STUDENT ENGAGEMENT: UTILIZING BLOOM'S TAXONOMY

Student Engagement: An Experimental Approach Utilizing Bloom's Taxonomy

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Abstract

Interest in student engagement within colleges is well researched, and focuses on aspects such as quality of effort and classroom management. Classroom management, in particular "types of questions asked" was identified as an important element in business student engagement. Experimental research was conducted to assess whether teaching and learning utilizing questions asked across the six levels of Bloom's taxonomy was an effective way of engaging students. Two instructors with sections of the same business course (84 students) served as the sample. Changes in delivery of instruction were evaluated utilizing Bloom's taxonomy. Findings suggest that focusing instruction and student assessment on the types of questions asked can shift student's thinking to different and/or higher levels of thinking, therefore enhancing student engagement.

Student Engagement: An Experimental Approach Utilizing Bloom's Taxonomy

Student engagement is an extensively studied construct by academic scholars. Findings for this research suggests that the stronger the student's engagement in the academic experience, the greater their level of knowledge acquisition and cognitive development (Pascarella & Terenzini, 1991). As such, student engagement became the emphasis of a college wide initiative at South Texas College (STC) that involved the creation of cross-functional teams across five campuses working on research on this topic. Research discussed in this paper occurred at the Technology Campus of STC and focused on enhancing student engagement in business administration courses.

The driving force behind this multi-campus approach to student engagement is to develop unique approaches at each campus that are shared among the five campuses and eventually the entire faculty population. Student engagement in this college environment is tempered by various demographics such as first time college students, part time students, low program completion rates, and older average beginning age (20 – 25 yrs.). As such, engaging students in the classroom is one of the educator's greatest challenges.

Research on student engagement is being conducted by individual researchers and large groups of universities and colleges. At the university (National Survey of Student Engagement) and community college (Community College Survey of Student Engagement) levels annual national assessments are conducted of student engagement. A review of these annual findings (NSEE, 2008; CCSEE, 2008) provided guidance for this research. While these two annual surveys provide significant insight on student engagement, they do not delve deeply into the integration of teaching and learning elements and their impact on student engagement. Therefore, the researchers of this paper sought to identify what elements of student engagement

could easily be translated into practice and ultimately lead to increased student knowledge and cognitive development. This increased level of knowledge and cognitive development was how student engagement was assessed for this research.

Student Engagement

A review of the academic literature identified five student engagement concepts that were relevant at the campus and within the business administration classrooms. The five concepts were: 1) conation, 2) quality of effort, 3) principles of good practice, 4) student involvement, and 5) classroom management. Conation (Riggs & Gholar, 2009) is defined as the student's will to act or one's capacity to strive and is made up of belief, courage, energy, commitment, conviction, and change. A student may have the skills, knowledge, and ability (SKAs) to do the work and be successful, but not willingness, which leaves the student disengaged. Quality of effort (Pace, 1982) involves the effort students put forth to utilize the resources available to them. If the student does not put forth the effort, they are considered to be less engaged. Principles of good practice (Chickering & Gamson, 1987) consist of concepts such as encouraging student/faculty interaction, giving prompt feedback, and communicating high expectations. Instructors that utilize principles of good practice are hypothesized to result in higher student engagement. Student involvement (Astin, 1985) refers the students being engaged because of their choice to participate in extracurricular activities outside of the classroom. The more involved the student is on the college campus, the more engaged. Classroom management (Wiseman & Hunt, 2008) has various sub elements that are believed to impact student engagement. How an instructor manages the class can determine whether students are more or less engaged.

In the process of selecting which of these aspects to focus the research, the team decided to discuss the pros and cons of each concept identified in the extant literature. To choose which would be the focus of the research practitioner business approaches of utilizing Fishbone diagrams and multi-voting were utilized to select the team's approach. The concept selected using this approach was prioritized based on ease of implementation and ability to control by the instructor. The concept selected for further research was classroom management.

Classroom Management

Wiseman and Hunt (2008) identified in their research ten different aspects of classroom management that may impact student engagement. Again, to select among the ten which would be the team's focus, the practitioner business approaches of utilizing Fishbone diagrams and multi-voting were utilized again. The final three classroom management concepts selected for implementation across all business administration classrooms involved were: 1) rules of behavior for the class, 2) instructional variety, and 3) types of questions asked. The course selected for research purposes was titled *Business Principles*. One section or more of this course was being taught by each member of the participating team. This course was also selected because it was being taught traditionally as well as online.

