Interteaching to Increase Active Student Responding and Differentiate Instruction

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Abstract

Interteaching has been shown to be an effective method for increasing quiz scores and course evaluations. Although these increased scores are typically attributed to higher rates of active student responding throughout class sessions, the extent to which student responding increases during interteaching sessions has not yet been empirically validated. The current research examined the effects of interteaching on direct measures of active student responding. Additionally, teacher behavior was assessed in terms of amount of content presented in class as a result of each previous interteach. The effects of interteaching and traditional lecturing within a university classroom were systematically compared in this study. Levels of active student responding and a frequency count of instructor presented slides were compared across the two conditions. An increase in student responding and a decrease in slides presented were found in the interteach condition alone. These data indicate that interteaching is both an efficient and effective procedure for instruction at the university level.
Interteaching to Increase Active Student Responding

and Differentiate Instruction

Active responding is a cornerstone of effective teaching (Hattie, 2009; Heward, 1994). By accepting Skinner’s three-term contingency as the basic unit of learning, one can only conclude that the more opportunities a student has to shape a newly acquired response – and bring it into contact with the associated natural reinforcer(s) – the greater the probability that the student will emit the same behavior in the future, when similar conditions are presented. That is, increasing the number of response trials gives the performer multiple opportunities to define the discriminative stimulus and learn the boundaries the operant class, while simultaneously allowing the instructor to provide corrective feedback and supplemental reinforcement as needed.

While the evidence is strong to suggest that active responding directly impacts student performance (Munro & Stephenson, 2009; White, 1998), this practice is rarely applied in the university classroom where lecture slides are still the predominant method of instructional delivery (Dowling & Alemayehu, 2004; Lewis, 2008). However, Boyce & Hineline (2002) describe a practice called interteaching, which appears to increase the amount of time college students spend actively engaged during each class meeting. The general procedures for interteaching are as follows (Boyce & Hineline, 2002; Saville, Lambert, & Robertson, 2011). Students are assigned a reading and provided with an accompanying study guide. At the start of each class period, a brief lecture is presented by the instructor to address remaining questions from the previous interteach and prime students for that day’s discussion. At the end of the lecture, students partner with one another and spend 30 to 40 minutes discussing the answers they recorded on the study guide. During this time, the instructor moves around the classroom,
answering questions and guiding discussion. Immediately after the interteach session, students complete an interteach record on which they identify topics that gave them difficulty and topics they would like reviewed in further detail. The instructor then uses the information from these reports to develop the opening lecture for the subsequent class session.

Over the past decade, there have been increasing reports of interteaching at the college level (Goto & Schneider, 2010; Saville, Cox, O’Brein, & Vanderveldt, 2011; Seville, Zinn, Neef, Van Norman, & Ferreri, 2006). And while the measures used in these studies have demonstrated increased quiz scores and improved course evaluations, they have not directly examined the extent to which interteaching increases active student responding. Additionally, more evidence is needed to demonstrate how implementing interteaching procedures impacts course preparation for the instructor. Thus, the purpose of this research was to examine the effects of interteaching on direct measures of student and instructor behavior.

Methods

Participants

Twenty-four students enrolled in a master’s level course on special education policies and procedures and one university instructor participated in this research. Data were collected from each student enrolled in the course for the purposes of this study. Participants ranged in age from approximately 25 to 55 years old, and sixteen were female. They represented a variety of racial and ethnic backgrounds, including African-American, Asian, Caucasian, Hispanic, and Middle Eastern. All students were special education majors, but varied in the completion of their degree plan.

The instructor held a PhD in education from an accredited university in the United States, and had several years experience teaching at the university level. At the time of the study, the
instructor had never taught a course using interteaching. However, this was his fourth semester teaching special education policy and procedures. Throughout the semester, the instructor was told to vary his teaching style between traditional lecture and interteaching methods. Data collected throughout the study were not relayed to the instructor until after the course had ended.

**Setting**

The course in which the research took place was an overview of the historical and contemporary legal issues pertaining to special education. The purpose of the course was to provide students with information about legal issues in special education, with an emphasis on developing educationally useful and legally sounds policies and procedures in the classroom. Materials covered throughout the course consisted of a wide range of legal issues concerning the provision of special education and related services to students with disabilities in accordance with the most recent reauthorization of the Individuals with Disabilities Education Act (IDEA). In addition, a significant underlying purpose of the course was to examine the relationship between school personnel and parents of a child with a disability in order to facilitate the appropriate accommodations for students and their families in school and community settings.

