BEHAVIORAL PEDAGOGIES AND ONLINE LEARNING

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Behavioral Pedagogies and Online Learning

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Chapter 1.

Introduction

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The inspiration for this book came from an array of positive teaching experiences. We are thankful to have learned from excellent teachers in higher education. Moreover, we are also fortunate to have colleagues and friends from graduate school (and beyond) who also share the joy of teaching. Our overarching goal with this open educational resource (OER) is to begin to “pay it forward” and share some of the lessons learned, so that others may benefit in their own teaching, learning, and scholarship.

A topic of concern arising from many recent discussions about teaching, is that not all students of behavior analysis and other disciplines receive adequate graduate-level training in instructional design or the opportunity to teach under the mentorship of a senior instructor. Such experiences are an essential component for professional success in a university setting. This is also a noteworthy concern for new PhDs who may end up transitioning from a research-focused institution to a teaching-focused one.

To make matters more complicated, many faculty including those fortunate enough to have received some level of formal training for in-person teaching, may not have had experience teaching online prior to the COVID-19 pandemic. In this book, we have assembled a fabulous group of faculty who have online teaching experiences and were willing to disseminate their scholarship and teachings. It is our hope that this book is beneficial to many teachers in higher education.

We are extremely grateful to Division 2: Teaching of Psychology of the American Psychological Association for awarding grant funding for both a conference and this OER book based on the conference proceedings. The virtual conference was titled Online Teaching of Psychology and took place on November 13, 2020. This conference brought together a strong group of dedicated professional teachers in behavior analysis and other related fields such as instructional design, psychology, counseling, public health, and biology. These talented presenters shared their experiences and ideas to implement evidence-based practices in online teaching environments. The audience interacted with the presenters during a stimulating question and answer portion facilitated by a moderator at the end of each presentation.

The topics of the conference were also aimed at providing support and tools for teachers working in higher education and teaching remotely during the COVID-19
pandemic. Some of these colleagues have had many years of experience with online learning, while others had no experience prior to this pandemic. In this sense, the conference turned out to be a space to gather professionals in need of technical but also collegial support in a time of crisis and burnout. The conference included topics stemming from evidence-based practices in teaching such as meaningful student outcomes in an online environment, online behavioral instruction, active student responding and student engagement, creativity in the classroom, self-management techniques, supporting students with disabilities, and fostering community and rapport in the classroom.

In its online format, this conference ended up gathering approximately 177 synchronous attendees from a variety of locations within and outside the United States. Ninety of such attendees recruited continuing education units (CEUs) towards Board Certified Behavior Analyst (BCBA®) certification, offered for free at the conference (courtesy of University of St. Joseph, CT). After the conference, a short survey was sent to all attendees. Nearly 98% of respondents rated the overall quality of the conference favorably and were willing to attend a future event on the same topic. In addition to the survey, we received additional positive and encouraging comments about the conference. In particular, we would like to highlight comments shared on the Teaching of Behavior Analysis Listserv (TBA-L) by a leader in behavioral education, J. Twyman (personal communication, November 23, 2020)

(... thanks for organizing, hosting, and then posting the talks from your terrific conference. What a tremendous wealth of resources. I've only had a chance to watch Alligood’s [italics are ours] and James’ talks -- but what gems! I look forward to viewing the rest and want to thank you for this service you've done for the field. Hopefully the talks can be organized into a collection of papers somewhere, I can only imagine how useful the materials would be.

This and other positive comments related to the inspiration provided by the conference propelled our interest in keeping this energy alive and making a more permanent product, this OER book, that we hope will continue to support the central reason that gathered us in this conference: teaching. Shortly after the conference, we reached out to presenters and other colleagues to confirm they were still willing to contribute a book chapter based on the conference. Approximately two years later, we have co-edited this book. Although many of the chapters elaborate on adaptation of behavior-analytic approaches to instruction to online environments, this book also includes more general topics in education such as the scholarship of teaching and learning, understanding creativity from a behavioral standpoint and how to use it in the classroom, and understanding and building equity for diverse student learners.

Given the generality and relevance of the topics contained in *Behavioral Pedagogies and Online Learning* we have compiled what we consider is a revitalization of behavioral instruction that goes beyond online education. In their chapter on online behavioral instruction, Diller and Gray elaborated on how despite the many benefits of adopting behavioral instruction, there are also potential sources of resistance to a widespread
adoption of such type of instruction. Despite such resistance, Diller and Gray follow up on how the rise of online instruction and rapidly changing circumstances of learning, makes for a good time to adopt a behavioral approach to instruction. In line with their perspective, one of the goals of this book is to reinstate and continue to build upon this strong foundation of a behavioral approach to instruction.

This book also represents and recognizes the efforts of teachers, many of them within behavior analysis, who in a time of crisis rose to the occasion to help others continue what we consider is one of our biggest responsibilities as professionals; to teach the next generations of professionals in the field of behavior analysis and related areas, such as psychology, biology, education and others. In the midst of an ongoing crisis in education brought by the COVID-19 pandemic, this conference and this book embody the importance of collaboration and reciprocal support needed to survive and continue our call to teach a growing diverse group of learners and to continue to learn about such diversity in needs.

We have been working towards widening the audience for this book. Although this book is aimed at serving as a guide for college instructors (not necessarily in behavior analysis), it is also aimed at teachers who are working toward teaching online, instructional designers, and individuals in faculty development. Each chapter incorporates the value of conceptual and basic-research foundations for teaching, and specific applications for in-person and online classrooms at the undergraduate and graduate levels. Another related goal, illustrated in the chapters of Dracoby, Elcoro, and Lippincott, respectively, is to support the connections between teaching, behavior analysis, and scholarship to contribute to our colleagues’ well-rounded development as professionals. We support the idea that teaching and scholarship are interrelated and that the need for scholarship within behavior analysis should be addressed and valued as research in any other area of the field.

The book contains twelve chapters, including an introduction followed by acknowledgements. Although each chapter is based on a unique topic, there are natural interconnections that emerge across chapters. We present a brief description of each chapter and highlight some of these interconnections below in the form of three interrelated themes. These themes are not mutually exclusive, rather allow for one way of organizing the chapters contained in this book.

- Implementation of behavioral instruction with examples of online adaptations prompted by the pandemic (Diller & Gray; Alligood; Wine & Pritchard; Leon et al.; Kuhn et al.),
- General topics that promote connections between fields and guide scholarship of teaching and learning (Dracoby; Elcoro; Lippincott), and
- Diversity and inclusion in behavioral instruction extended to online environments (DeRonck et al., Mann; Anderson-Carpenter; Lippincott)

In Chapter 2, **Online Behavioral Instruction: An Introduction** Diller and Gray provide a review of relevant literature on behavioral instruction and ideas for their online
implementation. Focusing on four behavior-analytic techniques: programmed instruction, personalized systems of instruction, interteaching, and contract grading, Diller and Gray provide their expertise and ideas to effectively adapt them to online classrooms to teach undergraduate courses. They highlight that the key elements of behavior-analytic instruction effectiveness, regardless of the type of environment (in-person or online) are contingency management, focus on observable behavior, individualized education, and active student responding.

Chapter 3, by Alligood is titled **Supporting Meaningful Student Outcomes in the Online Environment.** This is a concise and practical guide to specific evidence-based pedagogical strategies and recent experiences of the author using them. Alligood presents a behavioral version of Bloom’s taxonomy with concrete examples of instructional practices. The explicit discussion of Bloom’s taxonomy is sorely needed for behavior analysts that may not have a background in instructional design. This chapter is also contextualized in current times by including trends in faculty perceptions and priorities before and during the COVID-19 pandemic. These current trends and faculty perspectives are followed by an operational definition of student engagement and two case studies of implementations that include online environments.

Following the omnipresence of behavioral principles in teaching, the role of feedback is essential in maintaining and changing behavior. Behavior analysis provides a solid research foundation employed by Pritchard and Wine in Chapter 4, **The Use of Feedback in Higher Education.** Although much of the content in this book is within behavior analysis, the authors have written their work for a wider audience, including many pertinent take-aways on the effectiveness and delivery of feedback in the college classroom. The authors tell a compelling teaching story that readers are likely to identify with. This is a widely debated topic likely to spark much conversation, especially when it comes to criticisms of end-of-semester evaluations. The knowledge and expertise shared in this chapter is clearly relevant beyond online environments. The chapter also provides many avenues for research, which is a great way to inspire scholarship of teaching and learning.

Léon, Campos, and Migan-Gandonou Horr contributed Chapter 5, **Considerations for Remote Practicum and Student Research Supervision.** In this chapter, Léon et al. describe the expansion of possibilities that remote technologies, forced by the global COVID-19 pandemic, have brought to a variety of settings, focusing on using such technologies for training and supervision. Several considerations to plan sessions, develop agendas, provide feedback, conduct assessments and how to implement these sessions in an online environment at a university setting are described. The chapter includes a discussion on reliable online platforms, networking and classroom environments.

An introduction to Active Student Responding (ASR) techniques both low and high-tech is included in Chapter 6, by Kuhn, Krebs, Diller, and Brewer titled **Active Student Responding to Increase Student Engagement in Online Asynchronous College Courses.** Kuhn et al. concisely reviewed the relevant literature on ASRs while also providing ideas for implementations of ASRs in online environments (synchronous and asynchronous).
Toward the end of this chapter, a case study of an online asynchronous graduate course reveals the effectiveness of using ASRs to increase student learning and engagement.

All chapters in this book involved the creativity of contributors to implement and adapt behavioral techniques into a variety of learning environments and diverse groups of learners. Pertinently, in Chapter 7, Dracobly brings *Creativity in the Classroom: What it Is and How to Make It Happen*. A concise review of the literature on behavioral variability and creativity in behavior analysis sets the stage to translate some of the findings from the basic-research literature into the classroom. At the core of this chapter is that providing frequent opportunities for students’ responding and delivering corresponding reinforcers are foundational for meaningful learning.

Both Dracobly and Elcoro reflect on how the classroom may be considered a laboratory when it comes to data collection and conducting research in behavior analysis. Both authors propose that scholarship involving the application of behavior principles in teaching may be considered translational research in behavior analysis. In Chapter 8, *Exploring Connections Between Behavior Analysis and the Scholarship of Teaching and Learning*, Elcoro provides an introduction to the field and methodological approach of the scholarship of teaching and learning (SoTL). In this chapter, Elcoro draws connections between SoTL and behavior analysis, and shares three examples of research that blends SoTL and behavior analysis. Finally, reciprocal contributions between both SoTL and behavior analysis are outlined.

Chapter 9, titled *Syllabus Design to Foster Community in Online Courses* by Lippincott highlights the importance of interdisciplinarity to better serve students. The chapter includes useful discussions on building community. In addition, a discussion of Universal Design for Learning (UDL) will be most helpful to behavior analysts and other professionals who teach. There is much overlap between UDL and instructional design in behavior analysis. For instance, Diller and Grey discussed offering choice of assignments. This chapter also fits with the theme below, so it serves as a good transition to the incorporation of Diversity, Equity, and Inclusion in pedagogical practices.

In higher education, the pandemic has brought a needed visibility to topics and practices within diversity and inclusion. In Chapter 10, *Working Towards Equity: Meeting the Online Learning Needs of Students with Disabilities*, DeRonck, Monte, and Werling Morel describe a case study about changes in college instruction during the COVID-19 pandemic experienced by students with disabilities. By highlighting the roles of faculty and students, the authors provide avenues for creating a successful online learning experience for students with disabilities. A balance of challenges and benefits makes this chapter enlightening and useful. Areas for continued development for faculty and students including additional training, and advocacy, are described.

Mann contributed Chapter 11, *Practical Strategies for Supporting College Students with ASD: A Guide for Faculty*. This chapter provides practical considerations grounded in empirically-supported research. Among some important issues rarely addressed,
is how group work could be especially challenging for some students with autism spectrum disorder (ASD). Importantly, this chapter highlights the heterogeneity of students with ASD, and, the fact there is no such thing as a one-size-fits-all approach. This chapter promotes much-needed perspective-taking skills for instructors to create more inclusive learning environments.

Chapter 12 titled **Integrating Behavioral Science and Rightful Presence to Support Diversity, Equity, and Inclusion (DEI) in Online Learning Environments** by Anderson-Carpenter, presents a novel and necessary integration of a socially-valid framework with behavioral science. This chapter describes how self-assessment and practical questions can be used to encourage growth of instructors and disrupt a hierarchical model of teaching. Following Anderson-Carpenter, the infusion, and integration of DEI is progressively increasing in pedagogical literature, yet such literature in behavior analysis warrants more of this integrative and interdisciplinary approach to inclusive learning. The introduction of rightful presence emphasizing compatibilities with behavioral science serves both as a conceptual and practical primer to instructors beyond behavior analysis.

These chapters represent current implementations of behavioral instruction grounded in basic research. The contributors shared their experiences from these implementations, ideas, and recommendations for further implementations. The balance of evidence-based approaches, collaborations, and openness to change in the learning environment are present in each one of the chapters.

We recognize that these chapters are not exhaustive and that this book does not intend to provide a complete overview and tools of online teaching, rather a selection that encompasses relevant and current themes, experiences, and implementations that we hope are helpful to the members of our teaching communities. We also acknowledge a rich and existing body of literature within behavior analysis and other fields of similar applications that have inspired much of the work presented here. Our original goal, which remains at the foundation of this book, is to start and continue conversations with colleagues.

Another foundational inspiration that was agreed upon by all contributors is the fact that this book, from its inception, has been an Open Educational Resource (OER). As an OER, this edited book can be used for free, reducing cost, increasing access and equity (Howard, 2019). We support the creation of OER to better serve students and instructors, and to serve education as a common good.

We want to close highlighting the importance of collaborations. As teachers and scholars, we may feel lonely, but our work is not done in isolation. We are better together and we are a community that can only grow as a collective. To reinforce this aspect of the work, we acknowledge our contributors and we outline below additional sources of support and collaborators who contributed to this work. Thank you all.

**Acknowledgements**

We are extremely grateful to have had the opportunity to collaborate and learn from such a wonderful and dedicated group of colleagues in the conference and editing this book.
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Additionally, we would like to thank co-sponsors of the conference: the Center for Excellence in Learning and Teaching (CELT), Online Education Committee, Information Technology Committee at Western Connecticut State University; the University of Saint Joseph for facilitating the recording and provision of continuing education units (CEUs) approved by the Behavior Analyst Certification Board (BACB); and the Faculty Mentoring Program, and the Center for Excellence in Learning, Teaching, Scholarship, and Service (CELTSS) at Framingham State University, MA for supporting the organization of the conference and the facilitation of Q&A throughout the conference.

Live captioning was provided via Otter.AI, courtesy of the Behavior Analysis Resource Center at University of North Texas.

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We thank our contributors who stuck with us for the time after the conference. We look forward to continuing to work with you on future projects. And we thank you for reading and using this book in your teaching and research.
References

Over the past several decades, behavior analysts have been interested in the development of effective educational strategies while capitalizing on current technologies (e.g., Johnson & Ruskin, 1977). From Skinner’s (1958) *Teaching Machines* to the analysis of online personalized systems of instruction (e.g., Pear & Crone-Todd, 1999) to interteaching (e.g., Boyce & Hineline, 2002), behavior analysts have developed and applied systems of instruction that lead to efficient and durable learning.

These behavioral instruction techniques are designed to solve problems that have been observed in higher education. In a conventional college classroom (i.e., one in which a lecturer presents material to a large number of students), student work is not adequately reinforced (Keller, 1968) or it is maintained by long-term contingencies (Boyce & Hineline, 2002) such as the awarding of a grade at the end of the semester, or the receipt of a degree after 120 credits have been earned. Within a class, instruction typically progresses as if all students learn at the same pace (Boyce & Hineline, 2002) and students may not receive individualized attention (Keller, 1968). In large lecture-style courses, it is difficult to achieve active participation (i.e., asking and answering questions, participating in demonstrations), even though such active responding demonstrably improves learning. Even when there are opportunities for active responding built into the class session, only a small portion of students tend to participate (Boyce & Hineline, 2002). Research has consistently shown that a lecture-based format is less effective than other behavioral education strategies (e.g., Bernstein & Chase, 2013; Saville et al., 2006), despite fluent lecturers leading attendees to report that they have learned something (Deslauriers et al., 2019).

Behavioral instruction strategies have been developed to counter the limitations of conventional college instruction. These techniques generally have the following traits: management of educational consequences, the division of course material into small units, multiple opportunities for response, observable behavior as a measurement of learning, individualized education, and emphasis on social validity (cf. Bernstein & Chase, 2013). As Holland (2003) noted, “[a] student learns what he or she performs” (pp. xvii–xix). Thus, the observable responses made by students should be informed by the priorities of the educational program.

Not only can behavioral instruction techniques be useful in a conventional college classroom, but these strategies may be of particular importance when considering online instruction. With online instruction, teaching can take place outside of a classroom setting.
In fact, the use of asynchronous classes delivered remotely has increased throughout the years, with 35.3% of college students taking at least some remote courses prior to the COVID-19 pandemic (U.S. Department of Education, 2018). Additionally, with the recent global pandemic, many students experienced first-hand the transition from traditional in person classes to online courses. Students reported a multitude of issues with transitioning to online courses, including lack of motivation, connectivity issues, finding a quiet space, having the needed electronic resources, and simply being able to fit the course into their other responsibilities and home life (Means & Neisler, 2020). The application of behavioral instruction strategies has the potential to alleviate some of these issues and increase the efficacy of online instruction in general (e.g., Krebs et al. 2021).

While this is not a comprehensive list of behavior-analytic instructional techniques, the following four techniques were selected for this chapter because they have been used successfully in higher education, suggesting that they are useful in teaching advanced concepts to adult learners. The techniques we will highlight include programmed instruction (e.g., Kulik et al., 1980), personalized system of instruction (e.g., Kulik et al., 1979), interteaching (e.g., Boyce & Hineline, 2002), and contract grading (e.g., Lindemann & Harbke, 2011). For a discussion of other behavioral instruction strategies that emerged in the 1960s and 1970s, interested readers are encouraged to refer to the book by Johnson and Ruskin (1977). In that text, the authors deftly articulate the rationale for and the evidence supporting behavioral instruction, and their work lays the foundation for subsequent developments.

In what follows, we will describe the four behavioral instruction techniques listed in the previous paragraph (see Table 1 below, for a summary). We will begin by describing the origins of these techniques and evidence supporting their use before turning to a description of their application to online education. Our goal in this chapter is to provide an overview of these strategies, including a description of the evidence of their effectiveness, along with some suggestions for how they might be employed in online education.
## Table 1

### Summary of Behavior-Analytic Techniques

<table>
<thead>
<tr>
<th>Technique</th>
<th>Components</th>
<th>Benefits</th>
<th>Limitations</th>
</tr>
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| **Programmed instruction** | - Clear learning objectives  
- Material broken down into steps  
- Students progress at their own pace  
- Fading/prompting used  
- Students respond frequently  
- Immediate feedback | - Reduce instructional time  
- Students can learn at their own pace | - Time intensive to develop  
- May experience push back when implementing as PI differs from traditional lecture approach |
| **Personalized system of instruction** | - Learning objectives and study questions used  
- Students complete a mastery quiz  
- Must pass quiz before moving onto other material  
- Lectures are motivational tools  
- Emphasis on mastery | - Students can work at their own pace  
- Higher performance relative to conventional classes (Kulik, Kulik, & Cohen; 1979) | - Self-pacing can lead to procrastination  
- Grade distributions negatively skewed or bimodal  
- Students may dislike the lack of class time |
| **Interteaching** | - Preparation guide given to students  
- Small groups formed in class to discuss preparation guide questions  
- Instructor facilitates discussion  
- Students fill out record at end of class to identify material that was difficult  
- Instructor constructs lecture based on record | - Students report favoring interteaching over traditional learning  
- Ability to self-pace within a class setting, but not across a semester  
- Emphasis on student discussion decreases time spent delivering lectures | - Time intensive to create  
- Session quality of class could be poor if participation is poor |
### Contract grading

- Assignments scored pass/fail
- Mastery criterion is set by instructor and students
- Students can revise work
- Students may choose from a catalogue which assignments to complete

- Large flexibility in tailoring contracts to a class or individual students
- Students can track progress
- Students report feeling more in control of their grades
- Emphasis on mastery

- If students given complete control over contract may choose "easiest" assignments
- Time intensive to create a contract
- Grade distribution likely to be bimodal

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**Note.** The four behavioral instructional techniques discussed in this chapter are summarized below as a reference guide. From left to right, each technique, main components, benefits, and limitations are presented in bullet points.

### Programmed Instruction (PI)

A drive for efficiency in the delivery of instructional materials set the occasion for the development of Programmed Instruction (PI). Pressey (1927) sought “to free teachers of much of [their] burdensome routine so that [they] could do more real teaching” (as cited in McDonald et al., 2005, p. 25). To solve this problem, and to promote active responding by students, Pressey developed an automated testing/grading machine, which reduced the burden of the tedious but necessary work of evaluating student progress. Pressey’s work ended in 1932. Benjamin (1988) suggested that the cultural environment of the 1920s was not ready for teaching machines, but when Skinner picked up the idea a few decades later, the zeitgeist had changed, and they were more accepted.

Skinner’s (1958) devices involved large paper discs that displayed instructional materials, questions, and answers, divided into frames. Students could progress through the instructional programs at their own pace, reading the questions and providing and checking their answers, with immediate feedback provided in the programs. This feedback also helps to maintain the student’s interest. The frequent need for responding created students who were “alert and always busy” (Skinner, 1958, p. 971). Watters (2021) presents a cogent and comprehensive history of teaching machines, clarifying the conditions under which they were developed, and the challenges that prevented them from being widely adopted. In her analysis, Watters describes the work of Pressey, Skinner, and other instructional designers as they worked to hone the technology of teaching machines and develop marketable models.

Skinner’s teaching machines were delivering PI, which Holland (2003) defined as arranging “sequences of contingencies to meet behaviorally defined educational objectives" (p. xxiv). Fernald and Jordan (1991) defined PI in terms of the following components: (a) clear learning objectives are developed; (b) material is broken into small units which are...
organized in a logical progression; (c) prompting and fading are used to elicit the correct response; (d) students respond frequently; and (e) feedback is provided immediately.

Students using instructional programs work through the material at their own pace and are provided with feedback immediately after their response so they can track their own learning. The goal with PI was to achieve errorless learning (i.e., incorrect responses occurring less than 5% of the time; Holland, 2003). Skinner (1958) proposed that better learning would result from students composing their answers to questions rather than answering multiple-choice questions, since recall is a desired target response instead of recognition. The difference in response modality marked one of the departures between the work of Pressey and Skinner (Watters, 2021).

Skinner’s model involved a linear progression through steps within a program. Other programs involved branching steps, which move learners through dynamic programs based on their performance rather than having a consistent sequence of programming. This changing program may be more challenging—and, therefore produce more interest—than Skinner’s error-free model. The opportunities to make mistakes “could be useful in diagnosing why a student made a mistake” (Watters, 2021, p. 142, italics in the original).

On the development of frames in PI, Skinner (1958) wrote: “Each step must be so small that it can always be taken, yet in taking it the student moves somewhat closer to fully competent behavior” (p. 970). Skinner described how each instructional step was presented as a frame, with only one frame available at a time. In Skinner’s arrangement, students worked through each program until all items were responded correctly, promoting mastery. This mastery requirement ensures that all students can progress through material at their own pace.

Skinner (1958) commented that the performance of the students in an instructional program provided feedback to the programmer. This notion may have informed the truism of behavioral instruction that “the learner is always right”. The frames that frequently have incorrect responses can inform the programmer that the instruction is not as effective as it could be. As Skinner noted, such immediate feedback is not available for conventional lecturers or to textbook authors.

Early research evaluating PI found that students worked through their programs at a high and steady rate (Lloyd & Knutzen, 1969). PI has been shown to produce similar learning outcomes in less instructional time than other methods (e.g., Fernald & Jordan, 1991), and students withdrew from PI classes at rates comparable to classes with other instructional modalities (Kulik et al., 1980). In a meta-analysis, Kulik et al. (1982) found mixed results, with 24 of 47 studies finding higher performance in conventional class arrangements compared to PI. These authors concluded that PI did not lead to definitive increases in performance, or improvements in attitudes about the subject matter being studied or the quality of the education they received. Furthermore, Kulik et al. (1982) found that the aptitude of the student influenced performance equally in PI courses and standard educational settings. However, Kulik et al. (1982) noted that more recent studies had larger
effect sizes than earlier studies, suggesting that the refinement of PI may have produced a more effective educational strategy.

Miller and Malott (1997) found that requiring overt responses in PI led to greater improvement on a written exam than for a read-only group. This effect was maintained even when there was a grade-based incentive for improved performance on the posttest relative to the pretest. Harrington (1999) compared performance in an in-person and a computer-based remote PI statistics course. She found that students with a lower GPA performed worse in the PI course than students with high GPAs, and that the in-person students all performed at about the same level as the high-GPA remote students, independent of their GPA. This finding suggests that while PI might be effective for some students, others might need additional supports to be successful. Individualizing the educational approach for each student, based on their unique progress, might be one way to promote student success.

Despite these benefits, the PI model is not without limitations. It is time-intensive to develop and test good instructional programs, identifying the necessary and sufficient components that allow students to achieve mastery (e.g., Holland, 2003). From the perspectives of administrators or colleagues who are not behavior analysts, PI may not look like college-level instruction since there is far less lecturing and far more self-paced, individual working than a conventional college class. Thus, some advocacy might be required to convince these parties that this is, in fact, teaching. Skinner (1958) suggested that the high levels of student success (i.e., the requirement for mastery) might make PI seem too easy for the students. He also raised concerns about the generalization of performance to “real life” from the programmed environment. This concern about the generality of text-based skills may be endemic to all educational enterprises.

