EBA Business Education & Accreditation

VOLUME 15 NUMBER 1 2023

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Business Education & Accreditation

Business Education & Accreditation, ISSN: 1944-5903 (print) and ISSN: 2157-0809 (online) publishes high-quality articles in all areas of business education, accreditation and related fields. Theoretical, empirical and applied manuscripts are welcome for publication consideration. The Journal is published once per year by the Institute for Business and Finance Research, LLC. All papers submitted to the Journal are blind reviewed. The Journal is distributed in print and through EBSCO*Host* and RePEc.

This Journal is the result of the collective work of many individuals. The Editors thank the members of the Editorial Board, ad-hoc reviewers and individuals that have submitted their research to the Journal for publication consideration.

ISSN : 1944-5903 (print) and ISSN: 2157-0809 (online)

Business Education & Accreditation
Vol. 15, No. 1, 2023, pp. 1-15
ISSN: 1944-5903 (print)
ISSN: 2157-0809 (online)

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FACTORS INFLUENCING STUDENTS' CHOICE OF MATHEMATICS IN HIGH SCHOOL AND EXPERIENCE IN THE COMPULSORY BUSINESS MATHEMATICS COURSE: EVIDENCE FROM NORWAY

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ABSTRACT

This paper explores business students' attitudes towards mathematics and their choice of mathematics course at high school. We analyze students' preference, skills and attitudes towards mathematics following the Attitudes Towards Mathematic Inventory (ATMI) framework. We examine how their mathematical pathway in secondary school influence how difficult they find an introductory course in business mathematics at the first year of business school. The analysis is based on a survey of 273 students from two business schools in Norway. The results display strong indications that students' choice of mathematics course is linked to the three variables, self-confidence, value, and enjoyment. We also find evidence that the three variables are probably indicators of the choice of mathematical pathway, and not vice versa. This suggestion is based on the study of students who change their minds one year after making their choice and by applying a regression model. Students who choose an easier mathematics course in secondary school, find the business mathematics (BM) at business school substantially more demanding, compared with the group who choose more difficult mathematics in secondary school. We suggest that the main reason for this finding is not the students' choice of mathematical level at high school, but their attitudes towards mathematics.

JEL: A22, M10, M20

KEYWORDS: Attitudes towards Mathematics, Business Mathematics, Mathematics at High School, Business Students, Mathematical Skills

INTRODUCTION

Knowledge and abilities in mathematics is an important indicator of success in business studies. This link is particularly strong in the quantitatively oriented subjects (Alcock, Cockcroft, & Frank, 2008; Ross & Wright, 2022). In some countries, students can choose between different levels of theoretical mathematics at the secondary school (Asian Chaves et al. 2022; Opstad, 2018). Research shows that students who choose more practically oriented mathematics at high school underperform in business courses. Hence, it is important to inform students at high school about the usefulness of mathematics and create a more positive attitude towards the subject, which in turn may result in better achievements in business school (Opstad, 2021). Another approach is to require skills in mathematics upon admission to business schools in the same way as is done for technical education in Norway.

Although previous research shows a clear relationship between the choice of mathematics at high school and performance in mathematics, the causal relationship may nevertheless be unclear. On one hand, the choice may depend on the students' skills and confidence in theoretical mathematics. On the other hand,

students with practical mathematics may achieve less success in business courses due to a strained relationship with mathematics and not because of their choice of mathematics courses at high school. The purpose of this article is to explore why business students make different math choices at high school. Furthermore, this article also investigates how the experience with the compulsory course in business mathematics is connected to students' mathematical pathway and their attitudes. Students with a background in practical mathematics, who tend to dislike mathematics, may find this course quite demanding. A deeper understanding of these issues is useful for admission, lecturers and the debate concerning requirements for future students at business schools. To explores these issues, data has been collected by asking 273 business students at 3 different campuses in Norway.

This paper is structured in five sections. After this introduction, a review of the literature is presented in section two. Thereafter, the data and methodology applied in our study is described in section three, before we present our findings in section four. In the fifth section, we summarize the key insights, theoretical implications and the limitations of our study and discuss further research paths.

LITERATURE REVIEW

The Structure of High School Mathematics in Norway

Mathematics is compulsory at high school in Norway. In their first year, the students must choose between practical mathematics (P- math) and theoretical mathematics (T- math). P- math focuses on examples from practical situations in people's everyday life. T- math involves a deeper understanding of topics like geometry, algebra, functions, and probability. It is an introduction of theoretical mathematics. The second year of high school, student have the following options:

Keep learning P-math.
Select mathematics for business and social sciences (S- math).
Mathematics for natural sciences (N- math).

S- math includes analysis of exponential functions, regression models, calculations, and solving equations of first and second degree. Students with N- math deal with algebra, geometry, analysis of figures in planes, and the use of vectors. Students can convert from P math first year to P- or S- math second year, and from T math first year to P-, S-, and N- math second year. The third-year mathematics is voluntary, and the student may continue with S- and N- math.

Previous Research

Students with mathematical skills tend to achieve success in many subjects in courses for Business and Management Administration Degrees (Asian-Chaves, et al., 2022; Opstad, 2018; Tuan et al., 2019).
Many researchers report a positive relationship between attitudes towards mathematics and achievements in mathematics (Ajisuksmo & Saputri, 2017; Bal, 2020; Güner, 2012). Students with positive attitudes towards the subject tend to succeed in mathematics, and this is an important factor explaining good performance in this field.

Students with a background in practical mathematics in high school have much lower self-confidence in mathematics (Opstad & Årethun, 2019a). There is a strong correlation between the choice of level of mathematics at secondary school and attitudes towards mathematics. However, the causal relationship is debatable. Do students choose practical mathematics because they have low self-confidence in the subject, or do they get low self-confidence because they have a background in practical mathematics?

Many students have a negative view towards mathematics. They may obtain a feeling of helplessness and often cannot concentrate when working with mathematics (Hoorfar & Taleb, 2015). These students consider mathematics as quite difficult compared to other subjects (Carey et al., 2019). This might explain the high degree of anxiety towards mathematics. Therefore, many students have a negative emotional reaction to the prospect of learning mathematics. One can dislike, worry, or be frustrated when studying mathematics. Hence, many students might postpone or avoid doing homework in this course. Factors explaining student math anxiety might be (Carey et al., 2019): Negative experience and bad performance in mathematics, negative experiences with how the lecturers teach and present the subject, study habits, general negative attitudes towards mathematics and, finally, some parents do not see the usefulness of learning the subject and this may influence the attitudes of their children.

Brezavšček et al. (2020) report that the teaching style and methods at secondary schools are critical for further success in mathematics. The timing in which anxiety towards mathematics occurs, seem to vary among students (Siebers,2015). Also, the degree of math anxiety varies depending on the difficulty of the mathematical subjects (Ching, 2017).

According to Süren et al. (2020), mathematical anxiety is the key factor when explaining why many students dislike mathematics. A high degree of math anxiety will result in less motivation and lower performance in mathematics (Carey et al., 2016; Hiller et al., 2022; Namkung et al., 2019; Zhang et al., 2019). This may result in a vicious circle: Due to poor performance in mathematics, one gets anxiety towards the subject, which again leads to poorer results. This in turn may cause even greater anxiety towards the subject, etc.

Students' anxiety towards mathematics is closely linked to students' self-efficacy and self-confidence (Irhamna et al., 2020; Schulz, 2005). These variables are strongly correlated (Hiller et al.,2022). High anxiety is an important factor when explaining low levels of self-efficacy and self-confidence in the subject (Steven et al, 2004). Self-confidence is an import factor linked to success in mathematics (Çiftçi & Yildiz, 2019). However, the causal effect could go both directions: Self-confidence leads to success, and vice-versa (Mazana et al., 2019). Opstad (2021) reports that self-confidence is significantly positively related to performance in business mathematics.

Based on previous research and theory, the following research questions will be discussed:

Research question 1: The choice of mathematical pathway at high school depends on students' preferences and attitudes.

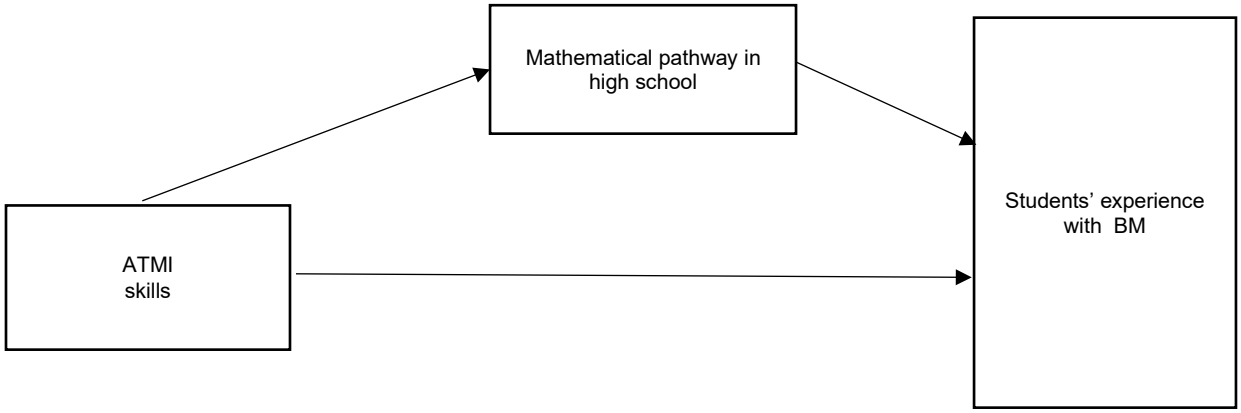
An assumption is that students with good theoretical abilities choose T-math in their first year of high school. Students with weaker mathematical abilities tend to choose P- math. In addition, it is assumed that students' academic background, preferences and views on mathematics influence the choice of mathematics direction. In line with previous research, we assume students' attitudes towards mathematics matters (Cerbito, 2020).

Research question 2: Students who have a background in P-math and low score in ATMI (Attitudes Towards Mathematical Inventory) experience business mathematics as more demanding and difficult compared to those who have T- math.

Published articles show that mathematical background and skills are correlated with the success in mathematics and various business courses (Asian Chaves, et al., 2022). Therefore, we assume that students with P-math struggle more to get through the compulsory course in business mathematics. Opstad (2021) suggest ATMI is a key factor in explaining students' performance in Business Mathematics (BM) at the University. ATMI is a survey designed to measure high school and university students' attitudes toward mathematics. In this study, we will investigate which of the two effects from the research questions that is

most dominant: Is ATMI or mathematical level at high school is the main factor to explain the students' experience with BM (see figure 1). Which factor has greatest impact?

Figure 1: The Relationship Between Students' Experience with BM (Difficult and Demanding) and ATMI and Students' Choice of Mathematics at High School



The figure explains the assumed relationship between ATMI-score (scores on students' attitudes toward mathematics) and the students self-reported experience with Business Mathematics (BM). This relationship is assumed to be partly direct, shown by the lower vertical arrow, and partly indirect, mediated by their choice of mathematical pathway in high school.

DATA AND METHODOLOGY

The data are collected from a survey that was distributed in a mandatory first year course at two business schools in Norway (NTNU Business School and Western Norway University of Applied Sciences, HVL) in the autumn of 2019. Most students attended the lectures and answered the questionnaire (214 from NTNU and 59 from HVL). Some students choose not to attend the lectures, this is therefore not a random sample. Previous surveys show that this type of survey provides a good picture of the views of the students (Bonesrønning & Opstad, 2015).

There are many papers examining the attitudes towards mathematics (Opstad & Årethun, 2019a). This study is based on the work of Tapia and Marsh (2004), and their Attitudes Towards Mathematic Inventory (ATMI) framework. ATMI includes four factors: (1) Value, (2) Enjoyment, (3) Self-Confidence and (4) Motivation. The method has high reliability and validity (Ngurah & Lynch, 2013). After using factor analyses the last scale was the excluded from our analysis since it did not meet the following 4 requirements (Adelson & McCoach, 2011):

A) The coefficients are higher than 0.4
B) Non-relevant factors are less than 0.3
C) The difference between relevant and non-relevant factors is at least 0.2
D) The value of Cronbach's alfa is above 0.7

As a result, the following categories are used in this study: Value, Self-confidence and Enjoyment (see Table 1). The same data are used by Årethun and Opstad (2023), where the factor analysis is explained in more detail.

Table 1: Attitudes Towards Mathematics

Category	Description
Value	To measure students' beliefs in the usefulness, relevance and worth of mathematics in their life now and in the future
Self-confidence	To measure students' confidence and self-concept of their performance in mathematics. It measures whether students believe that they have enough ability to succeed in mathematics.
Enjoyment	To measure the degree to which students enjoy working with mathematics

This table explains the categories in ATMI (from Opstad & Årethun, 2019b)

The Model

In this study, we will analyze the answers in the questionnaires to answer the two research questions. In this context, statistical methods are primarily used comparing two independent means using T-test. In this way, we can identify whether there are significant differences depending on the students' choice of mathematics path at high school and their ATMI score. In addition, analysis of correlational relationships is also used. The questionnaire is based on a 7-point Likert scale, where 1 is 'completely disagree' and 7 is 'completely agree. A weakness of this approach is that only partial links are considered in the analysis. Therefore, to answer whether it is ATMI or choice of mathematics that explains the students' experience of BM, we have chosen to analyze this simultaneously using following linear regression model:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \varepsilon_i$$

Y: Students' view of BM measured using two variables: (BM is demanding, BM is difficult) (7-point Likert scale)
I = student
β_0 = constant
X_1 = Dummy variable gender (1: M, 0: F)
X_2 = Dummy variable mathematical level high school (1: P-math, 0: others)
X_3 = Self-confidence mathematics (7-point Likert scale)
X_4 = Value mathematics (7-point Likert scale)
X_5 = Enjoyment mathematic (7-point Likert scale)
ε = stochastic error.

The regression analysis considers two dependent variables: BM is demanding and BM is difficult. Gender is included as a standard background variable. There are about as many women as men in this sample. Previous analyses suggest that gender has little impact among business students in Norway (Opstad, 2020).

RESULTS

In this section, we will look at the reasons given by the students for their choice of mathematics, how they experienced the subject at high school, exam results and parental background. In the last part, the relationship between mathematics choices and attitudes towards mathematics generally and business mathematics specifically is analyzed. We study more closely those students who change mathematics course from the first to the second year of high school, as it is interesting to see if they stand out compared to students who do not change direction.

Students' Choice of Mathematics Level at High School (Question 1)

According to Thorsen (2015) 80 percent of the students expect higher grades by choosing P-math. The difference in finding mathematics difficult is significant between T- and P-math (Table 2), This is in line with the suggestion of Opstad and Årethun (2019b).

Students who study T- math are also more likely to have an academic family than students with P- math (measured by the proportion of those who have academic parents). The difference is significant (Table 2).

Table 2: Comparing Scores on Some Variables for T- Math and P- Math-Students, Respectively

Variable	T-Math (N = 146)	P-Math (N = 78)	Diff.	Two-sided t-test for Differences
At least one of my parents has a higher education (0: no. 1: yes)	0.89 (0.31)	0.67 (0.47)	0.22 (0.05)	0.001***
I received the following grade for the exam in high school (Fail:0, Highest score:6)[1)]	4.04 (1.06)	3.50 (0.92)	0.54 (0.18)	0.002***
Mathematics first year at high school was difficult and demanding[2)]	4.06 (1.54)	2.14 (1.40)	1.92 (0.20)	0.001***

*The first column in this table shows the mean value scores on some background variables and "find mathematics difficult and demanding" for students choosing theoretical mathematics (T-math) in their first year in high school. The second column shows the corresponding information for students choosing practical mathematic (P-math). The third column shows pairwise observations (T-P). [1]Not everyone had a final exam, therefore N=95 for T, and N=42 for P. [2] The Likert scale ranged from 1 to 7. The selected method is an independent t-test and equal variance assumed and two-tailed significance, standard error in parenthesis. ***: p < 0.01, **: p< 0.05, *:p< 0.1.*

Students were asked to provide the reason for choosing a mathematical pathway at second year at high school (Table 3) It shows a clear pattern. The main purpose for choosing P -math is that the students find the subject easier. However, students with P-math do not find this kind of mathematics relevant for further studies. Even though those with practical mathematics find the subject easier and expect higher success compared to theoretical mathematics, the final mean grade from high school is substantially and significantly lower for the P-group (Table 2).

For students who choose theoretical mathematics (either S- or N- math), the main motives are that it is relevant for further study or that one is interested in mathematics. Hence, there is a substantial difference in interests and motivation among those students choosing theoretical mathematics compared to practical mathematics as reported by Opstad and Årethun (2019b). A higher percentage of P-students find the subject easier and are less motivated compared with N- and S- students (Table 3).

We find a strong significant relationship between attitudes towards mathematics and the selection of level of mathematics at first year at secondary school (Table 4). In particular, the difference is great regarding self-confidence in mathematics. Students who have chosen practical mathematics have a much lower self-confidence than those who prefer theoretical mathematics. The finding is in line with previous research (Shih et al., 2019).

Table 3: Reason for Students' Choice of Mathematical Pathway in High School (P-, S- or N-Math), Measured in Percent

	P-Math (N=96)	S-Math (N= 113)	N-Math (N=59)	ALL[1)] (N=268)
The course is easy	29.1	10.6	8.5	16.8
I am interest in the subject	4.2	28.3	27.1	19.4
I am not motivated for learning mathematics	12.5	2.7	3.4	6.3
It is relevant for further studies	1.0	37.2	47.5	26.5
Other reason	53.1	21.2	13.6	30.9
All	99.9	100.0	100.1	99.9

The table shows students' reason for choosing their specific mathematical pathway in high school. The first column shows the main reason why P-math students (students in practical mathematics) chose this mathematical path in high school, measured in percent of total students attending P-math. The second and third columns provide the same information regarding students who chose S-math (students in mathematics designed for social sciences) and N-math (mathematics designed for natural and technical sciences), respectively. [1] 273 persons responded on the questionnaire, 5 of them did not answer the question regarding their choice of mathematics at high school.

Table 4: Mean Scores on ATMI-Dimensions for Students at Different Mathematical Pathways in Their First Year in High School

Variable	All (N=273)	T-Math (N=146)	P-Math (N=78)	Diff.	Two-sided t-test for Differences
Self-confidence	4.18 (1.18)	4.54 (1.08)	3.58 (1.05)	0.96 (0.15)	0.000 ***
Value	4.86 (1.08)	5.10 (1.00)	4,51 (1.13)	0.59 (0.15)	0.000***
Enjoyment	4.18 (1.08)	4.33 (1.07)	3.96 (0.96)	0.37 (0.15)	0.010 **

*This table shows the mean value scores on the ATMI-dimensions (Self-confidence, Value and Enjoyment) for students who chose either T-math or P-math, respectively, in their first year in high school. The selected method is an independent t-test (T-P), equal variance assumed, and two-tailed significance, standard error in parenthesis. ***: $p < 0.01$, **: $p< 0.05$, *:$p< 0.1$.*

The cause-and-effect correlation is not obvious. Do students choose P-math because they have low confidence or vice versa? To study this, we investigate students who change their minds after their first year and go from T to P-math. (Table 5). We want also to compare those who keep studying P-math against those who change to S-math.

Table 5 shows some interesting results. For students who have low self-confidence in mathematics, the probability that a student substitutes theoretical mathematics in favor of practical mathematics increases. The relationship is strongly significant (Table 5). We find the same correlation for value of mathematics, but the impact is not so strong. The effect is opposite for students who have switched from P to S. They have substantial and significant higher score in attitudes towards mathematics (ATMI) compared to the rest of the P-students. For those who go from P to S mathematics, the result is significantly weaker grades. This confirms the assumption that it is easier to achieve good grades by choosing P-math.

One reason for students to transfer from P- to S-math is that they want to study business administration subjects and realize that S -mathematics is especially useful. We do not have data to confirm this.

Table 5: Students Changing Mathematical Level After First Year in High School Compared to Students Not Changing

	From T to P-Math (N=17)			From P to S Math (N=22)		
Variable	**Changed**	**Diff [1)]**	**Sig.**	**Changed**	**Diff [1)]**	**Sig.**
Self-confidence	3.80 (.92)	-0.83 (0.27)	0.003***	4.11 (0.96)	0.74 (0.25)	0.002***
Value	4.66 (0.92)	-0.50 (0.25)	0.005*	4.83 (0.99)	0.45 (0.28)	0.094*
Enjoyment	4.20 (1.29)	-0.16 (0.33)	0.318	4.19 (0.78)	0.33 (0.24)	0.067*
Grade final exam high school ((Fail:0, Highest score:6)[)]	4.11 (1.17)	0.07 (0.37)	0.419	3.06 (0.93)	-0.71 (0.27)	0.007***

*The first column in of this table (Changed) shows the mean value scores on the ATMI-dimensions (Self-confidence, Value and Enjoyment) for students who changed from T-math to P-math after the first year in high school. The second column (Diff) shows the difference between the ATMI-score for those students who changed from T-math or P-math after the first year in high school and the P-math students who did not change. The fourth and fifth columns have the same interpretation as the first and second column, respectively, with the exception that this is students who changed from P-math to S-math after the first year in high school. In the third column, we compare means by applying a t-test,7-point Likert scale, equal variance assumed and two-tailed significance. Standard error in parenthesis. ***: p < 0.01, **: p< 0.05, *:p< 0.1.*

Our findings suggest that there is a difference between students who choose practical and students who choose theoretical mathematics. Students who have chosen P- math seem to master the subject poorly and many have weak mathematical abilities. It is likely, that the same pattern would have occurred if these students had chosen theoretical mathematics. The selection is largely depending on the students' attitudes to mathematics. P-students want to avoid taking the demanding variant. Even so, they do not achieve good grades. This explains why P- students have lower values in their attitude towards mathematics and especially towards self-confidence.

According to Ching (2017) the level of mathematical anxiety depends on difficulty of the mathematical topics. Based on this reasoning, many of the students who have chosen practical mathematics will probably face major challenges in dealing with theoretical mathematics. This could have led to increased frustration and even more negative attitudes towards the subject. The interpretation is that many people choose P- math because they have weak analytical abilities and will struggle with a more theoretical approach. Based on such reasoning, the result may be that many of these students would have developed more anxiety and depression related to mathematics if they did not have the opportunity to take P- math.