The study took place in a computer lab on the campus of a public four-year university in the southwest United States. The room was arranged with two columns of long tables facing a lecture podium and projector screen at the front. Each seat in the room was equipped with a late model Apple computer. Students were free to choose their seat on each day of class, but typically chose to remain in the same seat selected on the first day of the course.

**Dependent Variable**

Active student responding was defined as an overt response made to an instructional antecedent (Heward, 1994). To assess the effects of both traditional lecturing and interteaching
on active student responding, data were collected through student self-reports. Throughout the semester, each student submitted an electronic record of class activities to help direct their attention during the assignment, and to provide feedback to the course instructor. In addition to other questions, students were specifically asked to report on the amount of time they spent in class discussing the assigned reading and answering the corresponding questions provided to them. Fifteen total surveys were collected throughout the semester. Data that were unrealistic were excluded from analysis (e.g., one student reported 1,000,000 minutes of active engagement). This resulted in the exclusion of three total data points across different sessions.

Reliability was measured by calculating interobserver agreement (IOA) for one-third of all sessions, across each condition. This was achieved by comparing student self-reports with direct observations by the instructor. Percent agreement was found by dividing the lower score into the higher score and then multiplying by 100. Overall IOA equaled 86.67%, with individual sessions ranging from 66.67% to 100%.

Additionally, the number of slides presented during class each week was recorded. These data were obtained by reviewing the PowerPoint presentations delivered each week throughout the semester. Title slides were included in the total count; however, slides not related to course content (i.e., general announcements) were excluded. Reliability on this measure was calculated for one-third of all lecture presentations, and equaled 100%.

**Procedure**

The course on legal issues in special education met once weekly for the duration of the semester. Every week, students were assigned a reading from the course text and provided with 14 corresponding discussion questions to answer before coming to class the following week. During each two and a half hour class, the first 60 minutes were dedicated to initial instruction of
the assigned reading material. Immediately following each initial instruction session, students were then asked to complete an electronic report available through the course management system about the instructional format implemented. The instrument included specific questions about the duration of the individual’s active participation during the first hour of the class, and prompted the student to list any additional information he or she would like covered more thoroughly when the class next met.

Over the course of the semester, two different instructional formats were used to introduce this new material: Lecture and interteach. These represent the two experimental conditions implemented throughout this research.

**Lecture.** In each lecture phase, students received one hour of initial instruction on the reading assigned for that day in a traditional lecture presentation format. The instructor developed a PowerPoint presentation that highlighted the major points throughout the reading. All 14 of the assigned discussion questions were also addressed in the presented lecture. Students’ question asking was reinforced during each lecture through the use of specific praise statements (e.g., “Good question!”), immediately followed by the answer.

**Interteach.** During the interteach phases, the hour-long initial instructional component was broken down into two equal segments. For the first 30 minutes, a PowerPoint lecture on the previous week’s reading was delivered specific to the feedback the instructor received about what students would like covered in further detail. For the second half hour, students broke into small groups of two or three participants and discussed their answers to the 14 discussion questions for current assigned reading. Student questions were again reinforced during both parts of this phase.
Across both conditions, students were asked to complete a brief electronic record immediately following the initial hour of instruction. The two conditions were alternated five times throughout the semester. Thus, an ABABA reversal design was employed.

**Results and Discussion**

Figure 1 shows the duration of active student responding during initial instruction in class each week across the two different phases of the study. Information on the first day of class was presented in a lecture format because students had not yet been assigned any readings for the course. Students reported that their active participation during this session lasted an average of 3.73 minutes. The next four sessions were taught using the interteach format. Students reported an average of 31.14 minutes of active responding during this phase. The next four sessions were a reversal to the lecture instructional phase, during which students were actively engaged for an average of 5.65 minutes. In a return to the interteaching condition during the next four weeks, students reported actively responding for an average duration of 33.46 minutes. In a final return to the lecture condition for the last two days of class, students were actively engaged for an average of 7.01 minutes. Percentage of non-overlapping data (PND) was calculated at 100% across each phase of the study. There is a distinguishable increase in active student responding during both interteach phases of the study.
INTERTEACHING TO INCREASE ACTIVE RESPONDING

Figure 1: Mean (and standard error of) duration of active student responding in class each week.