The team reached a consensus to standardize across the Business Principles course the following rules of behaviors: 1) attendance (% of time in class), 2) assignments (5 pt. penalty for every day late), and 3) assignment completeness (use grading rubric). For purposes of instructional variety the team decided to revise the syllabus to ensure that all included at least three of the following approaches to instruction (writing assignment, group project, lecture, Powerpoint presentations, role playing exercises, and online assignments). Finally, types of

questions asked led the team to seek a better understanding of how instructors ask questions with in the classroom and how this leads to higher cognitive development and student engagement. This thinking led to evaluation of Bloom's taxonomy (Bloom et al., 1956) as a means for developing increasingly higher levels of cognition, and subsequently student engagement. It was the process of seeking deeper understanding of question types asked in conjunction with Bloom's taxonomy that became the impetus of this experimental research. The next section is a review of the literature specific to the types of questions asked.

Types of Questions Asked – Bloom's Taxonomy

The remainder of this paper addresses the experimental teaching and learning study that was developed to better understand how "types of questions asked" (at increasing levels of Bloom's taxonomy) result in higher levels of knowledge and cognition as measured by their performance on exam questions at each level. First is a review of the literature on types of questions asked, secondly, a description of the experimental study, thirdly a report of the findings, and lastly, conclusions / recommendations.

Extant literature suggests that Bloom's taxonomy allows the instructor to cover the same material while meeting the needs of students that are learning at various levels. This ability to meet the needs of students at different levels results in students at all levels having the opportunity to experience success and subsequently be more engaged (Noble, 2004). Bloom's taxonomy also allows the instructor to assess with the student the level that they are operating at and work with them individually to increase their level of cognitive thinking. Bloom's taxonomy provides a hierarchy that can be utilized for curriculum development, classroom lecture material, student assessment and improvement, and provides the instructor with questions that can be

utilized at each level of the hierarchy. Utilizing Bloom's taxonomy as the hierarchical guideline for developing the questions utilized in the classroom was a natural choice. Bloom's hierarchy consists of six levels which are considered cumulative levels of thinking. The levels of the hierarchy are: 1) knowledge, 2) comprehension, 3) application, 4) analysis, 5) synthesis, and 6) evaluation (Bloom et al., 1956).

While the hierarchy has been revised since the original publication to consist of: 1) remember, 2) understand, 3) apply, 4) analyze, 5) evaluate, 6) create (Anderson & Krathwohl, 2001), for purposes of this research the team utilized the original six levels due to their more widespread knowledge, usage, and application. Other researchers have also created new taxonomies that suggest the levels are not hierarchical, but integrative (Fink, 2010), and that once a student understands one level they are able to integrate other levels. For purposes of this research again, the researchers utilized the original research by Bloom et al. (1956) and utilized the levels in a hierarchical context.

The use of Bloom's taxonomy for purposes of this research, identify heuristic levels that are utilized in the development of instruction material and assessment questions. So, this approach of utilizing Bloom's taxonomy to enhance student engagement is not only about the student being engaged and learning, but also about the instructor designing the class to include content that facilitates better delivery of instruction in order to enhance student engagement. One way of doing this is with the type of questions asked.

Literature on the "types of questions asked" is conclusive that the use of questioning strategies by instructors has a major impact on the quality and quantity of student achievement (Winne, 1979). Redfield and Rousseau (1981) found in a meta-analytic study of research on types of questions asked that when higher order questions are used in instruction that there are

gains in student achievement. Research on the types of questions asked focuses either on the instructor's ability to ask higher order questions and offers that training in question development for instruction and assessment is sorely needed (Reeves, 1990). The research also addresses the student contribution to higher order questioning and self-reflection (meta-cognition) of the level of thinking at which they are currently proficient (Anderson & Krathwohl, 2001). Aspects of how to implement Bloom's taxonomy questions into the classroom and specific classroom techniques for each level of Bloom's is also represented in the literature. This research seeks to experimentally investigate and understand if the use of higher order questioning in teaching does result in higher order learning. The approach utilized in this research presumes based on the literature that neither the instructor nor the student are proficient at higher order question instruction or assessment. The sociolinguistic perspective of questioning offers that questions should be mutually generated by instructors and students (Carlsen, 1991). Based on the extant student engagement and types of questions asked literature the researchers hypothesized the following.

