ESSENTIALS OF EFFECTIVE TEACHING SERIES

جامعة الملك سعـود
وكالة الجامعة للشؤون التعليمية والأكاديمية
عمادة تطوير المهارات

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Deanship of Skills Development

INTERTEACHING

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BOOKLET

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Interteaching

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Interteaching

Since their arrival on the teaching scene nearly 50 years ago, behaviorally-based teaching methods–those rooted in B. F. Skinner's (1938, 1953) operant psychology, or, as it is more commonly known today, behavior analysis–have consistently outperformed more traditional teaching methods (for a review, see Moran & Malott, 2004). Nevertheless, even in the face of such repeated successes, the use of behavioral teaching methods has declined to the point where few teachers use these methods anymore (Buskist, Cush, & DeGrandpre, 1991; Lamal, 1984). Some researchers (Boyce & Hineline, 2002; Buskist et al., 1991) have suggested that one reason for the decline was that teachers found them cumbersome to implement, a notion that is especially relevant in today's educational §arena, where faculty members are often expected to do more and more–and do it all well–even though the number of hours in a day has not increased.

In response to concerns about implementing behavioral teaching methods, Boyce and Hineline (2002) introduced interteaching, a user-friendly alternative that is based on the same principles that made other behavioral teaching methods effective. In contrast with these earlier teaching methods, though, interteaching may be easier for teachers to implement in their classrooms.

Theoretical Assumptions Underlying Interteaching

Before discussing how interteaching works, it is important to discuss the theoretical assumptions underlying this new teaching method (Boyce & Hineline, 2002). The first assumption focuses on what it means to "learn" something. Whereas traditional approaches to teaching often view students as empty receptacles waiting to be filled

with information that only teachers can disseminate, interteaching views learning a bit differently. In accord with the behavior-analytic view, a major premise behind interteaching is that learning entails a change in behavior—if students have learned something, they will behave differently than they did before.

The second assumption is that the change in behavior that defines learning is largely a function of consequences presented in context. More specifically, behavior that is reinforced in a certain context becomes more probable in that context, and behavior that is punished in a certain context becomes less probable in that context. For example, if a student studies and receives a good grade in her physics course, and if the grade functions as a reinforcer, the student's behavior of studying for physics becomes more likely. In addition, because punishment tends to produce undesirable side effects, many behavior analysts have suggested that reinforcement should be the focus of most behavior-change programs. Interteaching attempts to capitalize as much as possible on positive reinforcement (Boyce & Hineline, 2002).

Another related premise is that if learning is going to occur, students need opportunities to practice, and receive reinforcement for, the behaviors that will subsequently be indicative of learning. Moreover, the behaviors that students practice should not only be those that will help them do well in a particular course (e.g., answering multiple-choice questions on an exam), but also those that will help them function effectively once the course is complete. In many traditional classrooms, there is often little correspondence between the behaviors that students "practice" while listening to a lecture—sitting passively, taking a few notes, having someone else (i.e., the teacher) tell them the "correct" answers—and those they must subsequently perform to show that they have learned something—discussing ideas with other students, thinking conceptually, applying material to solve novel problems, finding information for themselves, and so on. In contrast, as I will discuss briefly, students in interteaching-based classes spend a good amount of each class period practicing and receiving reinforcement for the behaviors that subsequently indicate (on exams and beyond) that they have learned something.

Finally, following from the preceding assumptions, effective teaching does not equal lecturing (and doing it well). Rather, effective teaching entails rearranging the classroom environment in such a way that behavior change (i.e., learning) is more likely to occur than with traditional teaching methods, which means that "teaching" may not resemble the traditional view of teaching as lecturing. In short, interteaching is a new classroom strategy in which the teacher modifies the classroom environment to produce changes in learning.

Implementation of Interteaching

A typical interteaching session works as follows (for more detail, see Boyce & Hineline, 2002; Saville, Lambert & Robertson, 2011). The teacher first constructs a preparation (prep) guide, for the purpose of guiding students through a particular reading assignment. The prep guides typically contain anywhere from 5 to 15 items (each of which may contain two or more related questions), depending on the length of the reading assignment, the complexity of the material, the class schedule, and so on. To get students to think in different ways about the material, the questions often follow Bloom's taxonomy (Anderson & Krathwohl, 2001), which focuses on different ways of asking questions to promote different types of thinking. For example, one item might ask students to define a particular concept, a follow-up question might ask students to apply that concept to a real-world problem, and a final question might ask students to design a study to test a particular hypothesis based on that concept.

