The Relationship between Students' Reports of Learning and Their Actual Recall of Lecture Material: A Validity Test

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This study called the use of the learning-loss scale into question to the extent that the scale has not been validated experimentally. In order to conduct such a validation, students' performance in an experimental lecture was compared to their self-report of how much they learned during that lecture. The results identified a moderately strong validity coefficient between students' performance on a recall test and reports of how much they believed they learned during a lecture.
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In the past 12 years, instructional communication researchers have generated a significant body of research that has led to a number of important insights regarding teachers' and students' classroom communication behaviors. This research has identified many important links between teacher behaviors and important instructional outcomes such as students' motivation to learn (Christophel, 1990; Christophel & Gorham, 1995; Gorham & Christophel, 1992; Gorham & Millette, 1997; Frymier, 1994; Richmond, 1990) affect for instructors and courses (Rodriquez, Plax, & Kearney, 1996; Richmond, 1990), reports of communication apprehension (McCroskey, Booth-Butterfield, & Payne, 1989; Chesebro, McCroskey, Atwater, Bahrenfuss, Cawelti, Gaudino, & Hodges, 1992) and receiver apprehension (Ayres, Wilcox, & Ayres, 1995; Chesebro & McCroskey, 1999), and cognitive learning (Richmond, McCroskey, Kearney, & Plax, 1987). Of these outcomes, the conclusions related to students' cognitive learning remain the most suspect.

Beginning with installment number 7 in the "Power in the Classroom" research program (Richmond, McCroskey, Kearney, & Plax, 1987), instructional communication researchers almost exclusively have measured cognitive learning by asking students to report their own estimations of how much they have learned. Their responses to the question "how much did you learn in class?" are subtracted from their responses to the question "how much do you think you could have learned in the class had you had an ideal instructor?" (Plax & Kearney, 1992, p. 75). Both questions are on a scale from 0–9. By subtracting student estimations of learning from their perception of the ideal situation, the scale measures "learning loss" (p. 75). Thus, the lesser the amount of learning loss, the more students learned cognitively. Although it is reasonable to expect students to be able to comment on how motivated they are, how much they like a teacher or a class, or how much anxiety they experience in a particular class, anyone who has ever had students argue that they "deserve a higher grade" can see that students' ability to report on their own learning is less evident. In other words, it cannot be taken as a "given" that students

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can report on how much they learned in the same way as they can report on their feelings.

Given this circumstance, a closer examination of the way instructional communication researchers measure cognitive learning is warranted. At stake is 12 years of research which has generated claims regarding student learning largely based on students' reports of their own learning. The scholarship which examines the relationship between students' cognitive learning and teacher variables such as immediacy, misbehaviors, clarity, credibility, gender, and student variables such as motivation, apprehension, and affect all rest to a certain degree on the ability of the learning loss scale to measure the extent to which students are learning their course material.

The Impact of the Learning-Loss Scale

The learning loss scale has played a key role in establishing our knowledge of instructional communication. It has been used in several studies to establish a link between important instructional variables including: immediate teaching and student learning (Chesebro & McCroskey, 1999; Christensen & Menzel, 1998; Christophel, 1990; Frymier, 1994; Gorham, 1988; McCroskey, Sallinen, Fayer, Richmond, & Barraclough, 1996; Richmond, 1990; Richmond et al., 1987; Rodriguez, Plax, & Kearney, 1996; and Sanders & Wiseman, 1990), student motivation and learning (Christensen & Menzel, 1998; Christophel, 1990; Richmond, 1990; Frymier, 1994) and affective learning and cognitive learning (reviewed by Rodriguez et al., 1996). Though incomplete, this list of studies involving the learning loss scale suggests that the scale's validity should be examined with greater scrutiny.

As Richmond et al. (1987) and McCroskey and Richmond (1992) have noted, the issue of how to best measure cognitive learning is not a new one. McCroskey and Richmond (1992) reviewed this problem in explaining the development of the learning loss scale. Though standardized measures in specific content areas exist, their specificity does not permit the study of cognitive learning while generalizing across subject areas (p. 107). McCroskey and Richmond also reject the notion of using students' grades because grades do not reflect the extent to which students may learn in a given class (p. 107). For example, grades may be influenced by that which students know at the time they enroll for a course and not on how much students learn during the course. The use of specific exams from individual classes is problematic for a number of reasons outlined by McCroskey and Richmond (1992):

> These were rejected because of the obvious difficulty of obtaining scores from the teachers, the absence of norms from which to generate standard scores for each student, the general incompetence of individual teachers in generating reliable and valid tests, and, finally, the fact that many teacher-made tests are not based on publicly stated objectives and are only marginally related to what is taught in the class (p. 107).

As a result of these measurement problems concerning the process of cognitive learning, Richmond et al., developed the learning loss measure to assess cognitive learning by using student reports of the extent to which they learned course content from a particular teacher. McCroskey and Richmond (1992) acknowledged that this solution was not perfect:

> We do not argue this is the true, valid measure of cognitive learning. We do argue that this method provides useful information concerning learning, that if compared with other data on cognitive

> learning from laboratory experiments, will give us insights into teacher behaviors that can contribute to increased cognitive learning of students (p. 108).