Although PI was initially developed in an analog setting, it is possible to adapt this technology to an online environment. For instance, Davis et al. (2007) compared three models of online information presentation in a college class: a scrolling website, typical PI, and PI with progressive prompts when incorrect responses were made. In the standard PI condition, students read material in frames and had the opportunity to respond to questions throughout the tutorial. Following a response, the correct answer was presented. In the prompting condition, for each incorrect response, one letter for the correct answer was provided, and the learner had several opportunities to respond correctly. In the scrolling condition, no active responses were required as students moved through the material. The students in the prompting condition spent more time than the traditional PI condition, and both PI conditions involved more time spent by the students than the scrolling website condition. These PI conditions both yielded higher post-test scores and scores on essays related to the material than the scrolling website condition.

Generally, to apply PI in an online environment, the instructor should begin with clear learning objectives. The material to be taught should be broken into small pieces (i.e., frames) where content is presented to the learner. Opportunities should be provided for the learner to respond and receive immediate feedback. A pretest could help determine where the learner should begin with their training program, and the material should be structured in
a way that progresses from recitation of facts to application of material. As a starting point, existing programmed texts (e.g., Holland & Skinner's 1961 *The Analysis of Behavior*) could be used as a model for the development of new materials.

PI could be implemented in a relatively low-tech way using an online survey application. The frames of material could be presented as text or images, and the questions could be built into a quiz format. Logical structures within the survey could allow for students to receive differential feedback based on their responses. Branching programs could also be used to move students through multiple versions of the program, but this may require additional technological skills and more sophisticated software. Of course, the refinement of the instructional frames would likely take several iterations to ensure that the instructional components were necessary and sufficient to produce the desired terminal performance. The revision process of programmed materials could be aided by the data provided by the software used to administer it, including accuracy and time spent on each frame.

**Personalized System of Instruction (PSI)**

The Personalized System of Instruction (PSI) was developed by Fred Keller and his colleagues, J. G. Sherman, Rodolfo Azzi, and Carolina Martuscelli Bori (Johnson & Ruskin, 1977), as they built upon the technology employed in PI. Keller’s (1968) model of PSI began with the instructor’s selection of textual material. Based on these texts, the instructor develops learning objectives and study questions. Students work through the study guide and review questions before taking a mastery quiz. In Keller’s model, more advanced students administered and graded these quizzes. If a student failed to meet the specified mastery criterion on the quiz, they were provided with feedback about the materials that they did not master and were given the opportunity to study again before retaking the quiz. If they did meet the mastery criterion, students were permitted to move on to the next unit of material. In this model, lectures or demonstrations performed by the instructor were used as a motivational tool—only those students who had reached a particular unit of material could attend the lectures.

In a meta-analysis of PSI research, Kulik et al. (1979) found higher performance in PSI conditions relative to conventional classes, with about an 8% increase in grades in PSI courses. They also found that students in PSI courses retained more information for a longer period of time compared to conventional courses. Furthermore, student ratings of social validity were moderate to higher than traditional teaching methods (Kulik et al., 1979; Pear & Crone-Todd, 1999), but some students may dislike the lack of interaction with the professor and the lack of scheduled class time (Pear & Novak, 1996). Buskist et al. (1991) suggested that the key components of PSI that make it effective in boosting student performance are the requirement of mastery, immediate feedback, and review units. These authors suggested that the self-pacing, optional lectures, and peer proctors/tutors are not sufficient to improve performance on their own.

As with the other instructional strategies discussed in this chapter, PSI requires high levels of student engagement (Pear & Novak, 1996). Self-pacing may lead to procrastination.
on the part of the students (Bernstein & Chase, 2013; Eyre, 2007), but contingency management has shown to be effective in mitigating this problem (e.g., Brooke & Ruthven, 1984).

In PSI courses, grade distributions are either negatively skewed or bimodal (Bernstein & Chase, 2013), which may be problematic for colleagues who are used to normal distributions in grades. Furthermore, administrators may feel that instructors are not actually teaching when they use PSI (Eyre, 2007), although PSI is more time intensive for the instructor than strict lecture-based classes (Bernstein & Chase, 2013; Eyre, 2007).

Although it was developed as an analog technology, PSI has a long history of electronic administration. Over two decades ago, PSI was converted to a computer-based system: the Computer-aided Personalized System of Instruction, or CAPSI. Pear and Crone-Todd (1999) carried out a CAPSI system that involved, essentially, an asynchronous online course, on an intranet instead of the internet. Students in four classes (two sections of behavior modification, learning, and history and systems) participated, and 68% of students completed their course. This system involved students taking unit tests (3 randomly assigned short-answer questions per unit) graded (within 24 hours of completion) by proctors. The proctors were students who had already passed the test for the relevant unit, and grading was double-blinded. The possible grades were pass or restudy, and a 1-hour delay was imposed before the next test was available to provide time for studying. Two proctors graded each test, and their assessments had to match for the grade to count. Students could appeal grades by providing “a valid argument for why his or her answer was correct” (p. 206). Midterm and final exams were graded by the faculty instructor of record. Across all of the students participating in these classes, there was a 48-100% completion rate (average = 65.94%). The average grades on the midterm exams were higher than on the final exam (86% vs. 71%, respectively). Most students were satisfied by the course, with 54% of students rating it as good or very good compared to other classes.

To remain faithful to the PSI model, moving this type of instruction online would require coordination with the proctors, and a learning management platform sophisticated enough to have multiple levels of permissions to provide grading access. The self-paced materials should be developed in advance of the course start date (similarly to the PI materials described previously), and access to these materials could be staggered, with release of the next module dependent on student progress. Lectures or demonstrations from the faculty member could be prerecorded or held synchronously, to capitalize on the motivational aspects of that component of the course. PSI could thus be delivered in either a synchronous or asynchronous online format.

**Interteaching**

The behavioral approaches to classroom instruction such as programmed instruction (PI) and personalized system of instruction (PSI) have not been readily adopted in the teaching community. These techniques may not be adopted because they require extensive time to prepare (Bernstein & Chase, 2013), the approach does not fit into the traditional calendar (Saville et al., 2006), or because it clashes with the traditional form of education in
today’s world. In an effort to remedy the issues seen in PI and PSI, Boyce and Hineline (2002) developed interteaching, a behavioral approach to instruction that emphasizes small class discussions, changing the role of the instructor from lecturer to facilitator, and using records of student work to customize a lecture for the following class (see Querol et al. 2015 for a review).

A typical interteaching session was described as a “mutually probing, mutually informing conversation between two people” (Boyce & Hineline, 2002, p. 220). Interteaching begins with students receiving a preparation guide which contains information on what topics are most important and the relevant due dates. This guide helps students navigate through specific material. Students are expected to complete this preparation guide prior to coming to class. Once in class, students form small groups and discuss the questions. Boyce and Hineline recommended that different students should work together for each interteaching session to avoid consistent pairing of students who struggle academically. While the students are discussing, the instructor moves among the groups to facilitate discussion, clear up any confusion, answer questions and monitor the students’ understanding of the material. At the end of the interteaching session, students fill out a record. The instructor then uses this record to identify any material the students collectively struggled with, as well as identify any components students found particularly interesting. This record guides the instructor in what material to include in the subsequent class.

Though the overall format of interteaching is consistent, there are several additional components an instructor can introduce. First, to improve student discussions an instructor can require students rate their discussion and provide a rationale for why they deserve that rating and instructors can offer “quality points” if all participants in a group perform well on a certain portion of the exams (Boyce & Hineline, 2002). Saville et al. (2006) recommended offering quality points to students who effectively engage within their discussion groups. Another component of interteaching is to evaluate student progress via “probes”, such as quizzes or exams. Boyce and Hineline recommended that students know the questions on the probe in advance and to administer a minimum of five probes throughout the semester.

The role of the instructor during an interteaching session deserves particular attention. In the traditional lecture format, the instructor simply delivers information. During an interteaching session, it is the instructor’s role to facilitate discussion by rotating between the groups of students answering any questions or clarifying any points of confusion (Boyce & Hineline, 2002). Saville and colleagues (2006) found that because instructors facilitate discussion, they actually interact more with their students than during a typical lecture. This increased student-instructor interaction “allows instructors to deliver additional reinforcers for appropriate behavior” (p. 58). Furthermore, instructors develop a lecture tailored to their current students, based on the content students request in their reports. Not only does this report lessens the instructor’s workload of developing a lecture from scratch, it also likely functions as a reinforcer for the students’ attendance, participation, and engagement, since the lecture is based on their questions, concerns, and interests.
Although anecdotal evidence (e.g., Boyce & Hineline, 2002) supports the effectiveness of interteaching, relatively few empirical studies on its effectiveness are available. In an early laboratory study, Saville and colleagues (2005) assigned undergraduate students to one of four conditions: interteaching, lecture, reading, and control. Participants in the interteaching condition received a preparation guide before they read a journal article. Students were given 15 minutes to read the article and answer the questions given. Afterwards, participants formed pairs and discussed the questions while the second author moved between groups of students answering any questions. Lastly, the students informed the instructor of any questions they wanted to go over more in depth. During the lecture condition, students heard a 45-min lecture where they were allowed to ask questions throughout. In the reading condition participants were instructed to read the article and study the information in it. In the control group, participants had no exposure to the information contained in the article and took the quiz when they arrived at the laboratory. After the initial teaching sessions, students returned to the laboratory and took a short quiz. Participants in the interteaching conditions answered significantly more questions correctly than participants in the other three conditions.

In a more applied setting, Saville et al. (2006) alternated interteaching and conventional lecturing within a special education course. Test scores following the interteaching sessions were higher compared to test scores following lecture. Additionally, students performed better on exam questions that were based on interteaching than questions based on the lecture. Lastly, Saville and colleagues administered a social validity questionnaire asking students to choose between interteaching and lecture and to rate the extent of learning that occurred in each condition. A large majority of the students indicated they preferred interteaching to the conventional lecture and that they learned more with interteaching. The improved test scores with interteaching seen in this study supports the use of interteaching, and the students’ stated preference for interteaching is an additional benefit.

Even though peer interactions are a primary component of interteaching, there have been several studies demonstrating that interteaching can be effective in an online learning environment (Gayman et al., 2018; Gayman et al., 2020; Rieken et al., 2018; Soldner et al., 2017). Gayman and colleagues (2018) conducted a study with 76 students enrolled in two sections of an asynchronous online undergraduate psychology class. The study implemented an alternating-treatments design, in which students were taught either using a traditional lecture or an interteaching session for each week. To facilitate discussion in an online environment, Gayman and colleagues had students complete discussion posts where students were responsible for answering prep questions. The interteaching method produced more A and B grades whereas the traditional lecture method produced more Cs, Ds, and Fs. An interesting component to this study was that students were divided into 3 groups based on their GPA: low, moderate, and high. The students in the low GPA group improved their exam scores by 7.22% following an interteaching week, students in the moderate GPA group improved scores by 4.24% and students in the high GPA group improved scores by 3.17%.
Though preliminary, these data could suggest that interteaching may help students who are already struggling with their academic success.

Interteaching has the flexibility to be used with asynchronous classes (Gayman et al., 2018), as well as during live components of an online class. For instance, Rieken and colleagues (2018) compared a modified interteaching strategy to a traditional lecture-style. During interteaching, students video chatted synchronously with one another to discuss the comprehension questions and to construct a teaching record and then listened to the provided lecture. The students in the interteaching section had a higher average quiz score than those in the traditional lecture style section. Interteaching has the possibility to be applied effectively and efficiently via online format, and it has the flexibility to fit both student and instructor needs.

Interteaching has several benefits. The first and most predominant being that it improves student learning outcomes (Dunn et al., 2013; Gayman et al., 2018; Rieken et al., 2018; Saville et al., 2005; Saville et al., 2006; Saville et al., 2012). Additionally, students generally rate interteaching more favorably than a traditional lecture approach and generally give positive feedback for classes that use an interteaching component (Gayman et al., 2018; Gayman et al., 2020; Saville et al., 2006). Another benefit for students is that interteaching allows them to self-pace within a class period, rather than across an entire course (Boyce & Hineline, 2002; Saville et al., 2005). This is beneficial because a main limitation of other behavioral instructional approaches such as PSI is that students are required to self-manage, which has resulted in students being unable to pace themselves adequately throughout the whole semester (Bernstein & Chase, 2013; Eyre, 2007).

Instructors also experience some benefits from this teaching style. For instance, instructors can avoid being redundant during lectures (Boyce & Hineline, 2002) since they can construct lectures to consist of only the information students are struggling with or had an interest in. Additionally, even though interteaching requires some initial time investment in preparing the course, the emphasis on student group discussions requires less lecturing and reduces time spent preparing and delivering lectures (Saville et al., 2005). Lastly, instructors are still playing a vital role in interteaching as a facilitator of discussion, so students, colleagues, and administrators still view instructors as playing an active role (Saville et al., 2005) whereas in PSI and PI instructors have been criticized for not contributing to the learning process (Eyre, 2007).

Despite the benefits interteaching offers, it still comes with some limitations. The amount of work in implementing interteaching the first time can be considered extensive and difficult (Querol et al., 2015). Transitioning a course from traditional lecture to interteaching will require work from the instructor as well as developing the preparation guides to be used in subsequent classes. Additionally, because of the nature of interteaching instructors will spend a small amount of time lecturing (Boyce & Hineline, 2002) which could be seen as a drawback for instructors who enjoy lecturing or have a long learning history with it. On the other hand, out of the behavioral instruction strategies discussed, interteaching does allow the instructor more time to lecture than other behavioral methods.
(Saville et al., 2005). Furthermore, it is possible that session quality of the class could be poor if class participation is not contingent on effective interteaching/discussion (Boyce & Hineline, 2002). Lastly, underperforming students are likely to choose to work together, resulting in poor academic performance for this group of students over time (Boyce & Hineline, 2002). Though these limitations are valid, many could be solved with proper planning and adequate resources.

Overall, empirical research supports the use of interteaching in college classrooms, whether in person or remotely. Adapting an interteaching approach to an online format would require some upfront planning by the instructor. A preparation guide should be made available to students virtually within the online classroom. There are several possible options for instructors when it comes to the discussion portion of interteaching. Instructors could require discussion board posts (Gayman et al., 2018; Rieken et al., 2018) or incorporating breakout rooms to allow students to discuss live (Soldner et al., 2017).

For the session record, instructors can upload a document for students to fill out and submit after their discussion and then use the virtual record to constructor follow-up lectures that can be delivered synchronously or asynchronously. Krebs and colleagues (2021) described how interteaching could be used in both an asynchronous or synchronous classroom and give recommendations for increasing student participation. They recommend using breakout rooms to have students answer a set of questions and complete a record to provide feedback to the instructor about any questions that were unclear.

**Contract Grading**

Thus far, the behavioral techniques discussed have focused on teacher interaction, student discussions, breakdown of information into small units, and mastery criterion, but none have targeted the grading system directly. One behavioral strategy that focuses on the evaluation process is contract grading, which is “a system in which students determine and specify at the beginning of a class the grade they would like to earn, from a set of instructor-defined parameters” (Lindemann & Harbke, 2011, p. 1). The general format of contract grading is as follows: (a) assignments are scored pass/fail; (b) a mastery criterion is determined by the instructor and students must meet this criterion to successfully pass the course; (c) students can revise work to earn a passing grade on assignments and activities; (d) students usually have the ability to choose from a catalogue which assignments they would like to complete. In general, an instructor and students can work together to develop a contract that describes the objectives of the class, the behavior that will be evaluated, the assignments and which grade the student wishes to contract for (Lemieux, 2001). For instance, Lindemann and Harbke constructed a grade contract where students contracting for an A in the class must pass 4 exams with 80% or higher, complete, 3 writing assignments and 3 activities.

There are a multitude of ways to tailor a grading contract to each classroom and to individual students. Hiller and Hietapelto (2001) discussed that when they have implemented contract grading in their pass classes they sometimes require certain assignments, but give the students the choice in deciding the weight of that assignment (how much it should be
worth). This is a particularly useful adaptation of contract grading because there are some assignments in courses that must be required. For example, completing a research project proposal should not be an optional assignment in a research methods class, whereas participating in a research experiment on campus could be deemed optional in other courses. Another possible variation of contract grading involves instructors designing the contracts themselves. Kirkschenbuam and Riechmann (1975) used contract grading with a large class, which made it impossible to construct the contract with student involvement, therefore the instructors designed the contract themselves. Students were then allowed to choose which grade they wanted and were made aware of what assignments and grades on exams would be required of them. While students reported they preferred contract grading, there were no performance outcomes included in this study. Other variations could include letting students pick from a menu of assignments to complete, having students decide what behaviors are acceptable in the classroom/discussions, and having students pick what the teacher is responsible for (being available during certain times, answering emails by a certain time, or having grades completed after a particular time).

A large component of the grade contract involves a negotiation between students and instructors (Hiller & Hietapelto, 2001). It is not necessary to have this part of the process when designing a grade contract if instructors want certain components within their contract (see Elbow, 2008; Kirkschenbuam & Riechmann, 1975), but some studies do include this component. Hiller and Hietapelto negotiated with their students on what assignments to include as well as let students create their own assignments that they felt were relevant. Additionally, they allowed students to decide on some evaluative components within the contract, such as choosing to give feedback to peers after presentations and feedback to an instructor halfway through the semester. Gooding (2009) used a grade contract within a beginner-level guitar class. Students were given a contract developed first by the instructor but then were given the opportunity to modify it through group consensus. Students chose how much they should be expected to improve on the guitar throughout the semester (measured via number of errors and percent improvement of tempo) and what reward they received. Improvements were largest and errors decreased the most for the two contracting groups. Although it is not a necessary component, the negotiation process may make students feel more involved in their own learning and help clear up any inconsistencies that may arise.

A grade contract is similar to a contingency management contract, which is a behaviorally based treatment where a target behavior is chosen and a reward is delivered contingent upon that behavior (e.g., Kelley & Stokes, 1984). It is possible to conceptualize grade contracts as a contingency management intervention. The contract lists out various behaviors on the part of the student such as completion of assignments, discussion in class, arriving on time, and contingent on these behaviors the reward of an A is delivered. Van Patten and colleagues (2015) implemented an academic contingency management strategy with members of a fraternity. These authors identified major assignments due for each member of the fraternity and split the members into two groups: one receiving contingency
management and a control group. Participants who experienced the contingency management strategy were instructed that contingent on a certain grade, they were allowed to select a prize from a bin. The contingency management group showed an increase in GPA during the semester and this increase was maintained over time, whereas participants in the control group did not show the same increase.

Contract grading has been shown to be effective in a multitude of ways with students reporting feeling more control in their grades, being able to monitor themselves more efficiently, being more involved in the learning process, and preferring these contract grade to the traditional grading system (Grau, 1999; Hiller & Hietapelto, 2001; Kirschenbaum & Riechmann, 1975; Polczynski & Shirland, 1977). Unfortunately, many of the studies were conducted during the 1970’s, and today’s classroom may be importantly different from classrooms 50 years ago. The advancement of technology has altered the traditional college classroom from in-person with a blackboard to potentially 100% online. As such, a need exists for the evaluation of grade contracts in the modern classroom.

One such study was conducted by Lindemann and Harbke (2011) where they used contract grading in an introduction to psychology class, with one section receiving a grade contract and the other using the traditional grading scheme. Their grade contract consisted of grading assignments as pass/fail, having an 85% mastery criterion, allowing students two opportunities to resubmit work, and allowing students to pick which assignments to complete. Lindemann and Harbke measured grades and several self-report measures to evaluate the course, instructor, and student effort. Students in the contract grading group were three times as likely to receive an A in the course, rated the instructor more favorably, reported a higher degree of control over their grade, and rated their effort higher than compared to the traditional grading group. Gooding (2009) also reported similar results in a beginner level guitar class, where students in the contract grading group increased their performance and decreased their rate of errors on a chord progression more than traditional grading group.

Preliminary results suggest that contract grading can be used successfully in a contemporary classroom, but additional research is required with other teaching modalities such as online instruction. Currently, the research of implementing contract grading via remote courses is light, but the potential is there; it is possible to use contract grading even in a remote format. Instructors could create a survey with ease in the online classroom and let students pick and choose which assignments to complete, what grade they would like, what should be expected of them and from the instructor. Furthermore, students would be able to track and monitor their progress easily with an online gradebook as well as document how many times they needed to re-do an assignment to receive a passing grade.

There are several benefits of contract grading for both the instructor and the learner. From the perspective of the learner, students are better able to track their progress throughout the course (Grau, 1999), the student may feel more control or empowered in their learning process (Kirschenbaum & Riechmann, 1975; Lemieux, 2001), with assignments graded as pass or fail there is more emphasis placed on mastery rather than
simply doing enough to get a C (Lindemann & Harbke, 2011). Contracting allows students to make decisions on how they would like to learn (Hiller & Hietapelto, 2001) which in turn could result in students preferring contract grading over the traditional grading scheme (Kirschenbaum & Riechmann, 1975). A contract also makes the contingencies very clear to students so they know exactly what to expect from the class and what behaviors to emit to obtain the grade they desire. Arguably the most important benefit for the student is that grade contracts have been shown to improve performance more than the traditional grading system (Frank & Scharff, 2013; Gooding, 2009; Lindemann & Harbke, 2011).

Instructors can also benefit from this behavioral approach. Since assignments are graded as pass or fail, the time spent on grading is reduced for instructors. This time can allow instructors to focus more on helping students revise their work, meeting with students, or creating more effective material for the class. Lastly, contract grading allows a large amount of flexibility for the instructor. If the instructor wishes to let students be in control of all aspects of the class that is possible, but if the instructor would like certain assignments completed that can also be accommodated within a contract (Hiller & Hietapelto, 2011). This flexibility allows an instructor to tailor a contract specifically to each class and potentially each student if they so choose.

Despite the many benefits of grading contracts there are always limitations worth noting. One limitation discussed by Hiller and Hietapelto (2001) is known as “free ridership abuse”. This occurs when students are given complete control over the contract and they choose to complete the “easiest” assignments or weight the “hardest” assignments the lowest. This results in students essentially creating an easy class. Though a reasonable concern, if instructors are vigilant during the contract designing process this could be avoided during the negotiation process or by implementing certain assignments that are not optional. Another limitation is that it may be difficult for instructors to give up full control of the class assignments (Hiller & Hietapelto, 2001). Instructors will need to practice on how best to balance each class with giving students more or less control of assignment options. Additionally, instructors may feel an increased burden in preparation for class as the time developing a contract and negotiating it with students may take up some class time (Hiller & Hietapelto, 2001). Lastly, because contract grading uses a pass/fail orientation the grade distribution for classes is likely to be higher than classes with a traditional grading system. Though these limitations are valid, with practice and experience instructors can potentially mitigate the effects of many of these disadvantages.

Contract grading has been shown to be a good substitute to traditional grading systems. The benefits of increased improvement as well as students being more involved in their own learning are appealing. The flexibility of the contract makes us optimistic that contracts would be successful in a remote format as instructors have the capability of uploading a contract and having students sign them electronically. If negotiation is needed a virtual meeting can be scheduled between student and instructor. Additionally, with online classrooms students will be able to easily see what assignments they are contracted to complete and be able to monitor their own progress via a gradebook.
General Discussion

Behavioral instruction strategies have been developed to solve problems seen in a conventional classroom such as using aversive procedures to change behavior, a lack of individualized education, and learning being maintained by long-term consequences. The main elements of these behavioral instruction techniques (i.e., contingency management, observable behavior, individualized education, and active student responding) leads to their effectiveness in promoting behavior change in students. Despite their efficacy, behavioral approaches to education are still not widely accepted today.

There are several reasons for the lack of adoption of behavioral strategies in education. The techniques discussed above do not coincide well with other traditional pedagogical practices (Buskist et al., 1991). Additionally, these behavioral methods result in higher grade distributions, which some educators perceive as grade inflation. Current instructors may be resistant to transitioning to a behavioral approach to learning because lecturing is what they have done since they started their profession. Switching to a behavioral teaching style could take considerable time and effort on the part of the instructor (Saville et al., 2011; see also the concerns raised by Elcoro in this volume related to engaging in novel areas of scholarship). Students may also be resistant to these new approaches as their learning history thus far has been with traditional lecture style teaching. If an institution places high emphasis on student feedback instructors may be hesitant to use behavioral instruction for fear of low evaluations from students. Lastly, the philosophy of behaviorism has been misunderstood or rejected which has likely contributed to the lack of widespread adoption of behavioral techniques in education (see Watters, 2021) for a discussion of this issue with respect to teaching machines).

With new developments in technology these reasons for the scarcity of behavioral instruction may be irrelevant. Pedagogical practice has been changing rapidly within our society, especially with the recent emergency shift from conventional classrooms to an online environment (e.g., Krebs et al., 2021). The resistance to these strategies may be diminished as both students and instructors have been exposed to different teaching formats delivered using Zoom, Skype, BlackBoard, and other online resources. With the rapid increase of online instruction, it may be time for these behavioral strategies to be incorporated more consistently. As Boyce and Hineline (2002) noted, “learning is something a person does, not something that happens” (p. 215). We hope that this chapter and this volume provide a framework for productive application of evidence-based behavioral instruction techniques.
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Chapter 3.
Supporting Meaningful Student Outcomes in the Online Environment

Christina Alligood

Classroom instruction in psychology presents many opportunities for teaching and assessing skills such as analysis and application. While the online teaching environment presents some challenges in translating these practices, creative applications of behavioral teaching strategies can facilitate skill development without face-to-face interaction. This chapter focuses on operationalizing outcomes at multiple levels beyond multiple-choice assessment performance using a behavioral version of Bloom's taxonomy as a guide, and describes examples of instructional practices that can be used to facilitate these outcomes in both small- and large-enrollment asynchronous online courses.