The teacher distributes the prep guides (often via a course Web page) several days before class, and students complete the prep guides before the next class period. During the first part of class, students hear a brief lecture over material from the last class period that the teacher had determined difficult for students to understand (see below for more detail). Boyce and Hineline (2002) suggested that these "clarifying lectures" should last approximately one third of the class period (e.g., 25 min in a 75-min class), although this amount may vary a bit depending on the length of the reading assignment, the complexity of the material being covered, the class schedule, and so on.

Following the lecture, students form pairs and spend the remaining class time discussing their answers to the prep-guide items. During the discussions, students should focus on having "a mutually probing, mutually informing conversation" (Boyce & Hineline, 2002, p. 220), in which they expand on the prep-guide items and do their best to help their partners learn and understand the material. During the discussions, the teacher (and a teaching assistant, if available) moves from group to group, answering questions, guiding students' discussions, and probing to see which material is proving problematic for students. Although students should take their time and discuss the prep guides completely, the discussions are essentially self-paced. As such, students are able to work through the material each day at a pace that best suits their particular level of learning. Unfortunately, some students may attempt to take advantage of this self-paced feature of interteaching—they become tempted to finish early, without having quality discussions, knowing that the teacher will be

reviewing some of the prep-guide items at the start of the next class period. Although one solution to this problem might be to increase the length of the prep guides, as Saville et al. (2011) noted, one potentially negative effect of lengthening the prep guides might be to make the prep guides unpleasant to students. Another way to solve this problem would be to construct supplemental questions that students answer once they have completed the prep-guide items.

Once students have finished their discussions, they submit a record sheet. On the record sheet, they list several pieces of information, including their and their partner's name, how long it took them to complete the discussion, whether they had enough time to finish, how well the discussion went, which prep-guide items were difficult to understand, which items or concepts they would like the teacher to review, and any other information that might be useful to the teacher as she or he prepares a lecture.

The teacher then uses the information on the record sheets to prepare a brief lecture that begins the next class period and precedes student discussion of the next prep guide. During the lectures, the teacher typically reviews information from the prep guides that students found most confusing, although these lectures might also contain supplemental information that helps further clarify confusing concepts or that students might find interesting.

Although the general purpose of the lectures is to review *any* information for which students have requested clarification, I have found it useful to limit the number of topics I review for at least two reasons. First, if students know that the teacher is going to review any topic they request, they may be less likely to discuss those items in depth during their discussions. Second, from a practical standpoint, there simply is not enough time to review every prep-guide item during the lectures. Thus, as Saville et al. (2011) recommended, it might be most beneficial to limit the lectures to those three or four topics that the majority of students listed on their record sheets. If students have additional questions over material that was not covered during the lectures, the teacher should offer to discuss that information one-on one-with them during his or her office hours.

There are other components of interteaching as well. First, students receive a small number of points for every discussion they complete. Boyce and Hineline (2002) suggested that participation points totaling approximately 10% of each student's course grade should be enough to motivate students attend class. Second, Boyce and Hineline (2002) also recommended that teachers should assess students' learning (e.g., via exams) at least five times during the semester, and they also recommended that students should be able to drop their lowest exam grade. This

way, students have ample opportunity to show what they have learned, and they are not punished if they happen to do poorly on one assessment. Third, Boyce and Hineline suggested that the exams should consist of at least one essay question (so students can practice writing their answers) and other objective questions (e.g., short answer, fill-in-the-blank) that are closely tied to the prep-guide items. The close connection between the prep guides and the exams provides guidance as students are initially learning and later preparing for the exams. Finally, Boyce and Hineline (2002) recommended the inclusion of quality points as a way to control the quality of students' discussions. The quality-points component of interteaching refers to a cooperative relationship in which part of each student's exam grade depends on how well his or her discussion partners performed on certain exam questions. Imagine two students, Abdullah and Tariq, who discussed a prep guide last week and who are now taking an exam on which one of the essay questions (worth five points) is based on a prep-guide item they discussed. If both Abdullah and Tariq get four or five points on the question, they each earn additional points toward their course grade. If, however, one or both of them get fewer than four points, neither earns quality points. Boyce and Hineline (2002) recommended that quality points across all of the exams should total 10% of students' course grades. They believed that this contingency would motivate students to have quality discussions, because part of their course grades depends on how well their partners learn the material.

