students to assist them after the semester in internships and part-time work for digital marketing and social media assistance.

In addition, the feedback that the regional director has received from the owners of the businesses has been very positive, and a representative set of comments that he has collected from owners about their experience with the project and students is as follows:

- **From a landscape company** "I would definitely work with the students again. I think it's valuable for them to see how 'real-world' marketing jobs work. It's also valuable for us in that we get some new ideas from different perspectives."

- **From a fitness business** "Your students are going to be exceptional in this field. They had great ideas and very personable to work with."

- **From a retail store** "The marketing team was really adept at putting themselves in my shoes and understanding my perspective as a business owner. I appreciated the team's ability to understand what it would be like to run this type of business and the plan they put together."

- **From a local credit union** "I thought the process was great and our group listened well, asked great questions, and were always incredibly professional. We got some great information that we will use, and we will further develop the campaign—specifically on their work to identify the target market. They brought some strong clarity to who we should be talking to that will absolutely play a role in our final decisions, as well as the idea to target grandparents and have various campaigns that go after the various stakeholders in a child's life."

- **From a local manufacturing business:** "10 out of 10 for sure! We loved our group and enjoyed working with them. Thanks again for allowing us this opportunity."

- **From an art business:** "We were really happy with the work the students did for us in the project. They listened to everything we told them and touched on everything we wanted them to do. I would say they represented

themselves and WUSBDC very well. On a scale from 1 to 10 I would give them a 10.

DISCUSSION AND CONCLUSIONS

One of the more challenging aspects of this model is working with clients to develop data-driven research questions. Instructors should also be aware of the challenge created by the midsemester presentations of the marketing research and consumer behavior teams to the capstone team. Therefore, it is critical to notify students well in advance of the presentation date, so they can make the appropriate modifications to their schedules. Consumer behavior and marketing research faculty must prepare their students to begin work on this project early in the semester. This necessity may require modifying the order of material to correspond with the needs of the project. Finally, a constant flow of clients that fit the parameters of the project must be maintained. We have found that the SBDC is a strong resource for this purpose and a valuable asset to connect the business community to the business school.

Adaptations and Extensions

This multicourse educational approach can be adopted by the marketing area faculty of most business schools. Adaptation of the model could include additional specialized marketing courses, such as advertising and promotion or digital marketing. It can be further adapted to other business disciplines, and even nonbusiness disciplines that have opportunities to work with external clients. Instructors can also consider longitudinal studies that measure students' preclass knowledge of course objectives and then measure knowledge after completing the three-course sequence.

With the increased use of technology in the classroom, it reasonable to assume that this model would be well-suited for geographically dispersed campuses, allowing students from various regional areas to interact on projects in ways not previously achieved. Expanding on this idea, international applications between university teams should show similar benefits for students, although access to clients and the management responsibility of the relationship may fall more on faculty without SBDC networks. Instructors should have access to clients through the School of Business network and through the networks of local organizations, such as the local chamber of commerce, Rotary clubs, and other business or service clubs. This project would be beneficial and easily applicable to other institutions of a similar or smaller size. Much larger universities may find the coordination more challenging because of the number of course sections, students, and faculty involved, as well as the corresponding number of clients that may be needed. Even so, this project, or any number of

multicourse adaptations, should engage students and create meaningful deliverables to clients in their local economy.

The key requirement for adaptation is to integrate courses that can relate to complex projects needed by real clients. Faculty in all of these courses must be prepared to manage a process that has many moving parts. Feedback from students indicates that close faculty involvement with student teams during the development stage of the marketing plan is key to their learning outcomes. Recent research suggests that close guidance between faculty and student teams encouraged additional collaboration between team members (van Leeuwen and Janssen, 2019). Therefore, faculty should remain available and proactive to student inquiries during the semester in all three courses.

CONCLUDING REMARKS

The three-course coordination model described in this article represents a cyclical and dynamic approach to marketing education. Its development is centered around the introduction of students to a collaborative experience. Indeed, they must learn to work together with people from diverse backgrounds, contrasting personalities, and potentially different personal goals, which are also very much a part of modern business and found in both large and smaller firms [Mazzarol and Reboud, 2020]. The cross-functional nature of the courses encourages collaboration across groups, and this enhances business productivity. Thompson [1967] suggested that pooled interdependence or the absence of work flow between units can be problematic and that this “silo effect” can burden many firms [Tett, 2015]. Thus, the collaborative nature and integrated course coordination of this model promotes positive learning outcomes for students that are distinct from specific marketing-related learning objectives.

Throughout the two-semester process, students are exposed to consumer behavior and marketing research experiences that can enrich strategic decision making and the marketing plan process. Further, because this project involves three required courses for the major, all marketing students are eventually involved in each phase of the project. This inclusive approach over time (two semesters and multiple courses) aids in reducing some of the pitfalls of collaborative learning, such as low involvement of students who lack the social skills required to fully engage in teamwork. This model allows students more time to develop relationships, with both other students and professors, therefore improving collaborative performance [Zambrano et al., 2019]. We included peer evaluations in each class to combat “free-riding” [Le et al., 2018].

Another interesting outcome noted by faculty involved with the project was improved communication among faculty members themselves. Although communication increased due to the obvious coordination effort involved, there were other less-obvious cultural improvements within the department. The

coordination of courses not only improved student outcomes, but an intangible cultural improvement appeared to occur internally, which was not anticipated. Additional research into this area might prove interesting and promote a case for course integration in other institutional departments that may ultimately benefit faculty, departments, and universities alike [Bazett and Clough, 2020].