H1a: Instructor 1 instruction and assessment will be highest for Knowledge and Application levels of Bloom's (Treatment 2 – Exam 2)

H1b: Instructor 2 instruction and assessment will be highest for Knowledge and Comprehension levels of Bloom's (Treatment 2 – Exam 2)

H2: Different unfocused Bloom instruction and assessment delivered across all six levels will result in different Bloom configuration between instructors (Treatment 3 – Exam 3)

H3: Identical Bloom focused instruction and assessment delivered across all six levels will result in equivalent Bloom configuration between instructors (Treatment 4 – Exam 4)

Method

Participants

Participants for this experimental research consisted of 84 students enrolled in a Business Principles course at STC. STC is a large community college with more than 27,000 students. The Business Principles course provides instruction on elements of business such as the dynamics of business and economics, managing business globally, organizing a business, managing a business, and financing the business. Business Principles is core curriculum required for all business administration degrees and certificates. Students taking this course have an interest in working in the business field and/or starting their own business.

Two instructors participated in this research to integrate aspects not only of learning, but also teaching in the same study. The two instructors both had prior experience teaching the course as well as prior practitioner experience (see Table 1). The two instructors entered the experiment with pre-conceived notions of which levels of Bloom's taxonomy dominated their delivery of instruction. Instructor 1's business background is based in Operations Management, while Instructor 2's business background is in Accounting. The reporting of data for both instructors is documented as Instructor 1 first and Instructor 2 second.

Over half of the participants were female for both instructors (55.1% and 60% respectively). The majority of participants for Instructor 1 were between 17 – 20 years old (53%). The majority of participants for Instructor 2 were between 21 – 25 years old (45.8%). Participants 30 years and older were low for both instructors (see Table 2). The majority of participants were classified as freshman (81.6% and 68.8% respectively). Participants were represented by various areas of specialization with the highest business administration

participants for both instructors (45% and 43% respectively). More detailed demographics of the participants in the study by instructor can be found in Table 2.

Design

The design of this research involved four different treatments that were executed by the two instructors. Each treatment had a different combination of delivery of instruction based on Bloom's six levels and different assessments based on Bloom's six levels (see Table 3). During the first treatment, no enhanced student engagement activities existed, and no formulated Bloom's taxonomy assessment questions were given to the participants. The instructor's intent at this level was to uncover whether the instructors were teaching at pre-specified Bloom's levels. The second treatment also had no enhanced student engagement activities, yet participants were assessed across all six levels of Bloom's taxonomy. This treatment included the independent creation of questions by each instructor. The third treatment included various enhanced student engagement activities during each lecture and contained formulated assessment questions on each level of Bloom's taxonomy. Instructors were teaching at specified Bloom's taxonomy levels. Enhanced student engagement activities included written assignments and team projects. Each instructor formulated their own questions for the class based on similar course elements. Final treatment included the instructor's use of identical material for delivery of instruction and identical formulated assessment questions across all six levels of Bloom's taxonomy. The intent at each treatment was to vary the delivery of instruction and monitor the impact on changes in assessment outcomes across the six levels of Bloom's taxonomy.

Procedure

Participants were provided instruction at the treatment levels discussed above. Once the instruction was completed an assessment (exam) was given during the same week. Upon completion of the assessment the participant success level was captured across the six levels of Bloom's questions. Results were gathered for each treatment (exam) and each level of Bloom's taxonomy. While the control group did receive similar delivery of instruction as the experimental group, they were not assessed across the six levels of Bloom's taxonomy. The average assessment score for the control group was captured for purposes of analysis. See results across all four treatments (see Table 4).

Results

An original hypothesis by each instructor was that their style of instruction and assessment was based primarily on two of the Bloom taxonomy levels. Instructor 1 believed their content of instruction and assessment was focused on Knowledge and Application. Instructor 2 believed their content of instruction and assessment was focused on Knowledge and Comprehension. Utilizing Exam 2 results the instructors evaluated which of the levels scored the highest. See Figure 1a and 1b for the results of this comparison. Instructor 1's highest levels turned out to be Knowledge and Analysis, while Instructor 2's highest levels were Knowledge, Analysis, and Application. This phase focused on difference within each instructor.