Evidence of Interteaching's Effectiveness

To date, a growing number of studies have examined the efficacy of interteaching in the context of college classes. Teachers have implemented and studied interteaching in several different disciplines. In the first experimental study of interteaching, Saville, Zinn, and Elliott (2005) conducted a lab-based study in which they randomly assigned undergraduate students to one of three teaching conditions: interteaching, reading, or lecture. One week later, students in each condition (along with students in a no-teaching control condition) returned to take a 10-question, multiple-choice quiz. Saville et al. found that students in the interteaching condition correctly answered significantly more questions than students in the other three conditions. Students in the reading and lecture conditions did not do any better on the quiz than students in the control condition.

Saville, Zinn, Lawrence, Barron, and Andre (2008) also examined how interteaching and lecture affected students' self-reported critical thinking. Saville et al. alternated

between interteaching and lecture several times throughout the semester and then asked students to complete Ferrett's (1997) "attributes of a critical thinker" inventory andfound that students were more likely to report that they engaged in critical thinking during interteaching sessions.

In a similar study, Scoboria and Pascual-Leone (2009) exposed students to lecture or an "interteaching-informed" teaching method. They found that students' performance on writing assignments that involved analytical and critical thinking was significantly better in the interteaching sections of the course than it was in the traditional lecture-based sections. Scoboria and Pascual-Leone also found that most students preferred the interteaching-based method.

Goto and Schneider (2009, 2010) implemented a slightly modified interteaching approach in several upper-level, nutrition courses. Although they did not present any performance data (e.g., exam scores), Goto and Schneider did find that students reported that interteaching helped them better focus during lectures, better prepare for class, and engage in critical thinking; students also reported that interteaching gave them a sense of responsibility over their own learning.

Advantages and Disadvantages of Using Interteaching

As with any new teaching method, there are likely to be both advantages and disadvantages of implementing interteaching in a new setting. For example, although interteaching tends to produce superior student-learning outcomes, its implementation can be time-consuming. As such, teachers wishing to incorporate this new method into their classrooms should be aware of, and carefully weigh, its pros and cons.

Advantages

In addition to the enhanced performance that seems to result from using interteaching (e.g., Saville et al., 2005; Saville et al., 2006), there are at least five primary advantages to using this new teaching method in one's courses. First, interteaching is based on well-established principles of learning. Conceptually, Boyce and Hineline (2002) developed interteaching based on Skinner's (1938, 1953) well-known ideas about learning. With more than a century of empirical evidence, the notion that consequences affect behavior is one of the most entrenched ideas of human behavior. Thus, when teachers implement interteaching in their courses, they can be assured that they are using a method that is conceptually sound and based on empirical evidence.

Second, in contrast with lecture-based courses, students in interteaching courses tend to be more engaged on a number of levels. They spend more time engaged with the material, more time interacting with other students, and more time interacting with their teachers—three factors that predict success in college and that may enhance students' overall college experience (Astin, 1993; Saville, in 2011). It may not be surprising, then, that students tend to prefer interteaching to more traditional teaching methods (e.g., Saville et al., 2006; Scoboria & Pascual-Leone, 2010).

Third, from the teacher's standpoint, interteaching makes class preparation very easy. Because it is nearly impossible to cover every important concept during the limited amount of time that teachers have with their students, teachers often have to make difficult decisions regarding which material to cover and which material to ask students to read and learn on their own. With interteaching, however, students tell teachers what material to lecture on by listing on their submitted record sheets which prep-guide items were most difficult to understand. Thus, with a quick scan of the record sheets, teachers can determine exactly which information they should focus on during the clarifying lectures. As Boyce and Hineline (2002) noted, because teachers target material that students have specifically requested, the lectures are likely to sustain attention longer and be more interesting to students.

Fourth, with interteaching, teachers are able to receive relatively immediate feedback regarding what their students do and do not understand. During traditional lectures, teachers typically have two means of determining whether their students comprehend the material: by looking for some sort of physical feedback (e.g., an approving nod, a frown) or by asking students to provide verbal confirmation of their understanding. In both cases, feedback is dependent on whether students are engaged or willing to speak up in class. As anyone who has taught a college course—especially a large college course—can attest, getting some students to speak up in front of their peers can be a challenge. With interteaching, though, teachers have at least two primary means of gathering consistent feedback. First, during the pair discussions, teachers are able to listen in on the discussions and hear whether students comprehend a particular concept. If students are "on target," teachers can provide positive feedback; if students are off track, teachers can steer them toward the correct answer. Second, as noted earlier, teachers are able to gather relatively immediate and useful information on student learning from the record sheets. By counting the questions students listed most often, teachers can determine fairly easily the concepts that were most troublesome for students. Thus, even in classes where students are frustratingly quiet, teachers can determine rather easily how well their students understand the course material.

