CHAPTER 3

TEACHING LEARNING THEORIES

A SOAR-Driven Approach

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Learning theories are an integral part of the teacher education curriculum. Prospective teachers might take a learning theories course or learn about them in an educational psychology course. Either way, learning theory instruction is meant to help teachers understand human learning and to design instruction compatible with learning principles. This chapter: (a) explains the importance of learning theories for teacher training; (b) specifies challenges associated with teaching learning theories; (c) offers a promising practice to meet this challenge; (d) demonstrates this practice; and, (e) concludes with instructional recommendations for teaching learning theories.
We begin by offering three instructional scenarios followed by some questions.

**Scenario A:** Abbey waves her arms feversishly and calls, “oh, oh,” each time she volunteers to answer her teacher’s question. Her teacher has called on her in the past, but now wants this behavior to stop. **Why does Abbey do this? What should the teacher do to stop it?**

**Scenario B:** When studying for his astronomy test, Baker makes flash cards with each card showing a planet name on one side (e.g., Mars) and a planet fact (e.g., orbit speed = 15,000 miles/hour) on the other. He reviews by going through the cards in random order again and again. **What is wrong with Baker’s approach? What alternate study method should the teacher suggest?**

**Scenario C:** Cassidy gets a math test back and sees that she got a 65%. When speaking to the teacher about it, Cassidy blames her low performance on “being bad in math.” **What’s wrong with Cassidy’s reasoning? How should Cassidy’s teacher react?**

How should teachers react to these scenarios? Fortunately, there exists a **science of learning** that can guide teacher understanding and intervention. That science is called **learning theory**. Actually, there are many learning theories that explain how learning occurs and provide the basis for teacher understanding and intervention strategies. Let’s see how learning theory helps teachers in Scenarios A–C.

In Scenario A, **operant theory** helps the teacher understand that Abbey’s hand waving and moaning persist because they are positively reinforced by the teacher calling on Abbey. Operant theory also provides an intervention, extinction, which involves—from here on out—ignoring Abbey’s previously reinforced behaviors. If Abbey is not chosen to answer when she waves or moans, then eventually those behaviors will decrease.

In Scenario B, **information-processing theory** helps the teacher understand that Baker’s piecemeal and rote approach is not conducive to understanding and remembering information. The same theory suggests that the teacher should encourage Baker to **seek relationships** among planet facts. For example, if Baker examines planets’ orbit speeds relative to their distance from the sun, then he will learn this important relationship: As planets move farther from the sun, their orbit speeds decrease.

In Scenario C, **attribution theory** helps the teacher understand that Cassidy is making a faulty attribution when she blames poor performance on low math ability. Armed with an understanding of attribution theory, the teacher should council Cassidy that people are not inherently good or bad.
in math and that the cause of low performance is most likely the result of insufficient effort or weak math strategies—both of which can be fixed.

In summary, learning theories are the foundation for understanding the learning process and for making instructional decisions. All prospective teachers should be taught about learning theories and their implications for instruction. With learning theory information in hand, teachers become *meta-teachers* who reflect on and amend their teaching practices in accord with learning theory.

**CHALLENGES ASSOCIATED WITH TEACHING LEARNING THEORIES**

Three challenges for teaching learning theories are discussed. The first challenge is complexity. Learning theory has a long history, comprised of many theories and sub-theories, and much detail. To give you a flavor for this complexity, consider that learning theories date back to the times of Plato and Aristotle (around 400 B.C.), that current learning theory textbooks cover about 20 unique theories or sub-theories, and most theories contain multiple parts. Hull’s Hypothetico-Deductive theory, for example, includes 17 laws and 133 specific theorems. This complexity makes it difficult for students studying learning theories to comprehend relationships within or across theories. For example, a student might be uncertain how different theories interrelate in terms of time (i.e., Which came earlier, classical or operant theory?) or classification (i.e., Is Guthrie’s theory one of contiguity or contingency?). Or, how certain theories or their components compare and contrast (i.e., How are Pavlov’s and Watson’s conditioning theories alike and different? How are operant theory’s positive and negative reinforcement components alike and different?).

