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Evaluating Pre-Service Teacher Objective Writing

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Abstract

The authors of this study conducted a comparative analysis of the objective writing skills of pre-service teachers to determine the efficacy of utilizing a master verb list based on Bloom's Taxonomy. Students enrolled in a mid-size university were asked to create a set of objectives to measure learning outcomes across the six levels of Bloom's hierarchy. One group received a master list of verbs appropriately categorized, based on research into learning levels. The other group received a variety of lists with conflicting verbs in categories. Students who received the master list were better able than their counterparts to write precise, clear and accurate objectives.

Introduction

One of the challenges of working with pre-service teachers is training them to compose well-written, specifically-stated outcomes of student learning. When teacher candidates begin the process of planning for instruction, they often focus on selecting content, developing activities, deciding on methods of delivery, and identifying instructional materials. These are all important components of instructional planning: however, the entire procedure could be more efficient if teacher candidates began by clarifying their

instructional objectives and using precise language to describe learning outcomes across a continuum of cognitive levels. Pre-service teachers must be able to identify learning outcomes and can learn to do so by asking how they could describe, in performance terms, what students are like when they have learned what is expected of them (Gronlund, 2004).

Citing objectives as intended learning outcomes of instruction provides a basis for selecting the content, activities, methods, and materials of instruction that are most apt for influencing student learning. If students are being asked to comprehend concepts, instructional techniques and materials that enable them to form proper conceptions and eliminate common misconceptions must be planned and implemented. If students are being asked to solve real world problems, projects that require the solving of realistic complex problems must be planned. Clearly-stated performance objectives provide a framework for planning the type of instruction needed to bring about desired learning outcomes.

The key element in stating the specific learning outcomes that define student learning is selecting the appropriate action verb. The selection of action verbs is a vital step in the preparation of a useful set of objectives. In choosing action verbs to define learning outcomes, teacher practitioners ask pre-service teachers to consider those that

(a) most clearly convey instructional intent

(b) most precisely specify the student performance that is acceptable as evidence that learning has taken place and

(c) most precisely describe learning outcomes across a range of cognitive levels (Gronlund, 2003).

Unfortunately, action verbs vary widely in their ability to meet these criteria. Some verbs communicate instructional intent but are less accurate in detailing the specific response to be observed. Other verbs clearly state the performance to be observed, but the indicated response fails to satisfy the intent of instruction. Yet other action verbs fail to provide accurate descriptions of learning across a range of cognitive levels and seem to address a number of different learning outcomes. Identifying action verbs that accurately convey instructional intent, define acceptable student performance and target specific thinking skills is, to say the least, a complex task.

Considering the importance of action verbs, it became clear to the authors that pre-service teachers could benefit from learning about action verbs that have been classified according to cognition based on the work of Bloom et al (1956). The focus of this paper was on comparing the quality of instructional objectives written by pre-service teachers who received and used a master list of illustrative verbs categorized according to Bloom's levels of cognition in objective construction, to those who did not receive and use such a list.

Teacher educators frequently refer to the work of Bloom and his associates when discussing various components of the learning cycle. In 1956, Bloom and associates developed a structure for assisting teachers in identifying the types of learning they can anticipate from their students, commonly referred to as Bloom's Taxonomy. The taxonomy outlines six hierarchical levels of cognitive complexity. Each category represents an increasingly complex type of thinking and is ordered from the least to most complex as follows: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation.

Almerico and Baker (2005) conducted an analysis of the research related to the labeling of learning targets according to Bloom's Taxonomy. They discovered many variations of lists which categorically defined verbs according to Bloom's classification (Airasian, 2001; Bloom's Taxonomy, 2002; Borich & Tombari, 2004; Chatterji, 2003; DLRN's Technology Resource Guide, 2002; Gronlund, 2004; Hazari, 2002; Lane, 2002; Lee, 1999; McMillan, 2004; O'Malley & Pierce, 1996; Objectives in an Outcomes, 2002; Preparing for Clinical, 2002). They noted that many of the verbs were assigned to more than one level or category within the hierarchy in a given list. Matters became more convoluted when they found verbs categorized across levels of the taxonomy in different lists.

When teacher-educators ask their students to choose action verbs to clearly convey instructional intent, precisely specify student performance, and pinpoint the level of cognition addressed, conflicting lists can lead to frustration and confusion. As a result of their analysis, Almerico and Baker (2005) developed a master list of illustrative verbs for each of the six levels of Bloom's Taxonomy. The illustrative verb list provides a standardized record of verbs categorized in terms of specific types of learning outcomes that can be used as the basis for writing instructional objectives, planning and assessing instruction.

Comparative Analysis

A comparison of undergraduate pre-service teachers was conducted to determine if, after having received and used the Almerico and Baker (2005) illustrative verb list, the quality of their written objectives increased in the ability to

(a) clearly convey instructional intent

(b) precisely specify student performance considered acceptable as evidence of learning, and

(c) precisely describe learning outcomes across the six levels of Bloom's taxonomy.