<u>P-Students and Students with Low Score on ATMI Experience Business Mathematics to Be More Difficult and Demanding (Question 2)</u>

Business Mathematics (BM) is a compulsory first year subject for all students attending business schools. It is of interest to study how different mathematics background from secondary school is connected to the experience of BM. We will analyze this in more detail. Furthermore, we also investigate the relationship between ATMI and experience with BM by applying correlation analysis. In the last part we will conduct a simultaneous analysis using the regression model.

Students with P- math experience the introductory course in business mathematics difficult and demanding (Table 6). There are significant differences compared to S- and N-students Therefore, P-students have significant higher study effort (Årethun & Opstad, 2022) and achieve less success in the subject (Opstad, 2021). This confirms the first part of research question 2. Student with P-math tend to find business mathematics quite demanding. Probably, the reason is that these students have weaker mathematical abilities and have a less positive attitude towards the mathematics subject. It is reasonable to assume that

the students with the best mathematics skills have a background in N -math. This may explain why there are statistically significant differences between N -and S- math regarding finding BM demanding or difficult.

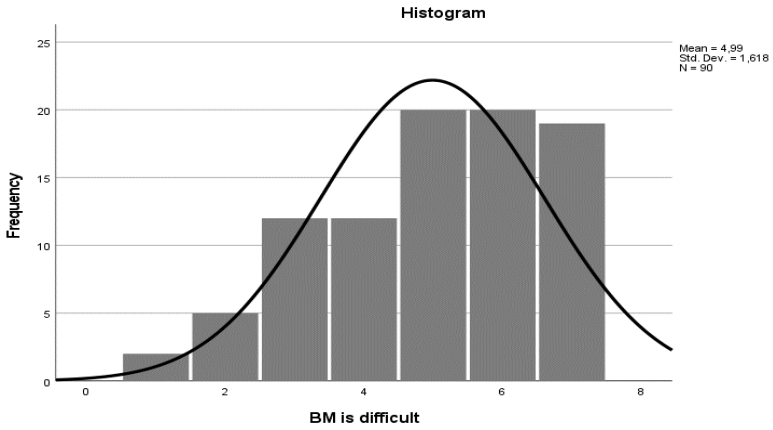
Table 6: Students' View on Some Aspects of the Compulsory Business Mathematics (BM) Course

Variable	All (N= 265)	Diff S-P	Sig	Diff (N-P)	Sig	Diff (N-S)	Sig.
BM is demanding	4.53 (1.72)	-1.44 (0.22)	0.000 ***	-2.51 (0.31)	0.000 ***	-1.07 (0.30)	0.000***
BM is difficult	4.13 (1.74)	-1.44 (0.23)	0.000 ***	-2.36 (0.31)	0.000 ***	-0.92 (0.29)	0.002***
BM is interesting	4.80 (1.34)	0.36 (0.20)	0.007	-0.43 (0.30)	0.140	0.07 (0.27)	0.799
BM is instructive	5.23 (1.27)	-0.004 (0.19)	0.986	0.139 (0.27)	0.606	-0.14 (0.26)	0.575
BM is to no use	2.13 (1.58)	-0.030 (0.23)	0.896	0.372 (0.28)	.181	-0.34 (0.28)	0.232

*The first column of this table shows the mean score regarding the students' view on each of the five aspects of the BM course. The second column shows the difference in the mean score between BM students who attended S-math in high school (S) and BM students who attended P-math in high school (P). The fourth and sixth columns contain the same information as the second column, except that the fourth column is about the difference between those who were N-math students (N) in high school and those who were P-math students (P). The sixth column is about the difference between those who were N-math students (N) in high school and those who were S-math students (S). In the third, fifth and seventh column, we compare independent between S- and P-math, between N-and P-math, and finally between N- and S- math by using t-test, 7-point Likert scale, standard error parentheses, two-tailed significance equal variances assumed. ***: p < 0.01, **: p< 0.05, *:p< 0.1.*

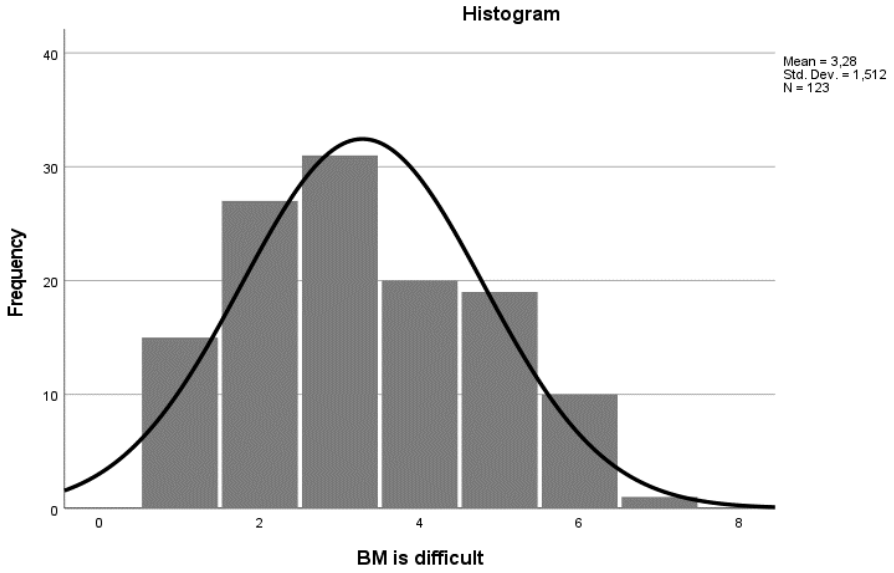
Some students with S- or N- math also experience BM to be difficult (see Figure 3). On the other hand, there are also P- math students who do not experience BM as difficult (Figure 2). Hence, one should be careful to conclude.

Figure 2: The Distribution of P- Math Students Who Find the Introductory Course in Business Mathematics Difficult



This is a histogram showing the distribution of answers to the question on whether students who attended the P-math during high school find business mathematics difficult. The empirical distribution is compared with the normal distribution.

Figure 3: The Distribution of S and N Math Students Who Find the Introductory Course in Business Mathematics Difficult



This is a histogram showing the distribution of answers to the question on whether students who attended either the S-math (mathematics designed for social sciences) or the N-math (mathematics designed for natural and technical sciences) during high school find business mathematics difficult. The empirical distribution is compared with the normal distribution.

We can report a clear relationship between BM and ATMI (Table 7). We find a strong significant negative correlation between ATMI and that BM is demanding and difficult. This confirms the second part of research question 2. The correlation coefficient is particularly high between BM is difficult and Self-confidence.

From the table below, we can see that for students with T math, self-confidence is strongly negatively correlated to how demanding they find BM. On the other hand, for students with P math, the correlation is negligible. One reason for stronger impact on T-math may be that some students choose this mathematical level because it is relevant for further education and careers even though they experience mathematics as difficult (see Figure 2). Table 7 shows nothing about causal relationships. But one possible interpretation could be that students who score low on ATMI (especially self-confidence) struggle with BM regardless of math background in high school. In order to investigate this, we turn to the regression model.

Table 7: Correlation between BM and ATMI

	BM Is Demanding			**BM Is Difficult**		
Variable	**All**	**T-Math**	**P-Math**	**All**	**T-Math**	**P-Math**
Enjoyment	-0.256 ***	-0.307***	-0.037	-0.370***	-0.419***	-0.247**
Value	-0.237***	-0.239***	-0.066	-0.292***	-0.324***	-0.185
Self-Confidence	-0.403***	-0.386***	-0.003	-0.497***	-0.459***	-0.308***

*The first column of this table shows the Pearson's correlation coefficient between students who find BM demanding and each of the three dimensions of ATMI. The second and third column shows the Pearson's correlation coefficient between students who attended T-math or P-math, respectively, on the first year in high school and who find BM demanding and each of the three dimensions of ATMI. The fourth, fifth and sixth column provide the same information as the first, second and third column, respectively, but these columns represent the part of the sample who finds BM difficult. **: p<.05, *** : p< .01.*

The connection to BM is investigated further by a simultaneous analysis (Table 8). In line with previous research gender does not seem to matter as an explanatory factor among Norwegian Business students (Opstad, 2021). Moreover, the results from the regression model confirm our suggestions that it is primarily ATMI that is correlated with the students' perception that BM is demanding and difficult (Table 8). When using a simultaneous model, the significance levels and values of β are much stronger for self-confidence than the dummy variable for math choice in high school. There is a close negative link between students struggle in mathematics and their performance (Mensah et al., 2013). Regarding the dependent variable "BM is difficult", the value of β is much smaller for P-math (and opposite sign) than self -confidence and the impact is only weakly significant. Also for the depended variable "BM is demanding", the influence of P-math is considerably weaker than for self-confidence. The result confirms our assumption that the reason that students struggle with BM is due to the students' difficulty in handling mathematics. This impact is much stronger than the math choice in high school. In other words: It is not the selection of mathematics pathway at high school that causes thestudents' challenges to mathematics, but ATMI. Students who have anxiety in mathematics and low self-esteem largely choose P-math, but not all.

Table 8: Output from the Linear Regression Model

Explanatory Variable	**Dependent Variable**					
	BM Is Demanding			**BM Is Difficult**		
	Beta (B)	**t-Value**	**Sig.**	**Beta (B)**	**t-Value**	**Sig.**
Gender	-0.020	-0.341	0.733	-0.059	-1.07	0.287
P-math	0.188	3.17	0.002***	0.104	1.82	0.069*
Enjoyment	-0.042	-0.544	0.587	-0.124	-1.68	0.095*
Value	-0.011	-0.147	0.883	0.009	0.13	0.899
Self-confidence	-0.316	- 0.419	-0.000***	-0.406	-5.63	0.000***
	N=263, Adjusted R^2 =.179, R^2 =0.195			N = 261, Adjusted R^2 =.256, R^2 =.256		

The first column of this table shows the linear regression estimates of the standardized Beta-coefficients in the equation: BM is demanding $= \beta_0 + \beta_1(GENDER) + \beta_2(P\_MATH) + \beta_3(SELF\_CONFIDENCE) + \beta_4(VALUE) + \beta_5(ENJOYMENT)$. *The fourth column contains the same information as the first one, but this regression analysis carries BM is difficult as the dependent variable. VIF values (Variance Inflation Factor) are all between 1.0 and 2.0 (not shown in the table).*

Some Final Comments

Students with N- and S-math outperform students with P- math (Opstad, 2018). For this reason, many would argue that requiring T-math from high school, will ensure much better quality and better results from the students attending business courses. This study shows that this is somewhat hasty and partly a wrong conclusion. An important reason for students to choose P- math is that those students initially have weaker mathematical abilities. Selecting P-math may be the best option since they have problem with theoretical mathematics. If the students struggle with mathematics, they will only to a limited extent handle BM better by switching from P- to T-math. Since theoretical mathematics is more demanding than practical mathematics, the choice of mathematics level affects the ranking of students applying for further studies especially since a student tend to achieve better grades by substituting T- with P-math. This can be compensated by giving additional points for S- and N- math. One can also require that students must take S- or N- math to be admitted to business studies. For quantitative fields such as finance and economics, this may be a way to go. But business courses are complex and heterogeneous. In fields like marketing and management, mathematics may not be such an important tool. Therefore, there is no easy answer. The current system where weak students can choose P- math have clear advantages. This probably leads to more people completing high school and fewer having a strained relationship with mathematics. Hence, one avoids to a greater extent that students get into an undesirable circle with a strained relationship with mathematics (Zhang et al., 2019). Some students have anxiety towards mathematics and therefore they want to avoid a demanding program. On the other hand, research shows that those who have good

mathematical skills tend to succeed in business courses (Opstad, 2018). It is likely that business schools will receive more applications when there is no requirement of theoretical mathematics because more students meet the admission requirements.

CONCLUSIONS

In this paper, we have discussed two research questions.

Research question 1: The choice of mathematical pathway in high school depends on students' preferences and attitudes.

Research question 2: Students who have a background in P-math and low score in ATMI experience business mathematics as more demanding and difficult compared to those who have T- math.

We have analyzed business students' choice of mathematics course at the upper secondary school, and students' attitudes using the (ATMI) framework. We generally found great heterogeneity among the students' attitudes, depending on their different mathematical backgrounds. Students choose P-math because it's easy and they lack ambitions regarding further studies, while students who are interested in mathematics and regard this subject as relevant for further studies tend to choose T-math. Particularly, we saw that the variable "self-confidence" appears to be an important predictor of students' choice of mathematics course at the upper secondary school.

The choice of course at secondary school seems to follow students who later attend a business school, as those who initially chose easier mathematics find the course in business mathematics substantially more difficult and demanding than those who chose more difficult mathematics. This effect is, however, reduced when we bring ATMI into a regression model. We found evidence that ATMI is a stronger predictor of attitudes towards business mathematics than the choice of mathematics in high school. It is therefore likely that it is the factors in ATMI, and not the high school choice that contributes to a gap between students in business schools. An understanding of ATMI and the choice of high school mathematics is important to address the gap found in business schools.

Teachers in primary school should try to strengthen the pupils' interest and their self-confidence in mathematics, while professors in universities and colleges may adapt the curriculum to increase the students' sense of value towards mathematics. Although we in this paper present several links and correlations between students' choices and the ATMI framework, the total picture is still unclear. We know that ATMI influences the choice in high school, and that ATMI is important for future performance, and we know some of the mechanisms behind the choices.

Further research is still needed on how to address the gap in mathematics, and how business schools as well as other institutions best may use the knowledge that we have present in this paper. Note however, that we surveyed students in business schools several years after they made their initial choice of mathematics course in upper secondary school. One should therefore apply caution when generalizing our findings to students at other institutions than business schools.

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Business Education & Accreditation
Vol. 15, No. 1, 2023, pp. 17-38
ISSN: 1944-5903 (print)
ISSN: 2157-0809 (online)

IBFR
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COLLABORATIVE ONLINE INTERNATIONAL LEARNING: STUDENTS PERCEPTIONS AND INSIGHTS ABOUT MANAGING DIVERSITY AND INCLUSION IN GLOBAL ENVIRONMENTS

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ABSTRACT

The Collaborative Online International Learning (COIL) model is an innovative strategy to be applied in online and hybrid courses. The COIL model presents a great opportunity for college students to learn and relate with international peers in multicultural virtual environments. This paper reviews the existing literature regarding international learning, its benefits and the current trend in higher education. It examines a COIL course design, based on the development of common curricula for a period of five weeks in the Fall semester of 2022, the design of instructional materials to collaborate globally, and team-taught with colleagues from diverse cultural and linguistic backgrounds. This paper introduces practices that can be implemented by using a common Learning Management System (LMS), and international networked teaching to help college students increase intercultural and diversity awareness, explore and develop cultural competencies, and gain experience in communication in a global context using a cost-effective pathway. It also discusses challenges, opportunities and limitations, as well as the lessons learned through the process of course development and implementation.

JEL: I230, M140, M160

KEYWORDS: Academic Research, Diversity, and Cross-cultural Management

INTRODUCTION

Around the globe, the demand for Higher Education Institutions (HEIs) focuses on internationalizing their curricula (Higher Education Academy, 2014) and assure that their students acquire intercultural capabilities that allow them to act as global citizens and global professionals. Such capabilities include resilience, flexibility, the ability to relate and communicate with global others, and awareness of globalization in the workplace. Besides the strategic statement of HEIs, it is very important that the academy members develop students with the capability for managing inclusion and diversity, and internationalization ambitions. This includes the ways in which international and intercultural dimensions can be integrated into curricula, how staff expertise is steered by faculty, and how individual practices are resourced and supported (Wimpenny, Beelen, & King, 2019). As Leask (2015) contends, internationalization must be an all-embracing institutional approach, reflected in strategy, training, institutional values, and culture. Virtual exchange is an online form of intercultural exchange (European Parliament, 2018) that has been piloted by the European Commission alongside Erasmus mobility programs. Virtual exchange has been defined as "a practice, supported by research, that consists of sustained, technology-enabled, people-to-people education programs or activities in which constructive communication and interaction takes place between individuals or groups who are geographically separated and/or from different cultural backgrounds, with the support of educators or facilitators" (Evolve 2018). It is based on the assumption that bringing students into contact through structured educational programs

allows them to develop intercultural and linguistic competence as well as a range of soft skills that are key to participating in a globally interdependent world. It is not seen as a replacement for student or youth mobility, but rather as a compliment, since it offers a means of providing intercultural, international experience through sustained online projects in formal or informal educational contexts. In today's global society, higher education institutions are charged with preparing students to be world citizens who possess holistic perspectives on diversity and inclusion. Through communication and idea exchanges, members within the international and multi-disciplinary learning community analyze their own identities, biases, and prejudices, challenge existing perspectives and stereotypes, and reshape their worldviews (Olson, Evans, & Shoenberg, 2007). Despite the benefits of international learning, however, there are many factors that may prevent college students from studying abroad, such as concerns about the cost and resources, work and family obligations, or just the fear of the unknown. The National Association of Foreign Student Advisors (NAFSA): Association of International Educators (2018) reports that only 1.6 percent of all students enrolled in higher education institutions in the United States take part in study abroad programs. Thanks to the development and utilization of new technology, these days, learning does not have to occur within a certain physically bounded classroom. Instead, it can take place anytime, anywhere, and with anyone across disciplines and across nations (Kahn & Agnew, 2017). At the postsecondary level, Pew Research Center reports nearly 100 percent of college students access the Internet (Smith, Rainie, & Zickuhr, 2011). New technology, pedagogy, and methods of teaching provide tools for expanding access to international education. Technology implemented in the educational systems enables, supports and reinforces educational reform, impacts students' academic performance directly (Kreijnsa, van Acker, Vermeulend, & van Buuren, 2014), enhances pedagogical effectiveness, and enriches learning and teaching experiences at local, national, and global levels (Chen, McMurtrey, McCalman, Castillo, & Ligon, 2015).

Technology in education makes it easier to access and manage knowledge, helps develop critical thinking and problem-solving skills (Alghazo, 2006), and enhances students' technological proficiency and communication competencies (Mac Calluma, Jeffrey, & Kinshuk, 2014). During the Covid-19 outbreak, the technologies that allow digital education became an unavoidable alternative for academic institutions. In this regard, institutions should be aware of their responsibilities in terms of the aspirations of students to provide appropriate services in relation to the normal education period, while upgrading and introducing a new system in which they should not face any barriers (Budur, Demir, & Cura, 2021). As Zhang and Pearlman (2017) affirm, in order to better prepare students to become world citizens and to meet the challenges caused by globalization, many colleges and universities in the United States of America actively seek international partners and offer technology-enhanced collaborative online international learning (COIL) courses. Considering all the benefits of using technology in education, especially during the pandemic and post pandemic periods, when the opportunities for interchanges were blocked, the implementation of an international virtual classroom using the COIL model was an excellent option for developing in the college students the competences for working and managing in global environments.

Along this paper, the authors are sharing the generalities of course design and implementation using the COIL model. The participants are two professors and their students from two HEI, The College of Business and Entrepreneurship at the University of Texas Rio Grande Valley (UTRGV), and The Faculty of Economy, at the University of Niš, in the United States of America (USA) and the Republic of Serbia, respectively. The development of a common curriculum by the two instructors includes the design of instructional materials to collaborate globally using a common Learning Management System (LMS), individual and teamwork activities with colleagues from diverse cultural and linguistic backgrounds. The common course had a length of five weeks and it was implemented on the last five weeks of the fall semester of 2022. The main results presented are the students' perceptions on the dimensions of inclusion and diversity, global competence, and Multiculturalism. Those perceptions were measured by using a survey, once the students completed the five weeks of the common course. It also discusses challenges, opportunities and limitations.

LITERATURE REVIEW

COIL courses provide teaching and learning experiences across countries/continents, across disciplines, and often expose participants to different home languages (with English as default) and different cultures using a variety of materials, activities, and assessments. Usually, the two instructors from the partner institutions find mutual interest in topics and develop the assessments and rubrics together. The professors used the same assessment, reviewed all students‘ work, yet evaluated and graded their own students’ work individually. The COIL course instructors could be in the same discipline or in different disciplines. For example, two professors of Special/Inclusive Education in the United States and Brazil offered a COIL course, which explored various topics of special/inclusive education in the two counties (Zhang & Capellini, 2018). At the beginning of their COIL course, Pearlman and Fraile (2018) used “the Iceberg Concept of Culture,” adapted from Hall (1977), as an icebreaker activity, asking the students to share their knowledge, or sometimes assumptions, about the culture of their peers in the partner institution. Through discussion, the participating students in U.S. and Netherlands learned about each other and broke down cultural stereotypes. The surface culture is defined as what people face at first when they visit the country, the second layer or shallow culture represents what is acceptable or desired behavior, and the deepest layer includes the unconscious rules invisible for people who are not familiar with the culture (Hall, 1977; Pearlman & Fraile, 2018). This is one example of how COIL could help the development of intercultural competence and communication skills.

Interdisciplinary COIL courses may inspire and profoundly impact participating students. For example, a professor of Special Education in the United States and a professor of Media and Culture in Sweden offered a COIL course, which focused on the topics of how individuals/groups with disabilities are portrayed in popular media and its impact to the society at large (Zhang & Glimäng, 2018). Technology is a critical component of the COIL course. The instructors from the partner institutions share, explore, discuss, and decide which technology tools are to be used in the course for course delivery, material sharing, collaboration, communication, and assessment. Ideally, the technology tool(s) should be selected for seamless interaction among the participants (Zhang & Glimäng, 2018). A technology-enhanced Collaborative Online International Learning (COIL) course could be one cost-effective solution for universities to internationalize curricula, develop new partnerships globally, and provide their students with international learning opportunities and global competencies. COIL courses use technology innovatively to foster collaboration between faculty and students in partner institutions worldwide, and to facilitate student learning (the SUNY COIL Center, n.d.). As campuses systematically update classroom technology to include virtual exchange communication tools, usually, no additional technology is required. Instead, existing hardware and software available on the partner campuses as well as technologies housed in the instructors’ and students’ homes/dorms are used. Thus, when taking a COIL course, students do not need to make a huge commitment financially or in terms of time, compared to their peers who study abroad (Fowler, Pearlman, LeSavoy, & Hemphill, 2014). Instead, the students take the course in their current institution and use existing networking technology for communication and collaboration, which adds no additional cost (Zhang & Pearlman, 2017).