It is important to note that the data reported in Figure 1 are an average of each student’s self-reported time spent actively engaged during each phase of the study. The actual duration of active student responding varied for each student from week to week. Often during the lecture phase, two or three students shouldered all the weight of active responding for the rest of the class. Across all lecture sessions, the majority of students reported zero minutes of active engagement. Various durations of active student responding were also reported during interteaching. However, during these sessions, the lowest reported duration of time was 20 minutes.

Figure 2 displays the effects of lecturing and interteaching on the total number of slides produced and presented during the initial instruction session of class each week throughout the
semester. During the lecture conditions, the instructor presented an average of 43 slides to present new information to students. In contrast, only 17 slides were displayed on average by the instructor for initial instruction during the interteach phases. Thus, interteaching resulted in a 60% reduction in course preparation with regard to developing slides. Percentage of non-overlapping data was calculated at 93.33% across all phases.

Figure 2: Frequency of slides presented by the instructor in class each week.

The decrease in number of slides presented during interteaching can be partially attributed to the decreased lecture time during this condition, from 60 minutes during each Lecture phase to 30 minutes during Interteach. However, despite a 50% reduction in time, the number of slides presented decreased by 60%. The primary reason for this reduced workload
was that the instructor had received specific feedback from students on the previous weeks’
assigned reading. Rather than trying to cover all of the content of the reading, this allowed him
to differentiate instruction to address the specific inquiries of students.

Although the total number of slides produced by the instructor significantly declined
during the interteach condition, the amount of variability increased. During the first reversal to
lecture phase, the number of slides produced ranged from 36 to 42. This range of six slides is far
less than that found in the first interteach phase, which varied from 7 to 39 slides, a difference of
32 slides. It must be noted here that curriculum is an important consideration for choosing a
particular teaching methodology. Although the instructor produced and presented far less slides
in the interteach sessions when compared with the lecture sessions overall, an exception can be
seen in Week 5. The lecture presented on this day was a follow up to the previous week’s
inter teach on Section 504 of the Rehabilitation Act of 1973. The feedback students provided on
the interteach record indicated a great deal of confusion on the distinction between Section 504
and IDEA, which the instructor sought to clarify in the opening lecture of Week 5.

Interteaching incorporates many elements of the effective teaching cycle, in which the
instructor provides a review set of previously mastered material, presents of new content,
scaffolds instruction during guided practice, supervises independent practice, and then probes for
generalization and maintenance (Hudson, Lignugaris/Kraft, & Miller, 1993; Rosenshine &
Stevens, 1986). However, in interteaching the presentation of new content is often done through
independent readings. In some cases, an intermediate lecture (or other type of instruction) may
be required to effectively present new content prior to moving to the mutually probing, mutually
informing guided practice (Boyce & Hineline, 2002).
One of the primary limitations of this research is that the primary dependent variable was measured using self-report, which is widely known to have weak internal validity. Although students in the course had access to clocks and were asked to immediately write down the length of time for each interteach and lecture session, it is important to note that these students were provided no training in precise data collection. The researcher compensated for this by increasing the sample size to 24 participants and averaging the results across each week. The result is an aggregate number that does not specifically describe the actual behavior of any one individual. Rather, it reflects the performance of the class as a whole.

Across both interteach phases, there is a decreasing trend in active student responding. This corresponds with an increasing trend in the number of slides presented by the instructor during those same phases. This may be attributed to cultural conditioning, in which students have been punished in the past for interrupting a formal presentation with questions. Future researchers will want to systematically address the effects of lecture slides on active student responding.

Additionally, it is interesting to note an ever-so-slightly increasing trend in active student responding across all three phases of the lecture condition. This gradual increase may be due to the specific praise and reinforcement of question asking behavior throughout the semester, as well as a possible carry-over effect from talking in class from the interteach condition. Again, future research should more closely examine variables contributing to increased question asking by master’s level students.

Previous research has shown interteaching to be effective for increasing student test scores (Saville et al., 2006; Saville & Zinn, 2009) and student satisfaction (Goto & Schneider, 2009). This study adds to the current literature by demonstrating how interteaching directly...
impacts the duration of active student responding in the university classroom, while reducing instructor preparation by differentiating instruction to address only areas of student need. It is hoped that as the research base continues to grow in support of interteaching, so will the number of instructors using this instructional technique.
References