Online Teaching’s Watershed Event: Trends in Faculty Perceptions and Priorities Before and During the COVID-19 Pandemic

Online teaching has been on the rise in U.S. colleges and universities in recent years. In 2017-2018, 19.7 million students enrolled in courses at U.S. degree-granting postsecondary institutions (Bustamante, 2020). Of these, 6.6 million enrolled in some form of online learning. Among undergraduates, 19.5% took at least one but not all courses online, while 13.3% enrolled exclusively in online courses. When asked about their experience, 85% of online students enrolled in both online and face-to-face courses said their online course experience was the same or better than a classroom-based course.

During this same period, a national survey of online students revealed a variety of reasons for enrolling in online learning (Bustamante, 2020), with students most commonly citing existing commitments that were incompatible with campus-based courses (47%). Other reasons included a lack of availability of campus-based degree programs in the student’s field of study (21%), an employer incentive or partnership (21%), and the reputation of a specific online program (8%).

Students and faculty alike have long identified challenges with online learning (Bustamante, 2020; Song et al., 2004), including that this format can be problematic for students who are not well prepared for advanced coursework. Some studies cited completion rates of online programs at up to 22% lower than on-campus programs. Students cited a need for more effective instructional design and more establishment of community and connection in online courses.
A 2019 *Inside Higher Education* Survey of Faculty Attitudes on Technology reported that between 2013 and 2019, the proportion of U.S. college faculty members who had taught an online course rose steadily year-over-year from 30% to 46%. During that same period, faculty members’ opinions of whether online courses can achieve student learning outcomes at least equivalent to in-person courses declined, with 48% agreeing or strongly agreeing in 2013, and 36% selecting the same response in 2019 (*Inside Higher Ed.*, 2019). Notably, professors’ views on whether online courses can produce outcomes equivalent to in-person courses diverged sharply according to whether the professors had themselves taught an online course. Of those who had taught online, 61% agreed that equivalent outcomes were possible, compared with 14% of those who had never taught online. The same survey reported that faculty who had taught online believed that it had made them better instructors. Of faculty who had taught online courses, 77% indicated that the experience had helped them develop pedagogical skills and practices that improved their teaching, including better use of multimedia content, increased likelihood of experimentation aimed at improving the student learning experience, better use of learning management systems, and aligning content and assessments more closely with course learning objectives (*Inside Higher Ed.*, 2019).

In spring 2020, the U.S. higher education system began to experience the effects of the global COVID-19 pandemic. By June 2020, 97% of college students had switched to online instruction (Bustamante, 2020). Of those students, 63% indicated that the online instruction they received was worse, compared to in-person instruction. Parents rated the quality of remote instruction students were currently receiving as 5.6 on a 1-10 scale. Their concerns included poor content, little collaborative learning, inconsistent instruction, little to no access to professors and teaching assistants, poor instructor preparation, and limited technical knowledge by professors (Bustamante, 2020). Given that so many faculty were teaching online for the first time during this crisis, with no opportunity for preparation, these concerns were likely well founded.

Replicating the trend identified in the *Inside Higher Education* (2019) survey, Fox et al.’s (2020) survey of faculty teaching during the summer of 2020 found that by August, the proportion of faculty who agreed with the statement “Online learning is an effective method for teaching” had increased by 10% compared with those who agreed in May, suggesting that faculty opinions of online learning changed as they gained experience with it. Fox et al. (2020) reported that under 15% of faculty preparing to teach in fall 2020 planned to teach in person. The vast majority of faculty at four-year public and private colleges, as well as two-year colleges, planned to teach in either an online, highly flexible, or hybrid format. When asked about their course redesign efforts in preparation for fall 2020, faculty teaching in online formats reported implementing redesigns at higher rates than those teaching in person. Top planning priorities reported by faculty included, among others, increasing student engagement in class and increasing student collaboration (Fox et al., 2020). Both of these priorities were reported by a higher proportion of faculty in August than in May, suggesting that faculty teaching online were particularly attuned to these needs.
What is Student Engagement, and How Can We Measure it?

To understand how best to engage students in the online environment, we first need to define student engagement. Kahu (2013) discussed the problem of defining student engagement and the many ways that it has been defined, including time and effort devoted by students to course activities, interaction with instructors and peers, and participation in collaborative activities. They noted that important outcomes of engagement include learning achievement and social benefits such as reported satisfaction and well-being (Kahu, 2013).

While reported satisfaction and well-being has been measured through surveys, learning achievement can be somewhat difficult to quantify. Bloom et al. (1956) developed a framework, known as Bloom’s taxonomy, for educational objectives. They suggested that objectives start with knowledge and comprehension, and move through analysis and application to synthesis and evaluation as learning achievement progresses. Anderson and Krathwohl’s (2001) updated framework translated the nouns originally used to label the categories of outcomes to verbs (remember, understand, apply, analyze, evaluate, create), and made slight adjustments to the most advanced outcomes. For a comparison, see Wilson (2001).

Johnson and Chase (1981) noted that many classifications of goals for experienced learners, including Bloom’s taxonomy (1956), are based on inferred mental operations (e.g., comprehension) and might not result in real-world proficiency. Johnson and Chase (1981) operationalized increasingly complex tasks that content experts could be expected to perform, including stating facts, figures, and definitions; identifying real-world instances of concepts and principles; providing examples of concepts and principles; comparing and contrasting facts, figures, definitions, concepts, and principles; asking questions, determining methods for answering questions; synthesizing information in novel analyses; and engaging in other kinds of problem solving. They then re-analyzed the results of eight surveys of goals in curricula for experienced learners using their operationally defined tasks.

Based on prior research, Johnson and Chase (1981) postulated that in training programs tied to the competencies of subject matter experts, the skill of stating facts, figures, and definitions should account for about 19% of the outcome goals. Surprisingly, in all but one of the surveys they analyzed, 50-98% of the instructional tasks required facts, figures, and definitions, leaving less than half of instructional tasks to teach and assess competency on the remaining, more complex, categories of skills. In one survey, instructors estimated that one third of their exam questions went beyond the skill of recalling facts, figures, and definitions, when in fact the proportion of more complex questions was only 8%.

The authors also noted that classifying the complexity of tasks can be challenging and requires attention to context. For example, if a student has previously learned a concept and is now required to classify an example they have not yet seen, this could be categorized as a complex task. But, after having performed that task, later classification of the same example could be classified as a less complex recall task.
The same task may be elementary or conceptual, no matter where the task occurs during instruction or testing. Extension is determined by the relation between instruction and later behavior, not by the particular content, structure or wording of the task.” (Johnson & Chase, 1981, p. 109)

Crone-Todd et al. (2000) further operationalized the categories in Bloom’s Taxonomy (1956) in an effort to better define higher-order thinking skills, clearly delineate the categories, and facilitate a high level of agreement among raters as to categorization of tasks. For example, they specify that application skills require students to respond to examples not previously encountered in the course and apply previously-learned concepts and principles to this new example. Their definitions correspond with Anderson and Krathwohl’s (2001) elaboration on the categories in the taxonomy. Anderson and Krathwohl (2001) also noted that the upper levels of the taxonomy are enhanced by student interaction with the instructor and/or peers.

**Applying Evidence-Based Methods of Engagement: Two Case Studies**

I was fortunate enough to begin teaching online well before the COVID-19 pandemic. Like other faculty teaching in the online environment (Fox et al., 2020) I saw a critical need for student engagement and collaboration. I defined engagement in terms of repeated opportunities for students to contact the course materials and demonstrate progress toward skills consistent with the upper levels of Bloom’s taxonomy. Below I describe attempts to foster engagement and collaboration using evidence-based methods in asynchronous online undergraduate courses.

**Case Study 1: Large Asynchronous Course (Interteaching)**

When I began teaching at the University of Florida in fall 2018, I was assigned a 175-student-per-semester section of *Principles of Behavior Analysis*, a critical foundational course for students in the undergraduate Behavior Analysis track. In one of my first meetings, faculty in the program indicated that *Principles of Behavior Analysis* was essentially meaningless as a prerequisite for more advanced courses because one could not assume that students who completed the online section had learned anything. Taking this as a challenge, I set out to structure the course to maximize opportunities for engagement and collaboration.

Upon completing the *Principles of Behavior Analysis* course, my objectives were for students to describe the natural science approach to behavior, articulate the principles of respondent and operant learning, and apply these principles to analyze examples of behavior and experience, and solve socially important problems. In general, my goal was for students to be able to competently and confidently discuss the concepts taught in the course.

Anyone who has taught an online course has faced the challenge of discussions. The discussion board is a staple of learning management systems (LMS) because, at least theoretically, it represents a way to engage students with each other around the course material. However, producing high-quality engagement through a discussion board is not a simple task. Requirements such as a minimum number of sentences and a minimum number
of responses to peers can result in perfunctory comments that convey agreement with a peer but do not spur further discussion. For example:

*I totally agree, positive reinforcement is definitely a better form of reinforcement than negative. Rewarding employees is a good way to immediately and directly show them that their behavior is good. To them, it feels like their hard work is paying off. I also agree with your point on consistency. Consistency is a wonderful way to continue a certain behavior!*

This comment includes four sentences but adds no new information or questions to the discussion. Perhaps relatedly, students in online courses have reported low satisfaction with the value and immediacy of discussions (Song et al., 2004).

One pedagogical method that involves high levels of engagement and collaboration is interteaching, developed by Boyce and Hineline (2002). This method uses peer-learning activities to enhance engagement. In so doing, it shifts the student’s responsibility from passive reception to active engagement, and shifts the role of the instructor from imparting knowledge to structuring and guiding learning. Interteaching consists of several core practices.

**Preparation guide.** One of the staples of interteaching is the preparation (or prep) guide, a series of questions designed to lead students through the course material to be discussed in an upcoming class. Ideally, the questions progress from asking students to state facts to asking them to apply and synthesize concepts.

**Peer discussions.** Interteaching includes peer discussions of the prep guide questions, originally conducted in peers or triads that were different each time, comprising 75% of the class period. In interteaching’s original conception, an instructor moved from group to group providing clarification and probing questions. The peer discussion component is designed to provide distributed practice, an instructional design technique that enhances learning (e.g., Gerbier & Toppino, 2015).

**Interteaching record.** After completing a peer discussion, students complete an interteaching record in which they indicate which of the prep guide questions were difficult to answer, which should be clarified in a lecture, and their opinion of the quality of their peer discussion.

**Clarifying lecture.** The instructor uses student feedback gleaned from the interteaching records to create a brief clarifying lecture to begin the next class.

**Frequent assessments.** The interteaching method requires frequent tests that include questions similar in format to those on the preparation guides.

Some implementations of interteaching have also included a practice known as quality points, in which students receive points when they and their discussion partners all perform well on certain test items. Though Boyce and Hineline (2002) suggested that this component should account for approximately 10% of the final grade, there is some question as to whether this component is necessary for the effective implementation of interteaching (Saville & Zinn, 2009).
In their review of the literature on interteaching, Querol et al. (2015) described findings of increased student academic performance (when compared with the traditional lecture format) on homework, participation, quiz grades, final exam scores, and long-term recognition memory. These benefits were demonstrated across a wide variety of disciplines, a range of institution types and locations, and in small and large class sizes. In addition, students often report a preference for interteaching over the traditional lecture format (Querol et al., 2015). In studies that focused on the group-work component, performance did not differ between 2-person and 4-person groups, and students generally preferred larger groups.

While the studies reviewed by Querol et al. (2015) were all conducted with in-person classes, recently researchers have begun to assess interteaching in the online classroom. For example, Gayman et al. (2020) compared formats including interteaching, lecture only, and lecture with an optional study guide in asynchronous online classes. Students performed best on exams in the interteaching format, and students reported that they preferred and learned more from interteaching than the other methods.

A key finding of Gayman et al.’s (2020) study was that the optional study guide was not enough to produce improved exam performance. The requirement to complete the prep guide for credit was important. Gayman et al. (2020) also pointed out that the discussion component of online interteaching provided an opportunity for distributed practice in the form of contacting the material a second time after reading the assignment and completing the prep guide. A particular benefit of conducting these discussions online is the ability of the instructor to review every discussion contribution rather than sampling the discussions in the live classroom (Gayman et al., 2020).

When I implemented interteaching in my large asynchronous online section of Principles of Behavior Analysis, I provided a prep guide for each weekly module of the course in the Canvas learning management system (see Figure 1). Prep guide questions ranged from defining and distinguishing between terms to applying and synthesizing concepts. Students were required to post their initial answers to the prep guide questions to a discussion board by Wednesday of each week. For this initial post, students earned full credit if they provided a complete answer to each question. Students then discussed their prep guide answers in groups of 4-5 using the discussion board. They received feedback and credit for discussion posts based on specific criteria (see Table 1). Discussion posts were due on Wednesday of each week. Following the discussion, students completed a discussion record in which they rated the quality of their group discussion on a 7-point scale answered the following questions.

• Which prep guide questions were most difficult? Why?
• What is something interesting that you learned in this module?
• Any other comments or suggestions?
Figure 1
Screenshot of Online Module of an Asynchronous Course using Interteaching

Note. To provide a view of an online module of an asynchronous course using interteaching, a screenshot of Module 4 for a Principles of Behavior Analysis course is presented. The module is first described followed by learning objectives, reading assigned, prep guide, and a module survey.
Table 1

*Discussion Post Rubric for Interteaching Format*

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Points (Total possible=5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Topical relevance</td>
<td>The post addresses all instructions in the discussion assignment (for initial posts) OR the points made in a peer’s post (for reply posts)</td>
</tr>
<tr>
<td>Quality: Formatting</td>
<td>The post includes three or more sentences, most of which are complete sentences and grammatically correct.</td>
</tr>
<tr>
<td>Quality: Logic</td>
<td>Most statements in the post are logical and follow a logical order.</td>
</tr>
<tr>
<td>Quality: Detail</td>
<td>Position statements are well explained (one way to do this would be to use examples) and evidence is provided for claims.</td>
</tr>
</tbody>
</table>

*Note.* An example of a rubric for a discussion post with each criterion of evaluation (on the left) and corresponding points (range of points goes from 1 to a total possible of 5). Each column under points contains the corresponding requirements for each point value.

Teaching assistants created brief (10-15 minute) video tutorials based on the discussion record answers and posted the videos for student access as exam study aids.
Throughout each week, students also had access to 2-3 short lectures (5-10 minutes each) on topics from the week’s module. After discussing the prep guide questions with peers, students had the opportunity to revise their initial answers before submitting them to be graded for content. This submission was due on Sunday of each week. The 14-week course included seven timed exams, consisting of short-answer questions similar in format to those on the prep guides. Each exam was assigned after the completion of two modules, and students could complete each exam at any time during the week it was assigned.

Across three semesters, over 80% of Principles of Behavior Analysis students rated the quality of their group discussions at a 5 or above on a 7-point scale. Over 70% of students earned an A in the course, and the mean course rating was over 4.25 on a 5-point scale. In concert with the interteaching literature, my students appreciated the interteaching format of the course, and many wrote positive comments in their evaluations of the course and the prep guide assignments in particular. For example:

I think the prep guides make this course. Many courses just feed you information and hope that you understand it somehow, and give meaning to it. The prep guides force us to find meaning in the material so that we can actually write and talk about it and discuss the validity of the content. Without writing about the material in the prep guide I would never be able to form an understanding about the content that I currently have.

As an instructor, a particularly important outcome for me was the quality and detail of students’ written responses on prep guide answers, discussion posts, and exams. Criteria for these elements were included in the rubrics for these assignments, so students’ success in the course reflected their performance against these criteria.

After the first semester, I added word limits to the exams to require both accuracy and concision. Though short answer exams met my goal of ensuring competency in discussing foundational concepts in behavior analysis, with 175 students the assignments and exams required a great deal of grading. I was fortunate enough to have a team of graduate and undergraduate teaching assistants to share the workload, but elements of the course could be modified to allow for lighter instructor labor. For example, published studies on interteaching have typically used multiple-choice exams.

Case Study 2: Small Asynchronous Course (Student-led Inquiry)

Another course I designed at the University of Florida was a small senior-level seminar course in one of my areas of expertise, applied behavior analysis with animals. Like the larger course, this was an asynchronous online format, with about 30 students per semester. My objectives were for students to finish the course with the ability to:

- Describe the history and current applications of behavior analysis to animal behavior.
- Apply standards of evidence-based practice to examples of animal behavior management.
• Critically evaluate animal behavior management practices with a quality-of-life focus.

Like the larger course, my overarching goal was for the students to develop the skills to competently and confidently discuss the concepts in the course.

To foster discussion, I used the discussion board feature in Canvas and again found myself considering the many challenges of discussions in the online format. Baran and Correia (2009) noted several of these. The most troubling thing is that online discussion board assignments tend to facilitate limited student participation as students expend the minimum effort required to qualify for full credit. This often means that critical analysis of peers’ ideas is inadequate, and students fail to communicate effectively with each other and the instructor about course concepts. However, this challenge is a feature of discussion board assignments, not discussion boards themselves.

Baran and Correia (2009) describe student-led strategies to elevate the value of discussion board assignments. They suggest strategies in which an instructor provides coaching and support for discussions, which is reduced as students gain more independent skills. The National Research Council (2000) conceptualizes these skills in terms of learner self-direction, with the amount of self-direction being inversely proportional to the amount of direction from a teacher or class material.

When implementing the practice of student-led inquiry in my senior seminar course, I provided original sources for students to read in each module. My goal was to guide students to formulate questions that would spark substantive discussion with their peers about the readings and other materials. This includes how the week’s materials might relate to materials from previous modules, and how they might apply in various contexts. I provided a rubric and supplementary instructions (see Appendix A) to guide students in preparing their questions. For the first two weekly discussion boards, I provided questions as a model, and required students to respond to my questions and comment on other students’ responses. In later weeks, students were required to write their own discussion question and respond to two peer questions. Their questions were due midweek, and responses due at the end of the week. I also provided a rubric for discussion responses (see Appendix A), and students received specific feedback on their discussion questions and responses relative to the rubrics.

In lieu of exams, students in this senior seminar course completed biweekly targeted one-page writing assignments, with essay prompts focusing on application and synthesis of the concepts from previous modules. For example:

*This week you learned about how HeroRats help to find and eliminate land mines, and you saw in the videos that HeroRats can also help detect tuberculosis. Last week you learned about the work of service dogs. These are just a few of the ways that animals can be trained to assist humans. This assignment will give you a chance to practice looking for behavior principles in these programs.*
1. Select a program that uses animals’ special abilities to help people. This could be one of the HeroRat programs or another program that you find on your own. For example, you might try searching for, “scent detection applications”.

2. What problem is the program solving? Describe why the program is important and how the animals help. What makes the animals well-suited for this work?

3. Describe the behavior principles involved in the program. How do the animals learn to do their jobs? What motivates them? What kinds of conditioning are involved?

Across four semesters of the senior seminar course, over 75% of students earned an A, and the mean course rating was over 4.25 on a 5-point scale. As with the larger course, these scores were tied to specific quality indicators, so high grades reflected performance relative to those criteria. In course evaluation comments, students expressed appreciation for the role of the discussions in helping them build fluency with the course concepts. For example:

The discussions allowed for students to interact and think critically about topics learned in the class. Because we had to create our own discussion questions, we were forced to expand our thoughts on the subject matter and even research information on our own. This allowed for a deeper understanding of the class material.

In the first semester of implementing this format, many student discussion questions focused on opinions, such as “What do you think would happen if…”. While opinions can be an important and stimulating part of a discussion assignment, I wanted to be sure that students posed questions that indicated their own engagement with the course materials, so I added this to the guidelines for discussion questions (see Appendix A).

The strategies employed in these two courses reflect a small number of the evidence-based strategies for engaging adult learners in online education. The remaining chapters in this volume will detail other strategies. The evidence clearly demonstrates that high-quality online education is possible, and the stigma around this modality is diminishing as more instructors successfully engage students in online courses.
References


Appendix A
Discussion Question Rubric and Instructions

<table>
<thead>
<tr>
<th>Points</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantity</strong></td>
<td>Two questions were submitted.</td>
<td>One question was submitted</td>
<td>No questions were submitted.</td>
</tr>
<tr>
<td><strong>Quality: Form</strong></td>
<td>Questions are written in complete sentences that are grammatically correct.</td>
<td>Questions include at least one incomplete sentence or grammatical error.</td>
<td>Questions include more than two incomplete sentences or grammatical errors.</td>
</tr>
<tr>
<td><strong>Quality: Content</strong></td>
<td>Questions reflect a thoughtful analysis of the assigned reading and other materials.</td>
<td>Questions reflect a cursory review of assigned reading and other materials.</td>
<td>Questions do not reflect completion of assigned reading and other materials.</td>
</tr>
<tr>
<td><strong>Relevance</strong></td>
<td>Questions are closely related to assigned topic.</td>
<td>Questions are loosely related to assigned topic.</td>
<td>Questions are not related to assigned topic.</td>
</tr>
<tr>
<td><strong>Contribution to Discussion</strong></td>
<td>Questions are likely to facilitate group discussion and/or present creative approach to the topic.</td>
<td>Questions are yes/no or unanswerable.</td>
<td>Questions are answered in the reading.</td>
</tr>
</tbody>
</table>

**Discussion Question Rubric (Total possible points = 10)**

**Bonus Points:**
One bonus point is available for each discussion point assignment. If you earn full points in all categories above for a question that is not asked by any of your peers, a bonus point will be awarded. Only one bonus point is available per student per module.
Quality: Content

To convey a thoughtful analysis of the assigned materials, you should include a 1-2 sentence introduction to the topic of your question. For example, “In the Protopopova 2016 article, we learn how differential reinforcement of other behavior can be used to reduce target behaviors such as the frequency of barking in a dog when home alone. Other forms of differential reinforcement include differential reinforcement of incompatible behavior, differential reinforcement of alternative behavior and differential reinforcement of low rates. Which of these might be a good choice to reduce frequency of barking, and what would the procedure look like?” The italicized text here provides an introduction to the question.

Relevance

Make your questions specific to the assigned topic and materials. An example of a question not related to the assigned topic would be, “Discuss how the experimental methods could be improved.” This could be asked about any article and is not relevant to the topic at hand.

Contribution to Discussion

The discussion will be most valuable to you and your peers if it involves fact-based analyses of the concepts in the assigned materials. You should try to facilitate this type of discussion with your questions. It will not be as valuable to ask questions that can be answered with a yes or no, questions that merely ask your peers to repeat what is in the material, or questions that ask your peers to give unfounded opinions.

The following table is adapted from Crone-Todd and Pear (2001). It summarizes the levels of learning included in a well-known system known as Bloom’s taxonomy. Your discussion questions will be most successful if you focus on the higher learning levels.

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Levels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>Can be answered word-for-word from the material</td>
<td>“Define reinforcement.”</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Put key terms or concepts in your own words.</td>
<td>“Describe an example of reinforcement from the text.”</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Higher Levels</th>
<th>Application</th>
<th>Apply lower-level knowledge to a new situation or problem.</th>
<th>“Provide an example of positive reinforcement that is not in the text.”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>Respond to specific parts of a definition or concept.</td>
<td>“Compare and contrast negative reinforcement and punishment.”</td>
<td></td>
</tr>
<tr>
<td>Synthesis</td>
<td>Combine several principles and procedures to solve a problem.</td>
<td>“Describe how you would use behavior principles to teach someone to drive a car.”</td>
<td></td>
</tr>
<tr>
<td>Evaluation</td>
<td>Present a cogent argument examining different positions and drawing conclusions that follow from clearly stated premises.</td>
<td>“You are studying cocaine addiction in rats. An animal rights activist accuses you of animal cruelty. How can you defend your work?”</td>
<td></td>
</tr>
</tbody>
</table>

**Do:**

- Ask questions that require higher-level thinking (see examples in the table above).
- Ask questions that require integrating concepts from multiple sources in the module and even from multiple modules. For example:
  - “In a previous module (pet training), we learned about how stimulus control and how it can be used to get rid of unwanted behavior in dogs. After watching the video "How Puppies Train to Be Guide Dogs," how could you incorporate stimulus control when training the puppy using a harness? Use examples of how it could extinguish unwanted behavior or promote positive behavior when making the puppy comfortable wearing the harness.”

**Don’t:**

- Ask questions that require your peers to simply restate facts that can be found in the course material. For example:
  - “According to this week’s video, why is it extremely important to get the puppies into harnesses at such a young age?”
- Ask questions that require your peers to speculate. For example:
  - “Do you think…”
  - “In your opinion…”
  - “Do you believe…”
  - “Do you feel that…”
- Ask questions that are unanswerable or can only be answered by an experiment (these are known as empirical questions). For example:
  - “What would happen if…”
Chapter 4.
The Use of Feedback in Higher Education

Joshua Pritchard
Byron Wine

During our doctoral training, both authors of this chapter studied with well-regarded behavior analysis faculty who could charitably be labeled luddites. Dr. Pritchard vividly recalls the first day of a course watching the professor walk in, introduce themself, and then proceed to shuffle through looseleaf papers filled with writing. This professor never had a laptop, used a PowerPoint, or any sort of audio-visual support beyond chalk and slate on occasion. The professor provided their students with learning objectives, and lectures during which they guided everyone on a journey exploring the points made by Skinner, their critique of Skinner’s points, and other perspectives that they believed would be valuable.

Despite the lack of technology, their classes were endlessly captivating. The professor would entertain arguments against their view and would do so by inviting discussion and debate rather than shutting down ideas by pulling rank; however, they would not tolerate lazy scholarship or faulty logic. If one wanted to step into the ring, they had better have prepared well, or their arguments would be laid bare. It was these discussions, their openness to being wrong, and often, their erudite ability to demonstrate follies and close gaps in logic created a unique learning atmosphere. Dr. Pritchard notes he could fill volumes singing the praises of this professor, but the topic of this chapter centers on his attempts to reproduce this low-tech and engaging style of teaching, his total failure to do so, and the solutions implemented to fix the problem. First though, we must cover some background content.