Finally, with interteaching, teachers have more opportunities to establish rapport with their students. As Buskist and Saville (2004) noted, rapport refers to "a positive emotional connection among students, teacher, and subject matter that emerges from the manner in which the teacher constructs the learning environment" (p. 152). Buskist and Saville identified several ways teachers can establish rapport with their students, many of which have to do with increasing the amount of social interaction—and thus the opportunity to provide positive reinforcement—that teachers have with their students. Because teachers in interteaching-based courses spend a lot of class time interacting with their students, they may be more likely to develop rapport, which, as Benson, Cohen, and Buskist (2005) found, may set the stage for other student behaviors that are likely to have a positive impact on learning. Certainly, teachers in lecture-based courses have numerous opportunities to establish rapport with their students. Nevertheless, the very nature of interteaching makes it especially likely that teachers will have the opportunity to create the positive emotional connection with students that may further enhance the likelihood that students will show improvements in both performance and enjoyment.

Disadvantages

In addition to the advantages listed above, there are two primary disadvantages I have encountered over the last few years while incorporating interteaching in my courses. It is especially important that first-time users consider these disadvantages when deciding when and how to implement interteaching in their courses.

First, as with many alternative teaching methods, creating an interteaching-based course is time-consuming, at least at first. For example, creating prep guides can take a considerable amount of time (Tsui, 2010). Most teachers want their students to engage in the kind of higher-order thinking that produces long-term learning, and creating prep-guide items that produce this type of thinking is not a task that can be accomplished during a single 30-minute session. Rather, teachers who wish to incorporate interteaching into their courses should be prepared to spend a good amount of time reviewing Bloom's taxonomy and thinking about how they can use this framework to produce questions that will both evoke high levels of thinking and engage students in the material. Thus, teachers wishing to incorporate interteaching into their courses might want to start off with a "trial run," in which they pick a week or two during their regular semester to create some prep guides and use interteaching during that short time period. Based on how this initial attempt at interteaching goes, teachers can then slowly introduce more interteaching

into their courses. Conversely, teachers who want to incorporate interteaching fully from the beginning of the academic term (which is what I did the first time around) should make sure they have plenty of time to create their course materials. For example, a nice time to work on course preparation might be over the summer when teachers often have more flexibility in their schedules. Either way, it is important not to deviate (at least initially) from the description of interteaching provided above (i.e., for each class period, a lecture followed by discussion). As I noted earlier, there is conceptual rationale for incorporating interteaching the way Boyce and Hineline (2002) initially described it. Until additional research suggests that deviations do not lead to decreases in performance, I would recommend following the method as closely as possible. Finally, course preparation for interteaching gets easier with each subsequent installment (Boyce & Hineline, 2002). Eventually, the prep guides become more solidified, and teachers will likely be able to predict which prep-guide items will be difficult for students to understand. Consequently, course preparation will take less and less time.

Second, because most students are used to lecture-based courses, some do not like interteaching, at least initially. By the time students get to college, they have had considerable exposure to "teaching as lecturing," and this notion is not likely to change with their entry into postsecondary education (Benjamin, 2002). As a result of this exposure (and because of a societal emphasis on grades, often in lieu of real learning), students have learned to "jump through the hoops" in order to obtain decent grades. Especially for students who have learned how to get good grades by attending class, taking notes, and cramming prior to exams, they wonder why they have to complete prep guides, discuss material, and so on. Consequently, students may at first be resistant to interteaching. I have found it useful to spend a good amount of time at the beginning of the semester explaining to my students why I use this new teaching method; I even show them some of the data we have collected and explain how I really want them to do well in my courses. Eventually, most students see the utility of interteaching, especially when they do well on their exams and, maybe even more importantly, when they realize that they are remembering information throughout the semester.

Ultimately, as with most teaching methods, there are disadvantages to using interteaching in one's courses. Nevertheless, the increases in student learning and enjoyment that result from using interteaching provide a good reason for teachers to consider this user-friendly, conceptually sound alternative in their courses.

ESSENTIALS OF EFFECTIVE TEACHING SERIES

Summary

- Earlier behavioral teaching methods improved learning, but teachers often found them difficult to implement in their courses.