A secondary approach was to evaluate difference between instructors. For each level of Bloom's taxonomy the performance (percent correct) was compared between the two instructors. Figure 2 shows the difference between Instructor 1 and Instructor 2 across the six levels of

Bloom's taxonomy. Instructor 2 scored higher that Instructor 1 on all levels of Bloom's taxonomy except Comprehension.

The final comparison was also between instructors, but when using identical focused instruction and assessment. Figure 3 shows the difference between Instructor 1 and Instructor 2. In the final assessment phase (Exam 4) Instructor 1 scored higher than Instructor 2 on all of the six levels of Bloom's taxonomy except Application. It is somewhat ironic that the levels that both expected to be strongest were the same levels that they scored the lowest when compared to the other instructor.

Discussion

Based on the hypotheses, H1a and H1b were both partially supported. Both instructors scored highest on the Knowledge level of Bloom's taxonomy, while the other expected level was different than hypothesized. H2 addressed whether difference existed between instructors across the six levels of Bloom's taxonomy while utilizing different, unfocused instruction and assessment. While graphically there is a difference discussed, statistically a difference does not exist between instructors ($p=.183$). The final hypothesis H3, also a comparison between instructors, yet this treatment involved the use of identical instruction material and assessment questions. Again, while graphically the results show Instructor 1's performance to be higher than Instructor 2's performance across the six levels of Bloom's, again statistically a difference does not exist between instructors ($p=.327$). While both instructors may have utilized effective questioning at lower and higher levels of Bloom's taxonomy, it is possible that the lessons were not equally effective at engaging the students (Barden, 1995). While the lecture material utilized by the instructors and provided to the students was exactly the same, the discussion and

questions in the classrooms may have been different enough that one instructor was more effective than the other. The challenge becomes how the instructor ensures that questions are asked at all levels, instruction is provided at all levels, and the cognitive level of the students is assessed in an effective manner. In addition to the findings the researchers offer a prescription for instruction that can be utilized for developing lecture material, enhancing questions asked, and assessing student engagement based on enhanced levels of thinking (see Figure 4).

Recommendations for future research include the development of a prescription for creating lecture material, questions, and assessments that span the spectrum of Bloom's taxonomy. Also the literature offers that utilizing the process for student self-assessment and improvement in student proficiency across all six levels. Enhancing the design of the study to be more reliable and externally valid are also key elements for the future. The researchers intend to further develop these recommendations in the future.

Table 1: Instructor Demographics

	Instructor 1	Instructor 2
Teaching Experience Overall (semesters)	4	6
Teaching Experience in Business Principles (semesters)	4	6
Professional Experience (years)	18	20
Professional Concentration Area	Operations	Accounting
Highest Degree Attained	MBA	MBA

Table 2: Participant Demographics

	Instructor 1	Instructor 2
Sample Size	49	35
Gender		
Female	55.1	60.0
Male	44.9	40.0
Age		
17-20	53.0	34.3
21-25	28.6	45.8
26-29	10.2	8.6
30-39	4.1	5.7
40 and over	4.1	5.7
Classifications		
Freshman	81.6	68.6
Sophomore	16.3	28.6
Other	2.0	2.9
Program		
Associates	77.6	94.3
Certificates	12.2	2.9
Bachelors	4.1	0.0
Undeclared	4.1	0.0
Other	2.0	2.9
Specialization		
Accounting	6.0	9.0
Applied Technology	4.0	0.0
Banking	6.0	3.0
Biology	0.0	6.0
Business Administration	45.0	43.0
Criminal Justice	0.0	6.0
Fine Arts	4.0	0.0
Interdisciplinary Studies	0.0	6.0
Kinesiology	4.0	0.0
Pharmacy Technician	0.0	6.0
Undeclared	4.0	0.0

Table 3: Experimental Design

Treatment	Instruction at Bloom's Taxonomy Level	Questions Created by Instructor	Activities and Questions Same for All Students	Assessment Contained Bloom's Taxonomy
1	No	No	No	No
2	No	Yes	No	Yes
3	Yes	Yes	No	Yes
4	Yes	Yes	Yes	Yes