Feedback

Feedback is a general term for an intervention that consists of providing information about past performance with the intention of influencing performance going forward (Prue & Fairbank, 1981). When applied in an organizational context, feedback consists of data on past work performance under the control of the employee to improve employee performance, typically relative to some pre-determined standard. Feedback is the most commonly implemented intervention in the organizational behavior management literature (VanStelle et al., 2012). Feedback is likely so popular because, according to a recent metanalysis, it is an effective intervention in changing behavior that is often relatively inexpensive to implement (Sleiman et al., 2020). In an educational context the term feedback, when applied to a learner, is designed to correct mistakes and improve acquisition of new material. Relatedly, feedback to course instructors is likely closer to organizational
contexts: information about past teaching performance that enhances desired or effective components of teaching to improve student outcomes.

In higher education feedback from students was initially conceptualized as a method to enhance the teaching skills of professors (Muns & Munz, 1997). However, beginning in the 1970’s feedback from students has become less about improving teaching and more about influencing professor hiring, promotion, tenure, and salary (Basow et al., 2013). To standardize the feedback of students into easily quantifiable metrics, feedback received from students most often occurs through formalized end-of-semester course evaluations. This is not to say students do not provide feedback to instructors informally throughout the course of a semester (e.g., asking an instructor for more examples of a difficult concept), but this feedback is difficult to quantify, and not often mentioned in the empirical literature. Likely, many professors have seen confused looks on faces after covering a difficult concept and they then react to this feedback from students by explaining the concept in a different manner or by providing more examples.

End-of-semester evaluations are both ubiquitous and controversial. While some researchers have found them to be valid measures of professor teaching performance (Wright & Jenkins-Guarnieri, 2012), most researchers point out significant limitations. Some researchers have indicated that male professors tend to receive higher scores than women, and that African Americans received lower scores than their Caucasian or Asian counterparts (Basow, et al. 2013). Additionally, physical attractiveness may influence evaluations (Bonds-Raacke & Raacke, 2007). In addition to questionable data on equity and effectiveness, end-of-semester evaluations are often used to determine promotion and pay in teaching faculty. Correlating teaching scores to salary and other financial benefits can have undesirable side-effects.

Grades, across most areas of study have been increasing since the 1980’s (Stroebe, 2016). Stroebe posits that one important factor for increasing average grade point average is professors lowering course difficulty to enhance teaching evaluations scores. To this end, Berezvai et al. (2021) found that lowering course requirements and giving one grade higher resulted in an increase in end-of-semester evaluations by .3. Ironically, grades could be seen as a form of summative feedback to students, and so instructors may alter their feedback in order to receive better feedback from students.

All of the reservations to end-of-semester evaluations notwithstanding, a key question remains, are evaluations effective in shaping good teaching practices in instructors. This question remains largely unanswered, even though many students appear to feel that their feedback is helpful if only the professor would listen (Penfield, 1978). While some researchers have posited methods to improve the quality of student feedback such as using more precise questions (Baldwin & Blattner, 2013), or adding evaluation components such as peer evaluation, alumni interviews, or learning outcome measures (Berk, 2005), the practices in many institutions of higher learning appear largely unchanged. Whether universities are resistant to criticism of end-of-semester feedback due to their ease of implementation of these systems, or simple inertia is unclear.
Components of Effective Feedback

Given how common feedback is in the organizational research there is an extensive literature on how to implement the procedure effectively. In their seminal text on applying behavioral strategies in the workplace Daniels and Bailey (2014) suggest several methods to enhance feedback: Ensuring the behavior of interest is under the control of the employee, that it is individualized, delivered by the supervisor, based upon data, and delivered as soon after the behavior as possible.

Feedback is only useful to the degree that the employee can use the information to alter behavior. To this end, delivering feedback related to behavior that is outside the control of the employee would not yield any significant results, aside from evoking irritation from the employee. For example, delivering feedback to a faculty member whose primary duties involve instruction on the net income of the department would do little good as it is unlikely that the faculty member could significantly alter this variable. End-of-semester feedback from students suffers somewhat from this problem in that if students do not provide specific examples of practices for the faculty member to change (e.g., you should speak louder as it is difficult to hear in the back, provide more detailed handouts to study from, etc.) it is unlikely the faculty member will be able to actually “do” anything with the information. This is especially true with rating questions that present average scores of somewhat vague constructs (e.g., how knowledgeable was the faculty member). The degree to which an instructor could prove to students that, due to self-study, formal education, or conference attendance, they are more knowledgeable on a topic than another faculty member, is difficult to fathom. Attempts to evaluate the usefulness of these broad impression questions have been met with mixed success. For example, in a recent meta-analysis Uttl et al. (2017) found that students’ overall rating of faculty quality did not relate the student achievement.

Individualizing feedback is a general recommendation that could be interpreted several ways, but typically refers to how the feedback is delivered. In the literature, presenting information in graphs or tables, along with verbal feedback, are the most common methods used when delivering feedback; however, written feedback is still a commonly used alternative. All methods of delivery appear largely effective (Sleiman et al. 2020), and so perhaps a method that is most convenient for the setting is warranted. In instructional settings verbal feedback would not often be advised (unless a peer evaluations system were implemented) as students may not feel comfortable providing it to faculty members. Likely, a positive aspect of end of semester feedback is that it is often anonymous, which encourages students to be honest without fear of retribution from an authority figure.

A final characteristic, that of timing, has been noted as an important factor in the effectiveness in feedback. Theoretically, feedback delivered immediately after performance should have a greater impact than delayed delivery. However, feedback in the empirical literature is often delivered after some delay has occurred, (Sleiman et al., 2020), most typically weekly (Alvero et al. 2001). Weekly feedback seems to be an interval that both allows for performance to occur but preventing the feedback from being too effortful, or
allowing so much time to pass that recalling the specific instance referenced becomes difficult.

While no research we know of has conducted an analysis of effective components of student feedback in higher education, we can extrapolate what is likely to be effective. Feedback would need to occur frequently enough during the semester to allow for the instructor to incorporate the information into their teaching. The feedback should be anonymous, and should use specific, as opposed to broad, questions that allow for actionable change.

**Feedback in a Behavior Analysis Graduate Program**

Before describing an attempt to recreate his professor’s teaching environment Dr. Pritchard wanted to make clear that the failure is not in any way their fault. When Dr. Pritchard became a professor, he decided that his graduate students should experience the same open and inviting environment from which he so befitted; fortunately, he was assigned to teach radical behaviorism after receiving his appointment. Dr. Pritchard wanted to be just like his advisor and hero, so decided to teach this course without any A/V support. It did not go well. The students found the lectures somewhat disjointed and were sometimes confused by the content. It was not until the end of the semester however that Dr. Pritchard received the feedback that would have allowed him to make changes. He decided that if he ever had the opportunity, he would implement a more effective feedback system for faculty.

The setting for the feedback program was a hybrid masters program. Students matriculated into a two-year program where they first completed a year of online asynchronous education consisting of videos, weekly meetings with co-instructors to review material, and weekly examinations. After the first-year students were assigned to a faculty member who taught synchronous classes, supervised a capstone project, and assisted in conducting supervision. Weekly classes were taught in-person and broadcasted to students at other sites. Classes were conducted at clinical sites around the United States. The final three semesters of the program, conducted under the supervision of the faculty members, was the specific time period during the program in which the feedback system was implemented.

The participants were five full-time faculty members, two men, and three women, all of whom possessed a PhD in behavior analysis or a closely related field. All faculty members were ranked as assistant professors and had between one and 20 years of teaching experience. Areas of specialty varied by faculty member and included education, early intervention, public health, acceptance and commitment therapy, and organizational behavior management.

Dr. Pritchard was the program chair and implemented the feedback system. Feedback forms (Figure 1) were presented to the students weekly. The feedback form presented several Likert questions and several open ended questions. The Likert-based questions asked about the overall class that week, the content, the technology used, the interest of the professor and student in the topic, and the relevance of the topic to practice.
The open-ended questions asked the student to list the main topic of the class, what was the favorite part of the class and what could be changed.

**Figure 1.**

<table>
<thead>
<tr>
<th>Weekly Feedback Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please complete the first six questions such that “1” is the lowest score and “10” is the best score</td>
</tr>
<tr>
<td>Date: __________________</td>
</tr>
<tr>
<td>Overall score for class this week</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Content delivered this week</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Use of technology this week</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Interest of professor in topic this week</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Interest of student in topic this week</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Relevance to practice of topic this week</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>What was the main topic of the class: ______________________________</td>
</tr>
<tr>
<td>Favorite part of class: __________________________________________</td>
</tr>
<tr>
<td>What could be changed: ________________________________________</td>
</tr>
</tbody>
</table>

*Note.* Weekly form containing six Likert-scale items (from 1 to 10) and three open-ended questions for students to provide feedback to their instructor.

Each week on Friday students were prompted to complete the survey based upon the class that week. Dr. Pritchard collected all responses and aggregated the scores to generate an average score for the closed ended questions and presented all the comments in
a de-identified manner. Figure 2 presents a hypothetical sample of what the information looked like. If multiple students made the same comment (in Figure 2, more than one student identified being able to see the faculty member for example), or if the weekly scores began to show a downward trend, Dr. Pritchard would meet with the faculty member to troubleshoot. As some students were online and other in-person special attention was paid to technical difficulties, and the weekly feedback allowed for problems to be identified and fixed early in the semester (e.g., new microphones, change of environment to decrease background noise).
Figure 2.
Sample Feedback Presentation Sent to Faculty

![Graph]

What was the main topic of the class:
- Behavioral Contrast
- Contrast effects
- Basic behavioral principles
- Behavioral Contrast

Favorite part of class:
- Dr. Pritchard’s examples
- Josh’s jokes
- All of the examples
- Nothing comes to mind

What could be changed:
- Nothing, it was great
- It was a little hard to see Dr. Pritchard in the camera
- The examples were fun, more would have been even better
- I had some trouble seeing Josh with the dark background

Note. Sample feedback presentation sent to faculty. Student ratings from the Likert-scale items are on the y-axis. The comments below are in response to the three open-ended questions.
By Monday of the following week the information was provided to the faculty member throughout the semester. While no information was ever provided to the faculty that might identify the students, the faculty could request additional information from Dr. Pritchard to clarify any of the comments.

The feedback system used in the program adhered to the recommendations of Daniels and Bailey (2014). The feedback allowed students to state specifically what they liked best and what they would like to change, thus typically providing the faculty member with specific aspects to consider for change; however, not all suggestions were directly under the control of the faculty (e.g., internet connection). Second, the feedback provided not only subjective opinions of the class that week, through Likert scale questions, the open-ended questions allowed for individualized assessment because the information specifically pertained to one class, as opposed to an entire semester. Moreover, the feedback was anonymous, so students were more likely to give honest answers. Last, by conducting feedback surveys weekly, the faculty received frequent information that allowed them to alter their behavior during the course of the semester.

In addition to adhering to research-based recommendations it also re-aligned feedback back to its original intent. Faculty evaluations were not based upon these weekly feedback scores. That is, the feedback was truly designed to allow the faculty to adjust their examples, teaching style, technology, or any number of other variables to improve the experience of the students. Informally, through questioning by Dr. Pritchard, both students and faculty stated that they both enjoyed and found the weekly feedback helpful.

Future Research

The feedback system described in this chapter has many potential benefits for both faculty and students. However, as an applied project in an operating program, relatively little of the program evaluated under research conditions and so there are many avenues for future research. The first, and most straightforward research goal should be to evaluate student acquisition and satisfaction in a formal manner. Additionally, the nature of the feedback allowed for a week-by-week analysis of content. For example, the relative difficult of a topic could be compared to class quality. It seems likely, although it was not confirmed experimentally, that classes covering more difficult material would receive lower scores. Also, by using weekly feedback where the topic is identified, researchers could compare changes made by faculty to the scores on that specific content if the professors teach the course repeatedly over time.

Feedback is a highly effective and common intervention. The current chapter describes how we changed the typical implementation of feedback in a higher education setting and developed it into an effective system to shape the behavior of faculty in a graduate program.
References


Considerations for Supervision of Remote Service Delivery

In March 2020, in an effort to mitigate the disruptions caused by the global COVID-19 pandemic, the United States Department of Health and Human Services (HHS) announced a historic expansion of telehealth access and mandated that providers be allowed to provide services via telehealth (HHS, 2020). Consequently, many healthcare providers, including Applied Behavior Analysis (ABA) service providers, pivoted their mode of service delivery from in-person to remote/telehealth, using technologies such as Zoom, Teams, and FaceTime (Cox et al., 2020). Findings from studies evaluating the effectiveness of remote (i.e., telehealth) staff and caregiver training (using the behavioral skills training model) suggest that remote synchronous training is as effective and efficient as in-person training (Fisher et al., 2014; Schieltz et al., 2018; Sump et al., 2018). Therefore, given the wide availability and accessibility of a variety of reliable and videoconferencing technologies (e.g., Zoom, Microsoft Teams, Google HangOuts, GoToMeeting, etc.), supervisors could continue to use these technologies to provide effective supervision that includes direct observation in the context of training and mentoring aspiring clinicians. In this chapter, we provide several considerations for mentors as supervisors who are considering incorporating remote platforms into their clinical and research supervisory activities.

Planning for remote direct observations. The BACB® requires that supervisors directly observe their supervisees at minimum once per supervisory period. When planning to conduct direct observations remotely, supervisors should determine a) the format (e.g., synchronous/real-time vs. asynchronous/pre-recorded) in which observations will be conducted and b) the technology most appropriate for that format. For instance, supervisors may consider Zoom, a free videoconferencing and communication platform that allows its users to schedule, host, and attend meetings from any location in the world. Although primarily used for live video conferencing and synchronous meetings, supervisors may find Zoom’s video recording capabilities to be appropriate for an asynchronous or pre-recorded session for situations in which synchronous direct observations are not feasible. Specifically,
supervisors may require that their supervisees use the recording feature in Zoom and record themselves for the duration of their observation session, then submit their recording to the supervisor for review and feedback.

**Developing an agenda for remote direct observations.** Once the format and technology necessary for the direct observation session have been identified, supervisors should consider developing an agenda. This agenda should include information relevant to the observation session, including but not limited to a) the purpose of the observation, b) expectations of both supervisor and supervisee, c) the specific skills or behaviors that will be observed, and d) when and how feedback will be provided. This information can be provided in the form of a written document and provided to the supervisee prior to the observation session.

**Feedback.** An evaluation of the independent effects of all components (instruction, modeling, rehearsal, feedback) of behavioral skills training (BST) by Ward-Horner and Sturmey (2012) suggested that the most effective and necessary component of BST was feedback, followed by modeling. Similarly, Parsons, Rollyson, and Reid (2012) found the feedback (supportive as well as corrective) component of BST to be as critical to the training process as the rehearsal component. Therefore, when planning for remote direct observations, supervisors must determine a priori the mode (e.g., verbal, written, audio, video) and timing of feedback delivery. In the case of previously recorded video sessions, we recommend the VoiceThread platform. Unlike Zoom, which is primarily used for meetings, VoiceThread is an educational platform that offers educators (and supervisors) an online interactive environment that allows its users to record or upload videos of themselves and provide interactive feedback within the platform in the form of written comments, text messages, phone calls, audio- and video-recorded comments, and drawings. Although used primarily by educators, VoiceThread’s online learning interactive features (specifically the various feedback delivery modalities) would be appropriate for supervisors and trainers who aim to incorporate modeling correct performance of the skill and providing immediate feedback using an online platform. Supervisors have the ability to pause a pre-recorded video and type a comment, provide oral feedback, or model the correct performance. Likewise, supervisees may re-record themselves performing the skill, respond to the supervisor’s feedback, and request additional feedback as needed, all within the platform.

**Assessment of competencies.** Supervisors can evaluate the effectiveness of their direct observation sessions, particularly in the context of supervision and training, by assessing their supervisee’s performance, ideally in vivo (Parsons et al., 2020). Whenever possible, supervisors should develop a competency list of skills that will be trained and assessed during direct observation sessions, similar to the Behavior Analysis Certification Board®’s (BACB®) Registered Behavior Technician® (RBT®) Competency Assessment [https://www.bacb.com/wp-content/uploads/2020/05/RBT_Competency_Assessment_Initial-210412.pdf] (BACB®, 2021). For supervision of BCBA trainees, supervisors may use the Supervisee’s Fieldwork Clinical Skills Competency Evaluation Form [available from third author upon request];
(Migan-Gandonou Horr, 2020), a comprehensive clinical skills training curriculum and evaluation tool which provides supervisors a list of various behavior analytic clinical skills and the ability to assess their supervisee’s performance on each skill.

**Special Considerations.** In addition to the aforementioned considerations, it is incumbent upon the supervisor to also assess – and plan for – potential barriers that are unique to remote training and supervision. For example, consistent access to clients, particularly for those supervisees in rural areas or areas with limited behavior analysis services who may be utilizing and relying on remote supervision because of lack of access to a local BCBA supervisor. Given that observations with a client are one of the supervised fieldwork requirements set forth by the BACB in the BCBA Handbook (BACB, 2022), supervisors should not only ensure that their supervisees have reliable access to consenting clients, but they should also plan for possible loss of access to clients for reasons beyond the supervisee’s control. The BACB® defines a client as “any person (or group of people) for whom behavior analytic-services are appropriate…” (2022, p. 13). Therefore, one potential solution is for supervisors to encourage their supervisees to diversify their client base and consider working with clients other than those individuals receiving insurance- or privately-funded ABA-based therapy recipients. For example, within the context of autism service delivery, a supervisee may spend the majority of their time working directly with a client. However, other relevant stakeholders that may benefit from behavior-analytic approaches to behavior change are direct care staff, teachers, or other employees at the organization. Furthermore, in light of the BACB®’s 2022 new experience guidelines, requiring that trainees accrue the majority of their experience hours performing tasks typically performed by a behavior analyst (i.e., unrestricted activities), supervisors may leverage their pool of existing supervisees/trainees as possible consenting clients for peer-to-peer training activities. For instance, a supervisor in a clinical setting may task her supervisee with developing and – under the supervisor’s guidance and oversight – implementing a BST protocol for training a particular behavior change procedure (e.g., preference assessment, functional assessment) to a fellow behavior technician. Similarly, a supervisor in a university setting may task her supervisee with developing and implementing a BST protocol for training how to create multiple-baseline design graphs to a group of undergraduate students. Although these recommendations are most relevant to those supervisees with limited access to clients, we encourage supervisors to offer these alternatives to all supervisees, regardless of client access, consistent with the BACB®’s recommendation that trainees be exposed to a variety of clients and settings.

**Considerations for University-based Remote Fieldwork Supervision**

Behavior analysis professors in university settings often teach supervised fieldwork or practicum courses. In this context, university faculty serve as supervisors for students accruing fieldwork hours for certification as part of their undergraduate or graduate training. Effective supervision is a fundamental component of the clinical experience and the overall growth of the student in the pursuit of becoming a behavior analyst (Sellers et al., 2016). The professional relationship developed by the supervisee and supervisor (in this case, student
and professor) plays a major role in the development of their behavior analytic skills. Historically, university-based practicum experiences were limited to students working at university-based clinics or community partners in close geographic proximity. Given the rise in telehealth and remote service delivery, we have also seen an expansion in university practicum opportunities that leverage teleconference technology. Remote practicum supervision has provided a platform for students to receive training and clinical supervision from professors with specialized expertise, regardless of their geographical location or the opportunities available in their hometown or country. Although the concept of remote supervision might be new to some supervisors and supervisees, online education has been successfully used for decades (Krebs et al., 2021). However, with the COVID-19 pandemic, the use of online learning has widely increased as nearly all colleges and universities have had to provide some sort of online learning (e.g., asynchronous, synchronous, or blended) to continue fulfilling their mission of providing high quality education to their students.

In a recent review, Sellers et al. (2016) recommended best practices for the individual supervision of behavior analysts. These best practices consist of five major objectives for the supervisee and supervisor and include a) the development of a supervisor-supervisee relationship, b) an effective plan for supervision, c) the evaluation of the supervision provided, d) the importance of ethical practices and professional development, and e) the continuation of a professional relationship of the supervisee and supervisor after the supervision period as concluded. Although these are all very important practices that should occur as part of effective supervision, there may be challenges to accomplishing some of these goals in an online or remote format. Thus, below, we provide some general guidance on how these best practices may be accomplished within the context of remote supervision. Moreover, we include some additional objectives that are important for the development of a supervisee-supervisor relationship and the general behavior analysis competency of the supervisee in an online setting.

**Reliable online platform.** In a remote or online setting, the use of reliable platforms (e.g., Zoom, Teams, Google hangouts, Blackboard, Canvas) is critical regardless of whether supervision practices are arranged synchronously or asynchronously. If supervisees live in areas or countries where there is limited access to technological equipment or restrictions for using the world wide web, the supervisory experience may be hindered. Thus, the first step for providing effective remote supervision is to make sure that both the supervisee and supervisor have access to reliable equipment and an online platform. In addition, it is important that both the supervisee and supervisor are competent in the use of technological devices and their preferred online platform.

**Online classroom environment.** The extent to which university-based remote fieldwork supervision is effective depends on the classroom environment developed by the supervisor. Creating a safe space for supervisees is critical for learning the a) behavior analytic content (i.e., the “hard” skills) and b) the development of successful peer and supervisory relationships (i.e., the “soft” skills). A safe space is a place where students from different cultures, identities, genders, ages, and socioeconomic statuses feel comfortable and
are encouraged to participate freely, express their opinions, and provide information about their unique needs to develop their own learning. Fostering an environment that promotes these soft skills and meaningful relationships can be a challenge in any format. However, given the nature of remote supervision, it is possible that there is a greater likelihood that the supervisor and supervisee come from different geographic and cultural environments in these remote mentorship formats. Additionally, it is possible that remote supervision provides the opportunity to mentor and teach students who may otherwise not have access to advanced education (e.g., students with very limited resources or learning opportunities). These challenges may be less apparent in an online format than in person. Supervisors should be prepared to identify what the students need and want from the supervision experience and develop contingencies for individual goals. Moreover, it is important to note that students who enroll in online programs may be more likely to be non-conventional students (e.g., full-time workers, parents) or live in rural areas or internationally. Faculty mentors should consider the barriers that students may face (e.g., childcare; English as a second language) and provide resources that may be available to promote student success. These resources may include university-wide resources available (e.g., writing center, student support departments) to in-person and online students. Finally, given the wide range of students’ demographics, cultures, and needs, it is likely that the diversity of students in online programs may be more widespread than that observed in traditional brick and mortar programs. Supervisors should be prepared to facilitate discussion across a range of student profiles in these contexts. Several behavior-analytic training curricula have been established to promote culturally-sensitive practices (e.g., Jimenez-Gomez & Beaulieu, 2022). Supervisors may consult these curricula to inform their own supervision practices.

**Building professional relationships.** One of the most influential skills of behavior change agents is to build rapport with the individuals whose behavior is targeted for change. As a supervisor, building rapport with all supervisees is not only critical to the relationship and the learning of the supervisee, but to the field of behavior analysis. As noted by Sellers et al. (2016), it is likely that we all have encountered supervisors who have been short of outstanding, but hopefully, we have also had supervisors who have been excellent role models. The definition of an excellent supervisor may vary depending on who you ask, but, generally, an excellent supervisor is not necessarily one who is very knowledgeable in the subject area (although this is an important aspect), but one who is also willing to learn with the supervisee, support the learning experiences of their supervisee, and accounts for potential cultural, political, and identity differences that may impact their professional relationship. Sometimes building rapport consists of just listening to the supervisee without pre-conceptions of their needs (e.g., do not assume that a student with a disclosed disability needs or wants a specific accommodation that you have previously arranged). Building rapport may also include the supervisor sharing information about their experiences and factors that may affect their professional lives. To some extent, showing that as a supervisor you are also a caring and compassionate human being is perhaps the best way to build a long-lasting successful professional relationship with supervisees. We recommend supervisors to be responsive to concerns and questions, create environments that are
enriched with reinforcement, and to check for their own biases when working with supervisees. As Curry et al. (2019) reported individuals tend to be more productive and feel more valued when rapport building has taken place as part of the relationship.

**Providing choices.** Research has shown that choice is an important aspect of service delivery. For example, when implementing applied behavior analysis (ABA) interventions with children, clinicians often conduct preference assessments (e.g., paired stimulus preference assessment, Fisher et al., 1992; multiple stimulus without replacement, DeLeon & Iwata, 1996) to determine toys, activities, and foods that are highly preferred. This same framework has been demonstrated to be influential for the behavior of workers in a variety of organizational settings. Understanding your supervisees’ preferences may result in building a better learning experience and contributing positively to your relationship. Thus, it is recommended that the professor or supervisor identifies their students’ preferences and provides choices in all aspects of the professional relationship. For example, supervisors can provide choices between individual or combined learning activities (e.g., individual presentation, in-class group assignment, assessment, or take-home reading) and incentives that involve either positive (e.g., points) or negative (e.g., breaks) reinforcers. Supervisors should also inquire about individual preferences related to feedback delivery (e.g., group feedback, direct constructive feedback, written feedback; Bacotti et al., 2021). One of the many advantages of remote supervision through an online platform is the ability to create anonymous surveys or polls within seconds. As a result, professors may make in-session decisions to enhance the learning of their students, including the delivery of the feedback. Thus, we recommend that professors use these tools to enhance the learning experiences of their students.