A second challenge associated with teaching learning theories is that instructional implications are not always specified or tied to theory. Learning theory texts are commonly written for a general audience and do not necessarily include instructional implications for teachers. Educational psychology texts do present instructional implications, but these are not always tied to theory. Kiewra and Gubbels (1997), for example, found that several educational psychology texts presented theoretical information about behaviorism in one chapter and presented applied information about behavior management in a later chapter without linking theory and practice.

A third challenge is that students use ineffective techniques when they try to learn material, whether it pertains to learning theories or other content. They tend to make four errors reflective of shallow, non-meaningful processing that limit learning: (a) incomplete note taking; (b) poor organization; (c) piecemeal learning; and, (d) redundant strategies. In terms of
note taking, students record incomplete notes (about 35%), which is problematic because amount of notes and achievement are positively correlated (Titsworth, 2004). In terms of organization, students rarely reorganize notes; when they do, they tend to create lists or outlines. Unfortunately, such linear organization actually restricts relationship learning (Kauffman & Kiewra, 2010). Most students also overlook potential relationships among ideas as they study one idea at a time in a piecemeal fashion. Piecemeal learning is akin to trying to figure out the end product of a puzzle by examining each puzzle piece one at a time rather than by how they fit together. Piecemeal learning is associated with low achievement (King, 1992). Finally, most students use redundant strategies like rereading, recopying, and reciting. These passive study techniques are also associated with low achievement (Callender & McDaniel, 2009).

In summary, learning theory instructors are apt to drown in the sea of learning theory information, not recognize the relationships among or within theories, and miss the potential instructional implications of those theories. Meanwhile, their students are apt to use shallow and ineffective learning techniques that limit learning.

SOAR: A PROMISING PRACTICE FOR TEACHING LEARNING THEORIES

One means to overcome these teaching and learning challenges is SOAR, a system developed by Kiewra (2009) meant to address common teaching-learning problems. SOAR is an acronym for the system’s four components: select, organize, associate, and regulate. Students can soar to success by selecting all relevant information by taking complete notes (rather than incomplete ones), organizing information graphically (instead of linearly), associating ideas to one another and to prior knowledge (rather than learning in a piecemeal fashion), and regulating learning through self-testing (rather than employing redundant strategies). SOAR methods can be directly applied by students or prompted by teachers who, for example, provide complete notes, present graphic organizers, make relationships explicit, and offer practice test questions. And, SOAR methods have empirical support and are based on learning theory. Research confirms that students using SOAR materials outperform students using their preferred study methods when learning from text (Jairam & Kiewra, 2009) and from computer-assisted instruction (Jairam & Kiewra, 2010) and that SOAR studiers also outperform students who study materials based on a competing study system: SQ3R (Jairam, Kiewra, Rogers-Kasson, Patterson-Hazley, & Marxhusen, 2013). Meanwhile, SOAR fits with information-processing learning theory. As shown in Figure 3.1, SOAR’s select component fosters attention,
the process by which important information enters into working memory. SOAR’s organize and associate components foster encoding, the recoding process by which information enters long-term memory. And, SOAR’s regulate component fosters retrieval, the process by which stored memories are returned to working memory. Unlike students’ preferred study methods, which are linked with shallow, non-meaningful processing, SOAR methods are linked with deep, meaningful processing.

**DEMONSTRATING SOAR FOR TEACHING LEARNING THEORIES**

In this section, we describe the empirical support for SOAR and demonstrate how a teacher educator could present information about a particular learning theory (operant theory) using the SOAR method. Operant theory was chosen because it includes concepts already familiar to readers such as reinforcement and punishment. In the end, you see how SOAR meets the three challenges of teaching learning theory: theory complexity is reduced, theory relationships and implications are emphasized, and students’ ineffective learning techniques are replaced with effective ones.