This coordination effort provides an experiential, client-based approach that takes students through the stages of designing and implementing a successful marketing strategy. Through our observation, it is evident that this multicourse, client-based project applies pressure to students to perform at a higher level and to produce higher-quality work. Personal involvement and team responsibilities motivate students to become more involved because they must work for and defend their results to a real client [Razzouk et al., 2003]. Ultimately, we contend that student learning is enhanced through increased responsibility to the client and to other student teams from other courses.

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Appendix

MARKETING PROJECT PROCEDURES FOR MARKETING MANAGEMENT

Your project is a collaborative effort between your team and the client. All your actions and interactions throughout this project reflect on *XYZ University* and the *XYZ University SBDC*.

Main Points of Contacts: *Name and Name, Admin Asst.*

Email: Email:

Phone: Phone:

Please cc name and addressee name on everything you send.

INITIAL CLIENT CONTACT

For your initial contact with the client, please select a single point of contact for your team. Have that person notify *name* at the above address with:

- Who is on your team
- Team member’s best email addresses for correspondence
- Team members’ cell phone numbers
- The best email address for contacting each team membero The scheduled date of your initial client meeting when decided

When contacting the client and scheduling the first appointment; place the client’s needs and schedule above your own by accommodating his or her calendar. Meetings may be scheduled at the client’s place of business, or you can use the SBDC office located at *XXX S. Street Xth Floor*.

CLIENT LOG AND DOCUMENTATION

Accurately recording your time spent on this project will affect your grade and overall results for the project. Record **ALL** time you spend on this project as either “Prep Time” or “Contact Time.”

Prep Time: This will be the time spent doing research, preparing the report, group meetings without the client, consulting with *Dr. Name* or SBDC staff, and anything else that does not fall under “Contact Time.”

Contact Time: ALL time spent with the client and corresponding with the client. The recording includes meetings, phone calls, email messages, and the final presentation. All direct contact time (face-to-face) needs to be documented with an explanation of the interaction in three categories:

1. The Client Need or Request
2. What the Key Findings Were
3. What the Follow-Up Actions Are

INITIAL CLIENT MEETING PROCEDURES AND GUIDELINES

Your first meeting with the client will be critical in developing a trust relationship and setting the stage for a successful project for both you and the client. Ensure that the client understands the information that you discuss will be held in confidence by all your team members. Do not breach this trust relationship. Confidentiality is one of the cornerstones in the consulting agreement that you have signed.

Please consider some of the following in the initial meeting:

- Develop an understanding of the business, how it operates, and how it makes money. What drives its profitability and sales?
- Is there a "rainmaker" in the business?
- Tell the client about yourself, your background, goals, ambitions, and any other relevant information that can help develop their ability to get to know you.
- Give the client another overview of the project so they understand the scope of the work and what the final presentation and document will include.
- Have the client tell you what their expectations are.
- Let the client help you understand their most significant marketing challenges, what they are currently doing to market their business, and what has worked and failed in the past.
- What are the key areas the client would like you to focus on during this project?

GRADING

Grades from the SBDC will be based on the following categories:

- SBDC communication
- Client communication
- Client assessment and feedback
- Client recommendations and Ideas
- Marketing Plan
- Research including, but not limited to:
 - Quality of research
 - Citations are complete and accurately annotated
 - Was it strategic?
- Recommendations
- Professional quality of work including, but not limited to:
 - Readability- Spelling and grammar
 - Organization
 - Table of Contents matches section headings and page numbers
 - Tables and illustrations are legible and clearly titled/subtitled
- Presentation

- Organization
- Professional quality of work
 - Well-presented (practiced)
 - Appropriate design
 - Legible content and illustrations

Category		Total Points	Score
Organization (20 points)	Overall organization	10	
	Information is presented in a logical sequence	5	
	Presentation is clear, crisp, and legible (font size)	5	
Content (60 points)	Client goals and opportunities are well defined	10	
	Demonstration of valid research	10	
	Images, charts, graphs, included are relevant to the overall message/purpose	10	
	Recommendations are supported with plan of action	15	
	There is an obvious conclusion summarizing the presentation.	15	
Presentation (20 points)	Dress is appropriate for business	5	
	Delivery	5	
	Information was well communicated	10	
Score	Total Points	100	

Notes:

CLIENT SESSION FORM

1. An analysis of the Client's Problem, Need, or Assistance requested:
2. Key Findings/Observations/Discussion Points:
3. Specific Recommendations and Required Actions:
4. Status of Client/Counselor Actions:

MARKETING MANAGEMENT RUBRIC

Client: _____

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INSTRUCTOR'S CASE SOLUTION

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of the 1990s, the 1990s have been a period of rapid change for the world of work.

The changes have been dramatic and have affected the way we work, the way we live, and the way we think. The changes have been driven by a number of factors, including the rapid pace of technological change, the increasing globalization of the economy, and the changing needs and expectations of the workforce.

As a result of these changes, the world of work has become more complex and more challenging than ever before. The traditional model of work, which was based on a clear division of labor and a hierarchical structure, is being replaced by a more fluid and flexible model. This new model is based on a more collaborative and team-oriented approach to work.

The changes in the world of work have also led to a number of new challenges for workers. One of the most significant challenges is the need for workers to have the skills and knowledge to succeed in a rapidly changing and competitive environment. This has led to a focus on continuous learning and development for workers.

Another challenge is the need for workers to have the ability to work in a more flexible and fluid environment. This has led to a focus on developing workers' ability to adapt to change and to work in a more collaborative and team-oriented environment.

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