In addition to synchronous class-to-class video conferencing during face-to-face class time, instructors and students use online collaboration tools existing on partner campuses or available for free. Platforms include but are not limited to CourseSites, Moodle, Blackboard, FeedbackFruits, and Blogger. Examples of online chats and video calls are Blackboard Collaborate, Skype, Facetime, Google Hangout, WhatsApp, Facebook Messenger, and Zoom. Examples of shared workspaces are Blackboard, Google Docs, Google Slides, YouTube, and examples of social media are Facebook and Twitter. Using these platforms, instructors and students share resources and exchange ideas (Andronie, 2014). These varied online collaboration technologies provide options for asynchronous and outside of the scheduled class time use, which help overcome the possible time difference across countries, enhance continuous collaboration at students’ own

pace, and develop a learning community (Andronie, 2014). Students in COIL courses get the opportunity to collaborate with peers in the partner institution(s) on one or more projects facilitated by their instructors, through which they increase intercultural and diversity awareness, explore and develop cultural competencies, and gain experience in communication and civil engagement in a global context (Fowler, Pearlman, LeSavoy, & Hemphill, 2014; Zhang & Pearlman, 2017).

The planning and delivery of COIL courses is a process of collaborative team teaching, which requires committed time for the instructors at the partner institutions to co-plan the instruction and assessments. It is a process of giving and taking among team members rather than using the sole direction of a given person. This collaborative process challenges the traditional way of individual planning, delivering the instruction, and assessing student learning. Collaboration is embedded in the curricula with the purpose to enhance student learning and to reach joint course goals. The development and implementation of COIL courses are time-consuming. Furthermore, it is an ongoing process that does not stop at the end of the COIL course. Instead, the instructors at the partner institutions record, analyze, and reflect on the development and implementation of the course and student learning outcomes, identify, and document any gaps between the desired goals and actual outcomes, and discuss the needed changes in curriculum, instructional materials, teaching strategies and assessments for improvement in the next cycle (Fraile, 2018).

The COIL courses offer college students a platform to enhance student-to-student interactions and emphasize experiential and collaborative learning. By using COIL, the students are engaged to learn course content through their own and the other's unique cultural lenses, build knowledge together, and develop diverse personal relationships through negotiation of meaning when working in virtual teams (Fowler, Pearlman, LeSavoy, & Hemphill, 2014). Accordingly, technology-enhanced COIL courses help increase not only intercultural awareness but also online intercultural communicative competence, so that students are better prepared for work and show civil engagement in a global context (Zhang & Pearlman, 2017).
In addition to the benefits to students, technology-enhanced COIL courses offer professional development and opportunities to faculty and staff members through networking and collaboration. It is a cost-effective pathway to internationalize curricula and an avenue to develop new partnerships globally (Fowler, Pearlman, LeSavoy, & Hemphill, 2014).

DATA AND METHODOLOGY

During the Spring semester of 2022, two professors, from The College of Business and Entrepreneurship (COBE), The University of Texas Rio Grande Valley (UTRGV), USA, and The Faculty of Economy, University of Niš (UNiš), Serbia, were conducting a series of meetings, in order to design a 5-week common course, under the COIL model. The communication formats that professors used the most were video conferences, phone calls and synchronous chat platforms (mainly What´s App). After exploring available options for an LMS platform, Blackboard was designated as a common platform for the design and delivery of the course. The Serbian professor was registered with guest co-instructor permission and her students were registered with guest permission at the beginning of the implementation stage. Instructors decided to designate English as the common language for the course, and the professor at the Faculty of Economics conducted a pre-selection of the students, based on their knowledge of the English language.

The codes and course names that the professors were teaching that Fall were MGMT-3361 Principles of Management and BBSc-4430 Entrepreneurship, both undergraduate programs. The common course name was COIL-Fall2022 Entrepreneurship & Principles of Management. The implementation of the 5-week COIL course was November 7th to December 7th, 2022 and the participants were 47 students from the COBE-UTRGV and 10 students from the Faculty of Economics, UNiš. "Activities points chart", "Grades" and other sections were independent for each class and were defined by each instructor, so there are specific sections of the joint course that apply for UNiš but do not apply for UTRGV students, and vice versa. The prerequisites to participate in this COIL course were to be enrolled in MGMT-3361 Principles of

Management or BBSc-4430 Entrepreneurship, to have at least an intermediate level of English language, and to have a firm wish to collaborate and participate in the frame of diversity and Multiculturalism, under a business college-level approach. Three-course objectives were settled for the COIL joint course: Identify the opportunities and challenges associated with diversity and inclusion and the steps managers and their organizations can take to cultivate diversity and manage globally; implement the best practices to work within multicultural and multilingual teams; and assess the business options to start an enterprise with international partners. The joint course goals were as follows: students will develop intercultural competencies by critically analyzing the effects of stereotyping in the workplace, applying the best practices for effective teamwork, and identifying opportunities and challenges that arise from working with international partners. The Student Learning Outcomes (SLOs) to be reached at the end of this course were: students will be able to develop awareness and understanding of cultural similarities and differences; develop teamwork skills in international and multicultural environments; and identify entrepreneurial opportunities in local and global settings. The programmed activities for the first week were: the COIL Kick-off session on 11/9, which was held in person for the UTRGV students (at 9:30 a.m.), and by Zoom for UNiš students (at 4:30 p.m.); navigate the course; read the course policy; review the counterparty University and College information. During the first and upcoming weeks, the students were encouraged to log into Collaborate Ultra chat and video for meeting their classmates, prior to agreement on a convenient schedule (considering the 7 hours difference due to USA-Serbia time zones), by messaging or emailing their classmates. The required activities for the second week were to attend classes in person or to connect remotely by Zoom to the lectures programmed on Monday & Wednesday from 9:30 to 10:45 a.m. (USA CST) or 4:30 to 5:45 p.m. (Serbia time zone). The optional activities for the students that were not able to attend live or remote lectures were reviewing the "Managing Inclusion and Diversity" slides and/or watching the pre-recorded videos for the weekly materials. The grade-related required assignment for this week was the student participation in the Discussion Board "Managing Inclusion and Diversity".

During the third week, the required activities were to attend classes in person or to connect remotely by Zoom to the lectures programmed on Monday & Wednesday from 9:30 to 10:45 a.m. (USA CST) or 4:30 to 5:45 p.m. (Serbia time zone). The optional activities for the students that were not able to attend live or remote lectures were reviewing the "Teamwork" slides and/or watching the pre-recorded videos for the weekly materials. The grade-related required assignment for this week was the student participation in the Discussion Board "Teamwork". The programmed activities for the fourth week were to attend classes in person or to connect remotely by Zoom to the lectures programmed on Monday & Wednesday from 9:30 to 10:45 a.m. (USA CST) or 4:30 to 5:45 p.m. (Serbia time zone). The optional activities for the students that were not able to attend live or remote lectures were reviewing the "Entrepreneurship" and "Business Plan" slides and/or watching the pre-recorded videos for the weekly materials. The grade-related required assignments for this week were the student participation in the Wiki (which is a learning tool available on Blackboard that allows simultaneous contributions by different individuals with common access to the group/in-team assignment). An instrument, under the survey modality, was designed for collecting quantitative data from the participant students. The software for writing the survey was Qualtrics, and it was available to the students on the common LMS platform (Blackboard) by clicking on the link that guide them to its electronic version, to be answered online. The survey was answered during the fifth week of the joint course (first week of December 2022).

This survey counts sixty questions organized into six sections. The first section is the consent statement, which allows the participant to know about the survey purpose and description, the survey authors and their contact information, the participants' requirements; and The Institutional Review Board for Human Subjects Protection (IRB) research questions authorization. The second section groups 25 demographic items (1-25). The third section focuses on the dimension of managing inclusion and diversity and uses 20 items for gathering the students´ thinking in this regard (26-45). The fourth section includes 8 items to measure the dimension of global competences (46-53). The fifth section measures Multiculturalism (54-59). Lastly, a final open answer question requires to respondents to list up to five words to describe the

course. Creswell (2011) settled that pragmatists do not see the world as an absolute inquiry but are driven to use multiple methods to gather different views and different assumptions when collecting and analyzing data.This study seeks to identify some predictions by analyzing quantitative and qualitative data. The quantitative date comes from analyzing the students' perceptions on the dimensions of inclusion and diversity, global competence and Multiculturalism, through their answers in the survey.

RESULTS AND DISCUSSION

The first section of the survey is the consent statement, which was the filter to continue with the rest of the survey items. In this section will be presented the results for the rest of the survey sections. Under Demographics (items 1-25) are the presented the results for the second survey section. The sections 3 to 5 are showing the results for the Dimensions of managing inclusion and diversity, global competence and Multiculturalism. Finally, a single item section, shows the results for the students' general perception on the COIL course.

Demographics

The survey counts twenty-five demographics items in its second section, and those are shown in Table 1.

Table 1: Demographic Items in the Survey

1. Please, select your age range.	14. Please, select your general level of proficiency in each of the following languages:
2. What gender do you identify with?	15. Do you have internet (Wi-Fi) service at home?
3. Which of the following describes your ethnicity the most?	16. Do you have internet (data) service on your mobile device (phone)?
4. Where were you born?	17. Which device do you use the most for online classes?
5. Where do you currently reside?	18. Which device do you use the most for online assignments?
6. What is your nationality?	19. What is your cumulative grade point average (GPA)?
7. Do you hold more than one nationality? Please select the option that best fits you.	20. Is it common/expected in the country of your residence to work while studying a college program?
8. What is your current semester standing?	21. Are you currently employed?
9. Which university do you primarily attend?	22. Which statement best describes your current employment status?
10. Are you a first-generation student at university?	23. Have you traveled outside the country of your residence in the last five years?
11. How many siblings do you have?	24. Which country/countries did you visit?
12. What is the highest level of school that someone in your family has completed, or the highest degree that someone in your family has received (including yourself)?	25. Please, indicate the purpose (s) of your previous international travel.
13. What is the primary language (languages) spoken in your household? Check all that apply.	

Authors 'Own Elaboration. This Table Shows the Demographic Items in the Survey.

The total number of students participating in the COIL 5-week course and answering the survey was 57. Since the survey consent statement included the statement "If there is a question that you prefer not to answer, just leave it blank," the students were free to skip some of the answers. The total answers per item and the summary of students' demographics are shown in Table 2.

Table 2: Students Demographics

Total Number of Students	**57**			
Enrolled in	UTRGV 82%	UNiš 18%		
Currently Residing in	USA 82%	Serbia 18%		
Current semester standing	Sophomores 18%	Juniors 61%	Seniors 21%	
Gender	Male 43 %	Female 52%	Prefer not to answer 7%	
Age range	18-21 yo 75%	22-25 yo 23%	40-49 yo 2%	
Ethnicity	Hispanic/Latino 70%	Caucasian 23%	Serbian 5%	Mix race 2%
Place of birth	USA 73%	Serbia 16%	Mexico 7 %	Argentina 4 %
Language spoken at home	Spanish 48%	English 37%	Serbian 14%	Bilingual E&S 34%
Number of siblings (Mean 2.58)	1-2, 60%	3, 20%	4-5, 13%	6 and more 7%
Highest Degree of Studies in the Students´ Family (including the student him/herself)	Doctorate 7%	Master 19%	Bachelor 18%	Associate 2%
	Certification 4%	Some college 19%	High school 21%	Less than HS 10%
First-generation at university	Yes 60%	No 40%		

Authors 'own elaboration. This table shows the students´ demographics.

The respondents from UTRGV were forty-seven (82%) and the ones from UNiš were ten (18%), and they are residing in the USA and in Serbia with the same percentages, respectively. From these participants, the ones from UTRGV were juniors and seniors, and from UNiš they were all sophomores, due to the upper-level of the Principles of Management and the lower-level of the Entrepreneurship courses in which they were enrolled. Participant students' gender is as follows: twenty-four are male (43%), twenty-nine are female (52%) and four preferred not to answer (7 %). Most of the fifty-seven students responding to this item forty-three (75%) were in the range of 18-21 years old, thirteen (23%) in the range of 22-25 years old, and one student (2%) in the 40-49 range. From 57 participants, forty of the UTRGV identify themselves as Hispanic/Latino, six as Caucasian, and one as mix race; and, from UNiš, seven identify as Caucasian and three as Serbian. From the forty-seven students from UTRGV, forty-one were born in The United States of America, four were born in Mexico (7%), and two were born in Argentina (4%); from UNiš, 9 were born in Serbia and one student did not answer to this item.

From 56 students that answer this item, the primary language spoken at home for the forty-seven students from UTRGV is Spanish with 48%, then English with 37% (35 and 27 students/families, respectively); nine UNiš students' language spoken at home is Serbian with 15%. From the 73 events in this item we can deduct that there is a relevant factor that impact directly and positively to the dimensions of inclusion and diversity, global competence, and Multiculturalism, which is bilingualism. Fifteen families among the forty-seven from UTRGV students spoke either English or Spanish, which means that 34% of the students' families are bilingual. The mean for the number of siblings of 56 respondents for this item is 2.58. Confirming the predictions of the surveyors, the number of siblings for the UNiš students is mostly one, and eventually two; and the number of siblings for the UTRGV students of the sample is much higher. The general distribution is as follows: one sibling (15, 27%), two siblings (18, 33%), three siblings (11, 20%), four siblings (1, 2%), five siblings (6, 11%) and more than five siblings (5, 7%).

Other factor that was predicted by the surveyors, and then confirmed by data is the students' family education level. The maximum level of school among the UNiš students' family is proportionally higher than the UTRGV students' family, since most of them count Bachelor and higher degrees. The general distribution (including the student itself in this factor) is as follows: four with a Doctoral degree (7%), eleven with a Master's degree (19%), ten with a Bachelor's degree (18%), one with an Associate degree (2%), two with a Career Certification (4%), eleven with some college but no degree (19%), twelve with High school diploma o GDE (21%), three with less than High School (5%), and three with Middle School (5%). In sum, Thirty-four students, mostly the ones for UTRGV are first-generation at the university level (60%), and twenty-three (40%) are not first-gens. Many of the students did not answered item 19, What is

your cumulative grade point average (GPA)? Surveyors do not know what the reason was, but a possible one may be that students prefer to keep it confidential. With regard to employment, Table X shows that from the 57 students, forty-seven from UTRGV and two from UNiš (86%) affirm that in their country of residency is common (expected) to work while studying a college program, while eight students (14%) said that it is not. Their current employment status is thirty-one UTRGV students working (54%) and twenty-six not working (46%). Of these students, twenty-six (46%) are working paid employees, five (9%) are self-employed, eleven (19%) are unemployed (looking for a job), and fifteen (26%) are not working (not looking for work). Table 3 shows Students Employment Status.

Table 3: Students Employment Status

Common/Expected to Work in Their Country	Yes 86%	No 14%
Working 54%	Employed 46%	Self-employed 9%
Not working 46%	Unemployed 19 %	Not searching 26%

Authors 'own elaboration. This table shows the students' employment status to the moment of the survey application.

From this data, we are confirming that the factor of employment status among college students is directly dependent of the country's culture. While in the USA is common to hold a part-time or full time job parallel to the college studies, in Serbia, as in most European countries, college students dedicate their time and efforts to fulfill the school tasks, besides the fact that government and private business do not consider to offer part-time job for college students as a regular practice. From those gatherings we can predict, but not confirm, that besides the countries culture and regulations, other factors are influencing employment rate. The *a priori* assumption is that the *unemployed* and *not searching employment* status among the UNiš students due to two factors. First indirect factor is the reduce number of siblings (mainly one sibling per student). The second indirect factor may due to the higher level of education among their family members (generally parents). Then a third direct factor that come with a higher education is a higher level of gross annual income per family, which derives in a higher income per family member (especially if we consider that families are formed by the student and one sibling to make a maximum of four members per family). Then the family behavior may be the financial support of the UNiš students, until they complete their college program. In terms of accessibility to internet and electronic devices, the data analysis shows that out of 57 students, fifty-five (96%) have internet (Wi-Fi) service at home, and fifty-six (98%) reported that they have internet (data) service on their mobile device (phone/tablet). The device that is most used for online assignments is their own computer (54 students, 95%), then borrowed or shared computer (1 student, 2%), and finally, their own smartphone (2 students, 4%). It all means that most of them have the proper conditions and equipment for holding online classes and working on their online assignments out of campus with no additional cost. Only two students, from the UTRGV, reported a lack of internet access at home, and one of them reported lack of mobile Wi-Fi. Table 4 shows the students accessibility to internet and electronic devices.

Table 4: Students Accessibility to Internet and Usage of Electronic Devices

Internet Service at Home	Yes 96%	No 4%	
Internet (data) service on mobile devices	Yes 98%	No 2%	
Most used device for online classes	Own computer 93%	Borrowed/shared computer 2%	Own smartphone 4%

Authors 'own elaboration. This table shows the students' accessibility to internet and usage of electronic devices.

When analyzing the traveling abroad within the last five years, twenty-three (40%) students reported not traveling abroad in the last five years, while thirty-four students have traveled in the same period (60%). Of this 60%, twelve were family-related trips (33%), one a job-related trip (3%), twenty-one for tourism (58%), one for a school-related trip (3%), and one for other purpose travel (3%). From a list of 196

countries, 70 visits to the following countries were reported: twenty-two visits to Mexico; five visits to Greece; four visits to France and Spain; three visits to Italy; two visits to Austria, Belize, Bosnia and Herzegovina, Croatia, Czech Republic, Germany, Jamaica, Montenegro, Serbia, Slovenia, and United States of America; and one visit to Bahamas, Bulgaria, Japan, Israel, Honduras, Portugal, Turkey, North Macedonia, Switzerland, and Sweden. It is worthy to say that UNiš students made most of their trips to European countries and the only trip to USA, and UTRGV students made most of their trips to Mexico and the rest of the countries in the American Continent. From the 70 trips, the ten UNiš students made thirty-five (47%), while the twenty-four UTRGV students did the rest of the trips (53%).

These higher numbers of trips by the UNiš students in proportion to the ones from UTRGV may be due to the financial situation of their families (fewer members per family, higher gross annual income per family member). Two more factors may be influencing positively the number of trips among UNiš students. First, the distances from Serbia to many of the European countries are accessible in terms of costs and time, and can be made by car, train and bus. Secondly, the abolishment of passport and all other types of border control once the travelers are in the Schengen area, as well as the usage of an uniform currency for all transactions. A possible negative factor that may be avoiding UTRGV students for making trips abroad is the migratory status of the ones that do not hold the American citizenship and do not count with a visa that allow them to reside and live in the USA legally. It is well known that some of the students in the USA are under the Deferred Action for Childhood Arrivals (DACA) program, and even when they are protected for living, studying and working in the USA, if they leave the country for any reason, they loss the DACA condition and cannot come back to their home in the States. In order to protect the confidentiality of students' migratory status, not any question in this regard was included in the survey. Table 5 summarizes the results of the students' trips to abroad in the last five years.

Table 5: Students Traveling Abroad in the Last Five Years

Traveling Abroad	Yes 60% (70 Visits)	No 40%	Number of Events Per Listed Country	Total (70 Visits)
Students participation in trips	24 UTRGV 53% 10 UNiš 47%	23 UTRGV		
Tourism	58%			
Family related trips	33%			
Job related trips	3%			
School related trips	3%			
Other purpose travel	3%			
Mexico			22	22
Greece			5	5
France and Spain			4	8
Italy			3	3
Austria, Belize, Bosnia and Herzegovina, Croatia, Czech Republic, Germany, Jamaica, Montenegro, Serbia, Slovenia, and United States of America			2	22
Bahamas, Bulgaria, Japan, Israel, Honduras, Portugal, Turkey, North Macedonia, Switzerland, and Sweden			1	10

Authors 'own elaboration. This table shows the percentage of students traveling abroad in the last five years, the purpose of their trips, the countries visited, and the events per country.

To the question "Do you hold more than one nationality?" from fifty-six answers, twenty-six students are Mexican-American (46%), two students (4%) have more than one nationality (Italian and Brazilian) and twenty-eight (50%) hold one nationality. The mean for the number of nationalities is 1.57, and the individuals holding more than nationality are all UTRGV students, which means that 60% out of the UTRGV students hold more than one nationality. Table 6 summarizes the percentage of students' with one

and more nationalities. It is said that when an individual hold more than one nationality, the factors that determine Multiculturalism and bilingualism may be much higher than in individuals with only one nationality.

Table 6: Students Nationality(ies)

Students Holding One Nationality	**50%**
Students holding Two Nationalities (Mexican-American)	46%
Two nationalities different from Mexican-American	4%
UNiš students holding one nationality	100%
UTRGV students holding more than one nationality	60%

Authors 'own elaboration. This table shows the students' nationality (ies).

In regard the languages spoken and level of proficiency, Table 7 shows the results of the student's level of proficiency in English, Spanish, Serbian, German French, Portuguese, Russian, Korean and Chinese. The item included the option for reporting three additional languages not listed in the survey. Only three students reported an intermediate level in other languages but they did not specify which ones. It is important to mention that the number of answers per language varied, and not all students answered for each language on the list. The column labeled TOTAL indicates the number of observations per language. The levels of dominium are native, proficient, intermediate, basic, and none. It is worthy to mention that from the 47 students enrolled at UTRGV, thirty-four are native speakers of English, and thirteen are native of Spanish language and proficient in English; three students from this group are native of both, English and Spanish languages. From the ten students enrolled in UNiš, four are proficient in English and six are in the intermediate level. Proportionally, the students from UNiš have knowledge of a higher number of foreigner languages compared with the UTRGV students. Besides English, they have intermediate and basic knowledge of Spanish, German, French, Portuguese, Russian and Korean languages, with at least 18 events. These results may be due to the fact that UNiš students and their families are giving more weight to the competence of communication in more than one language and parents may be supporting financially their student to afford foreigner languages classes. For both students groups the communication competence, due to the number and dominium of languages that they speak, is high. This competence allows them to communicate with a greater number of individuals in academic, labor and personal environments, with direct and indirect impacts on the dimensions of inclusion and diversity, global competence, and Multiculturalism that are discussed in next paragraphs.

Table 7: Languages Spoken by the Students and Their Level of Proficiency

Language	**Native Speaker**	**Proficient**	**Intermediate**	**Basic**	**None**	**Total Answers**
English	34	17	6			57
Spanish	26	11	7	6	7	57
Serbian	10	0	0	0	28	38
German	0	0	2	2	32	36
French	0	0	4	6	28	38
Portuguese	1		1	3	31	36
Russian	0	0	0	2	35	37
Korean	0	0	0	4	33	37
Chinese	0	0	0	0	36	36
Other	0	0	3	0	0	3

Authors 'own elaboration. This table shows the languages spoken by the students in the joint COIL course. The first column, labeled with "languages" heads the options for the languages that the students spoke, including a row for another language not listed there. The second to fifth columns indicate the level of proficiency for each language. The column labeled Total indicates the number of observations per language.

