

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

Blake Frank, University of Dallas
Robert Walsh, University of Dallas

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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BIOGRAPHY

Blake Frank is an Associate Professor Emeritus of Management in the Gupta College of Business at the University of Dallas. He previously served as Associate Dean of the Gupta College. His research appears in journals such as *Journal of Applied Psychology*, *Industrial Organization Psychologist* and *Journal of International Studies*. He can be reached at the University of Dallas, Gupta College of Business, Irving, TX 75062.

Robert Walsh is an Associate Professor of Accounting in the Gupta College of Business at the University of Dallas. His research appears in *Accounting Historians Journal*, *Global Perspectives on Accounting Education* and *Accounting and Taxation*. He can be reached at the University of Dallas, Gupta College of Business, Irving, TX 75062.