Table 4: Assessment Results

	Instructor 1				Instructor 2			
	Exam 1	Exam 2	Exam 3	Exam 4	Exam 1	Exam 2	Exam 3	Exam 4
Experimental Group								
Average Exam Score	65.2	64.8	70.9	63.2	70.3	70.1	76.5	82.7
Bloom's Taxonomy Level								
Knowledge		100.0	42.9	66.6		92.9	100.0	35.7
Comprehension		36.0	95.2	95.2		64.3	61.5	64.3
Application		36.0	52.4	9.5		78.6	92.3	28.6
Analysis		80.0	23.8	95.2		78.6	53.9	78.57
Synthesis		8.0	42.9	23.8		71.4	61.5	14.3
Evaluation		n/a	n/a	85.7		71.4	30.8	42.9
Control Group								
Average Exam Score	68.2	73.5	76.6	83.0	74.5	74.5	58.7	75.8

Figure 1a: Expected Instructor 1 Performance Results

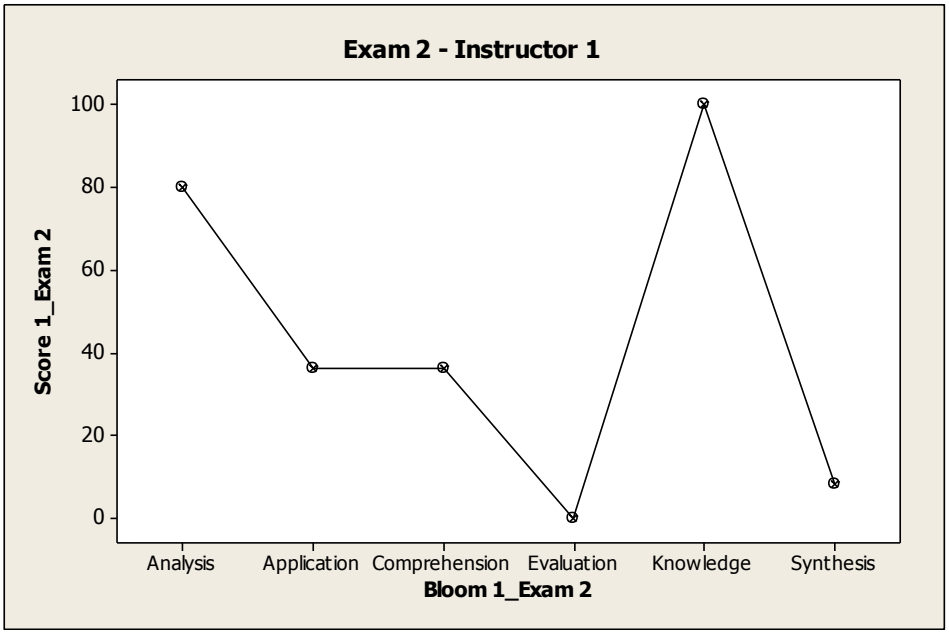


Figure 1b: Expected Instructor 2 Performance Results

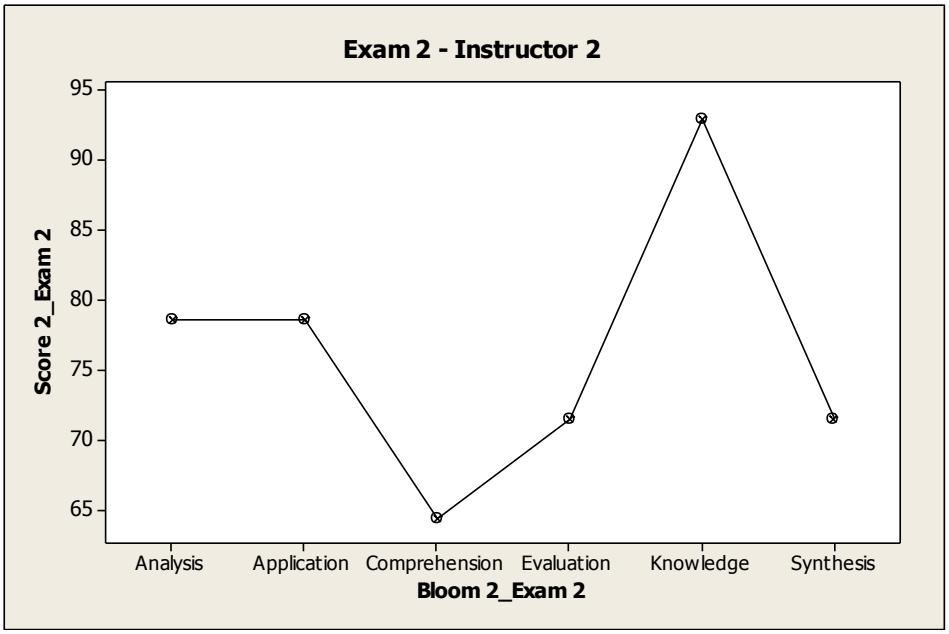


Figure 2: Comparison between Instructors Unfocused Instruction & Assessment

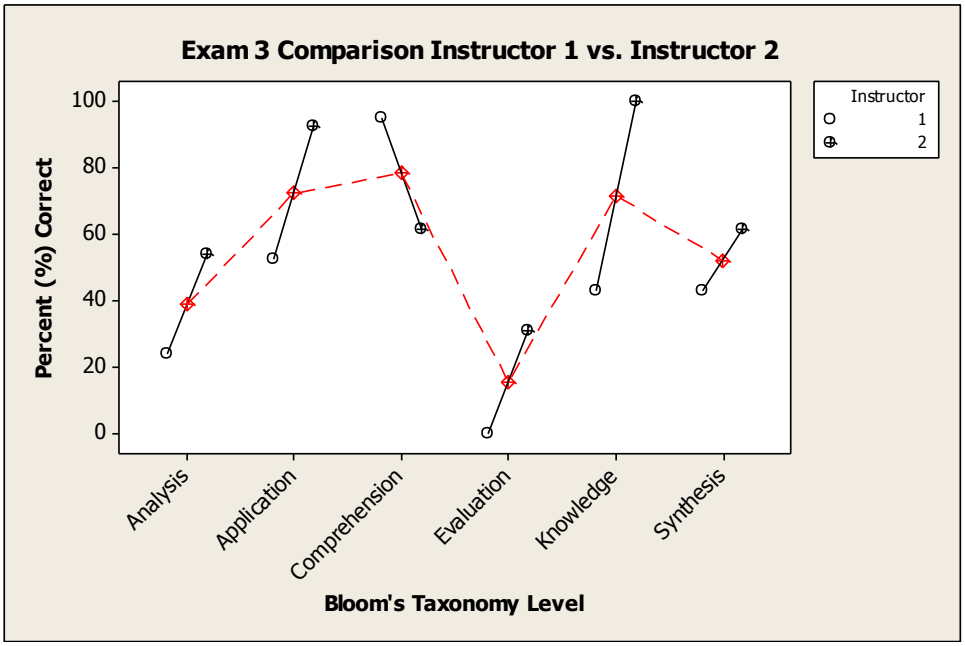


Figure 3: Comparison between Instructors Identical Focused Instruction & Assessment