**Asynchronous content.** In most online classroom environments, a portion of the learning happens outside of the classroom and is set up by the professors teaching the course. Generally, best practices would include determining the needs and current clinical skillset of the supervisee and setting up asynchronous assignments (e.g., readings, projects, presentations) that would allow the supervisee to expand their behavior analytic knowledge and professional skills. For example, if working with an international student who provides ABA services to individuals in developing countries with little experience with ABA, it may be critical for the professor to include assignments on how to explain ABA to parents so that the student, serving as a practitioner, may get buy-in of the parent prior to implementation of treatment. Although learning how to communicate information based on the audience (e.g., parents, medical practitioners, behavior analysts) is an important skill set for all supervisees, the extent to which this skill is modeled and practiced at an early stage in the career of a behavior analyst may substantially vary depending on where and to whom the student provides services. A student who is completing their clinical experience in a large ABA clinic in an urban city in the United States with a substantial number of BCBA’s may have the opportunity to observe a senior clinician implementing these skills but may not have the opportunity to practice this skill in the early stages of their learning because the supervising BCBA handles most direct parent interactions. However, a student who may be
working in a small ABA clinic, internationally or in rural parts of the United States, with a limited clinical infrastructure, may use this skill much earlier in their career, without the benefit of observing a skilled clinician modeling the appropriate behavior. Thus, assessing supervisee needs, based not only on their current skillset, but on the environmental needs, and determining goals and activities as part of their supervision course is critical in a remote classroom environment. Moreover, a structured assessment of supervisee clinical skills and competencies (e.g., LeBlanc et al., 2022; Tagg & Biagi, 2020) is important in this environment because the professor may not have direct knowledge of their supervisees’ clinical experience at the beginning of the professional relationship that an on-site supervisor may have.

**Synchronous sessions.** In addition to asynchronous assignments, supervisors in remote contexts should leverage current technology to include synchronous supervision sessions. The time spent during synchronous sessions is vital to the supervisee-supervisor relationship, effective supervision, and meaningful feedback. Synchronous sessions should be based on a structured schedule at agreed upon times. Generally, supervisors may start by discussing the asynchronous material (e.g., research article, book chapters, video of prior session) assigned prior to the synchronous session. Supervisors should encourage students to engage in active student responding (ASR, see Chapter 6) and program questions to a) further their practical knowledge of the technology of applied behavior analysis and b) expand their knowledge of learning and behavior in a conceptually systematic way (i.e., tie their clinical experiences back into the foundational principles of learning and behavior). For example, after learning about different types of preference assessments, a student may have practical questions about their experience implementing preference assessments with their own clients or about the rationale for determining what type of preference assessment might be best used for clients with specific characteristics. Additionally, supervisees may have more conceptual questions about the influence of preference on performance. In this case, part of the synchronous session should spark a discussion that allows students to analyze and question the material learned, apply it to practical matters of service delivery, and ultimately tie it back to basic learning principles. Supervisors may also assign small group activities, divide the material into smaller units, or incorporate inter-teach in group contexts so that the students can practice and learn from other supervisees in breakout rooms. Finally, synchronous sessions may also be used to develop other professional behavior such as public speaking, leading a meeting, or peer review. For example, group meetings may include case reviews and student presentations. Such presentations could include a description of implementation of different task list items, relevant research, and other case related content. For example, if learning about functional analyses, a student may do a literature review on different types of functional analyses, present different variations to their group, and then role model one or more of the variations of functional analyses. Generally, even when advanced students provide feedback during group sessions, there should be some time during the discussion devoted to faculty feedback on the content presented during that group meeting.
Clinical considerations. One potential roadblock in remote supervision that may not be apparent in more traditional brick and mortar programs, is that faculty supervisors are also likely not the clinical supervisor for the case. In fact, in this context, the faculty supervisor is likely not part of the clinical institution in which the supervisee is accruing their fieldwork hours. Therefore, special consideration needs to be given to policies and procedures for sharing sensitive clinical information in a way that is both ethical and meaningful for effective supervision. In many supervised fieldwork courses, students generally bring questions about their clinical cases. Students are typically eager to obtain outside feedback; particularly from faculty who may be experts in a specific clinical area. First, it is recommended that faculty or other supervisors obtain consent to learn more about the clinical case. Additionally, administrators of university-based practicum courses should consider creating systems that streamline the consent and information-sharing processes between faculty and students completing community-based fieldwork experience. However, even when students can freely share information about their clinical cases, it is important for professors / practicum supervisors to understand that they may be receiving only a snapshot of relevant clinical information. Therefore, supervisors in this context should limit their clinical recommendations and encourage the student to review the information with their worksite BCBA. Recommendations about specific clinical cases should remain conceptual and with an eye toward the supervisee’s growth as a behavior analyst, and not necessarily as a specific goal for the client. For example, if the student inquiries about a functional assessment for problem behavior, the professor may guide the student to research the topic and provide some general guidelines about best practice in functional assessment of challenging behavior. Additionally, the professor can provide feedback on appropriate methods, technological descriptions of procedures, and conceptual issues related to the case. If the professor has informed consent from the client’s legal guardian or the adult client and is welcomed to collaborate on the case via the site supervisor, the professor may provide more specific recommendations as part of their role as a supervising BCBA.

Supervision of Remote Research Experience

In addition to supervision of remote practicum experience, faculty in behavior analysis training programs may find themselves supporting student-led research projects in the context of thesis or capstone research. As the training requirements delineated by the BACB continue to progress toward more uniform standards, by the year 2023, all BCBA training programs must be accredited by the ABAI (i.e., the only BCBA eligibility pathway will be Pathway 1: ABAI Accredited Program). ABAI requires that all accredited programs include either a thesis, or thesis-alternative. ABAI describes the primary function of the research component as follows, “…develop competence in defining a research problem, designing a method to address the problem, and conducting and reporting an investigation that carries out the method to conclusion.” Additionally, ABAI will allow for work toward the thesis or other research project to fulfill the supervised fieldwork / experiential requirement. Therefore, training programs may consider developing their thesis, or thesis-equivalent projects, in a way that maximizes faculty time and coordinates the research and experiential requirements in a cohesive manner. Thus, the upcoming changes in training
standards will present both challenges and opportunities for online training programs that should be considered by administrators, faculty members, and partnering service-delivery programs. Below, we highlight some challenges and opportunities based on our experiences in remote supervision of student research projects.

**Considerations and Challenges**

Students completing their supervised research experience in a community based or other non-university affiliated program may encounter several challenges unique to that setting. Administrators, faculty, and students operating in this context must plan and prepare for several challenges that may not be relevant in more traditional, brick-and-mortar programs where clinical and research activities are often streamlined and supervised by the same group of faculty. One question that administrators and faculty of ABA training programs must answer prior to developing the boundaries of their supervised research experience is the extent to which they aim to produce *scientist-practitioners* (as is often the mission of many traditional on-campus, brick and mortar programs with thesis requirements) or *science-informed practitioners*. Training programs whose mission is the former may require research-intensive activities that may be more successfully executed in an environment where students can be immersed in on-going faculty led research while building basic research repertoires prior to initiating their own independent line of research. By contrast, training programs whose mission is the latter (who may be the majority of ABA training programs that are training primarily BCBA-practitioners), the focus may instead be to guide the students in the execution of a research project that may ultimately enhance their clinical skills by identifying a clinical problem, designing an appropriate intervention, and executing the project. Although many of these practitioners will likely not continue to conduct independent research throughout their careers, the benefits of planning and executing a research project will result in additional clinical competencies that may not have developed in a strictly clinical experience. In this context, a traditional thesis may not be necessary, and instead a capstone project or other research project embedded in coursework may be an appropriate approach to build these additional competencies.

For students working in community settings, regardless of whether they are in a thesis or thesis-equivalent program, it is likely that the mission of their clinical organization is not in line with the mission of the ABA training program. For instance, the mission of most private ABA agencies (whether non-profit or for-profit) is to provide high-quality, *efficient* behavioral services to a target population. Clinicians in these settings use evidence-based procedures informed by current scientific evidence to make treatment decisions that are in the best interest of their client. Thus, there may be competing contingencies between the training programs and community agency that must be managed. These competing contingencies may be related to a) funding sources, b) ownership of intellectual property, and c) clinical chain-of-command. For example, clinicians working in community agencies may have minimum billable hour requirements that prescribe the amount of direct clinical service delivery that must occur each week to maintain employment. Students may have to work together with their faculty mentor and clinical supervisor to carve out time during
which students have access to participants that does not encroach on a) client clinical time and b) student / employee billable time.

Similarly, it is likely that the contingencies that foster the discovery and dissemination of new knowledge may differ across university programs and community agencies. Dissemination of results obtained from research endeavors is a common expectation in the sciences in most academic programs. However, it is likely that clinical service-delivery organizations that are involved in the creation of new assessments, procedures, or clinical systems would favor privatization of those materials. Clearly setting boundaries related to ownership of data and intellectual property during these academic-private collaborations is a critical step in these partnerships. Researchers in other disciplines have begun to outline best practice for successful academic-private collaborations that may serve as an important model for behavior analysts conducting research in this manner (Pertuze et al., 2010). In this context, it may be important to establish a clear clinical and research “chain-of-command” or system whereby the student or supervisee understands a) the relationship between the research project and the client’s clinical goals and programming and b) which supervisor is ultimately responsible for guiding decision-making as it relates to the project. Ideally, the goals of the research project would supplement or enhance the clinical goals of the client’s clinical programming. However, given that the clinical supervisor and research supervisor are ultimately part of two different organizations, clearly outlining the responsibilities of each supervisor as it relates to execution of the project is critical for project success and a supportive student experience.

Finally, another important consideration is that it is likely that the community agency does not have a built-in research infrastructure in the same way that university programs have Institutional Review Boards (IRBs) or other research-specific administration and personnel. Thus, it is critical for faculty supervising student research conducted in community settings to a) understand the infrastructure and systems of the organizations in which their students are accruing experience, b) establish and maintain rapport with relevant decision-makers in those organizations, and c) effectively communicate common research practices and expectations related to planning and executing the research project in the clinical space.

Opportunities

Although there are a variety of challenges to remotely supervising student research in collaboration with service-delivery organizations, there are several unique opportunities that should also be considered. Specifically, student-led, faculty-supported, community-based research, may provide an opportunity to begin to fill some research-to-practice gaps that have been reported across a variety of behavioral interventions. Most research in applied behavior analytic journals has been conducted via university-based research and training programs in highly controlled environments. By contrast, the profession of applied behavior analysis is growing exponentially, primarily in clinic and home-based treatment settings. The tremendous growth of applied behavior analysis as a profession has resulted in the rapid translation and application of behavioral assessments and procedures that were established
and validated under tightly controlled settings. The extent to which these interventions maintain effectiveness in less controlled settings has largely been shown to differ across intervention types (e.g., Pence & St. Peter, 2015; St. Peter et al., 2016; St. Peter-Pipkin et al., 2010). Understanding the boundaries of effectiveness of common behavioral interventions is critical to continued widespread dissemination and adoption of behavioral technology. University-private collaborations may be a particularly fruitful partnership to continue to empirically answer questions related to the research to practice gap. Specifically, challenges that face service delivery organizations can inspire experimental questions that may otherwise not be readily apparent to a researcher working in a tightly controlled lab environment.

Another potential benefit of academic-private partnerships in the context of student-led research is to increase clinical capacity of the organizations. Specifically, clinical research projects may provide an opportunity to deliver additional services to meet some unmet client or community need that may not be currently supported by third-party funders or other conventional revenue streams. For example, a student developing a sibling mediated intervention may be able to pilot such a project in their clinical space, deliver a service to the clients, family members, and other stakeholders, while gaining valuable research experience that ultimately benefits the clients above and beyond their typical clinical programming.

Similarly, there are several “best practice” clinical activities that are not regularly incorporated into clinical systems because of practical limitations. For example, research has shown that interventions based on comprehensive assessments result in more successful and durable treatment outcomes. However, in clinical practice, there are limits to billable activities that often preclude conducting frequent and / or comprehensive assessments that may ultimately result in more efficient and effective interventions. Additionally, some assessments and interventions may require more resources than are currently reimbursable by third-party funders (e.g., multiple staff for a functional analysis of significant challenging behavior). Moreover, it may be difficult to find the time needed to consistently assess treatment fidelity and monitor implementation errors routinely in practice. In these cases, student-led research could benefit not only the student learning experience but also the clients receiving services and the ABA companies.

Finally, as previously noted, online students are often non-conventional students who may reside in different geographical areas. Although they take the same courses at the same university as their peers, there are often dozens if not hundreds of students in these courses, and the online format makes creating meaningful connections difficult. Strategic grouping of students in the context of their supervised research experience can approximate a cohort effect and create additional infrastructure and support. Grouping students based on common research interests may also serve other practical benefits. For example, students may be assigned a general topic, or asked to select a topic inspired by a clinical case or prior assignment (e.g., literature review). The students may then work on all sections of the research project independently but coordinate the final methods and implement the same procedures with their clinical cases. This approach not only increases student support, but it
also allows for replication of procedures across different learners and implementers. This approach may ameliorate some of the difficulties in conducting meaningful community-based research that have previously been discussed. Specifically, many students completing a thesis-equivalent or capstones project may only have the opportunity to implement procedures with one client. Grouping students within similar topic areas and building in replications across students can produce a more robust project that more fully answers the experimental question and ultimately increases the likelihood that the project results in a publishable product (e.g., see Leon et al., 2021 as an example).
References


Chapter 6.
Active Student Responding to Increase Student Engagement in Online Asynchronous College Courses

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Portions of this chapter have appeared in the previously published article listed below:


Active Student Responding (ASR) is a set of procedures used in teaching to improve student achievement by increasing student engagement in the learning process. Increased student engagement is largely accepted as a critical component to academic performance and student success (Zayac et al., 2015). The basis for ASR, most simply described as a “hands-on” or “learn by doing” approach is not a recent development, as Dewey described it in his 1916 teaching philosophy. The basic premise for this approach involves programming opportunities for student responding during instruction to facilitate learning. In behavioral terms, ASR opportunities increase student participation by using an instructional antecedent to occasion an observable student response (Heward, 1994). The critical ingredients for ASR include creating (1) abundant opportunities for student active practice, (2) frequent opportunities for students to practice newly acquired knowledge or skills through observable responses to allow a teacher to assess a student’s current level of mastery of the material, and (3) increased frequency of feedback by the teacher to students (Heward & Wood, 2015).

Decades of research have consistently shown that ASR promotes learning (e.g., Malanga & Sweeney, 2008; Prattin & Hales, 1986; Zayac, Ratkos, Frieder, & Paulk, 2016). This engagement using ASR, can take a variety of forms, including asking questions, choral responding (Heward, 1994), using response cards (Randolph, 2007) or “clickers” to answer questions (Kay & LeSage, 2009), interteaching strategies ( querol et al., 2015), and guided notes (Heward, 1994). Student engagement can be in written or oral format and gathered using low-tech (e.g., choral responding, white boards, and note cards) and high-tech
modalities (e.g., digital clickers and apps). Fortunately, both low and high-cost modalities have improved learning of students across the age span (e.g., Twyman & Heward, 2018).

There are several low-tech ASR options including hand raising, choral responding, response cards, and guided notes (Heward, 1994). Perhaps the easiest and most accessible method, choral responding, consists of each student responding orally to a teacher prompt (Heward, 1994). The response card method involves students simultaneously holding up cards to signify a response to a question or problem presented by the instructor (Heward, 1994). Clicker response systems are a higher-tech version of response cards where students indicate a response by pressing the corresponding button on an electronic device. Numerous online platforms and applications have emerged that serve as student response systems and are used in the classroom via student personal laptops and cellphones and can be used in a similar manner as clickers including Kahoot! Socrative, and iClicker. Guided notes present an outline of the information covered during a class that are delivered to students as handouts that are prepared by the instructor and given to students prior to a class (e.g., Riden, 2020). The outlines prompt students to write key points and examples presented during the lecture and are intended to help students organize lecture material, attend to salient points, and provide opportunities to actively respond to material presented in class (Heward, 1994).

Interteaching involves a multi-step procedure wherein students are assigned a reading and provided an accompanying study guide. At the beginning of each class period, a brief lecture is presented by the instructor to address remaining questions from the previous class meeting and to prepare students for the current class meeting discussion. Next, students partner with each other for 30 to 40 minutes to discuss the answers they recorded on the study guide while the instructor moves around the classroom answering questions and facilitating discussion. Students are asked to note areas of difficulty related to the content or for which areas they would like further instruction, and the instructor uses that information to guide the subsequent lecture (Boyce & Hineline, 2002). More on interteaching and its applications to online learning is described in Chapter 2.

Using ASR in university lectures consists of providing sufficient opportunities for students to actively practice a lesson and demonstrate skills or knowledge through observable responses, as well as increasing the frequency of feedback given to students by the professor (Heward & Wood, 2015). Heward and Wood (2015) referred to these steps as “Practice Elements” and broke them down into three components: practice, formative assessment, and feedback. The frequent demonstration of skills or knowledge by students allows teachers to assess the student’s current level of mastery at numerous points and adjust instruction as needed.

In typical lecture-based classes, student opportunities to respond are limited and thus also are the chances of contacting reinforcement for participating. (e.g., Keller, 1968). Lectures move along at a pace set by the instructor resulting in a situation where some students may disengage, become bored, or unable to keep up with the pace at which material is presented (i.e., they are “lost”). These situations set the occasion for students to engage in
competing activities such as using their laptops and phones for non-class related purposes. Even when students do actively participate in class sessions, the participation is likely uneven, with some small proportion of students providing the majority of comments or questions. Thus, self-pacing by the students and arranging contingencies that require high levels of active engagement from all students (i.e., interteaching) may be a desirable remedy (Boyce & Hineline, 2002).

Evidence Supporting Active Student Responding

In traditional face-to-face classrooms, instructors arrange for ASR using a variety of methods such as hand raising (e.g., Landrum, 2015), response cards (e.g., Marmolejo, Wilder, & Bradley, 2004), and clickers (e.g., Dallaire, 2011). Active student responding has been shown to be effective at improving academic performance in higher education classrooms (e.g., quizzes: Malanga & Sweeney, 2008) and beyond (for a meta-analysis see, Randolph, 2007). The evidence is clear that increased engagement benefits learning, however results are mixed on whether the modality of ASR influences student learning (Lasry, 2008). Zayac et al. (2016) compared three ASR methods (clickers, response cards, and hand-raising) to a control condition and found that students scored almost 5% higher on exams when an ASR approach was used in class compared to control conditions, however there were no statistically significant differences found between ASR conditions. There is also some evidence that the type of technology influences participation rates. Several studies have demonstrated increases in student responding with clickers and/or responses cards as compared to hand raising (Barr, 2014; Stowell & Nelson, 2007). In addition, students report preferring clickers over other methods evaluated (Barr, 2014; Lasry, 2008).

Stowell and Nelson (2007) compared effects of an audience response system (i.e., clickers) to standard lecture, hand-raising, and response cards on classroom participation in an introductory psychology course. Students in the clicker group had the highest levels of participation, followed by the response card group and participation in both groups was significantly higher than participation in the hand-raising group. However, no significant differences were found on post-lecture quiz performance between groups. Cheatham et al. (2017) examined the effects of a modified version of the Good Behavior Game (Barrish et al., 1969) on student responding across three sections of a college course. The instructor assigned students into teams which earned points for their team by raising their hand to respond to questions during the class. This modified version of the Good Behavior Game increased student responding (i.e., hand raising) relative to baseline, with and without a preferred reward.

Several studies have demonstrated positive effects on learning with the use of response cards in lectures. For example, Marmolejo et al. (2004) evaluated effects of response cards (with letters to indicate responses to multiple-choice questions) on quiz scores and participation. They found that response cards increased participation in a small class (i.e., 27 students). Kellum et. al (2001) evaluated effects of in-class review questions with and without responses cards and results indicated that a higher percentage of students earned A’s on end-of-class quizzes when response cards were used in combination with
review questions compared to when review questions were used alone. They did not observe any differences in student participation across conditions.

There are however some conditions in which response cards do not increase student learning outcomes. For example, Shabani and Carr (2004) evaluated effects of response cards in two university psychology research methods classes with approximately 50 students per class. There were no significant differences on unit-exam test scores or quiz scores between groups that used traditional lecture compared to groups that use the lecture plus response cards. However, students did participate more on days when response cards were used, and students reported liking the use of response cards.

Knapp and Desrochers (2009) compared an automated response system (i.e., clickers) to a manual response system (i.e., response cards) and found that significantly greater learning occurred when participants used the response cards rather than the clickers; however, students preferred the clicker over the response card format. Interestingly, in the Zayac (2018) study, response cards and clickers consisted of letter options whereas in the Knapp and Desrochers (2009) study, the response card option required greater effort than the clicker format (i.e., writing out a word vs. multiple choice). This suggests that the type of response required by students is a potentially important variable.

Guided notes have been found to be an effective strategy to encourage active student responding in class. Austin et. al (2002) assessed the effects of guided notes on student responding and accuracy of recall of lecture material in an undergraduate psychology course and found that quiz scores were higher and that students engaged more when using guided notes. Glodowski and Thompson (2018) also evaluated the efficacy of guided notes for reading assignments on undergraduates’ scores on quizzes covering reading material. Guided notes produced statistically significant improvements in quiz scores and note accuracy. Several other studies have compared effects of completed versus partial notes. For example, Cornelius and Owen-DeSchryver (2008) looked at the effects of partial versus full notes and found that students receiving partial notes performed better on examinations later in the semester, performed better on conceptual questions during the cumulative final examination, and were more likely to attend class compared to students who received full notes. Neef et al. (2006) compared the effects of guided lecture notes with completed lecture notes on quiz performance in a college course and found no consistent differences between the formats on quiz scores but did find that fewer errors occurred on complex quiz questions in the guided notes condition compared to the completed notes condition. Williams et al. (2012) compared the effects of traditional lecture with lecture plus guided notes and found that the lecture plus guided notes condition resulted in substantially higher tests scores (i.e., approximately one letter grade or more) both when the test was administered immediately after the lecture and when there was a one-week delay to the test administration.

Bahadourian (2006) compared effects of presenting curriculum material via written learn units (LUs) or in a lecture format and found that weekly short essay test grades were higher in the courses where material was presented via LUs as compared to lecture. LUs involved a combination of procedures including providing guided notes, the professor
reading and discussing a phrase or question from the guided notes, the professor exposing the phrase/question and its corresponding answer in the lecture material, providing an opportunity for all students to respond by completing the corresponding portion of the guided notes, and provision of immediate instructor feedback on accurate completion. Gier and Kreiner (2009) used a variation of guided notes where they imbedded what they referred to as Content-Based Questions (CBQs) into PowerPoint lectures in live lecture courses. These CBQs consisted of fill-in-the-blank or multiple-choice questions that were imbedded at several points within a traditional PowerPoint based lecture and provided an opportunity for students to check their understanding and ask clarifying questions. The PowerPoint plus CBQ condition resulted in significantly higher quiz and exam scores as compared to PowerPoint alone.

Interteaching is another effective strategy for encouraging active student engagement and the use of interteaching at the college level has increased (Seville et al., 2006; Slezk & Faas, 2017; Wheaton et al., 2019). Active student responding has been demonstrated to increase student engagement in college courses. For example, Mason (2012) examined the effects of interteaching on direct measures of active student responding and found student responding increased during interteaching conditions compared to non-interteaching conditions.

Overall, using ASR increases opportunities of rehearsal of information by students, increases opportunities for teacher assessment, increases the frequency of feedback given from the teacher to student, and increases the ability of teachers to adjust their instruction to better meet the needs of their students. The numerous studies cited above provide a variety of examples of how ASR has been incorporated into the classroom and, importantly, offer empirical evidence showing that ASR improves student learning outcomes.

**Online Education**

Online learning is prevalent in higher education. For example, in the Fall of 2018, 35.3% of students had taken a distance learning course at degree-granting post-secondary level and 16.6% were exclusively enrolled in distance learning courses (6.6 million out of 19 million) (United States Department of Education, 2019). Enrollment in exclusively distance education nearly doubled from 2019 (3,016,944 students) to 2020 (5,825,723 students) during the Covid-19 crisis where 44.7% of students were enrolled exclusively in distance learning courses and 28% were enrolled partially in distance education courses (NCSARA, 2020). Enrollment in online classes was increasing and outpaced overall enrollment in higher education prior to the Covid-19 crisis (Allen & Seaman, 2010; Allen & Seaman, 2013) and there have been numerous descriptive and experimental studies examining online pedagogy (Blackman et al., 2020; Crawford-Ferre & West, 2012; Gayman et al., 2018; Heinicke, et al., 2017; Kentnor, 2015; Malkin et al., 2018; Riekenet al., 2018; Rios et al., 2018; Watts, 2016).

In a review, Sun and Chen (2016) summarized some key design factors that need to be considered to make online instruction effective. These include having well-designed course content, having a motivated interaction between instructors and students, creating an
online environment that fosters community, and being in tune with recent developments in technology (Sun & Chen, 2016). According to the American Council on Education (2020) sustaining an online learning environment is one of the top three issues currently facing college and university presidents. One of the biggest concerns in online education concerns the excessively high attrition rates in fully online programs as compared with face-to-face courses (Bawa, 2016). Online courses have a 10% to 20% lower retention rate than traditional face-to-face environments (Herbert, 2006). Important factors that contribute to the attrition include a lack of student engagement and social interaction (Bawa, 2016). Despite the limitations, online learning is here to stay and there is some good news in terms of effective teaching online, as there is some evidence that attending lectures remotely via video can be as effective as attending a live in-person lecture (Brockfeld, 2018).