The Inclusion and Diversity Dimension

The dimension of Managing Inclusion and Diversity includes twenty items. By using a 5-Likert scale, students were invited to indicate the degree of agreement/disagreement (strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree) with the 20 statements (26-45), regarding their views on managing a diverse workforce. The results are shown in Table 8. Then the results are commented in the following paragraphs from higher to lower agreement degree.

Table 8: Students' Perceptions About the Inclusion and Diversity Dimension

Item Number	Item (Notice That Sentences May Be Affirming or Denying a Believe)	Total Answers	Strongly Disagree and Somewhat Disagree		Strongly Agree and Somewhat Agree	
			Answers	%	Answers	%
26	I think that diversity today refers to far more than skin color and gender and includes differences in religious affiliation, age, disability status, military experience, sexual orientation, economic class, educational level, and lifestyle, as well as gender, race, ethnicity, and nationality	57			50	88
27	I believe that recognizing religious holidays, differing modes of dress, and dietary restrictions, as well as accommodating the needs of individuals with disabilities are all efforts to cultivate a diverse workforce	57			52	91
28	I value pluralistic and multicultural organizations because they use an affirmative action approach in order to hire and train a diverse workforce	56			51	84
29	I think that diversity training is not significant to increase recognition of the meaning and importance of valuing diversity	56	33	59		
30	I consider that stereotyping is acceptable when managing a diversified workforce	57	37	65		
31	Companies with a reputation for providing opportunities for diverse employees are most likely to have a disadvantage in the labor market	56	28	50		
32	It is ok if, in my firm, women still earn less, on average, than men, especially younger women	57	41	72		
33	Sexual harassment should be tolerated in the workplace under specific circumstances	57	49	86		
34	I believe that successfully managing diversity requires a corporate culture that tolerates many different styles and approaches	57			47	82
35	I believe that a diverse workforce provides greater knowledge of diverse markets and can design products and marketing campaigns to meet consumers' needs, locally, nationally, and internationally	57			47	82
36	Organizations should not hire mentally and physically disabled people	57	35	62		
37	I would be happy to manage multicultural organizations by fully integrating minority group members because I value diversity	57			46	82
38	Judging foreign people by the standards of one's own culture is ok because one's own standards are superior	56	43	77		
39	I would like to work as a parent-country national at a foreign subsidiary	54			22	41
40	I believe that most people, independent of their cultural background, embrace the same core values: compassion, fairness, honesty, responsibility, and respect for others	57			39	68
41	I believe it is needed to identify, establish, and enforce ethical standards everywhere I do business	57			45	79
42	I define myself as an individual with traits of sensitivity to cultural differences, business knowledge, risk-taking, cultural adventurousness, and flexibility	57			41	72
43	I support affirmative action programs to correct the exclusion of women and minorities from the business world	57			39	68
44	I believe can influence cultural diversity within an organization through my managerial style	56			43	77
45	I feel comfortable managing/working with people from different cultural backgrounds	57			49	86

Authors 'own elaboration. This table shows the students perceptions on the 20 items that measure the Inclusion and Diversity Dimension.

First are presented the results for thirteen of the twenty items that conform the inclusion and diversity dimension. By selecting a higher degree of agreement on each of them, the students are perceived with a higher competence for managing inclusion and diversity in the workplace. For item 27, 91% of the students *believe that recognizing religious holidays, differing modes of dress, and dietary restrictions, as well as accommodating the needs of individuals with disabilities are all efforts to cultivate a diverse workforce*. These answers set up that they value diversity and they are ready for considering others in the workplace while providing accommodations. For item 26, 88% of the students agree with the statement *diversity today refers to far more than skin color and gender and includes differences in religious affiliation, age, disability status, military experience, sexual orientation, economic class, educational level, and lifestyle, as well as gender, race, ethnicity, and nationality*. This confirms that most of them have understand and value the concept of diversity, and recognize it is crucial to work and manage human resources in organizations. For item 45, 86% of the students *feel comfortable managing/working with people from different cultural backgrounds*. This affirmation means that managing and working with diverse individuals (different from themselves) is expected, and that including them in the workplace activities along the different organizational levels must be a common practice.

For item 28, 84% of the students *value pluralistic and multicultural organizations because they use an affirmative action approach in order to hire and train a diverse workforce*, showing that they have an understanding of the legislation, and are ready to comply with the requirements that apply to the human resources processes. For item 34, 82% of the students *believe that successfully managing diversity requires a corporate culture that tolerates many different styles and approaches*. These answers show that the students are or will be contributing to create a corporate diversity approach in the workplace. For item 35, 82% of the students *believe that a diverse workforce provides greater knowledge of diverse markets and can design products and marketing campaigns to meet consumers' needs, locally, nationally, and internationally.* This result support the thought that students are ready to leverage the organizations functions by hiring a diverse workforce, according to the firm needs.

For item 37, 82% of the students *would be happy to manage multicultural organizations by fully integrating minority group members because they value diversity*. Students' answers confirm that they are willing to manage under the diversity and inclusion approaches in the workplace. For item 41, 79% of the students *believe it is needed to identify, establish, and enforce ethical standards everywhere they do business*. This result confirms that the students believe that the settlement and observation of codes of ethics, independently of the country of origin and country of application, is necessary in the workplace. For item 44, 77% of the students *believe can influence cultural diversity within an organization through their managerial style*. The students in the sample are willing to improve the diversity and inclusion practices in the workplace, by applying what they have been learning in the school as well as their work experiences.

For item 42, 72% of the students *define themselves as individuals with traits of sensitivity to cultural differences, business knowledge, risk-taking, cultural adventurousness, and flexibility*. The students perceptions on this regard is their awareness and readiness for working and managing in global environments. For item 40, 68% of students *believe that most people, independent of their cultural background, embrace the same core values: compassion, fairness, honesty, responsibility and respect for others*. Even when this item ranked with a lower percentage of agreement than the previous, it is interpreted as the students' readiness for showing respect to individuals with a different cultural background and beliefs; but the lower rate of agreement may be due to the lack of confidence that others will present a behavior framed by the statement. For item 43, 68% of the students *support affirmative action programs to correct the exclusion of women and minorities from the business world*. Comparing with the previous, this item has a lower degree of agreement and it may due to the lack of awareness, in some of the students, of the exclusion of minorities in the workplace. Most of the students that marked different from strongly agree and somewhat agree with this statement are from the UNiš, and it may due to the fact that the Serbian population belong to a very compact ethnical group were the concept of minority groups (besides women)

almost do not exist. For item 39, out of 57 participants 54 students answered to the statement *I would like to work as a parent-country national at a foreign subsidiary*, and only 22 of them (41%) agree with it. These results show that even when the students embrace diversity and inclusion in the workplace, and they feel ready to work and manage people from diverse backgrounds, most of them prefer to work in their country.

In this section are presented the results for rest of the twenty items that conform the inclusion and diversity dimension. By selecting a lower degree of agreement on each of them, the students are perceived with a higher competence for managing inclusion and diversity in the workplace. For item 33, 86% of the students disagree with the statement *Sexual harassment should be tolerated in the workplace under specific circumstances*. The answers to this item settled out that most of the students reject any practices of sexual harassment in the workplace. For item 38, 77% of the students disagree with the statement *Judging foreign people by the standards of one's own culture is ok because one's own standards are superior*. This percentage is interpreted as the awareness of others culture and the respect of others practices and behaviors, which may be applied in the workplace. For item 32, 72% of the students disagree with the statement *It is ok if, in my firm, women still earn less, on average, than men, especially younger women*. The answers in this item show the students' knowledge of the inclusion practices in the workplace and the lack of is application when excluding women and minority group members from equal employment opportunities.

For item 30, 65% of the students disagree (37) with the statement *I consider that stereotyping is acceptable when managing a diversified workforce*. The answers to this item show that 20 students are indifferent or accept stereotyping as a normal practice in the workplace. For item 36, 62% of the students (35) disagree with the statement *Organizations should not hire mentally and physically disabled people*. These answers reveal that 22 students are indifferent or accept as a normal practice the exclusion of people with disabilities from the workplace. For item 29, 59% of the students disagree (33) with the statement *I think that diversity training is not significant to increase recognition of the meaning and importance of valuing diversity*. These answers reveal that 23 students do not recognize diversity training as a human resource tool for leveraging awareness and valuing diversity in the workplace. For item 31, 50% of the students disagree (28) with the statement *Companies with a reputation for providing opportunities for diverse employees are most likely to have a disadvantage in the labor market,* out of 56 students, 28 strongly disagree and somewhat disagree, with 50%. These answers reveal that 28 students consider that by providing opportunities to diverse employees in the labor markets do not bring any reputation to the firm, and even it may be implicit that they consider it is not determinant for choosing that organization as a good place to work.

The Global Competence Dimension

The Global competence dimension is measured through eight items. By using the 5-Likert scale (strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree), students indicated their degree of agreement/disagreement with the statements, regarding their abilities to function in the world of the world. The results are shown in Table 9. Then the results are commented in the following paragraphs from higher to lower agreement degree.

Table 9: Students' Perceptions About the Global Competence Dimension

Item Number	Item	Total Answers	Strongly Agree and Somewhat Agree	
			Answers	%
46	I am confident that I can thrive in any culture or country	57		
47	I unconsciously adapt my behavior and mannerism when I am interacting with people of other cultures	57	49	86
48	I often adapt my communication style to other people's cultural backgrounds	57	50	89
49	I am able to communicate in different ways with people from different cultures	57	46	81
50	I am informed of current issues that impact international relations	37	37	66
51	I am fluent in more than one language	57	45	79
52	I welcome working with people who have different cultural values from mine	57	52	91
53	I am able to mediate interactions between people of different cultures by helping them understand each other's values and practices	57	42	74

Authors 'own elaboration. This table shows the students perception on the Global Competence Dimension.

First are presented the results for thirteen of the twenty items that conform the inclusion and diversity dimension. By selecting a higher degree of agreement on each of them, the students are perceived with a higher competence for managing inclusion and diversity in the workplace. For item 46, out of 57 students, 86% of them agree that *they are confident that they can thrive in any culture or country*. For item 47, out of 57 students, 89% of them agree that *they unconsciously adapt their behavior and mannerism when they are interacting with people of other cultures*. For item 48, out of 57 students, 81% of them agree that *they often adapt their communication style to other people's cultural backgrounds*. For item 49, out of 57 students, 82% of them agree that *they are able to communicate in different ways with people from different cultures*. For item 50, out of 56 students, 66% of them agree that *they are informed of current issues that impact international relations*. For item 51, 79% of the students agree that *they are fluent in more than one language*, out of 57 students, 45 strongly agree and somewhat agree, with 79%. For item 52, out of 57 students, 91% of them agree that *they welcome working with people who have different cultural values from them*. For item 53, out of 57 students, 74% of them agree that *they are able to mediate interactions between people of different cultures by helping them understand each other's values and practices*.

The Multiculturalism Dimension

The Multiculturalism dimension is measured through five items and the 5-Likert scale (strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree). The results on regard the degree of acculturation abilities in the students are shown in Table 10, and then commented in next paragraphs.

Table 10: Students' Perceptions About the Multiculturalism Dimension

Item Number	Item	Total Answers	Strongly Agree and Somewhat Agree	
			Answers	%
54	I see myself as a bicultural individual	55	38	69
55	I have had significant exposure to two different cultures	57	43	75
56	I have internalized both the cultures in which I have lived	56	37	66
57	I speak fluently both the languages of my native country and that of my current country of domicile	57	37	65
58	I understand people in this culture as much as those in my home country	37	43	75
59	I value biculturality, biliteracy, and bilingualism	57	48	84

Authors 'own elaboration. This table shows the students perception on the Multiculturalism Dimension.

For item 54, 69% of the students, all from UTRGV (38 out of 47), *see themselves as bicultural individuals*.

For item 55, 75% of the students, all from UTRGV (43 out of 47), affirm that *they have had significant exposure to two different cultures*.

For item 56, 66% of the students, all from UTRGV (37 out of 47), affirm that *they have internalized both the cultures in which they have lived*.

For item 57, 65% of the students, all from UTRGV (37 out of 47), affirm that *they speak fluently both the languages of my native country and that of my current country of domicile*.

For item 58, 75% of the students, all from UTRGV (43 out of 47), affirm that *they understand people in this culture as much as those in my home country*.

For item 59, 84% of the students affirm that *they value biculturality, biliteracy, and bilingualism*.

It is relevant to comment that none of the UNiš students' agrees with items 54, 55, 56, 57 and 58, but most of them agree with item 59. This result was expected, since those students have almost null contact with people from another background, culture and language on daily basis in the place where they reside. In another hand, the UTRGV students have more exposure to the factors that compose the Multiculturalism Dimension. UTRGV students reside in the Rio Grande Valley area, which is a Texan borderland with Mexico, and this fact has direct influence on the population living there. As we mention in the demographics section, 60% of the UTRGV students hold more than one nationality, mainly the Mexican-American. Besides, the primary language spoken at home by those students is Spanish with 48%, then English with 37% (35 and 27 students' families, respectively). This intersection shows that fifteen families, among the 47 from UTRGV students, speak either English or Spanish, which means that 34% of the students' families are bilingual. These data are direct indicators of multiculturalism.

Finally, in the item number 60, the students were describing their experiences by participating in the COIL course using a maximum of five words. Here are shown some of the students insights: Meaningful, and important for future work. Interesting, exciting, informative, and interactive. Innovative, satisfied, and superior. Fun, informative, thoughtful, planned, and educational. Organized, informative, and helpful. Diversity, styles, inclusion, culture, and humans. Great class worth taking. Exciting, informative, comfortable, fun, and nice. Insightful, new ideas, oriented knowledge, and gain eye-opener. Diverse, informative, experiential, fun, and thorough. Exciting, knowledge, culture, teamwork, and opportunity. New and out of our comfort zone. Fun, good, and interesting. Great, informative, and different. Exciting, knowledgeable, interesting, motivating, and healthy. Different, new, challenging, and cool. Learning about

the management world. Exchange of experience and knowledge, and new friends. Interesting, educational, challenging, informational, and understandable. Helpful, eye-opening, and intriguing. New understanding, managing ready, and diversity knowledge. Diversity, understanding, and care for people. Understanding how to manage people from different cultures or backgrounds. Informative, great, and eye-opening. Strength in learning about new cultures and how to interact with them. Successful experience getting to work with students in a foreign country. Interesting, Collaboration, Learning, Communication, Intercultural. It was a great experience I learned a lot. Interesting, adventuring, fun, informative, and outstanding. It has helped me gain experience in working with people with different cultural views and practices. Fun, exciting, new, different, opportunity. Straightforward, welcoming, fun, educating, and exciting.

CONCLUDING COMMENTS

The goal of this paper is to present a Collaborative Online International Learning (COIL) course, based on the design of common curricula, using a Learning Management System (LMS). Along this document were detailed instructional materials to collaborate with international classmates, team-taught activities to create awareness from diverse cultural and to explore international entrepreneurship opportunities, in a multicultural academic environment The main results presented are the students' perceptions on the dimensions of inclusion and diversity, global competence, and multiculturalism. Those perceptions were measured by using a survey, once the students completed the five weeks of the common course. It also discusses challenges, opportunities and limitations. On regards data and methodology, this research was conducted in the spring semester of 2022 by the authors of this paper. The implementation of the 5-week COIL course was November 7th to December 7th, 2022 and the participants were 47 students from the COBE-UTRGV and 10 students from the Faculty of Economics, UNiš. An instrument, under the survey modality, was designed for collecting quantitative data from the participant students, during the fifth week of the joint course. This survey counts sixty questions organized into six sections: the consent statement, demographics, the dimension of managing inclusion and diversity, the dimension of global competences, the dimension of multiculturalism, and a final open answer question. The most relevant findings of this research are presented under the three core dimensions of inclusion and diversity, global competence and multiculturalism. The general perceptions of the students by living the experience of a COIL course are settled out in the last section of the conclusions.

The Inclusion and Diversity Dimension Results

The students have a high degree of agreement, ranging from 91% to 72%, on regard the inclusion and diversity statement. Their answers confirm that: they value diversity and are ready for considering others in the workplace while providing accommodations; most of them value diversity as a crucial piece to work and manage human resources in organizations; they are ready to work with individuals different from themselves; they are expecting to design inclusion practices in the workplace. They are aware of the local and international legislations, and are ready to comply with the requirements that apply to the human resources processes. They are willing to create a corporate diversity approach in the workplace. They are ready to leverage the organizations functions by hiring a diverse workforce, according to the firm needs. They believe that the settlement and observation of codes of ethics, independently of the country of origin and country of application, is necessary in the workplace. They are willing to improve the diversity and inclusion practices in the workplace, by applying what they have been learning in the school and the workplace. They are aware and ready for working and managing in global environments.

Even when the students are ready for showing respect to individuals with a different cultural background and beliefs, they rated with an agreement of 68% when considering the degree that another individuals will embrace the same core values of compassion, fairness, honesty, responsibility, and respect for others. This result may be due to the lack of confidence that others will present a behavior framed by the statement. Same level of agreement was assigned to the idea of supporting affirmative action programs to correct the

exclusion of minorities from the business world. Most of the students that marked different from strongly agree and somewhat agree with this statement are from the UNiš, and it may due to the fact that the Serbian population belong to a very compact ethnical group were the concept of minority groups (besides women) almost do not exist. Since only 22 students would like to work as a parent-country national at a foreigner subsidiary (even when the previous results confirm that they embrace diversity and inclusion in the workplace and feel ready to work and manage people from diverse backgrounds), this response shows that most of them prefer to work in their country of residence.

On regard the disagree perceptions of the students (in the range of 86% to 72%), due to the construction of the items, it was found that most of the students reject any practices of sexual harassment in the workplace, the practice of own culture superiority, and the lack of equal employment opportunity practices. It was also found that a 65% to 62% of the students do not accept stereotyping when managing a diversified workforce, and discrimination of disabled people from the workplace opportunities; but still 20 to 22 of them are indifferent or accept them as normal practices. Finally, 59% to 50% of the students disagree with the lower significance of diversity training as a valuing diversity practice, and the disadvantage that bring the opportunities for diverse employees in the labor market. More efforts need to be done to increase the awareness of the 23 and 28 students that do not recognize diversity training as a human resource tool for leveraging awareness and valuing diversity in the workplace, neither for bringing a positive reputation to the firms with those practices.

The Global Competence Dimension Results

The students have a high degree of agreement, ranging from 91% to 79%, on regard the global competence dimension. Their answers confirm that they perceive themselves as individuals able to welcome working with people who have different cultural values from them. They consider are able to communicate in different ways and often adapt their communication style, behavior and mannerism when they are interacting with people of other cultures. They are fluent in more than one language and are able to mediate interactions between people of different cultures by helping them understand each other's values and practices. They are confident that can thrive in any culture or country. Even though many of them (37, out of 56 students) agree on the statement that they are informed of current issues that impact international relations, 66% is a lower rate of agreement compared with the rest of the items in this dimension. This result means that their perception is that there are lacking of enough and relevant information for managing international relations.

The Multiculturalism Dimension Results

On regard the multiculturalism dimension, the UTRGV students have more exposure to the factors that compose the it. UTRGV students reside in the Rio Grande Valley area, which is a Texan borderland with Mexico, and this fact has direct influence on the population living there. As we mention in the demographics section, 60% of the UTRGV students hold more than one nationality, mainly the Mexican-American. Besides, the primary language spoken at home by those students is Spanish with 48%, then English with 37% (35 and 27 students' families, respectively). This intersection shows that fifteen families, among the 47 from UTRGV students, speak either English or Spanish, which means that 34% of the students' families are bilingual. Besides, they have internalized both the cultures in which they have lived and they understand people from both of them. These data are direct indicators of a high competence on the multiculturalism dimension. It is relevant to comment that none of the UNiš students' agrees with items 54, 55, 56, 57 and 58, but most of them (89%) agree with item 59 by considering themselves as individuals that value biculturalism, biliteracy, and bilingualism. This result was expected, since those students have almost null contact with people from another background, culture and language on daily basis, in the place where they reside.

Students General Perceptions

The general perceptions of the students, after sharing a five-week course under the COIL model, can be summarized by next insights. It was a great experience; I learned a lot. This course allows me an exchange of experience and knowledge, while making new friends. By taking this course, I got a broader understanding about how to manage people from different cultures or backgrounds. It has helped me gain experience in working with people with different cultural views and practices. I was learning about the management world. This course strength my knowledge about new cultures and how interact with them. It has been a successful experience getting to work with students from a foreign country.

Implications of Findings for Educators

After teaching and exploring the students' perceptions on regard the dimensions of inclusion and diversity, global competence, and multiculturalism, we can agree with Helm (2019), on regard the findings for educators: virtual exchange is an alternative application of communication technologies to foster the building of positive relationships across cultures and engagement with people from a wide range of backgrounds. We confirmed that a virtual course under the COIL model is also viewed by the students as a way of developing transversal competences such as intercultural communication, teamwork, problem-solving, and use of foreign languages, which are seen to be fundamental for their current and future professional activity. As evidenced in the results, this Collaborative Online International Learning course helped to promote students learning across a multi-faceted skillset including respect, self-awareness, critical cultural adaptation and relationship building. The most relevant findings include how the students' experience under a COIL course impact their intercultural sensitivity within their disciplinary practices through the promotion of peers' cultural approaches and epistemic knowledge, through a process of discovery and adaptation. As Shulteis (et. al., 2015), we also found that by incorporating the development of technology and the strengthening of international collaboration and connectivity, COIL has become a valuable approach to pedagogy as part of internationalizing the curriculum, with scope for diversity of practices across all subjects. Definitively, we can conclude that a COIL course is a cost-effective solution for universities to internationalize curricula. By designing and teaching a COIL course, educators are preparing their students with the transversal competences that allow them to insert successfully in real-industry settings local and in international environments. A well-designed COIL course develops and increases the students' sensitivity and awareness of different intercultural contexts, develops new partnerships globally and provides the students with international learning opportunities and global competencies.