Students participating in this study were juniors and seniors who had been accepted into the teacher preparation program at a mid-size university. The study took place over two academic years. Students enrolled in a one-semester, 14 week

educational assessment course were assigned an out-of-class project in which groups of 6 to 7 members were asked to accomplish the following tasks:

1. Watch a video of an exemplary teacher teaching an elementary-level math lesson
2. Write a summary of the lesson
3. Construct one objective for each level of Bloom's Taxonomy for the lesson
4. Develop two assessment strategies which could be used to ascertain student acquisition of each objective
5. Show the lesson to peers and share their work.

The research question guiding this study was "If pre-service teachers are provided with the Almerico and Baker illustrative verb list and parallel training in the writing of instructional objectives, will they be able to apply what they have learned from the database and write objectives that more clearly convey instructional intent, are more precise, and better describe learning outcomes across taxonomy levels?"

Both groups were instructed in the same manner by their professor in objective writing. The professor taught all sections of the course throughout the study. Approximately 12 hours of class time was expended in objective writing instruction. Both groups used the same videos, had the same set of written directions for completing this assignment, and both had the same scoring rubric that was used to evaluate their work.

In this study the independent variable or the one variable that was changed to test the hypothesis was the illustrative verb list. The first (control) group consisting of 40 students (divided into 6 smaller groups to complete this task), participated during the first of the two academic years of the study. These students were asked to complete this assignment without the benefit of the Almerico and Baker master verb list. Instead, these students were given multiple lists (copies of the lists mentioned above). The second (experimental) group of 40 students (divided into 6 smaller groups), participated during the second academic year of the study. The only list of verbs provided to this group was the Almerico and Baker list.

The maximum number of points students could earn on this assignment was 32. The highest number of points attainable for the component of the project dealing with objective writing was 6. Objectives were judged across a continuum; moving from the incomplete or incorrect ability to convey instructional intent, specify student performance considered acceptable as evidence of learning and identify appropriate cognitive level to a precise description of each of the aforementioned criteria.

Hypothesis

H_0: μ1 <= μ2, the intervention treatment did not make experimental group scores higher than the control group scores.

Ha: μ1 >= μ2, the intervention treatment did make experimental group scores higher than the control group scores.

Data Analysis

An analysis of the data was conducted pursuant to the following:

Group 1 = experimental group

Group 2 = control group

Intervention treatment – students in the experimental group were provided with the Blooms Taxonomy illustrative master verb list.

The evaluation procedure used was a one-tail t-test for comparing two independent means with a level of significance of .05 (α=.05) pursuant to the following formula:

$$t = \frac{x_1 + x_2}{\sqrt{S^2{}_P\left(\frac{1}{n}\right) + \left(\frac{1}{n_2}\right)}}$$

$$S^2{}_P = \frac{(n_1 - 1)S_1{}^2 + (n_2 - 1)S_2{}^2}{n_1 + n_2 - 2}$$

Table I - Summary data and statistical analysis

Control Group N=6										
Group #>	1	2	3	4	5	6	X1	S1	$S1^2$	n
Group Score>	3	2	5	1	4.5	4	3.250	1.541	2.375	6

Experimental Group N=6										
Group #>	1	2	3	4	5	6	X2	S2	$S2^2$	n
Group Score>	4.5	6	5	5.5	6	5	5.333	0.606	0.367	6
S^2_p >	1.370833333									
test t >	3.081960455									
df >	n1 + n2 - 2 =		10							
Critical Value >		1.812								
tdist (probability)>		0.006								

As indicated in Table I, the test t statistic result is 3.0819. Using a degrees-of-freedom value of 10, the critical value for the test is 1.812. The tdist value of .006 indicates a less than one percent probability that this result was from a factor other than the intervention treatment. Therefore, the null hypothesis is rejected. The sample evidence suggests the intervention treatment was effective in raising the objective-writing scores.

Students in the control group consistently scored lower point values in their ability to write objectives. One group was unable to develop a single objective which accurately met assignment criteria. They were unable to accurately identify verbs that describe learning outcomes by cognitive ability. Another group demonstrated trouble with creating higher-level objectives. A third group lost points in knowledge, synthesis and evaluation level objectives; as they could not determine which verbs best stated learning outcomes at these levels. Of the six control groups studied none wrote objectives that met all assigned criteria. In contrast, student groups which were in the experimental group, consistently wrote objectives that met assigned criteria.

Conclusion

Based on an analysis of objectives written by pre-service teachers before and after receiving and using the master verb list, and the observation of student scores, it was concluded the Illustrative Verbs Corresponding to the Cognitive Levels of Bloom's Taxonomy list provided students with a basis upon which to build effective instructional objectives. Students in the experimental group were able to use the categorized verbs to describe clearly what they wanted their students to learn or be able to do following their

instruction. They were better able than their peers in the control group to describe in very precise terms, including an accurate labeling of cognitive processing, what students were to accomplish as a result of instruction (Mertler, 2003).

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