It is with this in mind that the present study sought to test the learning loss scale experimentally to examine the relationship between students' reports of their own learning and their performance on a standard exam.

Method

Participants

The participants were 192 students from a large Mid-Atlantic university. They were selected from large-lecture classes to participate in this study and randomly placed into one of four experimental conditions. In exchange for their participation, they were offered extra credit for their course. Participation was completely voluntary and students who chose to not participate had other options for securing extra credit in their classes.

Design

The examination of the learning loss instrument took place as part of an experiment which examined the effects of teacher clarity and immediacy on student outcomes including learning (the design of that experiment is described in greater detail by Chesebro, 1999). The 2×2 experiment involved manipulations of teacher clarity (high/low) and teacher immediacy (high/low). A videotape of each of the four lectures was created. The same instructor appeared in each video and taught concepts related to Toulmin's approach to arguments. Each lecture was within a minute's length of the others and the instructor's behavior (aside from clear teaching or immediacy behaviors) was consistent. In both high-immediacy conditions, the instructor made direct eye contact with the camera, gestured moderately, smiled, exhibited vocal variety, appeared to be more relaxed, moved around to the extent permitted by the camera, and lectured in an enthusiastic manner. These behaviors were absent in the low-immediacy condition. In the high-clarity condition, the instructor used a projected power-point outline, previewed the presentation, used internal summaries, stayed on task (avoided lengthy tangents), used relevant examples, spoke fluently, and reviewed concepts several times. The instructor failed to do these things in the low-clarity condition. These manipulations were successful based on manipulation checks that were conducted as part of the preliminary analyses.

Procedures

Randomly-assigned participants attended one of the four lectures in a small seminar room. The room's characteristics (lighting, position of the television, volume of the television, etc.) remained constant. To avoid the problem of intact groups, participation in each of the four experimental conditions was counterbalanced such that each experimental condition was administered at five different times, in different times of the day, and in different order combinations with the other conditions. The person administering the video lectures followed a script with each set of participants. While viewing the video, students had the opportunity to take notes and were told to do so to the extent that they do in their regular classrooms. After watching the video and studying their notes for four minutes, students then completed a 7-item factual recall quiz, measures of their affect for the instructor and the material, the learning loss measure, the manipulation checks for clarity and immediacy, and finally a control check in which they reported their prior knowledge of the lecture's content. The experiment offered a controlled teaching situation in which students took and then studied notes, encountered one of four different teaching styles, and completed a standard test that was faithful to the lecture's learning objectives. This provides an actual learning situation with actual learning outcomes to which students' self-reports of their cognitive learning can be compared.

Instruments

In addition to the learning loss scale, students completed a short "quiz" containing a total of 7 questions designed to measure the extent to which they learned the lecture material. These questions were generated directly from the behavioral objectives which were used to create the lecture, thus helping insure that the test questions related directly to the material being taught. The quiz questions, based on the lecture about Toulmin's argument, include: "beliefs held by our receivers that we use to support our arguments are ____," "a weakness in our argument is a(n) ____," and "if someone says that you should go on spring break with them, they are making a(n) ____ claim?"

Manipulation Checks

Preliminary analyses revealed that the manipulations of clarity and immediacy were successful, that there were no significant differences in students' recall of lecture material as a function of the day or time at which the experiment was administered, and that the homogeneity of variance assumption was met (Chesebro, 1999).

Alpha reliability of the 7-item recall test was estimated at .85. Because of its nature, no alpha reliability test can be computed for the learning-loss measure. While no test-retest data were collected in the present study, McCroskey, Sallinen, Fayer, Richmond, and Barraclough (1996) reported a test-retest reliability of .85 for this instrument.

Results

Correlational analysis of the relationship between the recall measure and the learning-loss measure provides an estimate of their concurrent validity. In this case the analysis resulted in a statistically significant and meaningful validity coefficient between student recall and student reports of their own learning ($r = -.50$, $p < .001$). This indicates that the learning loss measure accounts for 25% of the variance in test scores. Given the alpha reliabilities of the measures used (both were .85), the highest possible validity coefficient that could be obtained is $\pm.85$, meaning that it would be possible to account for no more than 72% of the variance in test scores. Thus, the learning-loss measure is predicting 25% out of a possible 72% of the variance in student recall, meaning that it is predicting 35% of what it could possibly predict if it was a perfectly reliable measure. This should be considered a moderately-strong indication of concurrent validity.

It is important to note that the negative correlation is a function of the scoring of the learning-loss instrument. High scores on that instrument indicate a larger discrepancy between that which students feel they learned and that which students feel they could have learned from the ideal instructor. Low scores indicate that students feel they learned almost as much as they could from the ideal instructor. The negative correlation observed in this study indicates that students who performed well on the recall test also reported that they thought they learned nearly as much as they could from the ideal instructor. This is meaningful because it provides strong evidence that students can provide reasonably accurate reports of the extent to which they are learning in their classrooms.

Discussion

This study built on the recommendation of McCroskey and Richmond (1992) that the use of experimental studies of cognitive learning to compare student performance to students' self-reports of their learning would yield useful information concerning learning. The results of this study indeed are useful, because they support the notion that students can report accurately on their own learning. In doing so, this study helps validate the measure employed in a great deal of the research on teacher communication and student learning that has been reported.

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