Challenges and Limitations

Even though the multiple benefits of a COIL course, it is fair to comment about the challenges that it involves, at least from the authors perspective. Since the COIL courses do not come by institutional efforts, it is up to the faculty to conduct it or not. It is also important to point out the lack of pedagogical and instructional support, as well as the technological professional development and the administrative and IT support, for the faculty interested in designing and conducting it. An important challenge for the faculties was to find an their international partner interested in this joint project. One more challenge was the difference of time zone in which the institutions are located. Due to the difference of 7 hours most of the meetings that faculties held, for planning and conducting the course were out of their working hours. Then this issue was extended to the lectures schedule and common working time for the students. The latest time for starting the lectures in the United States of America was 9:30 a.m. Central Standard Time (CST),, while for the students in UNiš, it was 4:30 p.m. Since the course was taught during the fall semester, when the lectures ended after one hour and fifteen minutes, it was 10:45 a.m. for the UTRGV students, but it was 5:45 p.m. for the UNiš students. The implications of the time zone differences make that the UNiš students delay their regular schedule for leaving the campus, under the weather from the geographical zone were

UNiš is located (rain, cold and loss of daylight after 4 p.m.). Other challenges were languages (English/Serbian), institutional cultures and expectations, semester periods, course contents (Entrepreneurship and Principles of Management), methods for learning, assessment, learning management systems, quality assurance systems, issues of technology, and lack of technical and administrative support. Even though the virtual classroom was not easy to manage, once it was designed and implemented, the semester finished successfully for both partners.

After this experience we agree with Zhang & Pearlman (2017) when they affirm that possible challenges to the success of COIL courses are lack of understanding and support, time, technology, funding, promotions, and resources in general. Thus, it is essential for the administrators to support and recognize the work of the participants. It is also worthwhile for higher education institutions to explore the possibilities for overcoming the challenges and offering faculty and students collaborative online international course experiences. In terms of technology, the main obstacle of a COIL course is the exclusion of those individuals with no access to computational equipment and appropriate internet. In addition, the Learning Management System (LMS) of an institution plays an important role in designing, conducting and participating in a COIL course. Since the institutions may have different LMS, or even may have not any LMS, this resource, its characteristic and authorization of usage by external professor and students may be a limitation for the joint course.

Future Research

As we settled in the data and methodology section, this quantitative research purpose was to bring out the students' perceptions, on the dimensions of inclusion and diversity, global competence and Multiculturalism, through their answers in the survey, but through the course, we gathered qualitative data that should be subject of study. The qualitative data is the result of a simple observation of the student's interactions with their peers in online sets, mainly by their comments on the discussion boards, their inputs in their collaborative (in teams) final assignment, their comments on the closing session, and their anonymous post on the institutional course evaluations. This qualitative information was gathered with the students' acknowledgment and authorization for been used in a future stage of this research.

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Business Education & Accreditation
Vol. 15, No. 1, 2023, pp. 39-49
ISSN: 1944-5903 (print)
ISSN: 2157-0809 (online)

IBFR
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FAMILY-OWNED BUSINESS PROBLEMS: A PRE AND POST PANDEMIC COMPARATIVE ANALYSIS

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ABSTRACT

The objective of this research is to prepare a comparative analysis of the pre and post pandemic problems caused by Covid-19. The pandemic resulted in suffering by family businesses in the service sector in the central region of the state of Coahuila. The research is relevant since 84% of the companies in Mexico are family-owned. Moreover, after the pandemic from May 2019 to July 2021, 1.6 million family-owned businesses closed their doors permanently. To obtain information, a detailed bibliographic review on the background of the pandemic and problems in family businesses is provided. An instrument was applied to 108 companies located in the central region of the state of Coahuila between the months of November and December 2022. Results of pre and post pandemic problems in the administrative area are provided.

JEL: M1, M10, M20

KEYWORDS: Problems, Covid-19 Pandemic, Family Business

INTRODUCTION

Starting in 2019, when the Covid-19 pandemic began, professionals in Mexico to modified their ways of life and work. The economy in each sector is recovering at different rates, prompting entrepreneurs to reformulate their business model to strengthen their start-ups (Garduno, 2021). After the pandemic, factors that restrict the growth and development of companies are uncertainty of the economic environment, lack of confidence in economic policy, corruption, competition, non-paying customers, shortage of materials, inadequate equipment, lack of labor and poorly qualified labor (Business Pulse, 2019). The INEGI (2021) provides statistical information regarding consequences of the COVID-19 pandemic on micro, small and medium-sized companies (MSMEs). In 2021, a Study on Business Demography was carried out (EDN for Spanish Acronyms). The study showed that from May 2019 to July 2021, 1.2 million MiPymes emerged, but 1.6 million MSMEs disappeared from the market. Therefore, it is important to identify problems that family service companies face in the following areas: administrative, human capital, finance, and processes, before and after the pandemic and develop a pre- and post-pandemic comparison for family businesses in the service sector in the central region of the state of Coahuila. The work is organized as follows: review of the literature, methodology, results, conclusions and references.

LITERATURE REVIEW

Family Businesses

Mexican family businesses are economically important for the country because they generate jobs. In addition, according to the National Institute of Statistics and Geography (INEGI), there are around 4.5 million family businesses throughout Mexico, of which 99.8% are small and medium-sized enterprises

(SMEs) that are responsible for 52.0% of the national gross domestic product (GDP) (Medina & et.al, 2014). Dubois (2011) considers that family business must meet three dimensions: *Property*: A family owns the totality or large portion of the company. *Power*: One or several of its owners work exclusively or most of their time in the family business, as managers or part of the administrative council. *Ongoing Concern*: The family business has been ongoing for at least a second generation. There exists a successful transfer to the next generation and a continuity of the values in the organization of the founding family.

If it is possible to identify these three dimensions, we are in the presence of a family business. Therefore, a family business can be defined as one where the property and management are in the hands of a group of people whose members have a family relationship. Martín and Martínez (2013) argues that "family businesses are organizations with an emotional charge, the intermingling family and business creates a source of conflict". It is necessary to reduce the potential for conflict for family organizations to endure.

Context of the COVID-19 Pandemic in Companies

The National Institute of Statistics and Geography (INEGI, 2021), as part of it Study on Business Demography (EDN), provides statistical data on micro, small and medium-sized companies and consequences of the COVID-19 pandemic. This type of company represents 99.8% of the total business in Mexico. In 2021, a Study on Business Demography was carried out (EDN for Spanish Acronyms) showed that from May 2019 to July 2021, 1.2 million MSMEs emerged, but 1.6 million MSMEs disappeared from the market. For informal service activities 12.3% of MSMEs failed while 6.4% formal MSMEs failed. (INEGI, 2021) .

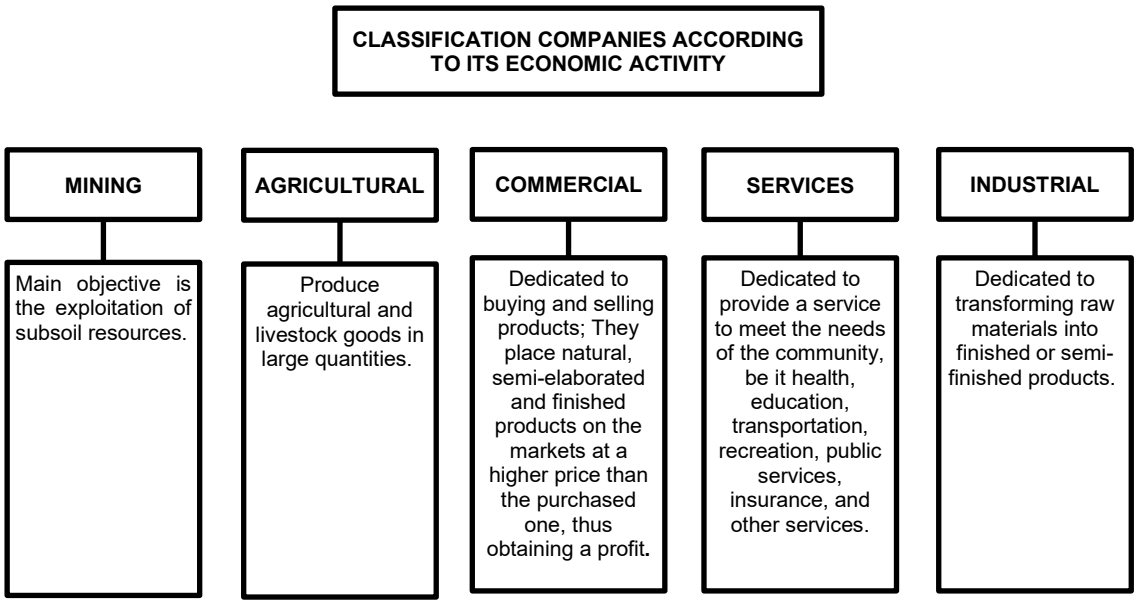
Company Classification

According to the Hidalgo State University (2015), companies can be classified as shown in Figure 1 according to their activity or business as follows:

Industrial: They are dedicated to the production of goods through a productive process or transformation of materials to finished products.

Commercial Companies are firms that buy and sell. They act as an intermediary between the producing companies and the final consumer. *Service Companies* provide services and can be for-profit or non-profit. *Mining Companies* are dedicated to exploiting resources of the subsoil. *Agricultural Companies* produce agricultural goods on a large scale.

Figure 1: Classification of the Company According to Economic Activity



This figure shows the classification of companies according to their economic activity, which can be in mining, agricultural, commercial, service and industrial activities. Source (grupo9gbi.wordpress.com/definicion-y-clasificacion-de-empresas/,2020)

Pre and Post Pandemic Problems of Family Businesses

Another factor holding companies back is the lack of certainty in the country. One in five entrepreneurs sees the economic situation as a factor limiting growth of their business. The percentage of entrepreneurs with sales greater than three million pesos went from 23% in 2017 to only 17% the following year. (Konfío,E., 2019). Growth strategy refers to methods or ways to achieve the objective of transforming the company structure. This is to increase its size, sales, profitability, quality or quantity of products, or improve positioning. The importance of growth strategies lies in the fact that they offer different possibilities to achieve the objective of introducing changes that make company progress possible (Ortiz, 2015). Administration is a universal phenomenon in the modern world, each organization, each company requires decision-making, coordination of multiple activities, people management, performance evaluation based on previously determined objectives, achievement, and location of several resources. The task of building an economically better society, as well as fostering expanding businesses, improved social norms, and more effective government, is the challenge of modern administrative management. (Velázquez Barron, 2018).

METHODOLOGY

To achieve the objective outlined in the present investigation, a quantitative method was used. This approach compiles data based on numerical measurement and statistical analysis to identify and establish behavior patterns in the phenomenon under study. According to Hernández-Sampieri, R., Fernández-Collado, C., and Baptista-Lucio, P., (2010), the statistical-analogical method is used to quantitatively state relationships and draw conclusions based on the results. This allows us to determine and to analyze the problems faced by family service companies in the central area of State of Coahuila during pre and post pandemic. An instrument was applied to 108 companies located in the central region of the state of Coahuila between the months of November and December 2022. The number of companies surveyed is presented in Table 1, classified according to their economic activity.

Table 1: Surveyed Companies According to Their Economic Activity

Economic Activity	Answers
Services	55
Commercial	32
Industrial	21
Total	108

This table shows the number of companies that were surveyed. The sample totals 108 and is divided by economic activity, such as services, commercial and industrial. Source: self-made.

Data were obtained through surveys that were applied electronically with the survey management software called Google Forms®. Some 55 companies were in service activity, 32 in commercial activity and 21 in industrial activity (see Table 1). This investigation is limited only to family businesses in the service activity in the central region of the state of Coahuila. Therefore, we only present the results for this segment. The questionnaire used included questions to identify the type of problems that family businesses had before and after the pandemic. Table 2 shows the variables and indicators that guided the questionnaire design.

Table 2: Instrument Variables and Indicators

Variable	Indicator
Company sector	Primary (Agriculture, livestock, mining and fishing). Secondary (Construction, industry and manufacturing). Tertiary (Trade services and transport). Quaternary (ICT and Apps)
turn of the company	Services Commercial Industrial
Pre-pandemic problem area	Administration Human capital Finance processes
Post-pandemic problem area	Administration Human capital Finance processes

This table shows the four variables that were used in the instrument, as well as the indicators to be measured in each of the variables. Source of own elaboration.

RESULTS

After application of the instrument, the Google Forms® database was downloaded to obtain the results and carry out the analysis and interpretation of the family service companies. The following text and tables report the results.

Administrative Area

In the administrative area of family service companies, Table 3 presents pre-pandemic problems and Table 4 shows post-pandemic problems. Results show the main problem before the pandemic was the manager's fatal capacity to be efficient. After the pandemic the most outstanding problem is the failure to manage remote work by the administrator.

Table 3: Pre-Pandemic Problems of the Administrative Area

Pre-Pandemic Companies Services Administrative Area	
Issues	**Answers**
inefficient manager	16
Manager incapable of being effective	17
robbery ant	4
Lack of leadership	12
Documentation not delivered in time and form	6
Total	55

In the table of family service companies in the administrative area, we find the most repetitive problem before the pandemic was: Manager incapable of being effective, with a total of 17 responses, closely followed by Inefficient manager with 16 responses of 55 companies. Source of search data analysis.

Table 4: Post- Pandemic Problems Administrative Area

Post Pandemic Service Companies Administrative Area	
Issues	**Answers**
Small theft "Ant robbery".	6
Management failure in remote work by the administrator.	15
Closing of bankruptcy operations.	10
No raw material suppliers were found.	14
Untrained staff.	10
Total	55

In the Administrative area, table 1 shows that family service companies' problems post pandemic are: failure to manage remote work (15 of response), No raw material suppliers (14 responses). Source data results.

Figure 2 presents problems detected pre-pandemic and post-pandemic of the 55 family businesses in the service activity surveyed. We found that business theft is the only common problem pre and post pandemic. Our results show the service sector business faced mostly different problems before and after the pandemic.

Figure 2: Pre and Post Pandemic Problems Administrative Area

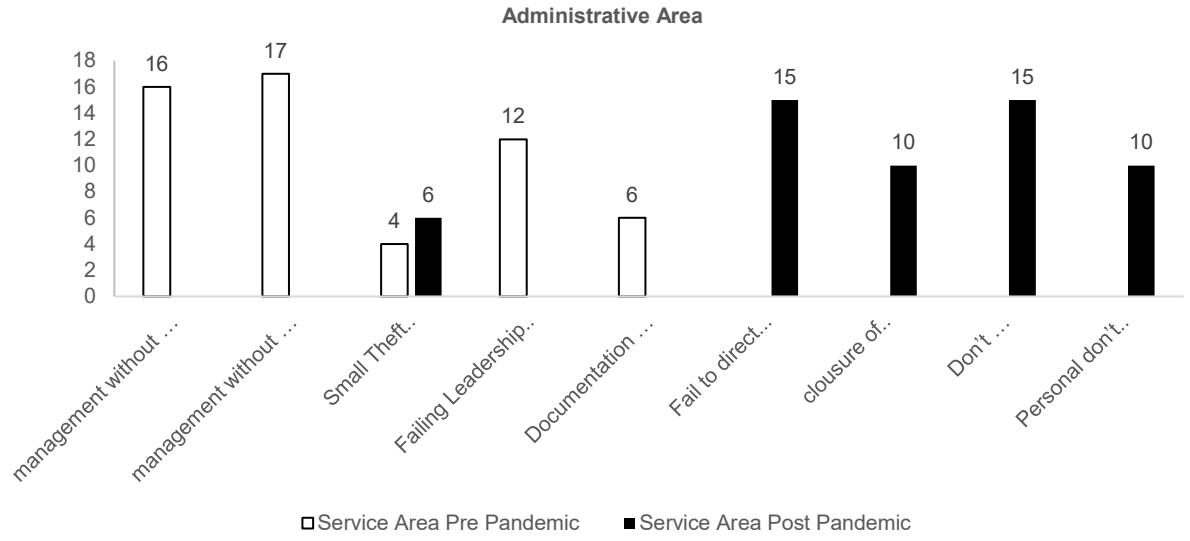


Figure 2 shows the pre- and post-pandemic problems of the 55 family service businesses that were surveyed for this study.

Human Capital Area

In the human capital area of family service companies, Table 5 presents the pre-pandemic problems and Table 6 the post-pandemic problems. We find the main problem before the pandemic was untrained

personnel followed by employee turnover and staff. On the other hand, we find that after the pandemic staff turnover is the most notable problem.

Table 5: Pre-Pandemic Problems in the Human Capital Area

Pre Pandemic Companies Service Area Human Capital	
staff turnover	17
untrained staff	23
bad work environment	5
poorly designed organizational chart	5
Lack of communication with the administrative area	5
Worker disabilities	1
TOTAL	55

In the table of family service companies in the human capital area, the most repetitive problem before the pandemic was: untrained personnel, with a total of 23 responses, followed closely by staff turnover with 17 responses from 55 companies. Source of own elaboration.

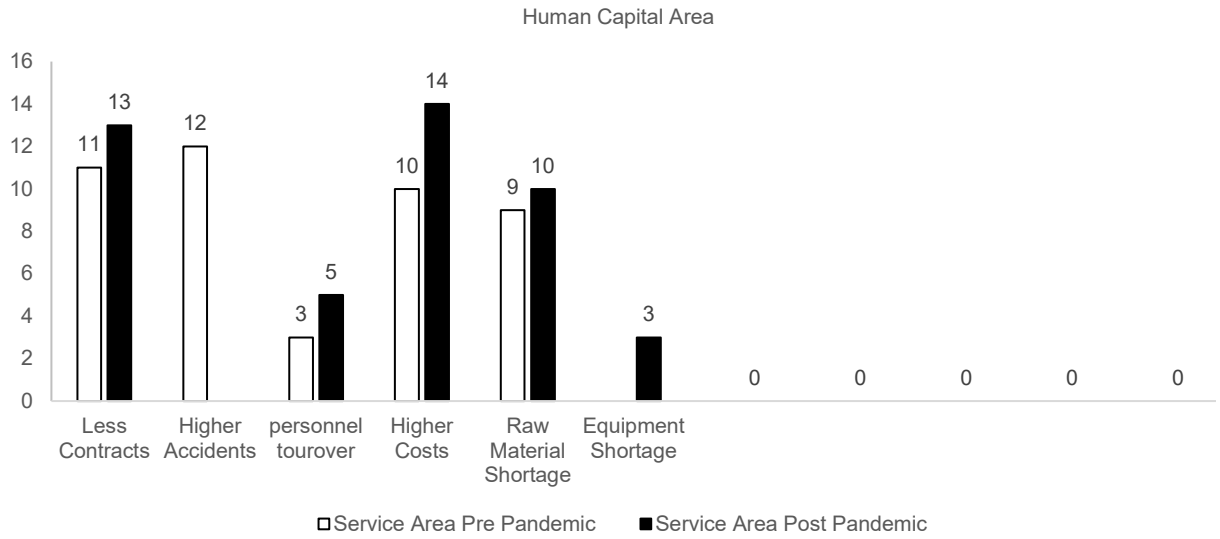
Table 6: Post- Pandemic Problems in the Human Capital Area

Post Pandemic Companies Services Human Capital Area	
Issues	**Answers**
Staff turnover.	21
There is no staff control.	12
Changes in working hours due to low demand.	4
Poor distribution of salaries according to job position.	3
Lack of communication with the administrative area.	7
Worker disabilities.	10
TOTAL	55

In the table of family service companies in the human capital area, the most repetitive problem after the pandemic was staff turnover, with a total of 21 responses, followed by no staff control with 12 responses out of 55. companies. Source of own elaboration.

Figure 3 presents the problems in the human capital area detected pre-pandemic and post-pandemic in the 55 family businesses with service activity that were surveyed. Three of the six problems detected remained, specifically staff turnover, the lack of communication in the administrative area and the inability of workers. We emphasize that after the pandemic the biggest problem is staff turnover with a considerable increase in staff incapacity.

Figure 3: Pre and Post Pandemic Problems Human Capital Area



This figure of the human capital area presents pre- and post-pandemic problems of the 55 family service companies that were surveyed for this study. Results show that after the pandemic the biggest problem is staff turnover and with a considerable increase in staff incapacity, while before the pandemic it was untrained staff. Source of own elaboration.

Finance Area

In the Finance area of family service companies, Table 7 presents the pre-pandemic problems and Table 8 the post-pandemic problems. We identify that the most repetitive problem both before the pandemic and after the pandemic in the Finance are: Low profits (24 responses) before the pandemic and 26 after the pandemic. Of the 55 companies surveyed, only 53 responded that they had a problem in this area.

Table 7: Pre-Pandemic Problems in the Finance Area

Pre Pandemic Companies Services Finance Area	
Issues	**Answers**
Services pay	6
fewer customers	13
little profit	24
Mishandling of accounts	6
staff turnover	4
Total	53

In the table of family service companies in the finance area, it is identified that the most repetitive problem before the pandemic was: Few profits, with a total of 24 responses from the 55 companies surveyed. Source of own elaboration.

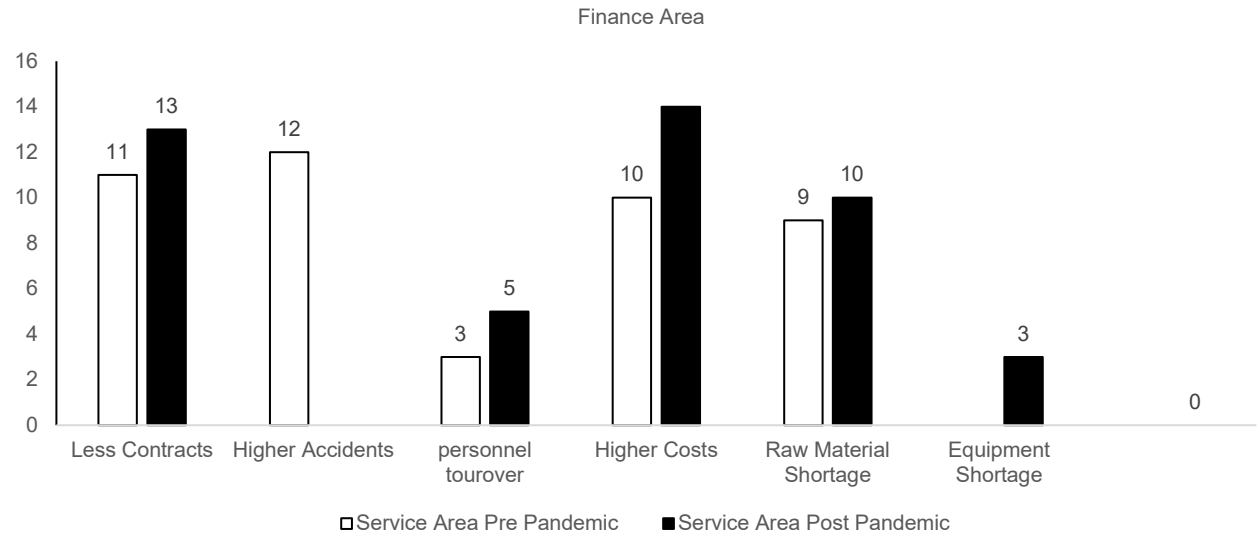
Table 8: Post- Pandemic Problems in the Finance Area

Post Pandemic Companies Services Finance Area	
Issues	**Answers**
Services pay.	9
Increase in raw material costs.	9
Little profit.	26
Increase in expenses for sanitation items.	3
Staff turnover.	6
Total	53

This table of family service companies in the finance area, shows the most repetitive problem after the pandemic was: Few profits, with a total of 26 responses from the 55 companies surveyed, only. Source of own elaboration.