**Select**

As previously mentioned, most students never give themselves a chance to succeed academically because they take incomplete lesson notes—recording just one-third of critical ideas. This is a big problem because the
number of notes recorded is positively related to achievement. Moreover, note taking is useful because it serves process and product functions (Williams & Eggert, 2002). The process of taking notes aids in sustained attention during lessons. The product derived from taking notes provides an external record that can be studied later.

There are four proven ways to bolster note completion and aid the selection process. Instructors can provide: (a) complete notes; (b) skeletal notes; (c) cues; and (d) pauses.

**Complete Notes**

One obvious way to increase the completeness of students’ notes is to simply give them a set of complete notes. Studying provided notes that are complete results in higher achievement than studying one’s own notes, which are often incomplete. One study (Kiewra, 1985) went as far as to show that students who did not attend a lecture but later reviewed a set of provided notes achieved more than students who attended the lecture, recorded notes, and later studied them. Figure 3.2 shows a set of complete notes that might be provided to students for the operant theory lesson.

**Skeletal Notes**

Some instructors might be opposed to simply giving students a set of complete notes to study, believing that students should be active participants in information selection. Skeletal notes are a good alternative for those instructors (and their students). Skeletal notes get their name because they are akin to the bones on a skeleton. They contain the lesson’s main ideas (bones) with spaces between them where students record lesson details (the flesh on the bones). Recording notes on skeletal frameworks leads to more notes and higher achievement than does recording notes without skeletal frameworks. One study (Kiewra, Benton, Kim, Risch, & Christensen, 1995) showed that students using skeletal notes recorded 22% more lesson ideas than students recording notes without a skeletal framework. Skeletal notes for the operant theory lesson might include just the bolded portions of Figure 3.2 with blank spaces for note taking following each bolded segment.

**Lesson Cues**

Teachers can also increase note taking by presenting cues throughout a lesson. Two types of cues have bolstered note taking: importance cues and organizational cues. Importance cues signal critical lesson information. Instructors can deliver such cues verbally when they say things like, “this is critical,” or “note this;” non-verbally, perhaps by waving their arms or nodding their head; and, by using voice inflections such as speaking louder, softer, or slower. One proven way of importance cuing is jotting key words...
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Operant Theory

- Reinforcement
  - Positive Reinforcement
    - Behavior: Strengthened
    - Stimulus: Presented
    - Example: Animal performs desired trick, is given food, and does trick more often
  - Negative Reinforcement
    - Behavior: Strengthened
    - Stimulus: Removed
    - Example: Animal receives slight shock, animal performs desired trick, shock is turned off, animal does trick more often

- Punishment
  - Positive Punishment
    - Behavior: Decreases
    - Stimulus: Presented
    - Example: Student does not return library books on time, is reprimanded, and stops returning books late
  - Negative Punishment
    - Behavior: Decreases
    - Stimulus: Removed
    - Example: Student does not return library books on time, is fined, and stops returning books late

- Extinction
  - Behavior: Decreased
  - Stimulus: Withheld
  - Example: Child throws tantrum (which has been reinforced previously with adult attention), adult ignores tantrum, tantrums stop occurring

- Time Out
  - Behavior: Decreased
  - Stimulus: Unavailable
  - Example: Child throws toys in his room, child is removed from his room, toy throwing occurs less often

Figure 3.2 A set of complete notes for the Operant Theory lesson.

on the board. Students record nearly 90% of information written on the board. When teaching about operant theory, a teacher might supply importance cues like the following:

- “Note that the stimulus is removed for negative reinforcement.”
- “It’s crucial that you distinguish withheld stimuli from unavailable stimuli.”
- “You surely see that “p-p-p-p-positive techniques involve the p-p-p-p-presentation of stimuli.”

Organizational cues alert students to the lesson’s organization and where they presently are within that lesson by signaling the topic and the category
being addressed. When teaching the operant theory lesson, a teacher might say: “Now, we will discuss positive punishment (the topic) with respect to the behavior produced (the category).” Research confirms that inserting such organizational cues throughout a lesson bolsters notes in terms of both organizational points (in this case, the terms positive punishment and behavior) and detail points (in this case, noting that behavior is increased) and also raises achievement compared with an un-cued lesson (Titsworth & Kiewra, 2004).