**Active Student Responding in Online College Coursework**

Lockman and Shirmer (2020) reviewed the research literature on online learning at the undergraduate and graduate level from 2013-2019 to identify effective instructional practices. They found that the strategies with effectiveness in the online environment were the same strategies that are effective in face-to-face classrooms and identified student engagement as one of five important themes. Ozan and Ozarslan (2016) examined learners’ online lecture viewing behaviors across 13 courses and found that students were most likely to watch interview style and shorter lectures completely and were more likely to seek forward (i.e., move or skip to a new position in the video) in longer lecture videos. They also found that students who watched lectures in their entirety scored significantly higher on final examinations.

While most of the research on ASR has been in K-12 settings, the literature on ASR in college teaching has expanded as technology has become more readily available and online college instruction has increased (Kellum et al., 2010). However, only a small portion of that research has investigated ASR in online college coursework where student engagement is critical. This low number may be due, in part, to the relatively recent shift towards increased enrollment in online programs in higher education. Regardless, research is beginning to emerge that provides a starting point for instructors and researchers.

Much of the literature on ASR in online college courses has focused on synchronous coursework. For example, Hollins (2021) evaluated effects of response cards and written responses in the chat forum of the Learning Management System (LMS) on response accuracy during an online synchronous graduate course. Students performed more accurately on post-lecture queries (i.e., quizzes) in the condition that required written responses in the chat forum and these effects maintained across examinations including a cumulative final. Interestingly, students reported preferring the response card condition over the chat condition. Kingsdorf and Pančocha (2020) conducted an interesting study where they used an ASR method with reinforcement for pre-service teacher training. They suggested that one way to establish better practices in primary and secondary education is to model the procedures that they wanted to see in pre-service classrooms (e.g., ASR methods). The course was delivered in a hybrid model, but the ASR component was only imbedded into the
in-person meetings. Results indicated high levels of student participation and accuracy of responding. These results are limited, however, in that there was no baseline comparison and the strategy to increase student engagement wasn’t used for the sessions that were online.

There are significant challenges in asynchronous course delivery including the lack of social presence and verbal communication, the time delay in instructor feedback, and challenges related to organization without instructor contact (Ashan, 2021). There are advantages to asynchronous courses that contribute to their popularity, including flexibility (e.g., time, geography, etc.), ability to review content, pacing, and affordability. Despite the lack of research on ASR in asynchronous college courses, there is a strong rationale for the necessity of methods to ensure ASR in asynchronous courses, most notably that there is not an option for live question-and-answer type interactions between instructors and students during lecture delivery. There is emerging research examining student engagement during video lectures. For example, Wong et al. (2021) measured viewing patterns of learners including completion, pausing, and repeated watching as a measure of engagement and found exam grades were significantly different across 3 groups with different levels of engagement with the high-engaged group having the best exam results.

Interactive features have also been found to be an important variable in student engagement in online asynchronous courses (Wei et al., 2015). Gayman et al. (2018) examined the effects of interteaching versus traditional lecture-based teaching in an online asynchronous class using an alternating-treatments design. Weekly exam scores were significantly higher following interteaching compared to standard lecture-based teaching and students scored more points on material that had been taught using interteaching on the final exam. In a follow-up study Gayman et al. (2020) compared interteaching with a preparation guide, standard teaching that consisted of a video lecture, and standard teaching plus an optional preparation guide, in an online asynchronous course. Average exam scores following interteaching were significantly higher than scores following standard teaching with or without optional preparation guides. In addition, students performed better on final exam questions that covered material taught using interteaching than on questions taught using either standard teaching condition. This suggests that optional preparation guides alone were not sufficient to improve exam scores.

One interactive feature that can be used in online asynchronous courses involves the use of embedded questions in recorded lectures. In-lecture quizzes involve presenting automatically assessed quiz questions within recorded lectures. One benefit of making videos interactive with embedded questions is that it programs an active responding component that provides students the opportunity to test their understanding and get feedback periodically during the lecture, and this strategy has been shown to increase student engagement (Cummins, 2016).

Several studies have investigated in-lecture questions in online asynchronous classes. For example, van der Meij and Böckmann (2020) compared engagement on an online video-recorded lecture with and without embedded questions (no feedback provided) and they found that students engaged significantly more in the lectures with embedded questions and
that mean test scores were significantly higher for the embedded questions condition. In a similar study, Haagsman et al. (2020) found that pop-up questions embedded in video lectures significantly increased test scores compared to video lectures that did not include embedded questions.

**ASR in Asynchronous Online Courses**

There are a variety of ways in which ASR can be incorporated into asynchronous, online environments. For example, a prerecorded clarifying lecture led by the instructor, based on a record of interteach and quiz performance, could be enriched with ASR questions (e.g., multiple-choice, true/false, reflection, etc.) interspersed throughout the lecture. For example, at the outset of the lecture, learning objectives could be provided to the students. After describing the learning objectives, the instructor would advance through the next slides that directly teach the objective at a steady pace, breaking the complex material into smaller manageable units. To conclude, the instructor would provide the students with several ASR questions to assess mastery of the learning objectives. Enhancing online lectures with ASR ensures that students watch the video and provides both students and the instructor with a way to assess mastery of the learning objectives. An important question for future research is whether face-to-face versus asynchronous online lectures enhanced with ASR questions produce similar learning outcomes.

There are multiple programs that can be used to create asynchronous online lectures. Kaltura (https://copr.kaltura.com/solutions.education/) is one such program and it is unique in that it has several tools that educators can use to promote ASR. Panopto is a similar program that, like Kaltura, integrates well with Blackboard and Canvas and can be used as an alternative. For instructors without access to these add-ons in a LMS, videos could be hosted on free sites such as YouTube and an associated quiz could be added within the course LMS (though access to video viewing analytics by a specific user would not be available). The analytic features in programs such as Kaltura allow instructors to view the number of plays, number of minutes viewed, and average completion rate of lectures or other materials posted. In addition, analytics include information on engagement per user. If an individual student is demonstrating performance issues in the course (e.g., low quiz or test grades), an instructor can easily access these analytics and determine the percentage of the lecture video viewed by that student. If the percentage viewed is low, the instructor can provide precise feedback to support the student regarding “time spent in class”. In addition, if there are large “drop-offs” in viewing, instructors can use this as feedback regarding the content of the video and adjust their courses and feedback accordingly (see Ozan & Ozarslan, 2016).

**Case Study**

Next, we will describe a case study in which we were delivering online asynchronous coursework through Kaltura for a graduate level program at a small university in the Northeast of the United States where analytics indicated that a portion of students were essentially not “attending class lecture” throughout the semester. At the time, there were no contingencies in place for viewing lectures in that no points towards a student’s grade were
allocated to “attending class” (i.e., viewing the lecture). Therefore, we decided to imbed an ASR component into lectures wherein students would receive points toward their grade for correct responding on embedded quiz questions in a recorded video lecture. Later, we added a contingency that required students to watch the video lecture in its entirety and answer the question correctly to receive credit. The placement of quiz questions varied, though were most often placed towards the end of the video lecture. Regardless of where the quiz question(s) were placed, the instructor examined analytics to ensure that the students viewed the lectures in their entirety (i.e., credit was adjusted in the gradebook if the quiz question was completed, and the video was not viewed in its entirety). We chose this route as opposed to disabling the seeking forward feature as the technology sometimes failed and we did not want to increase student frustration and dissatisfaction by requiring them to re-watch lectures to respond to embedded quiz questions because of technology issues.

We conducted an archival analysis on the lecture viewing behavior across two cohorts of students in an online Applied Behavior Analysis course. Cohort 1 had one brief video lecture per week (i.e., 10-15 in length) where technology to track viewing behavior was available. Cohort 2 had three to six lecture videos per week (the length of the video varied by course but ranged from 12-45 min) and included an ASR component embedded within lectures whereby students could earn points toward their final grade for correct responses.

Cohort 1 was exposed to the baseline condition which consisted of one short lecture per week using Kaltura with available analytics (15 lectures) with no contingencies in place for lecture viewing or responding during the recorded lecture for one semester. Cohort 2 was examined across three semesters and was exposed to the following conditions: a) Pre-treatment (i.e., baseline) during semester 1 which consisted of 3 lectures where non-contingent credit was provided for the lecture (i.e., credit was provided independent of lecture viewing and/or completing the embedded quiz question); b) Treatment 1 during semester 1 (22 lectures) where credit was provided for correct ASR completion; c) Reversal during semester 1 (1 lecture) with no ASR opportunity (and no point allocation); d) Treatment 2 during semester 2 (30 lectures) where a “warning” was provided regarding ASR credit being contingent on correct completion of the embedded question and viewing the lecture in its entirety and; e) Treatment 3 during semester 3 (26 lectures) where the contingency in the warning phase was implemented. As there were multiple video lectures each week, we selected a sample of lectures across the semester in the analysis that included the first and last lecture during each week of the course across the 15-week semester.

Students in Cohort 1 watched, on average, only 26.02% of the lecture video when no contingencies were in place for viewing. When an ASR component was added for Cohort 2, lecture viewing increased to 74.53% and in-lecture viewing patterns indicated that some students were seeking-forward to the ASR question. The average viewing percentage increased to 82.22% when a warning was issued about seeking-forward to complete the ASR and viewing further increased to 92.95% when a contingency was implemented that required completing the ASR and viewing the lecture in it’s entirely to receive credit for a correct ASR response (see Figure 1).
Figure 1

Effects of Active Student Responding Component

Note: Average percentage of video lecture viewed before the active student responding (ASR) component was added (Cohort 1) and viewing with the addition of the ASR component (Cohort 2) initially, following a warning, and following the addition of a contingency linked to grade.

In one class for Cohort 2, the scoring for the embedded quiz questions (i.e., ASR component) was not functioning properly and credit was provided non-contingently during week 1 of the course. There was also an unplanned reversal where one of the lecture videos in week 4 did not have an embedded quiz question (i.e., ASR component). During week 1, when students were not required to view the lecture or complete the quiz question, the average lecture viewing was 50.43%. When the contingency was in place where points were contingent on viewing lecture in its entirety to earn points for answering the embedded quiz questions correctly, responding increased to 77.11%. During the unplanned reversal in week 4, average lecture viewing was only 40.90% (see Figure 2).
Figure 2
"Effects of providing credit for viewing lecture and completing Active Student Responding component"

![Graph showing lecture viewing percentages under different contingencies.

Note: Average percentage of video lecture viewed when course points were assigned noncontingently for three lectures, with a combined contingency of correctly completing ASR and viewing lecture in its entirety, and during a brief unplanned reversal (1 lecture).

In addition to evaluating the average lecture viewing percentages, we examined some individual student viewing patterns to more precisely evaluate how our intervention affected viewing behavior. There were several students who viewed lectures in their entirety or close to their entirety (i.e., approximately 85% or more) regardless of the contingencies. Representative data are provided in Figure 3. For example, Student 35 engaged in high viewing levels initially except for the quick reversal in week 4 for one lecture with no ASR. Student 35’s viewing behavior continued to be high throughout the semester with some variability and a slightly greater tendency to drop viewing during the final lecture of the week suggesting that this student’s engagement dropped off over time during certain weeks.
Figure 3

*Student 35*

![Graph showing viewing behavior of Student 35](image)

*Note:* Average percentage of video lecture viewed for Student 35 and are an example of a student who engaged in high viewing percentages regardless of contingencies.

The viewing behavior of several students was very sensitive to the contingencies in place. For example, Student 17 had very low viewing percentages when no contingencies were in place for lecture video viewing. Lecture viewing increased in the first lecture of the week when a warning was provided when a points contingency was in place but remained variable in the final lecture of the week. Finally, lecture viewing increased in both the first and final lectures of the week when the contingency was put in place (see Figure 4).

Figure 4

*Student 17*

![Graph showing viewing behavior of Student 17](image)

*Note:* This Figure depicts average percentage of video lecture viewed for Student 17 and are an example of a student whose responding was very sensitive to contingencies in place.

There were also several students who struggled throughout and did not increase lecture viewing until the end of the semester. For example, Student 24 had an increase in
viewing percentages when the ASRs for credit were initially added, but then viewing dropped off – first, in the final lecture of the week and then across initial and final lectures. Viewing increased when the credit contingency was added and was the most stable during the final four weeks of the semester in what appeared to be an attempt to salvage their grade. Student 34 had a similar pattern but had a more immediate and sustained response to the credit contingency (see Figure 5). Overall, findings from this case study suggested that imbedded quiz questions increased viewing (i.e., active responding) by students when associated with course credit. If skipping forward was not disabled, a portion of students skipped forward to complete the question without viewing the lecture for credit unless credit was contingent on correctly completing the quiz question and viewing the video in its entirety (i.e., instructor monitored viewing analytics and adjusted credit accordingly). Nevertheless, an overall increase in student viewing of lecture videos increased with the addition of the ASR component.

**Figure 5**

*Students 24 and 35*

![Graphs showing viewing percentages for Students 24 and 35.][1]

*Note:* This Figure depicts average percentage of video lecture viewed for Students 24 and 35 and are examples of a student whose responding increased only at the end of the course and a student whose responding was only sensitive to the credit contingency.
**Future Directions**

As noted previously, future research should evaluate whether face-to-face versus asynchronous online lectures enhanced with ASR questions produce similar learning outcomes. Future research could also evaluate the necessary and sufficient components of ASR to support student learning. For instance, providing opportunities for practice with and without explicit feedback could elucidate the mechanisms that make ASR effective. Research suggests that elaborate feedback (Collins et al., 1987) can improve performance relative to feedback on whether the learner was accurate (Jaehing & Miller, 2007). Elaborate feedback may require the instructor to provide a brief rationale following the ASR highlighting why a particular response option was correct or incorrect. Further, instructors may wish to assess the effects of corrective feedback that requires the learner to respond accurately to the ASR following an incorrect response (Drevno et al., 1994). Additional questions remain about effective ASR teaching practices. For example, a common (yet puzzling) practice entails designing ASRs to assess whether students are simply attending to the material. For example, a professor may ask, “What is the color of my shirt?” A potential concern with this type of question is that it does not assess whether the learner understands material related to the learning objectives. Other areas of research might entail testing the boundaries of the “low-stakes” costs of ASRs. For example, to motivate student performance, the instructor could parametrically assess the effects of relatively small-, medium-, and large-amount of points earned for accurately completing ASRs. Taken together, further investigations into the applications of ASRs remain a ripe area for future scholarship of teaching and learning.

**Conclusion**

There is a growing body of evidence that Active Student Responding enhances student performance. This instructional strategy can be employed across a variety of course types, and with varying degrees of technology. Given that ASR can be effectively deployed in a wide range of course modalities (i.e., in person, online, synchronous, asynchronous), it is a practice that should be more broadly employed.
References


What Is Creativity?

Throughout history, it has been necessary for human responding to adapt to new circumstances. Sometimes, these responses are variations on past behavior. Other times, these responses are unlike anything ever seen before. What these responses share is that they are typically called creative. As humans sought to understand how these responses developed, sometimes for aesthetic purposes, sometimes for teaching purposes, a variety of explanations for creativity emerged. For example, ancient philosophers, including Greek, Arab, and Asian philosophers (e.g., Plato, Socrates, Aristotle, Zoroastor, Sun Tzu, Confucius), focused on creativity in artistic expression (e.g., poetry, sculpture, painting, music). This led to the most commonly found definition of creativity: both the act of developing novel, heretofore unseen products, and the products themselves. Within the realm of a scientific analysis, researchers have focused on identifying the conditions that give rise to creativity. In psychology, the most prevalent theory is based on a state of being, flow, giving rise to highly creative acts (e.g., Csíkszentmihályi, 1990). In behavior analysis, however, researchers have focused on three primary factors: response variability, response novelty, and social descriptions of behavior outcomes. From a behavior-analytic perspective, there are likely two factors contributing to creativity: the analysis of variables related to response variability (e.g., Neuringer & Jensen, 2013) and the analysis of variables related to response generativity (e.g., Epstein, 1999). Although response variability and generativity may seem like two distinct conceptualizations, both are necessary to a comprehensive, scientific analysis of creativity. Response variability is focused on the moment-to-moment changes in response form whereas generativity is focused on the production of novel response forms. Therefore, a behavioral account of creativity requires both changes from moment-to-moment (response variability) and some of those changes involving novel responses (response generativity). That is, the critical variable in a behavioral analysis of creativity involves analyzing how responses change from moment-to-moment, regardless of the historical status of those responses as either repetitive or novel. This conceptualization fits well into the needs of the higher education classroom, as much of teaching involves a balance between learning basic concepts and applying those concepts in novel ways. To those ends, it will be helpful to
understand some of the empirical research in behavior analysis on mechanisms that give rise to creativity.

Behavioral Mechanisms of Creativity

Many social scientists have approached creativity from a either trait-based or state-based perspective (e.g., Amabile, 2013; Arieti, 1976). Although these conceptualizations have produced much scholarly work, they typically are limited in experimental analysis, because of the difficulty of direct manipulations of traits and states. Behavior analysts, however, have focused on identifying variables that give rise to creativity. Generally, these variables fall into two categories: social variables, related to the description of response products, and variables related changes in responding from instance to instance. Because, as the saying goes, “beauty is in the eye of the beholder,” analysis of the social variables has led to primarily descriptive analyses, which may be of limited use in designing courses in higher education settings. However, the analysis of changes in responding from instance to instance has yielded a growing and strong research literature that has important implications for the design and implementation of higher-education teaching.

The analysis of changes in responding from instance to instance is, more succinctly, the analysis of response variability. From an operant perspective, response variability can be viewed as either a threat to experimental control (e.g., Sidman, 1965) or a dependent variable (DV) that we systematically alter (e.g., deSouza Barbara, 2012; Machado, 1988; Page & Neuringer, 1985). As teachers, we are likely more interested in the latter – variability as a dependent variable. For example, when teaching foundational material, such as the elements of the periodic table, a teacher might desire no variability – when a space on the periodic table is selected, all students should name the exact same element. However, when teaching application, such as chemical interactions, a teacher might desire a high degree of variability – students may be presented with several chemicals and asked to combine them and document what they observe. Behavior-analytic researchers have conducted a plethora of basic and applied studies on response variability.

Since the early days of the experimental analysis of behavior, behavior-analytic researchers have been interested in response variability as a DV. This work focused on various parameters of responding by animals in operant chambers. For example, Antonitis (1951) was interested in distribution of nose thrusting along a horizontal plane and found that variability of nose-thrusting location increased when under extinction and decreased when directly reinforced. Ferraro and Branch (1968), in a replication, found that intermittent reinforcement produced greater variability in the location of nose pokes, perhaps due to inducement by extinction. Finally, Blough (1966) evaluated the effects of reinforcement on the distribution of interresponse times (IRTs) and found reinforcing the least frequent IRTs produced rapid increases in variability of IRTs.
Extinction and Response Variability

Although early work demonstrated response variability was sensitive to operant contingencies (e.g., Antonitis, 1951; Ferraro & Branch 1968), their approach was indirect – they observed variability in responding under fixed antecedent and consequent arrangements. It is the direct-reinforcement approach, first demonstrated by Blough (1966), that has led to growth of research and a technology of response variability: direct manipulation of novel responding and direct manipulation of variable responding. Within this direct approach, researchers have focused on two general effects: induction and direct production. Researchers have described systematic changes in responding when a response undergoes complete extinction or periodic extinction when under intermittent reinforcement (e.g., Grow et al., 2008; Kinloch et al., 2009; Lopatto et al., 1998; Morgan & Lee, 1996; Neuringer et al., 2000; Valentino et al., 2011; Tatham et al., 1993). For example, in an evaluation of the effects of extinction on toy play variability, Lalli et al. (1998) observed a substantial increase in untrained play behavior when toy selection was under extinction. Although extinction-induced variability may seem like a promising approach, there are several limitations particularly relevant to the classroom. First, extinction does not maintain responding. In a classroom, students are typically learning new material. Learning this material may involve some errors, that contact extinction (e.g., no response from an instructor) or punishment (e.g., a poor score on a quiz). If extinction is explicitly programmed to induce variability, the combination of extinction or punishment of errors with extinction for correct but repeated responses may produce an overall reduction or cessation in responding by the student. Second, extinction produces well-known side-effects, such as emotional responding (e.g., Lerman & Iwata, 1995; Lerman et al., 1999), which could include verbal statements of frustration in a classroom. Taken together, the induction of variability via extinction is unlikely to be a sustainable practice in the classroom when used in isolation from other procedures.

Reinforcement of Response Variability

Although extinction can be effective in increasing variability, an approach based on reinforcement is more likely to produce sustainable outcomes. This has taken two forms: reinforcement of novel behavior and reinforcement of variable responding. Reinforcement of novel behavior typically involves providing reinforcement for a response that has never occurred. Researchers have evaluated a variety of methods for increasing novel responding, including the use of praise to increase novel responses to stimuli and providing reinforcement for only the first instance of a response (e.g., Cammilleri & Hanley, 2001; Goetz & Baer, 1973). In addition, researchers have found that providing reinforcement for behavior that previously occurred, combined in a novel way, something that often occurs with complex behavior, such as problem solving in a classroom or doing case studies, is effective at increasing novel responding (e.g., Alessi, 1987; Foxx et al., 1989). One of
the earliest examples of reinforcement of novel behavior is seen in Pryor et al. (1968), who reinforced novel tricks performed by porpoises at an exhibit. They found a substantial increase in both the diversity of movements and novel combinations of movements. Although effective, Pryor and colleagues encountered something that highlights the difficulty of this approach – the rapid occurrence of highly complex behavior that is difficult to record. This has great relevance to the classroom. In most college classrooms, a teacher is working with, often, upwards of 20 or more students. Attempting to monitor the behavior of multiple people at once may be very difficult if not nearly impossible. Additionally, trying to differentially respond to multiple novel responses at once may be very difficult. Finally, and perhaps most importantly, in many classroom situations, there may be a smaller number of acceptable responses and it may be acceptable for more than one student to make the same response. For example, in a clinically oriented class, a teacher may present a case and ask students to formulate an assessment approach. Within the specific discipline, there may be several different assessments that will be appropriate. The teacher may desire that, across students, each assessment approach is selected and described, such that the entire class is exposed to the strengths and weaknesses of each approach. However, in this case, it would not be possible to have entirely novel behavior - one would expect a small number of responses but desire that each of those possible responses, in this case assessments, was selected.

The more common and feasible approach to increasing variability is the direct reinforcement of variability per se (e.g., Duker & vanLent, 1991; Machado, 1989; Page & Neuringer, 1985). The most common approach is the lag schedule (see Neuringer & Jensen, 2012; Rodriguez & Thompson, 2014 for reviews). At its core, a lag schedule involves reinforcing responses that differ from an immediately preceding number of responses. For example, in lag 5 schedule, a response will produce reinforcement if it differs from the preceding five responses.

Page and Neuringer (1985) developed the lag schedule and were the first to evaluate various parameters. In a six-experiment study, Page and Neuringer evaluated the sensitivity of variability to reinforcement and various antecedent and consequent influences on variability. In experiments 1 and 2, Page and Neuringer replicated and extended an experiment by Schwartz (1982), demonstrating that variability was in fact sensitive to reinforcement – variability of key-peck sequences increased when food was contingent on varying sequences. In experiment 3, they evaluated the effects of lag values ranging from 5 to 50 on variability. They found that lag values of 5 to 25 produced similar levels of variability and there was a significant decrease in variability under lag 50. In experiment 4, Page and Neuringer evaluated how sequence length affected response variability. They found that longer sequences, those with six or eight response units, produced higher levels of variability than shorter sequences, such as those with only four response units. In experiment 5, Page and Neuringer compared the effects on variability of a lag 50 schedule to a
matched yoked schedule, that is, a schedule in which food was presented at the same
times it was under the lag schedule. They found that the lag 50 schedule produced
substantially higher levels of variability than the yoked schedule.

Page and Neuringer’s (1985) study led to a flurry of applied research over the
next 30 years, including research on variability of play behavior, martial arts, and
various types of verbal behavior (e.g., Esch et al., 2009; Grow et al., 2008; Harding et
al., 2004; Lee et al., 2003). Although the majority of these studies have occurred with
individuals with intellectual and developmental disabilities, there have been some
general findings across studies. First, researchers have been able to obtain response
variability under low lag values, but at the expense of so-called higher-order
stereotypy. Higher-order stereotypy is a pattern in which responses change from
moment to moment but in a fixed or reliable pattern. For example, if one were asked
to name elements from the periodic table, one could say oxygen, nitrogen, gold,
helium, and cobalt. Although each response is unique, if those were the only five
ever named, one could consider the sequence repetitive. This can be a problem in
the higher-education classroom for two primary reasons. First, higher-order
stereotypy represents a type of recitation. In many classrooms, particularly in high
level undergraduate or graduate courses, recitation is but a small part of the skills we
want students to learn. Second, higher-order stereotypy represents a lack of
sensitivity to what is going on in the immediate environment. That is, the repetitive
sequence of responding indicates that one is not responding to the immediate
variables present. For example, if a teacher asked someone to analyze a piece of text,
ideally, the response would be based on the content of that text and the student’s
generalized skills in textual analysis. One final issue with lag schedules that presents a
barrier to their direct use in the higher-education classroom involves practicality.
First, a teacher must be able to measure all student responses at once in order to
implement a lag schedule. This, therefore, requires some type of ongoing monitoring,
which may be accomplished by always having a written product of students’
responses, something that is not feasible in all disciplines or with all topics (e.g., a
musical performance). Second, a teacher must be able to monitor responding in real
time. This presents a barrier to teaching that involves independent or small group
work, in which a teacher may move from student to student or group to group.
Because of these issues, direct replication of lag schedules in a classroom may not be
the most feasible approach. However, researchers have evaluated methods for
increasing variability specifically in classroom settings.