Figure 4 presents problems in the Finance area detected pre-pandemic and post-pandemic of the 55 family businesses with service activity that were surveyed, only 53 answered in this area. The figure shows the problem both before the pandemic as after the pandemic is low profits due to decreased sales triggered by staff turnover, late payments for services and confusion when managing accounts.

Figure 4: Pre and Post Pandemic Problems Finance Area



This figure of the finance area shows pre- and post-pandemic problems of the 55 family service companies surveyed for this study. Results show that before and after the pandemic the biggest problem is low profits. Source of own elaboration.

Process Area

In the processes area of family service companies, Table 9 presents the pre-pandemic problems and Table 10 the post-pandemic problems. Results show the most repetitive problem before the pandemic is an increase in accidents followed by a decrease of contracts. After the pandemic in the processes area, an increase in costs is the main problem. Of the 55 companies surveyed, only 45 responded that they had a problem in this area, the rest did not respond in this area.

Table 9: Pre-Pandemic Problems in the Process Area

Pre Pandemic Companies Services Process Area	
Issues	**Answers**
decrease in contracts	11
Increase in accidents	12
employee turnover	3
Increase in costs	10
Lack of raw material	9
TOTAL	45

Table 9 shows that for the process area repetitive problems are: increase in accidents (12 responses) followed closely by a decrease in contracts with 11 responses of the 55 companies surveyed. Only 45 participants responded that they had a problem in this area. Source data analysis

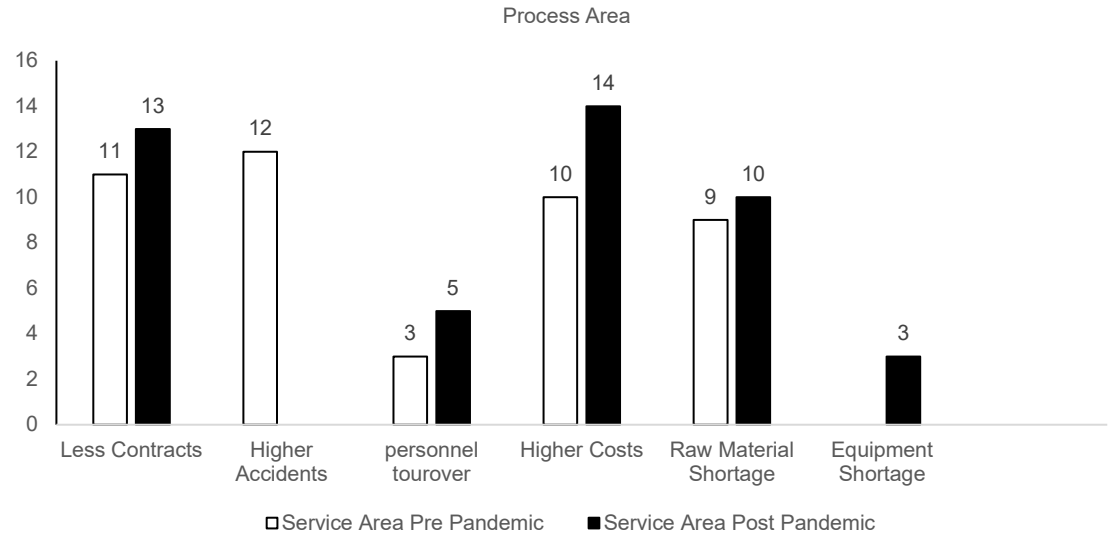
Table 10: Post- Pandemic Problems in the Process Area

Post Pandemic Companies Services Process Area	
Issues	**Answers**
decrease in contracts	13
Failures with machinery and equipment.	3
employee turnover	5
Increase in costs	14
Lack of raw material	10
TOTAL	45

This table shows that increase in costs, with a total of 14 responses, closely followed by the decrease in contracts with 13 responses and the lack of raw material with 10 responses are the most relevant problems for companies in the service sector.

Figure 5 presents problems in the area of processes detected pre-pandemic and post-pandemic of the 55 family businesses with service activity. We only received answers from 45 companies. We find that the increase in accidents, the decrease in contracts and the increase in costs are the most relevant problems after the pandemic. The increase in accidents disappeared after the pandemic, but the rest remained only in a different order of importance. Based on the results generated by this investigation, the way in which the government can support companies in times of crisis is by canceling or reducing the tax burden, issuing some regulatory norms for serious situations, such as the case of the pandemic. Also, funds can be created to support companies where they are provided with favorable payment conditions or symbolic interest rates, but with the commitment to pay the principal.

Figure 5: Pre and Post Pandemic Problems Process Area



This figure shows results for the process area. The pre- and post-pandemic problems of the 55 family service companies surveyed are presented. Only 45 responded that they had a problem in this area, highlighting that before and after the pandemic the problems are the same. Only the increase in accidents disappeared after the pandemic, but the rest remained only in a different order of importance. Source of own elaboration

CONCLUSIONS

This paper analyzes results obtained in this investigation, which aims to prepare a comparative analysis of pre and post- pandemic problems by Covid-19 suffered by family businesses in the service sector in the central region of the state of Coahuila. We determined that problems before and after the pandemic are different in three of the four areas surveyed. Only in the financial area the problems are problems the same before and after the pandemic. This research is useful to encourage family businesses to carry out a strategic plan that allows them to get ahead after the pandemic. This study also serves as a reference for MSMEs

that did not face this type of problem. A limitation of this research is that it focuses on family businesses in the service sector. The problems faced by MSMEs in other economic activities may be different. Thus, future research in the sectors is needed.

We concluded that in the administrative area, before the pandemic, managers were not efficient or effective in their work. Post pandemic the problem became that administrators did not know how to handle remote work. This was a challenge that arose in most organizations since they were not used to working remotely. In the human capital area, we found the main problem before the pandemic was untrained personnel followed by staff turnover, while after the pandemic staff turnover, followed by lack of personnel control were the key problems. These problems increased exponentially due to the covid-19 pandemic. In the area of finance, the most remarkable problems before the pandemic and after the pandemic was low earnings. After the pandemic, there was a decrease in employment contracts, which resulted in lower sales. Increase in costs triggered a decrease in profits.

In the process area before the pandemic, the main problem was the increase in work accidents, but after the pandemic increased costs, decreased contracts and lack of raw materials were the most notable problems. Consequently, some companies experienced liquidity problems to cover their payment commitments. We recommend that companies prepare a strategic plan of action to help them overcome all the problems caused by the Covid-19 pandemic.

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Business Education & Accreditation
Vol. 15, No. 1, 2023, pp. 51-67
ISSN: 1944-5903 (print)
ISSN: 2157-0809 (online)

IBFR
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TIME VALUE OF MONEY TEACHING TOOL EXTENSIONS: THE INCLUSION OF GROWING ANNUITIES

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ABSTRACT

Earlier research develops tools to assist professors in teaching time value of money concepts. These tools systematically walk students through questions to identify the appropriate technique to solve a problem. This paper extends these tools by incorporating growing annuities into the analysis and giving users additional calculation capabilities. The paper develops a visual tool that provides users an easy method for identifying time value of money problems. The analysis shows calculations for growing annuities, including some previously unavailable calculations. The paper surveys textbooks to identify if and how growing annuities have been incorporated in business education pedagogy.

JEL: M40, M41, M52, A22, A23

KEYWORDS: Time Value of Money, Tools, Grown Annuities, Business Education

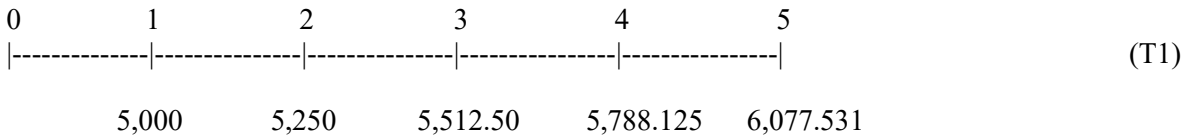
INTRODUCTION

Time value of money (TVM) concepts have proven difficult for teachers to communicate and for students to grasp. These difficulties are documented in the extant literature (Eddy and Swanson, 1996). Moreover, there exists variability in optimal pedagogy across students (Bloom, 1956). These issues motivate research to develop TVM teaching tools that accommodate the needs of various professors and students. Textbook presentation of TVM concepts commonly use inconsistent and misleading approaches as noted in Jalbert (2002). Text-book vagueness and impreciseness complicate user understanding of the materials. Efforts to clarify procedures and computations offer the possibility of improving student understanding and increasing mastery of the subject.

Earlier research provides tools to simplify the process of teaching TVM and provide students a systematic approach to solving problems. Jalbert (2002) and Jalbert, Jalbert and Chan (2004) first developed a visual technique selection tool which assists in solving TVM problems. This work was expanded upon by Martinez (2013), who includes calculator functions along with the visual presentation. Gardner (2004) suggests revisions to TVM calculations that include disregarding the beginning and ending terminology usually associated with teaching annuities. Jalbert (2002) provides tools to solve TVM problems including five questions users must answer which lead to six candidate techniques. Jalbert, Jalbert and Chan 2004 simplify the model by treating annuities as a special case of an uneven cash flow stream. Both tools systematically walk users through a series of simple and straightforward questions to identify correct techniques needed to solve TVM problems. This paper extends the work of Jalbert (2002) and Jalbert, Jalbert and Chan (2004) by expanding the tool to include growing annuity computations.

Growing annuities, sometimes called increasing annuities, provide useful computations for specific needs. This tool is especially useful for retirees who wish to assure a stream of annual payments that increase at

the rate of inflation throughout their finite lifetime. A growing annuity involves a series of payments, limited in number, separated by an equal amount of time, with each successive payment growing at a constant percentage rate. To demonstrate the nature of a growing annuity, consider a series of annual cash flows. The first cash flow equals $5,000 received 1 year from today. The cash flows increase by 5 percent annually for the following 4 years, for a total of 5 payments. Timeline 1 depicts the cash flows.



(T1)

This paper surveys introductory finance textbooks on their growing annuity calculation presentations. The survey also examines if texts provide a graphical TVM technique selection tool. The presentation provides a demonstration of growing annuity calculations including some new calculations not previously identified in the literature. The paper provides instructors a simple graphical method for presenting time value of money techniques in an easily understood format.

The remainder of the paper is organized as follows. In the next section we provide a review of the extant literature. The following section presents a graphical tool to frame growing annuities among other TVM techniques. The next section discusses the data and methodology used. The paper continues with a presentation of the results of our textbook survey. The next section presents growing annuity calculations. The paper closed with some concluding comments and suggestions.

LITERATURE REVIEW

There exists little literature related to the growing annuity technique. Thus, we relate the work here to the extant growing annuity literature as well as the general literature on time value of money techniques. The paper builds upon this research to develop a new graphical time value of money (TVM) technique selection tool. The paper also provides a comprehensive resource for growing annuity calculations.

Taylor (1986) demonstrated future value calculations for a growing ordinary annuity and growing annuity due. Hall (1996) discusses growing annuities as they relate to financial calculators. Others have provided instructions on how to complete the necessary computations using a financial calculator. Mayes (2023) demonstrated the necessary calculations using a Texas Instruments BAII Plus calculator. Omni Calculator (2023) provides an online tool to solve for future value, present values and payments of growing annuities. Michael's Law Firm (2023) provides the only known publicly available tool to solve for number of payments, the growth rate and the discount rate for growing annuities.

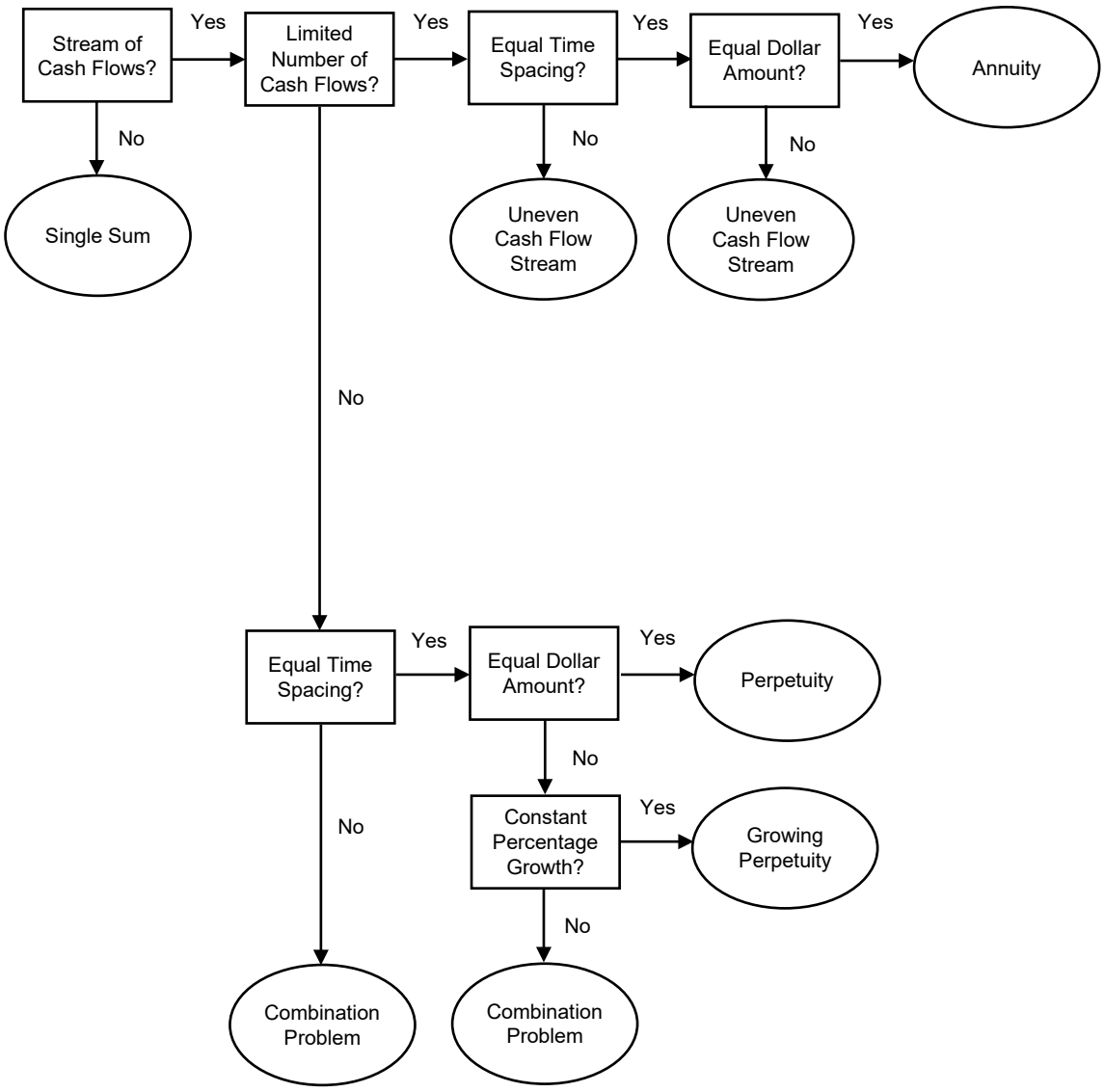
Bagamery (2011) provided a method for solving growing annuity problems that involves transforming a nominal stream of growing payments into a de-growthed stream of payments. He argued this approach makes the growing annuity approach more accessible to users. We extend the work of these authors by providing additional calculations related to growing annuities.

As noted earlier, Jalbert (2002) developed a teaching tool to assist in solving time value of money (TVM) problems as shown in Figure 1. The figure includes square boxes and ovals. Users evaluate five, yes or no, questions as indicted in boxes. The five questions are: 1. Is there a stream of cash flows? 2. Are the number of cash flows limited? 3. Is there an equal time spacing between each of the cash flows? 4. Is each cash flow for an equal dollar amount? and 5. Do the cash flows grow at a constant percentage rate? The question answers lead users to an oval which indicates the appropriate technique for solving a problem.

The tool includes six candidate techniques. Answering the questions correctly leads users unambiguously to the correct TVM technique.

To supplement the graph, Jalbert (2002), provided a summary of cash flow characteristics for each technique. Table 1, adapted from Jalbert (2002), shows the characteristics of each time value of money technique. A Yes indicator implies the technique requires the characteristic. A No indicator indicates the technique does not require the characteristic.

Figure 1: Time Value of Money Technique Selection Tool from Jalbert (2002)



This figure shows the time value of money technique selection tool developed in Jalbert (2002).

Table 1: Classification of Time Value of Money Problems

	Single Sum	Annuity	Perpetuity	Growing Perpetuity	Uneven Cash Flow Stream
Series of Cash Flows	No	Yes	Yes	Yes	Yes
Limited Number of Cash Flows	Yes	Yes	No	No	Yes
Each Cash Flow is for an Equal $ Amount	N/A	Yes	Yes	No	Yes/No
Equal Time Interval Between Cash Flows	N/A	Yes	Yes	Yes	Yes/No
Cash Flows Grow at a Constant Percentage Rate	N/A	No	No	Yes	No

This table shows time value of money technique selection criteria as adapted from Jalbert (2002).

Some students experience difficulty understanding and applying annuity techniques. As noted earlier, this stems in part from use of the terms beginning, end, ordinary annuity, and annuity due when describing annuity cash flows. It may also occur because individuals become overwhelmed with the number of techniques available. While annuity calculations provide added power, some individuals may not require the full range of capabilities that annuity techniques provide. These users can use a simplified method that treats annuities as a special cases of uneven cash flow streams. Jalbert, Jalbert and Chan (2004) provide a modification to the Jalbert (2002) technique that incorporates this reduced approach. Figure 2 and Table 2 show an adaptation of the revised technique. The reduced approach simplifies the TVM selection process by eliminating the annuity technique entirely. The reduced model results in one limitation. Financial calculators can solve for the payment amounts and number of observations in an annuity. However, they cannot do so when using the uneven cash flow stream tool. The simplified version proves valuable for those not needing these capabilities.

MODIFIED TIME VALUE OF MONEY TECHNIQUE SELECTION TOOL

We begin the analysis by providing a new graphical tool that walks users through the questions necessary to properly classify a time value of money problem. This paper extends the work of Jalbert 2002 and Jalbert, Jalbert and Chan (2004), by extending the graphical selection tool to include growing annuities.

Specifically, the new tool modifies the Jalbert (2002) tool by incorporating the growing annuity technique. Figure 3 provides the tool. The new feature is incorporated under the Equal Dollar Amount question on the figure's top row. The figure shows a growing annuity involves a stream of cash flows, limited in number, with equal time spacing between each cash flow. The cash flows do not equal each other, however; the cash flows grow a constant percentage rate. Table 3 indicates characteristics of each available time value of money technique. Users reference Table 3 as an alternative to the graphical tool to select appropriate time value of money (TVM) techniques.

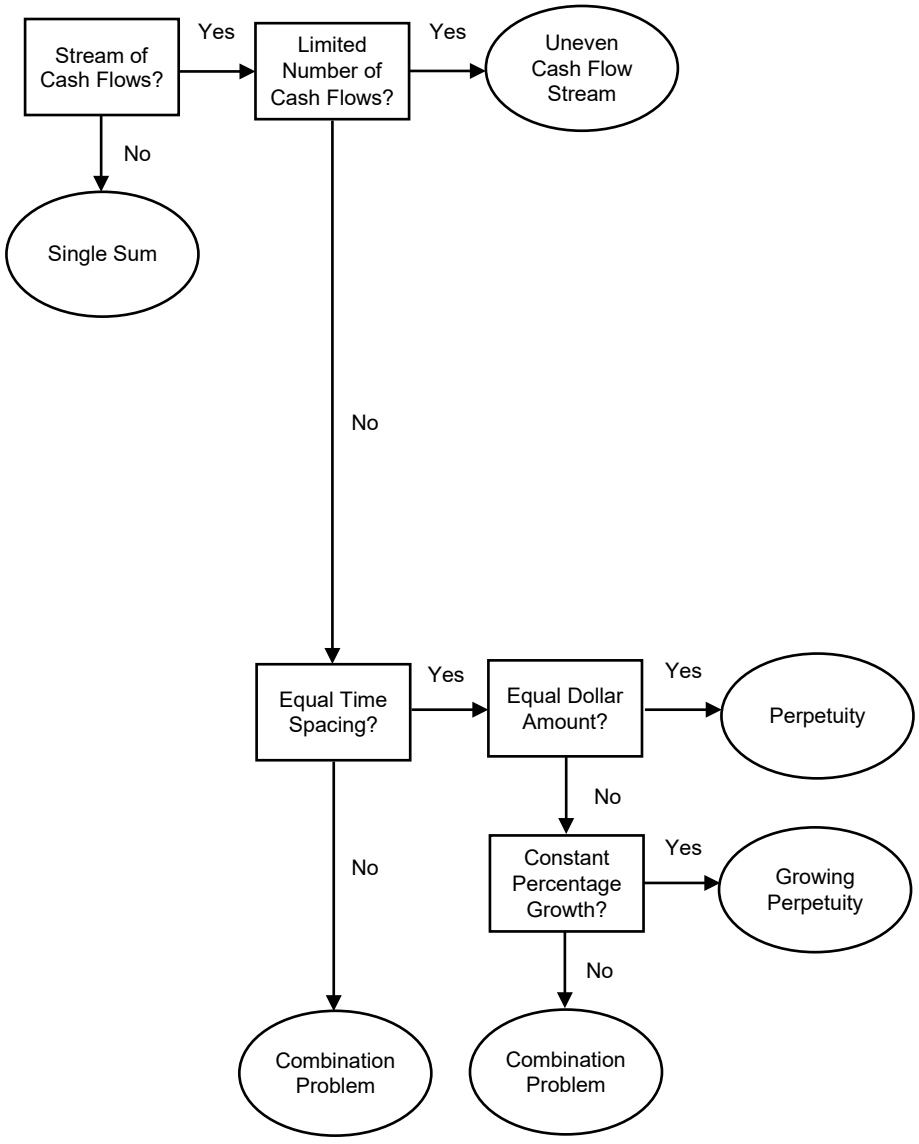
DATA AND METHODOLOGY

The analysis continues by evaluating finance textbooks to identify growing annuities coverage and the extent that textbooks include graphical time value of money (TVM) technique selection tools. The survey examines introductory and intermediate corporate finance textbooks along with personal finance textbooks. The sample of textbooks considered involves a convenience sample of fifteen texts. The sample includes thirteen corporate finance texts and two personal finance texts. Copyright on the texts range from 2000-2019.