Pauses

Students’ incomplete note taking might be, in part, the result of physical limitations. Most lectures are presented at a rate of about 150 words per minute. And, although adults can listen at a rate of about 200 words per minute, they can only transcribe about 50 words per minute. That is why pauses interspersed throughout a lecture are useful; they give students more time to record lesson notes they might have missed originally. A recent study (Luo, Samuelson, & Kiewra, 2014) confirmed that interspersing three five-minute pauses during a 14-minute lecture led to greater note taking and higher achievement than providing the same amount of pause time immediately following the lecture. When teaching about operant theory, a teacher can provide occasional pauses for students to supplement their notes.

Organize

Students often have trouble learning from lessons because information is presented in a piecemeal fashion and organized linearly so that relationships among ideas are obscured. When possible, it is better to organize material in a hierarchy, sequence, or matrix. The matrix is the most powerful organizer because it is a cross-classification table, extended from hierarchies and sequences, which highlights comparisons among steps displayed in a sequence or elements displayed in a hierarchy. (See Kiewra, 2009, for descriptions of organizer types). For example, it is difficult to discern operant theory relationships from the linear display in Figure 3.2. The matrix in Figure 3.3, however, reveals quickly that positive and negative reinforcement both increase behavior. The benefit of matrices over text or linear displays is well supported. In one representative study (Kauffman & Kiewra, 2010), college students studied wildcat information displayed in text, outline, or matrix form. The matrix group learned up to 22% more facts and 21% more relationships than the other groups.

Matrices are instrumental for addressing the complexity-of-learning-theories challenge mentioned earlier. The matrices presented in Figures 3.3–3.5 illustrate how complex information is tamed. The Figure 3.3 matrix
Figure 3.3  Operant Theory matrix organizer.
on operant theory reveals the material’s overriding classification structure (operant theory includes six techniques: two are types of reinforcement, and two are types of punishment) with just a glance. Similarly, Figure 3.4 displays how operant theory compares with another behavioral theory, and Figure 3.5 displays how behavioral theory compares with other theory classifications.

**Associate**

Organized information is of little value if studied one idea at a time in a piecemeal fashion. Instead, information should be associated. When associations are made, students learn more facts and, especially, learn more relationships. There are two types of associations: internal and external. Internal associations are those made within the new material being learned. External associations are those made between the new material and ideas outside that new material, usually stemming from the learner’s prior knowledge. When teaching operant theory using the matrix in Figure 3.3, the following internal associations, among others, might be made:

- Reinforcement increases behavior, whereas punishment decreases behavior.
- Positive techniques involve stimulus presentation, whereas negative techniques involve stimulus removal.
Figure 3.5  Matrix organizer comparing four learning theories.
Punishment, extinction, and time out all decrease behavior.
The stimulus is presented or removed in punishment, withheld in extinction, and unavailable in time out.
An animal trick is an example of a behavior. Giving the animal a treat is an example of a presented stimulus. And, the animal doing the trick more frequently is an example of an increased behavior.

And, here are some external associations that might be made:

- An example of positive reinforcement is when a teacher hands out a gold star for high marks and the student earns even more high marks.
- An example of negative punishment is when a referee penalizes a football team 10 yards for holding and they do not hold thereafter.
- To remember information about extinction, think that the dinosaur population decreased and eventually went extinct because food was withheld.
- A teacher who wants to strengthen polite social behaviors should positively reinforce those behaviors.

Associations are instrumental for handling the lack-of-relationships-and-implications challenge mentioned earlier. Internal associations unveil important relationships within and across theories, and external associations are a means for providing teacher implications.

Regulate

Effective learners regulate learning. This means that they check their understanding before their teachers test them. Teachers can help students regulate learning by questioning them or by providing practice tests in advance of real ones. Students who regulate learning through practice testing outperform those who use other non-regulatory study methods (Karpicke & Roediger, 2007).