Early applied work in behavior analysis evaluated increasing the variability
and complexity of speech by students in classroom settings. For example, Glover
and Gary (1976) evaluated the effects of reinforcement on the diversity of nouns,
verbs and sentence length. Across several phases, they evaluated the reinforcement
effects on each component separately. When reinforcement was programmed, they
saw a substantial increase in the diversity of that component. Maloney and Hopkins
(1973) evaluated the effects of reinforcement on different sentence components, with the goal of increasing sentence complexity. They found that reinforcement increased each sentence component separately, and when combined, produced substantially more complex sentences. Finally, Parsonson and Baer (1978) taught students to use a variety of tools. Following the training, the participants began using the tools in new, improvised ways. Taken altogether, researchers have found that programming reinforcement for changes in complex behavior that typically occurs in classrooms is both feasible and effective and increasing the variability of responding. So far, much of this work has been done in classrooms with younger children and adolescents. However, this does not preclude translation into the higher-education environment.

Translating Research into the Higher-Education Classroom

In scholarly writing, researchers exquisitely describe dependent variables, using precise operational definitions. Although this may seem different from many higher-education classrooms, this disconnect may be more of a mirage than reality. That is, teachers of higher education are often required to create detailed and observable and measurable outcomes for their class; in other words, teachers are operationally defining what they want students to achieve. Across a variety of disciplines, we know there are specific sequences of instructional content that produce durable and effective learning outcomes. Many may recognize this as Bloom’s taxonomy (Anderson et al., 2001). First, students must master content. Once they have this foundational information, we want them to apply that content to the real world. Depending on the class, this may take the form of analyzing texts, solving clinical problems, solving engineering problems, or the like. As students apply this knowledge to examples from the real world, we expect them then to begin synthesizing content from multiple areas, to better understand and analyze the real world. As this synthesis progresses, students begin to develop and create new solutions, new approaches, new treatments, and the like, to both understanding and solving problems in the real world. Bloom’s taxonomic approach has produced substantial gains in both the efficacy and applicability of many educational environments. Interestingly, many educators have argued that a behavior-analytic approach cannot produce outcomes beyond Bloom’s knowledge levels. As described above, there is a history of behavior-analytic research on the production of novel, complex behavior, that is, creative behavior, that would likely be represented as forms of analysis, synthesis, and evaluation in Bloom’s taxonomy. This seeming disconnect may be due to discrepancies between behavior-analytic and general education research methods and theoretical assumptions. For a discussion of these issues, including a detailed review and recommendations for advancing behavioral approaches to higher education, see Bernstein and Chase’s (2012) chapter discussing behavior-analytic contributions to higher education. These empirical and conceptual considerations notwithstanding, something must occur before teachers can
implement this general approach to facilitating creativity in the classroom: the development of a highly reinforcing classroom.

Creating Classrooms That Frequently Reinforce Student Performance

Over time, researchers have found that students report an increasing level of anxiety, that has likely been exacerbated by the COVID-19 pandemic (e.g., Hsu & Goldsmith, 2021; Jones et al., 2018; see American College Health Association, 2019, for a review). One of the ways this anxiety relates to the classroom is increased stress caused by a desire for “the right answer only.” That is, students report anxiety about making an error. From a behavior analytic perspective, this suggests that many of the classroom environments students have encountered involve highly aversive events surrounding responding. This would be exacerbated by an approach that focuses on increasing the variability of student responding because variability necessarily engenders greater opportunities for errors. As teachers, we know that errors are part of learning. In fact, some teachers may specifically program for errors, to help teach students how to overcome and adapt when things don’t work out as designed. However, we have to recognize that students don’t often come into our classroom with a history of errors being acceptable and reinforced. Therefore, we need to change how we approach things. One of the biggest changes we can make is to program repeated opportunities. This has several benefits. First, by programming repeated opportunities, we helped teach students that, at times, the process is as important as the outcome. Second, by providing repeated opportunities, we can align our grading not to just outcomes but change along the process continuum. By changing to a repeated-opportunities model, then, variability becomes a critical component of structuring our classroom environment.

The key to repeated opportunities is programming reinforcement for change—reinforcement of response variability. Although this may seem like a given in a classroom, many instructional practices are not oriented towards this. For example, in many classrooms, lectures and class activities are common occurrences but do not enter into the formal evaluation process for students. Instead, there may be a limited number of quizzes or exams and a final project. In these arrangements, then, the only differential outcome students experience is the final end-product of weeks, or an entire semester for a final exam, of learning. This can facilitate student anxiety, because the focus on a single outcome measure assumes there was a systematic change in student behavior along the way. This also can be frustrating for faculty members if they do not see a desired outcome in students. A straightforward way to solve this is to specifically teach students to vary. This involves presenting students with the opportunity to do something multiple times. The benefit of this approach is that it can occur in both synchronous and asynchronous formats. For example, in a clinically oriented class, this may involve presenting students with a variety of case studies and asking them to work through the case study. An instructor could then present the same case study multiple times and ask students to take a different
approach each time. In a psychology class, this could involve asking the students to develop a treatment plan based on different paradigms for the same clinical case. In an engineering class, this could involve asking students to develop a different building type for each building case study. As students do this, the instructor then reinforces their change in responding per se while also providing feedback on the content of their response. Although the feedback may involve some criticism and requests for refinement, the high rate of reinforcement for simply changing what they do substantially reduces the aversiveness of that feedback. This presents an opportunity for direct reinforcement of variability.

There are also times in which students need to repeat. That is, there are times in which doing the same thing is a good and necessary thing. For example, when learning to analyze a text, students may need to break the text into component parts each and every time before they begin the formal analysis. Likewise, in a clinical class, students may need to learn to do a specific assessment for each and every situation. This can be embedded in situations in which students are asked to vary. On each opportunity, an instructor could signal what needs to be repeated and when students need to vary. The critical thing is that students have the opportunity to emit their responses multiple times such that you can capture both repetition and variability when appropriate. A critical part of this, then, is instructors varying their responses to student responses. This has multiple benefits. First, we can differentially select responses we like in responses we don't like. In other words, by providing students multiple opportunities, we have multiple opportunities to identify acceptable responses. Those desirable responses, then, can serve as models for other students and help prompt more desirable responses in students who have not emitted responses that we would want while maintaining a high rate of reinforcement for responding. For example, in a math class, students may be asked to solve a word problem. There may be many ways to solve the problem and the instructor may find that a specific student comes up with a novel method. The instructor could highlight that novel solution by praising the student who developed it and asking them to share it with the class. Then, on a subsequent word problem, the instructor could measure the extent to which other students imitate that solution. This would present an opportunity not just for students learning a new skill but also an opportunity for the instructor assessing how new skills are applied to new situations, two higher-order skills on Bloom’s taxonomy.

**Developing Creative Instructional Methods**

Within this context, instructors must recognize that there are situations in which we will specifically limit the creativity of our students. Within Bloom’s taxonomy, the lower levels that support the higher levels are based on relatively uncreative responses by students - remembering, understanding, and applying. Although repeated opportunities present a method for differentially reinforcing these three skills, they are the least creative but are the most necessary for students to
successfully apply and synthesize. Many instructors may feel this is a limiting aspect of a focus on variability. However, the limitation of creativity in our students while they learn these foundational skills does not mean we as instructors have to limit our creativity. In fact, teaching these foundational skills to our students through repeated opportunities presents an opportunity for instructors to be highly creative. A popular new approach to teaching in higher education environments is the so-called flipped classroom (see Al-Samarraie, 2020, for a review). In the flipped classroom, students learn foundational material outside of class and work towards mastery before they come to class. In class, students focus on those higher order skills in Bloom’s taxonomy - application, analysis, evaluation, and creation. A method that incorporates both the flipped classroom concept and the repeated opportunities concept is interteaching (Boyce & Hineline, 2002). See chapters 2 and 3 for a description of interteaching. The classic interteaching method presents students with at least two opportunities to interact with their reading - while doing the preparation guide and while doing the interteaching. However, it is also possible to provide additional opportunities for students interact with the material. Although additional opportunities may seem like in approach that produces repetition, researchers have reliably found the interteaching does in fact produce substantially greater development of skills across Bloom’s taxonomy (see Querol et al., 2015, for a review). For example, in an evaluation of the relative contributions of each interteaching components, the author of this chapter presented students with a subset of questions at three different points during the end teaching process—before accessing the preparation guide, before completing the in-class interteach, and after the clarifying lecture. Across multiple courses, scores before the preparation guide never exceeded 30% and scores prior to the interteach never exceeded 60%. After all components of interteaching, no scores were below 80%. On a larger learning probe that included novel synthesis and creation questions, which occurred approximately every 4 weeks, students scored no lower than 90%. This indicated that not only were students retaining information, but they were also able to analyze, synthesize, and create to answer questions that were novel to them. In other words, the repetition of answering the questions produced variation in their answers, which then facilitated students’ creativity on a subsequent learning probe.

The benefits of this approach can be seen particularly in larger, online classes. First, the opportunity for students to answer questions multiple times helps automate, so to speak, some of teaching, using self-monitoring, peer feedback, or both. This allows for differential consequences to occur without specifically having to individually program unique reinforcement and feedback for each and every student. Second, as classes grow in size, the diversity of questions student may find difficult and topics student might find interesting grows, which presents a unique opportunity for instructor creativity. That is, with larger classes, an instructor may be able to group responses and create unique customized content for each set of students. The instructor could then create brief (e.g., 5 min) videos discussing the
questions students found difficult and the topics they found interesting. Because of the variability in questions and topics across students, then, an instructor has the opportunity to be highly creative in how they address these questions and topics, while also being sensitive to the unique needs of individual or groups of students. Additionally, this approach may not require substantially greater time than developing a traditional lecture. For example, when the author implemented this in a research methods course, he created videos for each pair of students for 10 total pairs maximum. Each video was between 5 and 6 min in duration for a total of a maximum of 60 min. Before implementing interteaching, the author would regularly lecture for far more than 60 min, but the lecture was the same for all students. By switching to interteaching-based lectures, the author reduced the amount of overall lecture time while also increasing the creativity of the lectures because each lecture was customized to specific students. The author found this to be quite an exciting and fun opportunity that substantially increased the enjoyment of developing and delivering lectures. Students also reported they valued these brief lectures much more, because they were customized to their specific questions and interests. One of the unique aspects of this approach is that it works particularly well for asynchronous instruction. Interteaching can occur at any time during a typical class week, based on each interteach pair or group’s availability. Because the instructor makes videos based on the results of the interteach, the videos can be made whenever the interteach records are submitted rather than having to respond “in the moment” during a synchronous class. Of course, this approach can also be used in a synchronous class arrangement, with some minor modifications. One modification would be to break the synchronous class into two periods: interteach and clarifying lecture (i.e., after a brief break to compose the clarifying lecture). Alternatively, the instructor could create the videos outside of class, much as was done in an in-person format.

Repeated-Opportunity Approach and Higher-Order Skills

Leveraging opportunities for changes in student behavior via repeated opportunities also opens-up the possibility for adding additional components of the course that facilitate higher-order skills in Bloom's taxonomy. By providing students the opportunity to initially respond outside of class and refine their responses during class, more class time is available for student activities. These activities are fantastic opportunities for increasing variability of student responding and for teaching students when to vary and when repeat. For example, in an undergraduate course on functional assessment, the author provided students with a reading guide, over the assigned journal articles for class, to be completed prior to class. Although students did not complete interteaching during class, by completing the reading guide before class, students had an understanding of the basic content of each journal article. Then, during class, there were greater opportunities to focus on applications of the components of the journal article to real-life cases. Across the semester, then, this was sequenced such that students built-on and added-to what they had learned.
before, to better address each case. At the beginning of the semester, students learned simple and basic functional assessment strategies: descriptive and anecdotal assessments. During initial activities, students were asked to vary in how they use these descriptive and anecdotal assessments. Once they had demonstrated they were able to adequately use and combine descriptive anecdotal assessments, students learned about different types of functional analyses (FA). Once they learned about FAs, they were asked to develop a comprehensive functional assessment. This involved using descriptive and anecdotal assessments to identify relevant variables that they would use in an FA. Students typically completed this in groups, and across groups, students very often developed different ways of designing the assessment, even though each group was given the exact same case. With respect to assessment, the author's goal was accomplished across groups - students were varying how they approach the assessment of a case and being creative in how they designed their assessments. Across the semester, this scaffolding continued. Once students had used descriptive and anecdotal assessments to design a customized FA, they use that information to design a function-based treatment. Initially students learned about a specific type of treatment, differential reinforcement, and they were asked to develop different ways of implementing that single treatment. As they learned about additional types of function-based treatments, they had the opportunity to select and design novel combinations of treatments based on their assessment outcomes. Across both students and groups, the author observed different types of assessment outcomes that lead to different types of function-based treatments. Again, the author’s goal was accomplished - students were demonstrating foundational knowledge, using that foundational knowledge to analyze and synthesize the assessment and treatment, and creating novel assessment and treatment combinations. By the end of the semester, students were addressing real world clinical cases in the manner that a fully trained behavior analyst would. First, they conducted highly socially valid descriptive and anecdotal assessments. Second, they designed FAs to evaluate and validate the outcomes of the descriptive and anecdotal assessments. Finally, they designed function-based treatments based on the results of their comprehensive functional behavior assessment. Although each student produced the same overall outcome, the content of that outcome was highly variable. Because students had the foundational knowledge, they were able to be unique in how they address the clinical case. This kind of iterative, scaffolded-component learning is well suited to online courses. In synchronous courses, this could be conducted in a similar way to in-person courses, with students broken into groups using web conference technologies. An instructor could then move between groups, much as would occur in an in-person course, and then allow students the opportunity to share what they developed in their group with their peers in other groups. Within asynchronous courses, modules could represent each component skills. As students mastered each component, subsequent modules could be made available. If a student struggled with a component, additional opportunities for
practice and feedback could be made available within the module, until the student fully masters the component.

So far, much of the approach I have talked about has been focused on courses that are highly amenable to application synthesis and creation. That does not mean, however, that this approach is not applicable to courses without immediate application or is focused on creation within highly structured conditions. For example, across most disciplines, students are taught research skills. In most disciplines, research skills are relatively fixed and students need to learn these fixed skills in order to be successful. On the surface, this may seem like a situation in which there are very little opportunities for variance. However, these types of courses present a very great opportunity for variability. That is, in teaching research, what we are teaching students are a set of skills that allow them to evaluate something, in order to replicate, extend, clarify, or refine what has previously been found. In other words, those research skills allow students to “riff” on what others have done before, that is, to vary. This requires a slightly different approach to presenting repeated opportunities. To teach those foundational skills, one may need to begin with a “prompted” approach. For example, in a research methods course, a common skill students need to learn is how to read a research article. To begin a prompted approach, students could be provided an article summary sheet. This summary sheet may have headings for each of the sections the instructor wants the students to summarize. Each heading, then, may have a prompt for how long the summary for that section should be. In the social sciences, this may be one sentence on the background of the study, three to four sentences on the methods of the study, two to three sentences on the results of this study, and one to two sentences on the implications and limitations of this study. An instructor may have students complete this prompted worksheet several times, focusing on students adequately summarizing the article within the boundary conditions. To facilitate this, the instructor may provide a curated list of articles to summarize. This reduces the workload on the instructor and helps ensure the instructor is certain that the article can be summarized within those boundary conditions. Once students have mastered this skill using the prompted worksheet, the instructor can then transition to a summary that looks more similar to summaries that are part of Introduction sections of manuscripts.

Initially, an instructor may ask students to develop a brief paragraph summary of a study. This could involve students transforming a study summarized using the prompted sheet into paragraph form or asking students to summarize a new article in a single paragraph. By having that foundation from the prompted form, students are able to more easily write a brief summary in a paragraph format. After several opportunities of this brief summary, an instructor could provide students the opportunity to expand the short summary into a longer summary. This could be accomplished by having students expand a brief summary into a multiple
paragraph summary or asking students to summarize a new article in a longer, multiple paragraph form. At this point, students will have mastered three skills - summarizing articles in a “prompted,” format, summarizing articles in a brief format, and summarizing articles in extended format. An instructor then has a myriad of possibilities for expanding this skill. For example, an instructor could ask students to extend this skill to articles outside of their content area or discipline. Alternatively, an instructor could expand this skill by asking students to summarize more than one article in one of the three previously learned formats. Although this approach is different from those classes that have immediate applications, the repeated-opportunity approach can easily be extended across different types of classes. This could also present an opportunity to implement a lag schedule of reinforcement. At the simplest, an instructor could program reinforcement for a change from the short to the long summary. A more complex arrangement could involve asking students to complete multiple summaries of the same study. For each subsequent study, all points, or additional points, could be provided if the student highlights a different aspect of the study. For example, in the first summary, a student might focus on the applied implications of the study. In the second summary, a student might focus on the basic processes at work. In the third summary, a student might focus on potential conceptual issues. In programming the lag schedule, an instructor could require a certain percentage of sentences be dedicated to a different topic. In the three examples above, then, if the number of sentences were dedicated to the applied implications, basic processes, and conceptual issues, respectively, a student would earn all points, or the bonus points, for each summary. However, if the third summary had only one sentence about conceptual issues and all remaining sentences about applied implications and basic processes, the student may not earn all points, or any points, for the third summary.

**Course Modifications for a Repeated-Opportunity Approach**

Once an instructor has decided to incorporate repeated opportunities into their course, several other changes must be made to facilitate repeated opportunities being successful in promoting student learning. First, an instructor must align the course to a focus on the process of repeated opportunities. This involves two components. First, an instructor must recognize that repeated opportunities mean there will be change over time. Initially, this may involve students simply changing how they respond from instance to instance. This change may not involve a high degree of novelty. At this point, an instructor must recognize that the process is simply about developing variability per say. That is, the initial repeated opportunities are about teaching students that changing how they respond is a valuable skill. This would be another opportunity to implement a lag schedule of reinforcement. In this situation, an instructor could program all or a portion of points to be available based on specific changes in student responses. Alternatively, an instructor could award bonus points for changes in responding. As students are mastering content, they learn that varying is valuable, and contact reinforcement for varying, this will
facilitate the development of creativity in student responses. As we know from Bloom's taxonomy, the foundation of application, synthesis, and creation is mastery of knowledge. Incorporating repeated opportunities facilitates the development of this mastery within the course. Because students have repeated opportunities, instructors must align what they do to these ends. That means that feedback must consider the fact that students will be varying before they create. As such, feedback should be oriented towards change, growth, extension, synthesis, and the like. This feedback then should also be oriented towards these outcomes happening in sequence. That is, for the initial opportunity, feedback should be oriented towards change. On subsequent opportunities, feedback can be oriented towards growth, extension, and synthesis. For example, on the first opportunity, an instructor may provide feedback as simple as, “How might you answer this in a different way?” On the second opportunity, feedback may be focused on some type of extension, such as, “How would you make this effect more robust?” On the third opportunity, feedback may then be oriented towards synthesis, such as asking, “How could you incorporate an alternative approach into this approach?” These examples are certainly broad and a bit vague, purposely, because just as students vary in becoming creative, so too must we as instructors vary and become creative in the feedback we give, based on changes in students responding from opportunity to opportunity. This feedback could be programmed into online learning management software, such that as soon as students make a submission, they are given this feedback automatically and provided an additional opportunity to respond. In their submission, an instructor could then compare their first and second (or more) responses and provide more detailed feedback on the specific changes in the student responses.

Although we know that feedback is an important part of instruction, an important part of feedback is the differential effects it has, most commonly seen in grading. Typical grading approaches may not be effective with a repeated-opportunity approach to instruction. As students report higher levels of anxiety, the repeated opportunity approach can appear to students to be another opportunity to receive poor grades, producing a counterproductive effect. This means instructors need to rethink how they design grades in a repeated-opportunity approach. As discussed above, a repeated-opportunities approach may be new for students, and thus may increase anxiety surrounding the possibility of more frequent errors and assumed negative effects on grades. Faculty, however, can make some relatively simple and low effort changes to the grading arrangement to facilitate both high quality responding on each opportunity and reinforce students growth overtime. First, faculty should consider aligning some grades to students emitting variation in their responding. One method to do this would be to assign a small number of points simply for completion of the initial opportunities. For example, if students were provided three opportunities to answer a series of questions, and the total points for the questions are 25, 5 points could be provided for answering all
questions on opportunities one and two and 15 points could be assigned contingent on the quality of answers on opportunity three. This could be programmed by requiring multiple submissions in an online learning management system. Students could immediately see the points for the first and second submissions and then an instructor could take the additional time to provide response-contingent points for the third submission, as they normally would with only one submission. Second, faculty should consider realigning their standards for the opportunities. The repeated-opportunities approach may seem like there is no standard for the quality of answers, because there is an expectation that student answers will improve overtime. The reality is, however, that there is a standard that is yoked to the expected student responding on each opportunity. For example, a faculty member may decide to provide students with multiple opportunities to address a multiple-component problem. As part of the grading, faculty may develop a rubric to assess the solution to that problem. The rubric may include different levels of scoring. To take into account repeated opportunities, then, the faculty member might expect that the initial opportunity would fall into the lower level and treat high scores in the lower level as the standard for that first opportunity. For the second opportunity, then, the faculty member may expect responding to meet the second level and assign full points for meeting that second level of the rubric. Finally, for the third opportunity, the faculty they may then grade using the full rubric standard and assign the full points only for meeting the third level of that rubric. This may be very similar to a “draft” approach that often occurs with written work. That is, when faculty assign a draft of a paper, there is an expectation that that draft is not the final form but will be useful in facilitating improvement toward that final piece of written work. A repeated-opportunities approach, then, could involve simply an adaptation of that expectation - each early opportunity could be seen as a “draft” of the final desired product.

**Incorporating Peer Assessment**

An issue that may become apparent is that the repeated-opportunities approach may present a substantial increase in the amount of grading faculty must do. It is true that each opportunity represents an opportunity for obtaining points and associated feedback. However, that does not mean that faculty grading necessarily has to increase. An emerging approach in higher education is the use of peer assessment and feedback (see Li et al., 2020, for a recent meta-analysis). This approach is perfectly suited to the repeated-opportunity approach to teaching. In fact, many online learning management systems already include support for peer assessment and feedback. There are several benefits to include peer assessment and feedback. First, this reduces the “stakes” of each opportunity because students are grading each other, which may be less anxiety inducing than receiving grades from the instructor. Second, peer assessment and feedback could allow for a greater number of opportunities. For example, a faculty member may program two faculty-graded opportunities. However, a faculty member may also offer the opportunity
before the first faculty-graded opportunity to receive feedback from a peer and then offer a second opportunity to receive feedback from a peer after the first faculty-graded opportunity. In this case, then, the faculty members provided up to four opportunities without requiring additional work on the faculty members’ part. Third, peer assessment and feedback provide an opportunity for students to both model optimal responses and imitate responses of their peers. This could be programmed by assigning peer models in an “informed” way. That is, one could assign stronger students in a course to work with students who are having more difficulty in the course, such that the “stronger” students serve as models for the students who are struggling, something one may consider a form of peer tutoring. Finally, peer assessment and feedback has a generative effect on the creativity of responding by students. By having students interact with each other’s work, each student has greater exposure to different approaches, ideas, and techniques. With this exposure, students have a greater base set of content upon which they can vary, which can substantially facilitate greater problem solving and creative responding on subsequent opportunities and in subsequent work. For example, in a course on clinical psychology, the author noticed that some groups of students preferred one conceptual approach to clinical psychology whereas other students preferred a different conceptual approach. About halfway through this semester, the author began purposely pairing students with different conceptual preferences. On subsequent case studies, the author noticed that these cross-conceptual pairings produced substantial changes in the creativity of treatment designs. Students began incorporating effective treatment components from multiple conceptual systems, often producing treatments that more closely reflect those in the empirical literature. In this case, it was exposure to different approaches that facilitated student development of more effective, creative treatment approaches.

Summary

There are three key concepts to remember. First, beyond teaching students content of a course, we can teach students to vary their responding. Providing students with repeated opportunities signals that some part of their responding should change. As students responding changes, then, faculty have the opportunity to reinforce that change toward the goal of producing both mastery of content and extension into synthesis, application, and creation. This approach capitalizes on what we know about increasing response variability from the empirical literature (e.g., Page & Neuringer, 1985; Dracobly et al., 2017) while adapting it to the unique needs and constraints of the higher-education classroom. Second, as we teach students to vary their responding, we can also teach them when to repeat. There are times in which students need to do the same thing - this is often necessary base content knowledge. However, without promoting variation responding, students may default to only repeating what they know. Therefore, it is important to teach students to vary and then also teach them when to repeat. The repeated-opportunities approach provides an opportunity to do just this. Finally, as students begin to vary in their
responding, and repeat when necessary, we also have the opportunity to vary our responses to help students. This can take the form of varying our instructional content, an opportunity to be highly synergistic in creation of instructional methods and varying how we respond to students’ performance. In doing so, we keep our instruction highly relevant to our students and their level of responding while also facilitating the development of higher order skills in Bloom’s taxonomy – synthesis, application, and creation.