The survey examines eight characteristics of the texts, seven related to growing annuity presentations and one related to inclusion of a graphical tool to assist users in selecting an appropriate TVM technique. The first survey item ascertains if the text addresses the basic growing ordinary annuity. For those texts that do present the growing annuity technique we examine a series of follow up issues. The first identifies if the

text also addresses growing annuity due calculations. The next three elements assess if the presentation includes solving for present value, payment or future value of a growing annuity. The following item examines if the presentation demonstrates how to solve for other variables in the growing annuity, including number of periods, growth rate and discount rate. Next, we examine how the text addresses calculations. Three basic options are available including the formula method, spreadsheet method, and the calculator method. Finally, the survey examines if texts include a graphical selection tool, similar to that suggested in this research.

Figure 2: Time Value of Money Technique Selection Tool Excluding Annuities (Jalbert, Jalbert and Chan, 2004)



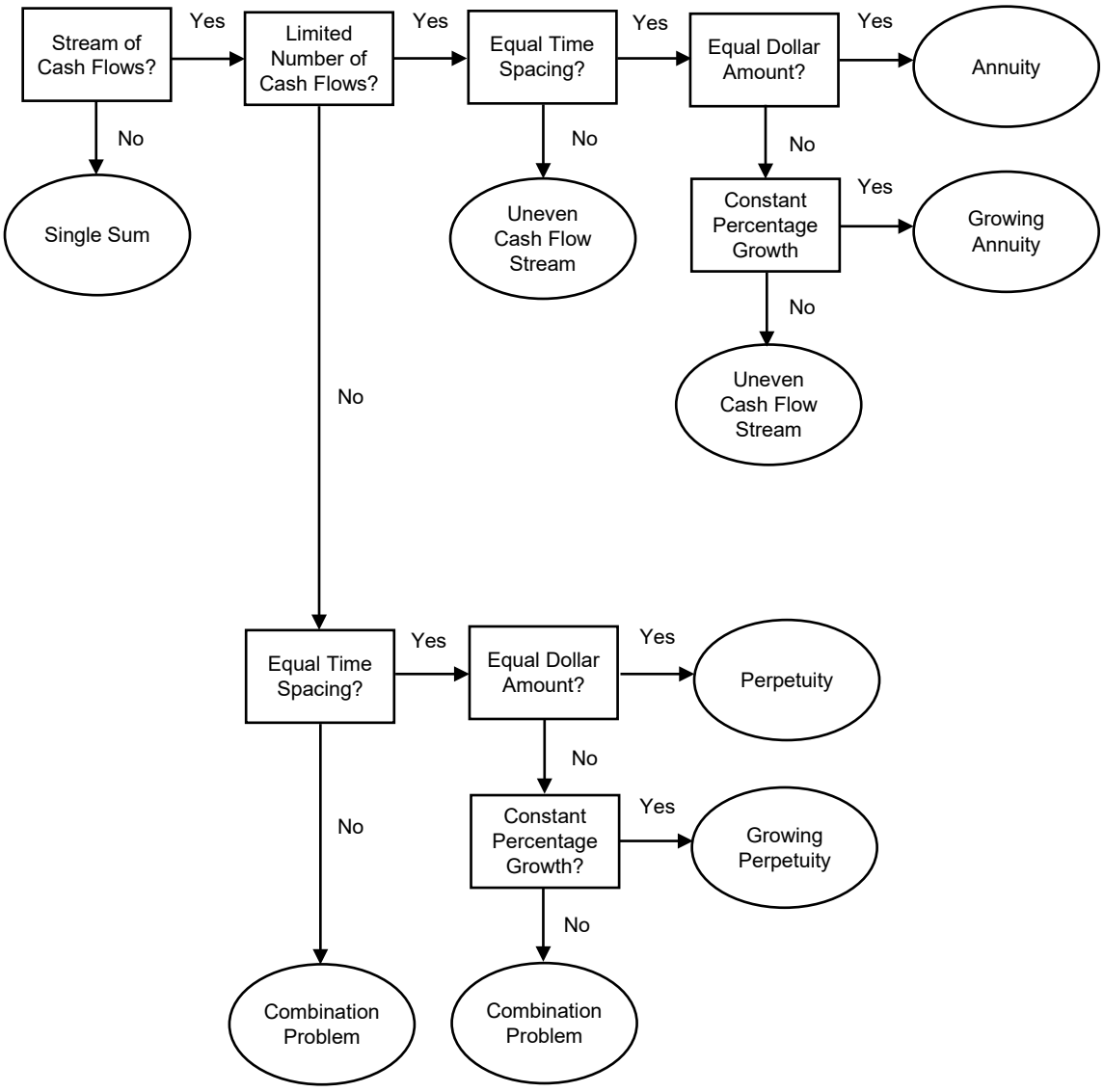
This figure shows the time value of money technique selection tool as adapted from Jalbert, Jalbert and Chan (2004).

Table 2: Modified Table for the Classification of Cash Flows

	Single Sum	Perpetuity	Growing Perpetuity	Uneven Cash Flow Stream
Series of Cash Flows	No	Yes	Yes	Yes
Limited Number of Cash Flows	Yes	No	No	Yes
Each Cash Flow is for an Equal $ Amount	N/A	Yes	No	Yes or No
Equal Time Interval Between Cash Flows	N/A	Yes	Yes	Yes or No
Cash Flows Grow at a Constant Percentage Rate	N/A	No	Yes	No

This table shows the time value of money selection criteria as adapted from Jalbert, Jalbert and Chan (2004).

Figure 3: Time Value of Money Technique Selection Tool Including Growing Annuities



This figure shows the time value of money technique selection tool developed here. The figure extends earlier works by incorporating the growing annuity technique.

Table 3: Classification of Time Value of Money Problems

	Single Sum	**Annuity**	**Growing Annuity**	**Uneven Cash Flow Stream**	**Perpetuity**	**Growing Perpetuity**
Series of Cash Flows	No	Yes	Yes	Yes	Yes	Yes
Limited Number of Cash Flows	Yes	Yes	Yes	Yes	No	No
Each Cash Flow is for an Equal $ Amount	N/A	Yes	No	No	Yes	No
Equal Time Interval Between Cash Flows	N/A	Yes	Yes	No	Yes	Yes
Cash Flows Grow at a Constant Percentage Rate	N/A	No	Yes	No	No	Yes

This table shows the time value of money technique selection tool developed that includes the growing annuity technique.

RESULTS

Table 4 shows the survey results. Results reveal that growing annuities receive sparse attention in finance textbooks. Growing annuities are not commonly presented in textbooks. Only three of the thirteen corporate finance texts surveyed address the issue of growing annuities. The Ross, Westerfield, Jaffe and Jordan 2007, p. 115-116, Berk and DeMarzo 2014, p. 118-119 and Brigham and Ehrhardt (2017) texts do present growing annuity calculations. Neither of the personal finance texts present growing annuities.

Berk and Demarzo (2014) and Ross Westerfield, Jaffe and Jordan 2007 take similar approaches to growing annuities. Both texts demonstrate calculation of present and future values of a growing annuity. They do not address annuities due, solving for payment amounts or solving for other variables. Their presentation is done with formulas. Brigham and Ehrhardt (2017) provide arguably the most comprehensive coverage of growing annuities. Their text covers both ordinary growing annuities and growing annuities due. They demonstrate present value and payment calculations. They do not demonstrate how to solve for the future value or other variables. They use an indirect calculator method to demonstrate their calculations. None of the texts surveyed demonstrate calculation of number of periods, growth rate or discount rate. Overall, the survey shows that no text provides comprehensive coverage of the growing annuity technique. Despite the general lack of attention that growing annuities receive, they constitute an important tool in the time value of money (TVM) arsenal.

Examination of the texts for the presence of a graphical technique selection tool reveals that none of the surveyed texts incorporate a graphical selection tool. This is surprising given the added clarity that a graphical selection tool provides. This added clarity is particularly important for retirees who desire a stream of cash flows for a finite life that increase annually at the rate of inflation.

Table 4: Textbook Survey of Growing Annuity Coverage and Graphical Technique Selection Tool

Text	Growing Ordinary Annuities	Growing Annuities Due	Solve for Present Value	Solve for Payment	Solve for Future Value	Solve for other Variables	Calculation Method	Graphical Selection Tool
Panel A: Corporate Finance Texts								
Berk & Demarzo, 2014	Yes	No	Yes	No	Yes	No	Formula	No
Besley and Brigham, 2015	No	No	No	No	No	No		No
Bodie and Merton, 2000	No	No	No	No	No	No		No
Brigham and Daves, 2002	No	No	No	No	No	No		No
Brigham and Ehrhardt, 2017	Yes	Yes	Yes	Yes	No	No	Indirect Calculator	No
Brigham and Houston, 2019	No	No	No	No	No	No		No
Brooks, 2016	No	No	No	No	No	No		No
Foerster, S., 2015	No	No	No	No	No	No		No
Gitman, 2003	No	No	No	No	No	No		No
Keown, Martin and Petty, 2014	No	No	No	No	No	No		No
Moyer, McGuigan and Rao, 2015	No	No	No	No	No	No		No
Ross, Westerfield, Jaffe and Jordan, 2007	Yes	No	Yes	Yes	No	No	Formula	No
Smart, Megginson and Gitman, 2007	No	No	No	No	No	No		No
Panel B: Personal Finance Texts								
Gitman, Joehnk and Billingsley, 2016	No	No	No	No	No	No		No
Madura, 2006	No	No	No	No	No	No		No

This table provides an examination of finance textbook coverage of growing annuities. It also shows the extent to which texts provide a graphical selection tool for identifying appropriate time value of money techniques. Texts selected for inclusion represent a convenience sample.

GROWING ANNUITIES

This section shows growing annuity calculations. The discussion adds to existing literature by aggregating various previously presented calculations into a single location for easy access. It also provides relevant calculations not previously presented in textbooks or the extant literature.

Recall that a growing annuity has the following characteristics: 1. There is a series of cash flows, 2. The number of cash flows is limited, 3. There is an equal time spacing between each cash flow, 4. Each cash flow is not for an equal amount, and 5. The cash flows become larger by some constant percentage amount in each subsequent year. Growing annuities differ from standard annuities. A growing annuity includes periodic increasing payments. In contrast, a standard annuity is characterized by equal periodic payments. Growing annuities also differ from growing perpetuities. Both a growing perpetuity and a growing annuity have periodic increasing payments. However, growing perpetuity payments continue into infinity while growing annuity payments have a defined end point.

We return to the growing annuity example presented earlier. Recall the growing annuity example involved a series of annual cash flows. The first cash flow equals $5,000, received 1 year from today. Cash flows increase by five percent in each year for the following four years, for a total of five payments. Timeline T1 depicts the cash flows.

0 1 2 3 4 5
|----------|----------|----------|----------|----------| (T1)

5,000 5,250 5,512.50 5,788.125 6,077.531

Future Value Based Calculations

We examine growing annuities by calculating the usual time value of money (TVM) parameters. We begin with formula for the future value (FV) of the growing annuity. Consider a growing annuity where PMT_1 equals the payment received one year from today, PMT_0 equals the payment received one minute from now, N equals the number of years payments will occur, I equals the interest earned on investments and G equals the growth rate in investments. $FVGOA$ indicates the future value of a growing ordinary annuity and $FVGAD$ indicates the future value of a growing annuity due. Equations 1 and 2 show calculations for $FVGOA$ and $FVGAD$ respectively:

$$FVGOA = PMT_1(\frac{(1+I)^N-(1+G)^N}{I-G}) \quad (1)$$

$$FVGAD = PMT_0(1+I)(\frac{(1+I)^N-(1+G)^N}{I-G}) \quad (2)$$

To demonstrate the calculation of Equation 1, consider the growing annuity noted above. Further note the interest rate earned on investments equals 7 percent. Then the future value of the growing annuity equals:

$$FVGOA = 5{,}000(\frac{(1+0.07)^5-(1+0.05)^5}{0.07-0.05})$$

$$FVGOA = 5{,}000(\frac{1.402551731-1.276281562}{0.02}) = 31{,}567.54213$$

Thus, an investor making the payments noted in the problem will accumulate $31,567.54213 at the end of the 5th year.

Now suppose, in the previous problem, that the first payment occurs at time zero rather than at time 1. The total number of cash flows remains at five and we wish to know the value of the stream at the end of the 5th year. Timeline T2 depicts the cash flows as follows:

0 1 2 3 4 5
|----------|----------|----------|----------|----------| (T2)

5,000 5,250 5,512.50 5,788.125 6,077.531

In this case the $FVGAD$ approach, given by Equation 2, applies with calculations equaling:

$$FVGAD = 5{,}000(1+0.07)(\frac{(1+0.07)^5-(1+0.05)^5}{0.07-0.05}) \quad (2)$$

$$FVGAD = 5{,}000(1+0.07)\left(\frac{1.402551731-1.276281562}{0.02}\right) = 33{,}777.27021$$

Thus, an investor who makes the deposits as noted will accumulate $33,777.27021 at the end of the 5th year.

Rearranging the formulas solves for the initial payment when knowing the future value, rate earned on investments, growth and number of periods as follows for an ordinary growing annuity and growing annuity due respectively:

$$PMT_1 = \frac{FVGOA}{(\frac{(1+I)^N-(1+G)^N}{I-G})} \quad (3)$$

$$PMT_0 = \frac{FVGAD}{(1+I)(\frac{(1+I)^N-(1+G)^N}{I-G})} \quad (4)$$

To demonstrate the use of Equation 3, consider an investor who wishes to accumulate 31,567.54213, five years from today. The investor makes five annual payments into the account to achieve the goal with the first payment occurring one year from today and the last payment occurring five years from today. Payments increase by five percent per year. The account pays seven percent interest annually. The investor desires to know the first payment amount necessary to achieve the goal. The following equation solves for the initial payment amount:

$$PMT_1 = \frac{31{,}567.54213}{(\frac{(1+0.07)^5-(1+0.05)^5}{0.07-0.05})}$$

$$PMT_1 = \frac{31{,}567.54213}{(\frac{1.402551731-1.276281562}{0.02})} = \$5{,}000$$

Similarly, if the payments occur at the start of each year, as in the case of a growing annuity due, we solve for equation 4 as follows:

$$PMT_0 = \frac{33{,}777.27021}{(1+0.07)(\frac{(1+0.07)^5-(1+0.05)^5}{0.07-0.05})}$$

$$PMT_0 = \frac{33{,}777.27021}{(1+0.07)(\frac{1.402551731-1.276281562}{0.02})} = 5{,}000$$

Present Value Based Calculations

Next, we calculate present values. Equations 5 and 6 show formulas for calculating the present value of a growing ordinary annuity and a growing annuity due respectively:

$$PVGOA = \frac{PMT1}{I-G}\left[1-\left(\frac{1+G}{1+I}\right)^N\right] \quad (5)$$

$$PVGAD = \frac{PMT0(1+G)}{I-G}\left[1-\left(\frac{1+G}{1+I}\right)^{N-1}\right] + PMT0 \quad (6)$$

Consider an investor who wishes to withdraw $5,000 from an account at the end of year one. The investor continues to withdraw funds from the account annually for each of the next four years, for a total of five payments. Payments increase by five percent annually and the account pays seven percent interest annually. The investor wishes to know the deposit required today to achieve this objective. Equation 5 calculates the present value of the growing ordinary annuity as follows:

$$PVGOA = \frac{5{,}000}{.07-.05}\left[1-\left(\frac{1+.05}{1+.07}\right)^{5}\right] = 22{,}507.2212$$

The result indicates that achieving a five-year growing annuity as specified requires an initial deposit of $22,507.2212.

Next, consider an investor who wishes to withdraw $5,000 from an account at the beginning of year one. The investor continues to withdraw funds from the account annually each of the next four years, for a total of five payments. Payments increase by 5 percent annually and the account pays seven percent interest annually. The investor wishes to know the deposit required today to achieve this objective. Equation 6 calculates the present value of the growing ordinary annuity as follows:

$$PVGAD = \frac{5{,}000(1+0.05)}{0.07-0.05}\left[1-\left(\frac{1+0.05}{1+0.07}\right)^{5-1}\right] + 5{,}000 = 24{,}082.72669$$

The result indicates that achieving the five-year growing annuity, as specified, requires an initial deposit of $24,082.72669.

The presentation continues by providing alternate formulae for calculating payment amounts in a growing annuity. Equations 7 and 8 provide formulae for calculating the initial growing annuity payment with a known present value. Rearranging equations 5 and 6 solves for the payment amount as shown in Equations 7 and 8 for a growing ordinary annuity and growing annuity due respectively.

$$PMT_1 = \frac{PVGOA}{\left[1-\left(\frac{1+G}{1+I}\right)^{N}\right]}\ (I-G) \tag{7}$$

$$PMT_0 = \frac{PVGAD}{\frac{1+G}{I-G}\left[1-\left(\frac{1+G}{1+I}\right)^{N-1}\right]+1} \tag{8}$$

To demonstrate use of Equation 7, consider an investor with 22,507.2212 in an account that pays seven percent interest annually. The investor withdraws annual payments from the account at the end of the following five years to empty the account. The payments grow at a rate of five percent annually. How much can the investor withdraw from the account at the end of the first year? Equation 7 calculates the time zero payment as follows:

$$PMT_1 = \frac{22{,}507.2212}{\left[1-\left(\frac{1+0.05}{1+0.07}\right)^{5}\right]}\ (0.07-0.05) = 5{,}000$$

To demonstrate the use of Equation 8, consider an investor with $24,082.72669 in an account that pays 7 percent interest per year. The investor withdraws annual payments from the account at the beginning of the following 5 years to empty the account. The payments grow at a rate of 5 percent annually. How much can the investor withdraw from the account at the beginning of the first year? Equation 8 calculates the payment at time zero as follows:

$$PMT_0 = \frac{24{,}082.72669}{\frac{1+0.05}{0.07-0.05}\left[1-\left(\frac{1+0.05}{1+0.07}\right)^{4}\right]+1} = 5{,}000$$

We continue with formulas to solve for *N* in a growing annuity with a known present value. To the best of our knowledge, this presentation represents the first discussion of formula for completing the task.

Equations 9 and 10 show the formulas for computing *N* in an ordinary growing annuity and a growing annuity due respectively.

$$N = ln - \left[\frac{PVGOA}{\left(\frac{PMT_1}{I-G}\right)} - 1\right] * \left[\frac{1}{ln\left(\frac{1+G}{1+I}\right)}\right] \quad (9)$$

$$N = \left\{ln - \left[\left(\frac{(PVGAD-PMT_0)*(I-G)}{PMT_0(1+G)}\right) - 1\right] * \left[\frac{1}{ln\left(\frac{1+G}{1+I}\right)}\right]\right\} + 1 \quad (10)$$

To demonstrate the use of Equation 9, consider an investor who wishes to accumulate 31,567.54213. The investor will make annual payments into the account to achieve the goal with the first payment of $5,000 occurring one year from today and the last payment occurring when the goal is achieved. The payments increase by five percent annually and the account pays seven percent interest annually. The investor desires to know how long it will take to achieve the goal. The following application of Equation 9 computes the result:

$$N = ln - \left[\frac{22{,}507.2212}{\left(\frac{5{,}000}{0.07-0.05}\right)} - 1\right] * \left[\frac{1}{ln\left(\frac{1+0.05}{1+0.07}\right)}\right] = 5$$

Thus, under the scenario presented, the investor accumulates $31,567.54213 at the end of the 5th year.

To demonstrate the use of Equation 10, consider an investor desiring to accumulate 31,567.54213. The investor makes annual payments into an account to achieve the goal with the first payment of $5,000 occurring later today and the last payment occurring when the goal is achieved. The payments increase by five percent annually and the account pays seven percent interest annually. The investor desires to know how long it will take to achieve the goal. The following application of Equation 10 shows the result:

$$N = \left\{ln - \left[\left(\frac{(24{,}082.72669-5{,}000)*(0.07-0.05)}{5{,}000(1+0.05)}\right) - 1\right] * \left[\frac{1}{ln\left(\frac{1+0.05}{1+0.07}\right)}\right]\right\} + 1 = 5$$

The result shows, under the scenario presented, the investor accumulates$24,082.72669 at the 5th year end.

Solving for other variables

On occasion it is useful to calculate other amounts. Given changing payment amounts, users might desire to know the payment at various points of time in the growing annuity. Equations 11 and 12 calculate the payment amount at any time point for a growing ordinary annuity and growing annuity due respectively.

$$PMT_t = PMT_1(1+G)^{N-1} \quad (11)$$

$$PMT_t = PMT_0(1+G)^{N} \quad (12)$$

The first known introduction of Equation 11 was done by Finance Formulas.Net (2023). This is the first known presentation of Equations 12. We demonstrate the calculations using the ordinary growing annuity example above for the payment at time four, with an initial payment of $5,000 that grows at a rate of 5 percent annually. The computations show a future value of $5,788.125 as follows:

$$PMT_4 = 5{,}000(1+0.05)^{4-1} = 5{,}788.125$$

To demonstrate the use of equation 12 we use the growing annuity due example noted above, with a Time 0 payment of $5,000 and a growth rate of 5 percent annually, the payment at time 4 equals:

$$PMT_4 = 5{,}000(1 + 0.05)^4 = \$6{,}077.531$$

It is possible to solve the equations for I, G. However, no direct formula is available for solving for these variables. Rather, solving for these variables is an iterative process. As such, users must vary values for the variable of interest, until the correct solution is achieved. As noted earlier, Michael's Law Firm (2023) provides the only known publicly available tool to solve for number of payments, the growth rate and the discount rate for growing annuities.