When teaching learning theories, teachers can provide students with practice questions that tap various learning outcomes such as facts, relationships, concepts (the recognition of new examples), and skills. Returning to the operant theory material, a teacher might provide these sample practice items: Fact items:

- For which technique does behavior decrease due to the removal of a stimulus?
- In extinction, is the stimulus presented, removed, withheld, or unavailable?
Relationship items:

- Which two techniques involve stimulus removal?
- Which two techniques involve an increase in behavior?

Concept items:

- When the baby cries at night, the parents ignore the crying. After several nights of this, the baby stops crying during the night. What operant technique did they use?
- When Johnny gets his chores done on time, his parents allow him to play computer games for 30 minutes. As a result, Johnny gets his chores done on time most every day. What operant technique are the parents using?

Skill items:

- A student is quiet and only occasionally speaks up in class. Come up with a plan based on operant theory that gets this student to speak up more in class.
- A child pulls books from a bookshelf whenever his father is around. The father believes that the child is doing this to gain attention from him. Describe how the father can use (a) extinction; and (b) time out to resolve this problem.

In summary, using SOAR methods addresses the three challenges of teaching learning theories. The graphic organization of ideas reduces information complexity. The association of ideas showcases relationships within and among theories and can include instructional implications. Overall, SOAR methods ameliorate the ineffective learning techniques students commonly employ.

RECOMMENDATIONS

Prospective teachers need to learn about learning theories so they can teach students in ways compatible with those theories. The problem is that prospective teachers, like most students, might use ineffective learning strategies themselves. They might record incomplete notes, fail to organize those notes, study those notes one idea at a time, and then try to commit noted ideas to memory using redundant strategies like re-reading and rehearsal. This chapter introduced an antidote to ineffective strategies called SOAR. Using SOAR, students: (a) select all the important information, not
just one-third of it; (b) organize information in comparative matrices and other graphic forms rather than in linear forms that obscure relationships; (c) associate ideas rather than try to learn them one at a time; and, (d) regulate learning through practice testing rather than mindlessly repeating information over and over.

There are two methods that learning theory instructors can use to help students soar to success. The good-teaching method is accomplished when teachers develop SOAR-compatible materials and simply provide them to students. Teachers, for example, provide students with a complete set of notes (select) organized in matrix form (organize). Teachers also provide internal and external associations (associate) and practice test questions (regulate). The problem with the good-teaching method is that student learning depends entirely on the nature of instruction. Ideally, educators want students to learn under all circumstances, even when teaching is not so good. For that to happen, students must be taught how to learn and taught how to use SOAR strategies independently. This teach-students-how-to-learn method is accomplished by embedding strategy instruction (in this case, SOAR strategies) in content instruction (in this case, learning theory instruction).

Here is how students are taught how to learn. As the learning theory teacher is presenting information about operant theory, for example, she can embed the teaching of SOAR strategies such as organization. Strategy instruction includes four components: introduce, sell, perfect, and generalize. When teaching organization, the instructor can introduce the matrix strategy by presenting a matrix like that in Figure 3.3 and explaining how to create one using columns and rows. She can sell the strategy by describing and demonstrating why a matrix is more effective than a linear display for comparing learning theories or their components. The teacher can perfect the strategy by providing various opportunities to practice the matrix strategy while covering operant theory. The teacher can also generalize the strategy by suggesting other opportunities to use matrices, such as when comparing various behavioral theories or when comparing behavioral theory and cognitive theory. Such strategy instruction over time enables students to use SOAR strategies independently.

In conclusion, a SOAR-based perspective can help learning theory instructors design effective learning theory instruction and teach their students how to employ SOAR strategies on their own. To appreciate these two approaches, recall the old adage that giving a man a fish feeds him for a day while teaching him how to fish feeds him for a lifetime. That adage fits the two approaches presented here. Using the good-teaching method bolsters student learning for today. Using the teach-students-how-to-learn method bolsters student learning for a lifetime.
REFERENCES


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