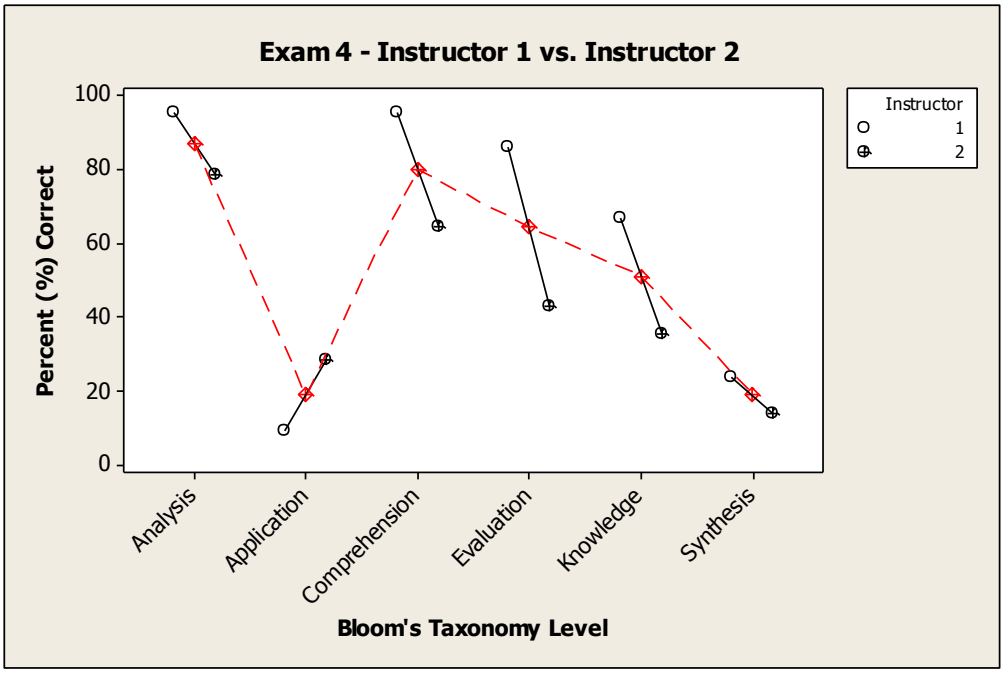
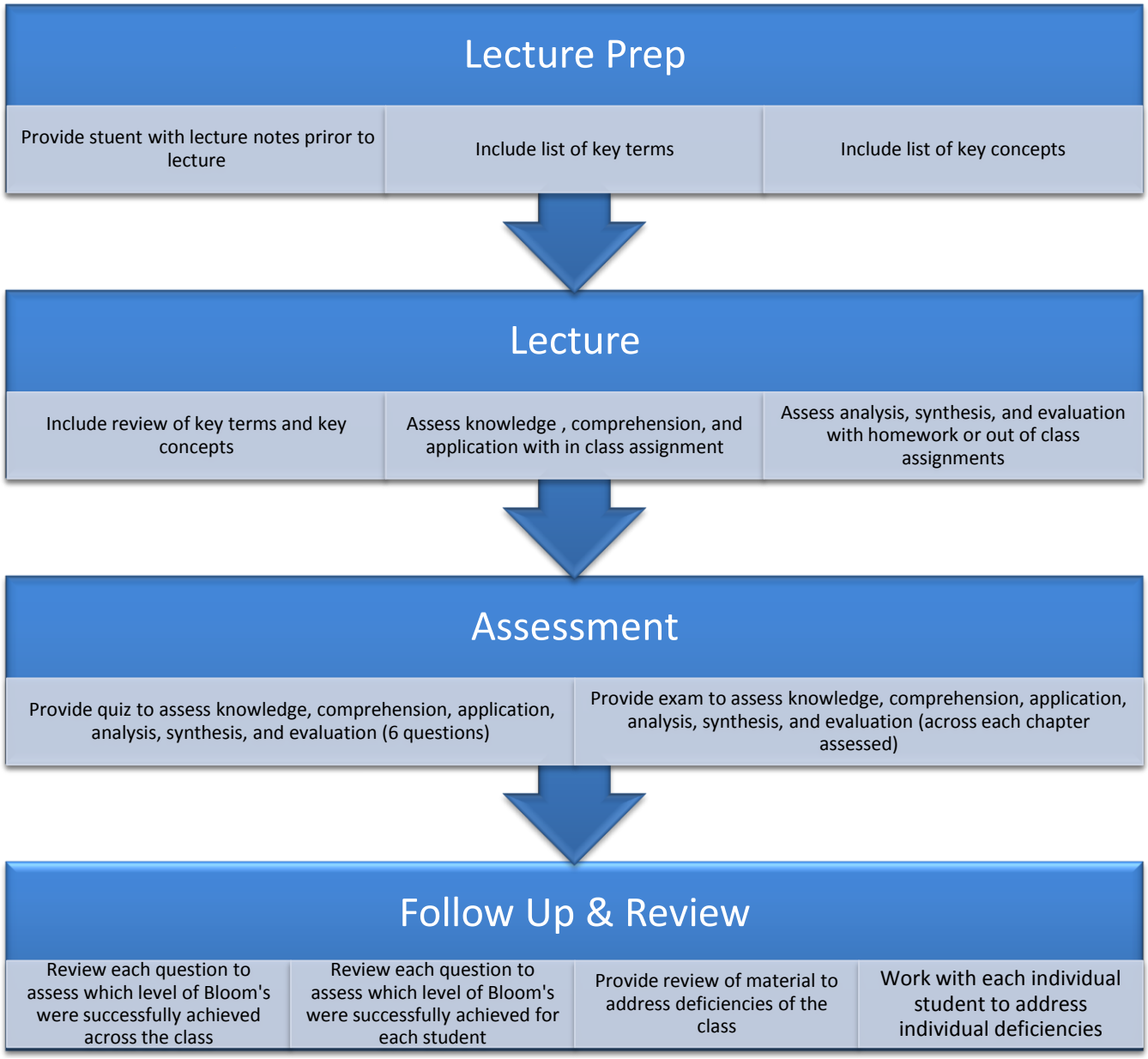


Figure 4: Prescription for Developing Instruction & Assessment Across all Six Levels of Bloom's Taxonomy



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