For brevity, we limit ourselves to the above calculations. However, the extant literature provides additional calculation tools for working with growing annuities that may be valuable for some users. Carbon Collective (2023) provides a formula for calculating the FV of a growing annuity when I = G as:

$$FVGOA = PMT_1 N(1 + r)^{N-1}$$

Taylor (1986) provides formulas for situations where compounding occurs more than once per year. In addition, Taylor (1986) provides formulas for a situation where payments occur more than once per year but increase annually.

Growing Annuity Value Table

Growing annual balances display interesting patterns with important implications for investors. To demonstrate these patterns, we examine a longer-term growing annuity. Consider a growing ordinary annuity, with an initial balance of $100,000. The first annual withdrawal of $4,627.070927 occurs at the end of the first year and the payments continue for thirty years. The annual growth rate in withdrawals equals five percent. The account pays a return of seven percent annually.

Table 4 shows the pattern of withdrawals and account balances throughout the thirty-year period. The first column indicates the year from 1 through the 30-year life of the growing annuity. The Beg. Balance column indicates beginning of the year funds held in the account. The column labeled Earnings indicates the amount of interest earned on the account during the year. The column labeled Withdrawal indicates the amount of money removed from the account at year end. Finally, the column labeled End Balance indicates the amount of money remaining in the account at year end.

Table 4: Growing Annuity Value Table

Year	Beg Balance	Earnings	Withdrawal	End Balance
1	100,000.00	7,000.00	4,627.07	102,372.93
2	102,372.93	7,166.11	4,858.42	104,680.61
3	104,680.61	7,327.64	5,101.35	106,906.91
4	106,906.91	7,483.48	5,356.41	109,033.98
5	109,033.98	7,632.38	5,624.23	111,042.12
6	111,042.12	7,772.95	5,905.45	112,909.63
7	112,909.63	7,903.67	6,200.72	114,612.58
8	114,612.58	8,022.88	6,510.75	116,124.71
9	116,124.71	8,128.73	6,836.29	117,417.15
10	117,417.15	8,219.20	7,178.11	118,458.24
11	118,458.24	8,292.08	7,537.01	119,213.31
12	119,213.31	8,344.93	7,913.86	119,644.38
13	119,644.38	8,375.11	8,309.55	119,709.93
14	119,709.93	8,379.70	8,725.03	119,364.59
15	119,364.59	8,355.52	9,161.28	118,558.83
16	118,558.83	8,299.12	9,619.35	117,238.60
17	117,238.60	8,206.70	10,100.32	115,344.99
18	115,344.99	8,074.15	10,605.33	112,813.80
19	112,813.80	7,896.97	11,135.60	109,575.17
20	109,575.17	7,670.26	11,692.38	105,553.06
21	105,553.06	7,388.71	12,277.00	100,664.77
22	100,664.77	7,046.53	12,890.85	94,820.46
23	94,820.46	6,637.43	13,535.39	87,922.50
24	87,922.50	6,154.58	14,212.16	79,864.92
25	79,864.92	5,590.54	14,922.77	70,532.70
26	70,532.70	4,937.29	15,668.90	59,801.08
27	59,801.08	4,186.08	16,452.35	47,534.81
28	47,534.81	3,327.44	17,274.97	33,587.28
29	33,587.28	2,351.11	18,138.72	17,799.67
30	17,799.67	1,245.98	19,045.65	0.00

This table shows the payoff pattern of a growing ordinary annuity. The growing ordinary annuity has an initial balance of $100,000 and an end of Year 1 withdrawal of $4,627.070927. Payments continue for thirty years with an annual payment growth rate equaling five percent. The account pays a return of seven percent per year.

A pattern stands out in Table 4. The careful reader will notice the End Balance increases during the first thirteen years of the thirty-year growing annuity. After year thirteen the balance declines until it reaches a balance of zero at the end of year thirty. This pattern is especially important for retirees planning their retirement spending. Retirees face the temptation to increase their spending in light of increasing account balances in years 1-13. It is important for retirees to recognize this account balance increase offsets planned spending in subsequent years and does not imply a higher initial spending level.

CONCLUDING COMMENTS

Growing annuity techniques provide important insights and capabilities to financial planners. This holds especially true for retirees who wish to create a stream of cash flows that increase with inflation throughout their finite life. This paper provides a comprehensive summary of growing annuity calculation methods. It also provides a graphical tool to assist users in identifying the appropriate technique to apply to any time value of money (TVM) problem. The tools presented here provide instructors an intuitive way to present TVM techniques that students can easily grasp and master.

We survey a convenience sample of introductory finance textbooks. Results show that most texts do not incorporate growing annuities into their presentation. Moreover, texts that do include growing annuities provide a limited discussion. Nevertheless, growing annuities represent an important TVM tool. We encourage textbook authors to fully incorporate the growing annuity technique as presented here.

The survey further reveals that textbooks do not present a graphical TVM technique selection tool. These tools provide a simple way for users to identify the appropriate approach to solve a problem. We encourage textbook authors to incorporate graphical tools into their TVM presentations to facilitate better, and easier student understanding.

We note that no known financial calculator incorporates growing annuities into their tool set. This holds despite incorporating similar functions such as annuities and perpetuities. The presence of these related tools suggest incorporating growing annuities would be a manageable task. We encourage financial calculator manufacturers to incorporate these tools into calculator functions.

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Business Education & Accreditation
Vol. 15, No. 1, 2023, pp. 69-76
ISSN: 1944-5903 (print)
ISSN: 2157-0809 (online)

IBFR
www.theIBFR.COM

BLOOM'S TAXONOMY: CAN HIGHER LEVEL THINKING BE IDENTIFIED IN AN ONLINE MBA COURSE?

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ABSTRACT

Online education has grown dramatically over the past 25 years. Questions about the effectiveness of online education have also increased as well. One issue that educators continue to ponder is "Can students engage in higher level thinking while taking a course completely online"? This paper examines that question by using Bloom's Taxonomy as a framework to examine student end-of-the-term responses to an extra credit question on the final exam. Seven different sections were surveyed from four different courses: Introduction to Financial Accounting, Introduction to Managerial Accounting, Value Based Marketing and Value Based Leadership. Results of the study found that students receiving higher grades use words in their responses that show both a higher and lower levels of thinking than students with poorer grades. Implications from the results of this study are also discussed.

JEL: M1

KEYWORDS: Business Education, Online Education, Higher Level Thinking

INTRODUCTION

As of 2012, nearly 6.7 million students were enrolled in at least one online course (Sloan Consortium, 2013). Furthermore, in a 2015 survey, over 70 percent of academic leaders report that online enrollment is critical to their institution's planning goals (PR Newswire, 2015). But within this critical and growing portion of the education market comes the continuous questions about whether this form of education is similar, better or worse.

A number of researchers have outlined advantages – like more time and location flexibility – and disadvantages – such as no real connections to faculty, other students or the vitality of on-campus life. Another disadvantage cited in the literature is the lack of reflective or deeper thinking in an online course, which is the focus of this paper. Some faculty and students believe this lack of active engagement has lead online learners to become merely recipients of passive, one-way, downward flowing education process (Rahm & Reed, 1997 and Sonner, 1999). Others though have concluded no difference in reflective learning between an on campus and an online course. (Peltier & Diego, 2004 and Peltier, et. al., 2003).

This paper examines the question of whether higher order thinking can take place in a variety of online graduate business school courses. Can students not only memorize but can they also evaluate and synthesize? Using Bloom's Taxonomy as a framework to examine this question, we asked students in MBA courses in accounting, statistics and leadership classes an extra credit question on the final exam:

"Explain one way in which you will be able to use what you have learned this semester in this course in your current job position, your next job position or your personal life?"

Seven different sections were surveyed from four different courses: Introduction to Financial Accounting, Introduction to Managerial Accounting, Value Based Marketing and Value Based Leadership. Over 370 students wrote a one-paragraph response (averaging about 25 words) to the question above.

This paper is as follows. Section two discusses additional literature in this area. Section three outlines the methodology employed and the data collected, including the determination of Higher Order Thinking Skills ("HOTS") and Lower Order Thinking Skills ("LOTS") words from 10 different websites that defined key words for Bloom's Taxonomy. Section four presents the results and section five concludes.

LITERATURE REVIEW

Bloom's taxonomy is a six-level classification of thinking based on progressive higher levels of complexity. These levels are often labelled as lower order thinking skills (LOTS) to higher order thinking skills (HOTS). Bloom and Krathwohl (1956) considered the LOTS as knowledge, comprehension, and application, as well as the HOTS as analysis, synthesis and evaluation. These levels were updated by Anderson, et. al. (2001) – they are now remembering, understanding and applying, for the three lowest levels, and analyzing, evaluating and creating, for the three highest levels. Reflective thinking, using Dewey's definition, could be considered elements of the highest three levels, where memorization of facts no longer is the end and the ability to apply these facts to new situations becomes important.

In general, the education process begins with the foundational, or lowest level thinking in Bloom's taxonomy. As the student becomes more knowledgeable about the subject matter, the teacher can introduce more complex ideas, including those which take knowledge and apply it to new scenarios. The framework has been used in many diverse fields of business including accounting (Davidson and Baldwin, 2005; Debreceny and Farewell, 2010; Kidwell, Fisher, Braun, and Swanson, 2013) and finance (Ashraf, Fendler, and Shrikhande, 2013).

In accounting, for example, the teacher might first define what an asset and liability is. Then illustrate how journal entries are made, followed by the construction of a balance sheet and income statement. Lastly, the instructor could "take something new" – like a business transaction – and ask the student how the balance sheet and/or income statement has been affected in a particular way. Higher order thinking – analyzing and evaluating – would be needed to document a relationship between a single change in an asset and how it affects the entire report of an organization.

Another question that could be asked to exhibit HOTS is "Could business students take the knowledge learned within the course and apply it to a future scenario in their lives?" Prior research has sought to define Bloom's taxonomy in organizational goals, including human resources (for example, Brewer & Brewer, 2010). A more personal question about a student's own personal goals within their career was asked in the data collection of this paper as a bonus but optional question on the final exam of each course listed above.

DATA AND METHODOLOGY

A dictionary-based qualitative analysis was performed on the following short, open-ended question asked of students in four different online MBA courses (a total of seven different sections and five different instructors):

"Explain one way in which you will be able to use what you have learned this semester in this course in your current job position, your next job position or your personal life?"

This question had not been previously asked in any course. Therefore, the students were not able to prepare and memorize an answer. The students' answers to this question then would be able to show, to some

extent, a student's ability to take information from the course, analyze and synthesis it and apply it to a new context. Every course offered a few points of extra credit for providing an answer. There was no word limit for receiving the points, though the student did not know this (a very simple short answer gave the same number of points as a long paragraph answer). There was no "right" or "wrong" answer – and no answer appeared unreasonable (such as answering with gibberish, etc).

The general concept underlying a dictionary-based analysis of written content is that word usage reflects underlying personal characteristics of the writer (Pennebaker, et al., 2003). Consequently, a list of verbs representing the six levels of the revised Bloom's taxonomy were collected from ten websites focusing on Bloom's taxonomic levels. The sites were identified on Internet searches based on the concept of "Bloom's revised taxonomy verbs." The ten websites are listed in Table 1.

Table 1: Ten Websites Defining Key Verbs from Bloom's Taxonomy

Websites
http://www.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm
http://www.teach-nology.com/worksheets/time_savers/bloom/
http://www.nwlink.com/~donclark/hrd/bloom.html
www.clemson.edu/.../Blooms%20Taxonomy%20Action%20Verbs.pdf
wed.siu.edu/faculty/JCalvin/bloomstax.pdf
pimarsc.pbworks.com/f/Revised_Blooms_Taxonomy_Words.doc
www.utar.edu.my/fegt/file/Revised_Blooms_Info.pdf
www.buffalostate.edu/pds/documents/mhbloom.doc
steveventura.com/bloom's_tax.pdf
ir.library.oregonstate.edu/

Table 1 shows a list of 10 websites which provide verbs that can show higher or lower levels of thinking, according to Bloom's taxonomy.

The six taxonomic levels by name were consistent across all websites. However, some verbs attributed to the six levels varied across websites. For example, some sites identified the verb "write" as representative of Bloom's higher order Create category, while others classified "write" into the lower order Remember category. Consequently, a frequency analysis was conducted on the verb lists. Verbs mentioned on four or more lists and classified into a specific category 70% or more of the time and verbs mentioned on two or three lists and placed in a specific category 100% of the time were retained as verbs representative of the category. This resulted in a list of 114 verbs classified into Bloom's six taxonomic categories and is shown in Table 2.

Table 2: List of Original 114 Verbs for Each Level of Bloom's Taxonomy

Category	**Verbs**
Remember	Count, define, draw, duplicate, find, label, list, match, memorize, name, omit, quote, recall, recite, recognize, record, repeat, reproduce, retrieve, state
Understand	Convert, discuss, express, extend, give example, indicate, interrelate, paraphrase, report, represent, restate, review, translate
Apply	Apply, Calculate, change, complete, compute, dramatize, employ, implement, interview, manipulate, operate, paint, practice, schedule, sketch, solve, use
Analyze	Analyze, Breakdown, categorize, deconstruct, deduce, detect, diagram, differentiate, dissect, examine, inspect, point out, question, separate, subdivide, survey, test
Evaluate	Appraise, argue, assess, attach, check, conclude, criticize, critique, decide, determine, evaluate, justify, prioritize, prove, rank, rate, recommend, support, value, weigh
Create	Assemble, collect, combine, compile, comply, compose, create, design, develop, devise, do, formulate, generate, hypothesize, integrate, invent, make, originate, plan, propose, rearrange, reconstruct, reorganize, revise, set up, synthesize.

Table 2 shows a series of words that appeared frequently in levels of Bloom's taxonomy, when examining multiple listings of verbs which could demonstrate higher order thinking.

The original set of 114 words was imported in Wordstat, a text analysis program, which is a subset of QDA Miner, a program used for the qualitative analysis of written material (Wordstat, 2014). These words formed the initial dictionary as shows in Appendix 1. The initial dictionary was expanded, following Wordstat's dictionary building procedures for identifying key synonyms. Only words with the highest relevance to the initial words within each Bloom category were added. In the final analysis, 389 total verbs were sectioned into six Bloom's categories, with 190 in the LOTS category and 199 into the HOTS category (with none of the verbs repeated in any category). This larger list is shown in Table 3.

Table 3: List of 389 Verbs Used for This Study

Category	**Verbs**
Remember	Count, define, draw, duplicate, find, label, list, match, memorize, name, omit, quote, recall, recite, recognize, record, repeat, reproduce, retrieve, state, brand, calendar, counterpart, credits, database, inventory, item, key, locate, mean, point, portfolio, standing, term, title, total, replay, access, acquire, call, fix, listing, tie, refresh, double, remember, specify, think, number, identify, refer, degree, detail, add, style, complement, equivalent, associate, base, being, benefit, buy, conflict, connect, earn, engage, feeling, freedom, gain, have, info, information, medium, obtain, office, ownership, position, power, preparation, profit, purchase, readiness, receive, relate, relationship, rent, representation, situation, status, win, extent, ladder, fact, regard, respect, select, function, role, incur, post, realize, clear, hire, choose, take, overlook, consume, enter, con, experience, miss, condition, cite, link, stage, accept, limit
Understand	Convert, discuss, express, extend, give example, indicate, interrelate, paraphrase, report, represent, restate, review, translate, present, interpret, drop, voice, wish, summarize, graph, model, picture, profile, say, sound, chart
Apply	Apply, calculate, change, complete, compute, dramatize, employ, implement, interview, manipulate, operate, paint, practice, schedule, sketch, solve, use, control, employment, enforce, finish, utilization, figure, utilize, exercise, commute, exchange, manage, run, close, drive, handle, average, break, factor, guess, process, application, development, commit, dedicate, devote, enjoy, put, deal, assign, care
Analyze	Analyze, breakdown, categorize, deconstruct, deduce, detect, diagram, differentiate, dissect, examine, inspect, point out, question, separate, subdivide, survey, test, class, part, sort, quiz, tell, study, notice, ask, note, reduce, section, segment, segregate, sense, group, compare, screen, view, audit
Evaluate	Appraise, argue, assess, attach, check, conclude, criticize, critique, decide, determine, evaluate, justify, prioritize, prove, rank, rate, recommend, support, value, weigh, confirm, demonstrate, influence, learn, level, mold, shape, show, watch, reason, tax, range, score, place, order, measure, see, agree, feel, infer, charge, date, format, price, believe, essay, forecast, pass, reject, try, back, document, verify, hold, pace, time, upgrade, estimate, cost, set, mark, affirm, grade
Create	Assemble, collect, combine, compile, comply, compose, create, design, develop, devise, do, formulate, generate, hypothesize, integrate, invent, make, originate, plan, propose, rearrange, reconstruct, reorganize, revise, role-play, set-up, synthesize, arise, gather, perform, program, frame, effect, father, start, write, grow, incorporate, get, piece, project, give, build, cause, produce, construct, projection, return, play, follow, fund, pick, store, bid, die, field, gamble, introduce, lead, offer, walk, engineer, elaborate, machine, output, redo, conduct, join, plot, facilitate, force, idea, motivate, move, outline, propel, thought, rush, serve, form, institute, manufacture, prepare, short, track, customize, bring, become, head, organize, cut, speed, work, travel, direct, accumulate, come, draft

Table 3 expands the list from Table 2 using Wordstat dictionary building capability of synonyms, which allows a greater chance of detecting higher-order thinking when students use these words in various form.

RESULTS

The population of answers came from 378 students, with seven different sections of four courses and taught by five different instructors, drawn from surveys in courses from 2018-2020. The students ranged in age from 21 to 62 years. The mean age was 33.8 years with a standard deviation of 7.1 years. Table 4 shows the breakdown of the population by gender and by ethnic group. Neither gender nor ethnic group was found to be significantly correlated with final course grade. The wide range of courses and instructors were used to reduce the potential bias of one instructor or one subject area to increase or decrease the ability of students to show higher or lower levels of thinking skills.

Table 4: Composition by Gender and Ethnic Group

	F	M	Total
Non-resident Alien	8	28	36
Unknown	5	9	14
White Non-Hispanic	61	120	181
Hispanic	9	31	40
AmerInd/Alaskan	1	3	4
Asian / Pacific Islander	16	27	43
Black Non-Hispanic	30	30	60
TOTAL	130	248	378

Table 4 identifies the gender and ethnicity of the student sample. Neither gender nor ethnicity was significantly correlated with final course grade.

Grade data was also available for the students. The grades were grouped into two categories: High (A & A-) and Low (All other grades). Table 5 shows this distribution. Within all courses, a grade below a B (B-, for example) is considered a possible "probationary" status for the student, with dismissal a possibility. Hence many students try to avoid that grade level or even a grade of B as well.

Table 5: Distribution of Grades

	F	M	Total
High (A & A-)	86	170	256
Low (B+ & Lower)	44	78	122
TOTAL	130	248	378

Table 5 show the distribution of grades between male and female and high grades (A&A-) and low grades (B+ and lower).

It is proposed that students with more advanced, deeper knowledge of the course will use more words that represented higher order thinking than students with a lesser knowledge of the course. We consider A and A- to be a higher grade, and B+ and below a lower grade, since a B average is required overall for graduation and continuing good standing. While a B- then would be a truly "lower" grade, we reasoned that a student with a B or B+ in the course would probably have a lower class ranking overall than an A or A- students.

The first hypothesis is based on the usage of the high-grade students and the words they use in their open-ended answer. A student receiving an A or A- would use a higher order thinking words (HOTS) than a student receiving less than an A-.

H1: Students who will receive a "high" final grade in a course will use more words that are considered HOTS than students with a "low" grade.

Table 6 shows that students receiving an A/A- were more likely to give HOTS advice rather than lower performing students. This difference was statistically significant to the 0.995 percent level, using a chi-square testing to at least three standard deviations.

Table 6: Results of HOTS vs. LOTS for Higher Order Word Usage

	High (A & A-)	Low (B+ & Lower)	Chi2	P (2-tails)
HOTS	71.4%	28.6%	12.315***	0.000

*Table 6 describes the percentage of words that were labeled as higher-order thinking by students getting an A or A- versus the percentage of higher-order thinking by students getting a B+ or lower as a final course grade. **** denotes statistically significant at the .01 level.*

Our second hypothesis was that students who are "high grade earners" would also use more advanced vocabulary words demonstrating lower-order thinking as well. As shown in Table 5, this was also true with a statistical significance of three standard deviations (.995).

H2: Students who received a "high" final grade in a course will use more words that are consider LOTS than students with a "low" grade.

Table 7 exhibits that students receiving an A/A- were more likely to give LOTS advice in a higher amount of words than lower performing students. This would also be confirmed through greater than three standard deviations – that high performing students are also able to demonstrate better lower level knowledge in Bloom's Taxonomy as well.

Table 7: Results of HOTS vs. LOTS for Lower Order Word Usage

	High (A & A-)	Low (B+ & Lower)	Chi2	P (2-tails)
LOTS	72.1%	27.9%	18.784***	0.000

*Table 7 shows the percentage of words that were labeled as lower-order thinking by students getting an A or A- versus the percentage of lower-order thinking by students getting a B+ or lower as a final course grade. *** denotes statistically significant at the .01 level*

CONCLUDING COMMENTS

This paper asked the question "Do students with higher grades in an online business course exhibit higher order thinking?" Prior research has shown, to some extent, that online courses represent a lack of reflective thinking, or a mere "one-way" flow of information from instructor to student. If this is true, then the answers students give to summarize the course content would be of lower levels of thinking. On the contrary, higher order thinking, as represented by more complex verbs, was exhibited by those students with greater knowledge of their subject matter as measured by the final course grade. It was also true these same students exhibited a greater usage of lower order thinking as well.

Future research could examine why both higher and lower levels were both affected by the level of understanding within the course as measured by a final grade. Future research questions could be as follows: (1) Perhaps the lower levels of understanding must be greater in order for the higher levels of understanding to also be better? (2) Is there ever a situation within a course where some students are able to do lower level understanding better than average but significantly falter when higher levels of understanding are required?

Another line of research could also seek to validate our dictionary or another one similar to it – but with substantially more or less words. The line of questioning might be asked "Do students who have higher order thinking skills use words to describe their thinking that consistent with the Bloom's taxonomy order?" One way this validation could be done is to analyze student essays (and the resulting word counts) that could be considered either descriptive or analytical and ascertain whether the latter shows more HOTS words than the former.

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