- Interteaching is a new approach to classroom instruction that is based on the same principles that made earlier behavioral teaching methods effective. In contrast, though, interteaching might be easier to implement in one's courses.

- In a typical interteaching session, students complete preparation guides before class, discuss their answers with a partner in class, and then hear a clarifying lecture over material that was difficult for them to understand.

- A growing body of research suggests that interteaching improves student-learning outcomes and critical thinking relative to more traditional methods of teaching.

- Teachers have used interteaching in a number of disciplines, including psychology, special education, nutrition science, sociology, and religion.

- Although course preparation with interteaching is initially time-consuming, and although some students might initially resist this new teaching method, there are a number of advantages that make it a worthy alternative to more traditional teaching methods.

Annotated References

- Boyce, T. E., & Hineline, P. N. (2002). Interteaching: A strategy for enhancing the user-friendliness of behavioral arrangements in the college classroom. *The Behavior Analyst, 25,* 215226-.

- In this article, Boyce and Hineline introduced interteaching as an alternative to earlier behavior-analytic teaching methods and to more traditional teaching methods such as lecture. They also provided a conceptual analysis for why interteaching should be an effective teaching method along with anecdotal evidence in support of its efficacy.

- Saville, B. K., Zinn, T. E, & Elliott, M. P. (2005). Interteaching vs. traditional methods of instruction: A preliminary analysis. *Teaching of Psychology, 32,* 161163-.

- Saville, Zinn, and Elliott conducted the first systematic investigation of interteaching. In this lab-based study, they randomly assigned participants to one of four groups—interteaching, lecture, reading, and control—and then examined how students in each group performed on a multiple-choice quiz given 1 week later. They. found that students in the interteaching condition performed significantly better on the quiz than students in the other three groups; they also found that students in the lecture and reading groups were statistically indistinguishable from students in the control condition.

- Saville, B. K., Zinn, T. E., Neef, N. A., Van Norman, R., & Ferreri, S. J. (2006). A comparison of interteaching and lecture in the college classroom. *Journal of Applied Behavior Analysis, 39,* 4961-.

- Saville, Zinn, Neef, Van Norman, and Ferreri conducted the first classroom-based investigation of interteaching. In two different studies (a graduate-level special education course and an undergraduate psychological research methods course), they alternated between lecture and interteaching several times and measured students' exam performance. In both studies, Saville et al. found that students performed better on their exams following interteaching. They also found that students typically preferred interteaching to lecture.

- Saville, B. K., Zinn, T. E., Lawrence, N. K., Barron, K. E., & Andre, J. (2008). Teaching critical thinking in statistics and research methods. In D. S. Dunn, J. S. Halonen, & R. A. Smith (Eds.), *Teaching critical thinking in psychology: A handbook of best practices* (pp. 149160-). Malden, MA: Wiley-Blackwell.

Interteaching

- In this chapter, Saville and colleagues described a study in which they alternated between interteaching and lecture in an undergraduate psychological research methods course and then asked students to complete a measure of critical thinking. Students reported that they were more likely to think critically during interteaching sessions than during lecture sessions.

- Saville, B. K. (2011). Interteaching: A behavior-analytic approach to promoting student engagement. In R. L. Miller, E. Amsel, B. M. Kowalewski, B. C. Beins, K. D. Keith, & B. F. Peden (Eds.), *Promoting student engagement: Volume 1: Programs, techniques, and opportunities*. Published on the Society for the Teaching of Psychology Web site: http://teachpsych.org/resources/e-books/ pse2011/vol1/index.php

- In this chapter, Saville discusses interteaching in the context of student engagement. First, he reviews early research on college-student success and then discusses how three types of engagement—time on task, student-instructor interactions, and student-student interactions—predict which students will succeed during their time in college. Finally, Saville discusses how interteaching increases time on task, student-instructor interactions, and student-student interactions and thus may produce superior student-learning outcomes.

- Saville, B. K., Lambert, T., & Robertson, S. (2011). Interteaching: Bringing behavioral education into the 21st century. *The Psychological Record, 61,* 153166-.

- In their review article, Saville, Lambert, and Robertson first discuss earlier behavior-analytic teaching methods and why they lost popularity over the last three decades. Next, Saville et al. describe interteaching and review studies that have examined its efficacy relative to more traditional teaching methods. Finally, they provide recommendations for researchers wishing to implement and study this promising new teaching method in their classrooms.

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