In summary, providing students with repeated opportunities and reinforcing changes in their responding across those opportunities helps produce meaningful change both in our instruction and student learning outcomes. Beyond learning content, synthesizing, analyzing, and creating, the repeated-opportunities approach teaches students to value varying in what they do. This helps students become better problem solvers and adapt to an ever-changing world. The repeated opportunities approach also provides students with the opportunity to practice those higher-order skills and Bloom’s taxonomy. Analyzing, synthesizing, and creating are difficult skills that take many opportunities to become fluent. By providing students with repeated opportunities to practice these skills and aligning our feedback and grading to both changes in student responding and the quality of their responses, students not only refine these critical skills but also do so in a manner that encourages embracing learning and receiving feedback and growing. Finally, and perhaps most importantly, the repeated-opportunities approach helps establish a very important history in our students. It is rare that we get anything right the very first time, whether it be our own instructional design or our own scholarly work. What often makes us effective as teachers and scholars is that we continue to refine what we have done before. We want to create that same repertoire in our students. To do that, we must provide them with a history of both responding, receiving feedback, and revising, multiple times and doing so in an environment that is highly supportive of this growth and refinement and improvement of responding. Creating this kind of environment substantially facilitates student creation of new and unique approaches and solutions. Not only does this present excitement and meaningful advancement for the student, but it also helps drive our understanding of both our effective teaching practices and the world around us. In the end, this represents the greatest goal of the academy - the development, refinement, and dissemination of ideas that will change the world.
References


Chapter 8.
Exploring Connections Between Behavior Analysis and the Scholarship of Teaching and Learning

Mirari Elcoro

The scholarship of teaching and learning (SoTL) is broadly defined as a movement and a field dedicated to the systematic examination and reflection on teaching and learning (McKinney, 2013; Nelson, 2012). According to Divan et al. (2017), SoTL has quickly grown as a faculty-development movement in higher education aimed at contributing to instructors’ teaching and students’ learning. In fact, SoTL has been conducted in higher education for over 30 years (McKinney, 2007).

SoTL as a movement has also been described as a revolutionary force in higher education (Liston & Rahimi, 2017; Nelson, 2012) as it combines teaching and scholarship to advance academic development of teacher-scholars and students. SoTL is guided by a definition of scholarship that views teaching as research (Boyer, 1990). And, although there are many definitions of SoTL (Fanghanel, 2013), Bishop-Clark and Dietz-Uhler’s (2012) framework serves as the basis for this discussion. According to these scholars, SoTL “is the study of teaching and learning and the communication of findings so that a body of knowledge can be established” (p.1). Thus, the scholarship of teaching unlocks the integration of a variety of research methods from multiple disciplines (Divan et al., 2017) and challenges the hierarchical structure in academia by, for example, including students as research collaborators and contributors to SoTL (Dewar & Perkins, 2021; Fanghanel, 2013).

The critical view of teaching through research with a variety of methods contributes to advancing aspects of social justice, such as identifying biases in student evaluations of teaching and helping minority faculty such as women to make a case advance their academic careers that addresses such biases substantiated by that type of SoTL (Atkinson & Grether, 2017). Scholars in SoTL have also made connections with social change pedagogy (Freire, 1990; hooks, 1994) and taken the commitment of becoming agents of social change as teachers, mentors, and peers (Benton Lee & Kayongo-Male, 2017).

The formalization and dissemination of SoTL as a cohesive field in the United States was initiated largely by the Carnegie Foundation for the Advancement of Teaching and the American Association for Higher Education (Dewar & Perkins, 2021; Nelson, 2012). One initiative stemming from these groups is the Carnegie Academy for the Scholarship of Teaching and Learning (CASTL), which establishes collaborations with various academic institutions to guide them into combining teaching and scholarship, and access expertise in
SoTL and other various related resources. According to Nelson (2012), SoTL invites the formalization of teaching as a form of research. Although the definitions of SoTL vary, as mentioned earlier, one component of the definition with which many agree is the dissemination of the work via conferences, workshops, publications, and other forms such as community events (Bishop-Clark & Dietz-Uhler, 2012).

Moreover, the various definitions of SoTL coalesce around common themes, such as scholarly teaching (Richlin, 2001), excellence in teaching (Kern et al., 2015), expert teacher, and research on teaching and learning (Dewar & Perkins, 2021). Such tightly linked terms seem to make drawing clear boundaries between these fields or practices a difficult task (Richlin, 2002). Such difficulty in delineating fields should not deter us from exploring SoTL as

(...) there are no clear dividing lines between scientific disciplines—a fact ever more obvious in any modern understanding of the world. Nature is certainly not fractured along the lines of any real or proposed academic categories—indeed, it’s not fractured at all. (Marr, 2009, p. 106)

Teaching and learning—key ingredients to defining SoTL—involve human behavior and serve as objects of study in the field of behavior analysis. Skinner (1953) elaborated on how science is the behavior of the scientist. Accordingly, SoTL pertains also to the study of the behavior of those who engage with teaching and learning. The goals of this chapter are to:

1. introduce SoTL and connect it to behavior analysis,
2. examine some of the steps and processes involved in entering SoTL as a beginner,
3. review the definition of scholarship,
4. share my experience in entering the field of SoTL through three SoTL projects connected with behavior analysis, and
5. conclude by highlighting the rewards and value of SoTL in behavior analysis as means of promoting social justice.

This chapter is intended for an audience of teacher-scholars of undergraduate students, but it may also be useful to teachers in other educational levels. The chapter is also written for teacher-scholars of behavior analysis who may be entering and/or navigating predominantly teaching institutions, and/or seeking to branch out their research areas, but it may also be informative for academics in other related disciplines (e.g., neuroscience, health sciences).

SoTL and Behavior Analysis

The field of SoTL embraces all academic disciplines (Dewar & Perkins, 2021). SoTL fits naturally within behavior analysis due to the discipline’s focus on behavior, and that both scholarship and learning refer to human behavior (Bordieri et al., 2012). This type of

\[1\] An example of a collaboration established with CASTL and the American Association of Geographers and other institutions is described here: http://www.aag.org/cs/education/undergraduate_and_graduate_education/carnegie_academy_for_the_scholarship_of_teaching_and_learning_castl
connection between SoTL and behavior analysis is in line with the natural connection between SoTL and psychology previously described by Gurung and Schwartz (2013).

Besides traditional behavior-analytic methodology (e.g., single-subject design) as a means to study teaching and learning in the classroom and other educations settings (e.g., Vargas, 2013) the field of SoTL offers and encourages theoretical and methodological pluralism (Divan et al., 2017; Hutchings & Huber, 2008). This approach involves the use of a diversity of theories and methodologies, even those beyond an individual’s area of expertise via collaboration and continuous professional development, which may include, for example, quantitative and qualitative methods when necessary to enrich the research (Divan et al., 2017).

In her outstanding, versatile, and useful book, Behavior Analysis for Effective Teaching, Vargas (2013) described the interactions between basic and applied research in the classroom. In doing so, Vargas established clear foundations of behavior analysis for any professional invested and dedicated to teaching. Further, she articulated how teaching and learning are complex human behaviors and, as such, are modifiable. In connecting SoTL and behavior analysis, Vargas states that teaching can be defined “as designing circumstances that change the way other individuals feel and behave” (p. 5).

After setting these foundations, Vargas (2013) goes into specific applications (along with examples and data) of these principles in education with corresponding use of operational definitions and measurement techniques to track (through graphing) changes in behavior. In a chapter titled, The Teacher as Researcher, she identifies “(...) features of science that makes it an essential part of teaching” (p. 143). Vargas goes on to describe the application of various types of single-subject research designs in the classroom to examine the effectiveness of a variety of teaching techniques and modify them accordingly.

Although Vargas (2013) does not specifically refer to SoTL, she clearly engages with it using behavior-analytic methodology. To answer scientific questions in the classroom, Vargas describes the application of observation and incorporating students into research in the classroom to examine instructional procedures. In fact, she argues that “students can be designers of research as well as participants” (p. 145).

Research in teaching in behavior analysis could also be considered translational research whereby, the knowledge from basic research in behavior analysis is applicable in educational settings to deal with problems of social relevance. In general, rooted in the biological and medical sciences, translational research, initially was defined as an area of research that involves drawing knowledge and findings from basic research to solve or deal with a practical issue (McIlvane, 2009).

The work in errorless learning represents instances of basic-to-applied and applied-to-basic translational research, in which basic learning principles studied in the laboratory

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2 The definition of translational research is one that also varies widely. For a discussion on the definition of translational research, see Butler (2008).
have been used for practical purposes in a real-world setting and vice versa (McIlvane, 2009). The drive of contributing to societal relevant causes made behavior analysts and teachers committed to the advancement of the science of behavior such as Skinner, Ferster, and Keller to skillfully, creatively, and rigorously translate the basic behavior principles into applied settings such as the classroom (Keller, 1981; Skinner, 1981). For instance, Keller (1968) introduced the concept of personalized system of instruction and carried the work with others who helped in developing this system that allows for individual students to manage and take control of their own learning. One example of his legacy is the Fred S. Keller School, a school operating under a Comprehensive Application of Behavior Analysis to Schooling (CABAS) (Twyman, 1998).

Errorless learning is a type of programmed instruction method initiated by Skinner and others working along him such as Holland (2003) and one fertile area for translational research. For example, Terrace (1963) conducted research using errorless learning, using fading procedures to train pigeons to respond in a discrimination task with few errors. Later, others such as Haupt et al. (1975) continued to apply these procedures to enhance learning of arithmetic skills in children. Errorless learning procedures have also been used in cognitive and psychiatric rehabilitation (see Middleton & Schwartz, 2012 for a review) making errorless learning also an area where behavior analysis other clinical fields intersect.

Sidman (2010) revisited the evidence of errorless training and programmed instruction, challenging the mythical concept of a learning curve, demonstrating how it is an artifact of averaging, rather than real, moment-to-moment behavior. Emphasizing the need for an empirical approach to instruction rather than a theoretical one, Sidman calls for further examination of the evidence of errorless learning:

Instead of investigating how pupils learn, we have to investigate how teachers teach. That the proper study of learning is the study of teaching is the exciting, counter-intuitive, radical conception that the fact of errorless learning has generated. We have, however, failed to present this conception to a world that needs a revolutionary approach not only to the education of children but also to the solution of adult economic, cultural, and political problems that call for all of us to learn new ways to behave. (p. 170)

Other early accounts contributions of behavior analysis to education are described in the essays by Skinner (1968) compiled as The Technology of Teaching. Throughout these essays, Skinner assumes a foundation in the experimental analysis of behavior, viewing teaching as a research endeavor. As Barrett (2003) pointed out in the first foreword to this book, it is pertinent to acknowledge that there have been many advancements since the publication of this book, in behavior analysis in the field of education (e.g., curriculum design, teaching machines, see Chapter 2) that are beyond the scope of this chapter.

If we consider teaching as research and bring together SoTL and behavior analysis, the potential for collaborations is not only exciting for basic, applied, and translational researchers in behavior analysis, but for teachers and experts from other disciplines outside
of behavior analysis. Such interdisciplinary collaborations can provide opportunities to learn other methodologies (e.g., survey research) not traditionally taught in graduate courses in behavior analysis that may focus more on single-subject research design.

The case for bringing together behavior analysis and SoTL follows a similar logic to the case presented by Bordieri et al. (2012) on the natural connection of behavior analysis and education, in the editorial for a special issue on those two topics in the journal *The Behavior Analyst Today*. Within this special issue, the publications were focused on “(...) direct applications of behavioral principles within the education system” (p. 1).

A contemporary behavior analyst and valuable contributor to the scholarship of the effectiveness of behavior analysis in education is Twyman. According to the ABAI (n.d.), Twyman is “an authority on instructional design;” she serves as Director of Innovation and Technology of the Center for Innovations in Learning (n.d.) “one of seven national content centers funded by the United States Department of Education.” The work of Twyman is hard to summarize; it is aimed at improving learning outcomes for students, supporting schools with technological resources, and to create learning innovations. This work has had a powerful impact on teaching and learning as it raises the use of evidence-based practices in teaching students to read (Twyman & Sota, 2009), study using guided notes and other empirically-based strategies (Twyman & Heward, 2018). Twyman’s research also includes explorations of innovations in teaching (Redding et al., 2013) among many other applications of behavior analysis in education.

Thus far, selected examples of behavior analysis’ contributions to education that can be considered SoTL have been reviewed. One could say that given this type of work, there is a space for the scholarly examination of teaching and learning in behavior analysis. In further exploring this space for the topic of teaching (and learning) in behavior analysis, it is important to mention the Special Interest Group (SIG) from the Association for Behavior Analysis international (ABAI, n.d.) called Teaching Behavior Analysis; its purpose “is to improve the teaching and learning of the principles and applications of behavior analysis in any setting in which those activities occur.” Despite these examples of scholarly work in education in behavior analysis, currently, the visibility of such work seems limited in behavior analysis conferences and publication outlets. The role of editors and conference organizers is important in increasing such visibility.

One example of an attempt, by Deitz (1990) during his year as editor of *The Behavior Analyst* (TBA, 1990-1991) to increase such visibility was to create a section of the journal called *Not for Professors Only* for teachers of behavior analysis to share ideas, lesson plans, even jokes. Deitz (1990) renamed this section *For Students of Behavior Analysis*, to make it more inclusive. The contributions to this section conveyed a sense of connection, camaraderie and perhaps openness to new ways of doing scholarship. The change in titles of this section of the journal also suggests that behavior analysts as a whole, at least the audience of TBA, are students constantly participating in the learning of behavior analysis. The question is, however, why was this section of TBA so short lived? (Elcoro et al., 2016).
Since the termination of *For Students of Behavior Analysis* in TBA, at least one journal has provided an outlet for behavior analysts to publish research on teaching; the *Journal of Behavioral Education* founded in 1991 (Lee et al., 2007). But journals such as *Journal of the Experimental Analysis of Behavior* (JEAB) and *Journal of Applied Behavior Analysis* (JABA) have not done so with enough focus and engagement; presenting a challenge for behavior analysts to locate resources to prepare and enrich their teaching and to find outlets to publish articles about teaching.

By examining the titles and abstracts of the articles published in the two flag-ship journals JEAB and JABA, over the last two years, such paucity of research within the field of education, particularly in higher education was confirmed. It is important to note though that the aim and scope of these journals do not specifically include topics within SoTL nor forms of scholarship such as reflective practices that are part of the SoTL research. The focus of such journals and topics selected for special issues are also influenced by the composition of the editorial boards.

One strategy to identify journals outside of behavior analysis to publish research on teaching is to search for the reference list of publications included in this chapter. For example, by examining the references for the work of Twyman mentioned earlier, journals such as *Journal of Evidence-Based Practices for Schools*, and *International Journal of Educational Teaching* were found. In the section below, additional resources to search for literature are provided. Becoming acquainted with journals to read and learn about SoTL research is also a valuable way to identify potential journals to publish SoTL work.

**Entering the Field of SoTL**

It is not uncommon for doctoral students to obtain their terminal degree from a research institution (R1 & R2 institutions; Carnegie Commissions on Higher Education, 2018) and find themselves with a faculty job in a teaching institution. One of the pressures undergoing this transition is the allocation of time and effort dedicated to teaching taking over the time dedicated to scholarship. This is a source of tension given that many faculty members need to create scholarly work to advance their careers. This tension is exacerbated by an institutional evaluation system in which the areas of teaching, scholarship, service, (and in some institutions, professional development) are viewed as separate. SoTL provides the opportunity to integrate these areas and thus potentially alleviate the pressures previously described by efficiently reaching goals in these seemingly exclusive areas.

One way of maximizing the time teaching and preparing to teach is to incorporate scholarship with teaching (Boyer, 1990). SoTL can allow a path for faculty to be productive teacher-scholars. This review chapter is designed to provide a forum where teacher-scholars can learn and feel empowered. Still, the transition to begin learning about SoTL may involve new tensions as there may be uncertainty and doubt at attempting to use methods different to those within areas of expertise. For example, a junior faculty member who was trained in a research laboratory to collect data in operant conditioning may have great training and expertise in single-subject research design, but not so much (or not at all) in survey research or between-subject analyses. These challenges are particularly critical for junior faculty.
members at teaching institutions, who are adjusting to a new environment and seeking resources to advance their scholarship.

The tendency of faculty to use familiar methods may limit the possibilities of acquiring knowledge in SoTL (Richlin, 2001). Collaborations with experts in other fields may help junior faculty alleviate these concerns and enter new methodological fields with more confidence. Searching the pertinent literature and attending conferences in which some of these novel methods are not only used but openly accepted may also help to develop competence in SoTL.

The process of entering a new field within a discipline involves learning new literature and methodology, which can be challenging. For example, exploring a new methodology may be discouraging, not only due to lack of time to “teach themselves,” but also concern for potential intellectual appropriation (C. Pina, personal communication, January 28, 2021). This fear of intellectual appropriation emerged in my conversations with colleagues who feel that their lack of expertise in a field does not grant them the knowledge or privilege of venturing into a new field. This may have a deleterious effect on junior faculty who are aiming to obtain tenure and promotion.

Professional identity is intimately linked with one’s identity as a scholar (Mathany et al., 2017). Many scholars begin by developing identities as disciplinary researchers. As a result, transitioning or expanding such identity to a SoTL researcher, involves moving into what Mathany et al. (2017) have called a liminal space that may feel unsettling. In addition, there may be tensions within the culture of the institution and how it views and considers SoTL, specifically in terms of reappointment, tenure and promotion and other retention processes (Asarta et al., 2018).

Challenging the dominant narrative of what is considered scholarship (Asarta et al., 2018) may also generate tensions. One of the difficulties faced by individuals moving from an institution primarily devoted to research (R1 & R2 institutions) to one with more of a teaching focus, is the increased teaching responsibility, which likely interferes with their time to conduct scholarship. Faculty going through this transition may suffer throughout the process of knowing that their time to engage in scholarship has been reduced, and this will impact their retention, or tenure and promotion processes. According to Asarta and colleagues, faculty teaching at R1 and R2 institutions also face challenges obtaining recognition of SoTL research.

Finding institutional support to conduct SoTL as a new field may also be challenging. Some institutions may have a center dedicated to faculty development with colleagues already doing this type of work. If so, this center probably queries faculty needs, so presenting this interest in SoTL as a need may propel the members of this center to seek support in the form of establishing networks with individuals in that institution who conduct SoTL, inviting speakers in the field, and financially supporting attendance to conferences dedicated to SoTL.
According to Rowland and Myatt (2014) although the number of natural-science faculty engaging in SoTL is increasing, few of them had previous training in SoTL research, struggle forming collaborations, and in some cases, finding support for the recognition of such work. Rowland and Hyatt provide a guide for faculty in the natural sciences starting in SoTL, along with recommendations for justifying this type of research, and promoting the implications of such work for teaching activities and practices. Moreover, these authors make a clear case that SoTL involves a scientific process.

SoTL Literature

The existing SoTL literature is expansive and growing quickly. Fortunately, a collection of open-access sources that is part of the Digital Commons Network, the Scholarship of Teaching and Learning Commons (n.d.), offers an ideal avenue through which to begin to explore the canon. Additionally, Morden and Summers (2019) crafted an online tutorial on how to conduct a SoTL literature review.

Further, journals such as the *International Journal for the Scholarship of Teaching and Learning* (IJSoTL), are considered a SoTL journals. Others such as *Teaching of Psychology* speak more directly to individual disciplines in which SoTL scholarship is published, in this case psychology. It is important to note that discipline specific research and SoTL research are not mutually exclusive. Table 1 presents a list of journals that provide a forum for SoTL research and articles with corresponding urls.

Table 1.
Selected SoTL Journals and Disciplinary (Psychology) SoTL Journals

<table>
<thead>
<tr>
<th>Journal Title</th>
<th>About the Journal</th>
<th>url</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Selected SoTL Journals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Journal for the Scholarship of Teaching and Learning</td>
<td>Open access, double-blind review, peer reviewed.</td>
<td><a href="https://digitalcommons.georgiasouthern.edu/ij-sotl/about.html">https://digitalcommons.georgiasouthern.edu/ij-sotl/about.html</a></td>
</tr>
<tr>
<td>Journal of the Scholarship for Teaching and Learning</td>
<td>“The journal publishes empirical research, case studies, essays, critiques, and articles of a theoretical/conceptual nature that contribute to deeper understanding of the issues, problems, and research relevant to the community of reflective teacher-scholars.”</td>
<td><a href="https://scholarworks.iu.edu/journals/index.php/josotl">https://scholarworks.iu.edu/journals/index.php/josotl</a></td>
</tr>
</tbody>
</table>

3 [https://taylorinstitute.ucalgary.ca/resources/planning-sotl-lesson-study-step-1](https://taylorinstitute.ucalgary.ca/resources/planning-sotl-lesson-study-step-1)

4 For a more comprehensive list see Appendix B and C of Bishop-Clark and Uhler-Dietz (2012).
### Selected Disciplinary SoTL Journals – Psychology

<table>
<thead>
<tr>
<th>Journal Name</th>
<th>Description</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Journal of Educational Psychology</em></td>
<td>Publishes “(...) original, primary psychological research pertaining to education across all ages and educational levels.”</td>
<td><a href="https://www.apa.org/pubs/journals/edu/index">https://www.apa.org/pubs/journals/edu/index</a></td>
</tr>
<tr>
<td><em>Psychology Learning and Teaching</em></td>
<td>International, peer-reviewed, “(...) devoted to enhancing knowledge of how to improve learning and teaching of psychology.”</td>
<td><a href="https://us.sagepub.com/en-us/nam/journal/psychology-learning-teaching">https://us.sagepub.com/en-us/nam/journal/psychology-learning-teaching</a></td>
</tr>
<tr>
<td><em>Teaching of Psychology</em></td>
<td>“Coverage includes research on teaching and learning; studies of teacher characteristics and student learning; reviews for class use; student, course, or teacher assessments; discussions of professional challenges; critical thinking exercises, curriculum designs, demonstrations and laboratory projects; and news.”</td>
<td><a href="https://journals.sagepub.com/home/top">https://journals.sagepub.com/home/top</a></td>
</tr>
</tbody>
</table>

*Note:* Selected SoTL Journals and Disciplinary (Psychology) SoTL Journals are listed as a resource in the left column. A brief description about each journal is included in middle column accompanied by the corresponding url located in the right column.

Another way to enter the field of SoTL and alleviate the tension of learning and implementing new methodology entails forming collaborations with experts in those research methods that are unknown (Dewar & Perkins, 2021). These collaborations may be disciplinary and/or interdisciplinary and could happen in a variety of settings. They could be structured in scheduled meetings or as informal as a conversation in the hallway or during a professional development meeting or a conference.
Attending conferences dedicated to SoTL is a great way to get introductions to the field. Some SoTL conferences are listed in Table 2. These conferences have a traditional in-person format, and some have been conducted online or canceled temporarily due to the COVID-19 pandemic.

**Table 2**

*Selected SoTL Conferences*

<table>
<thead>
<tr>
<th>Name of Conference</th>
<th>url</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>SoTL Commons Conference: A Conference for the Scholarship of Teaching and Learning</em></td>
<td><a href="https://academics.georgiasouthern.edu/sotlgsu/commons/">https://academics.georgiasouthern.edu/sotlgsu/commons/</a></td>
</tr>
<tr>
<td>International Society for the Scholarship of Teaching and Learning Annual Conference (issotl)</td>
<td><a href="https://issotl.com/">https://issotl.com/</a></td>
</tr>
<tr>
<td>The Teaching Professor Conference</td>
<td><a href="https://www.magnapubs.com/teaching-professor-conference/">https://www.magnapubs.com/teaching-professor-conference/</a></td>
</tr>
<tr>
<td>Conference on Higher Education Pedagogy</td>
<td><a href="https://chep.teaching.vt.edu/">https://chep.teaching.vt.edu/</a></td>
</tr>
<tr>
<td>Society for Teaching and Learning in Higher Education</td>
<td><a href="https://www.stlhe.ca/events/2020-stlhe-annual-conference/">https://www.stlhe.ca/events/2020-stlhe-annual-conference/</a></td>
</tr>
<tr>
<td>Lilly National Conference on College and University Teaching and Learning</td>
<td><a href="https://www.lillyconferences-nc.com/">https://www.lillyconferences-nc.com/</a></td>
</tr>
</tbody>
</table>

*Note:* Selected SoTL Conferences are listed in the left column; the corresponding url is listed in the right column as a helpful resource.

Additional obstacles may be faced when entering the field; for instance, how to narrow a topic or how to generate a SoTL research question. More specifically on pp. 26-27, McKinney (2013) offers specific questions and guidelines to deal with such obstacles. For example, how to identify adequate research methods to address the research question(s) related to teaching, as well as considering ethical issues related in the study. Before presenting three examples of SoTL research projects, it is important to pause and reflect on the definition of scholarship.

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5 For a more comprehensive list, see Appendix A of Bishop-Clark and Dietz-Uhler (2012) and The Office of the Cross Chair in The Scholarship of Teaching and Learning at Illinois State University, offers another list (n.d.).
On the Definition of Scholarship

The definition of scholarship differs across institutions, thus engaging in inquiry about the definition of scholarship is an important exercise for a teacher-scholar. Some definitions range from being narrow (e.g., defining scholarship by the value of the impact factor of journals) while some other definitions are broader. The definition of scholarship may differ across institutional cultures. For example, a recently graduated junior faculty member in a culture with a narrow definition of scholarship may carry over such definition to another institution in which that definition may be different. The definition of scholarship between these two settings may or may not be aligned, but certainly are likely to influence how an individual teacher-scholar views scholarship.

In *Scholarship Reconsidered*, Boyer (1990) provided a historical context of higher education in the United States recognizing changes that have added a multitude of tasks (e.g., advising, recruiting, community engagement, diversity, and inclusion initiatives) and are often not reflected in the systems of rewards available to faculty. Boyer prefaces a model of scholarship that captures more specifically and accurately the wide-ranging work of a scholar. From a behavioral perspective, the work of the scholar (scholarship) involves wide range of behaviors, often unrecognized at many institutions. Following Boyer,

*How then should we proceed? Is it possible to define the work of faculty in ways that reflect more realistically the full range of academic and civic mandates?* We believe the time has come to move beyond the tired old “teaching versus research” debate and give the familiar and honorable term “scholarship” a broader, more capacious meaning, one that bring legitimacy to the full scope of academic work. Surely, scholarship means engaging in original research. But the work of the scholar also means stepping back from one’s investigation, looking for connections, building bridges between theory and practice, and communicating one’s own effectively to students. Specifically, we conclude that the work of the professoriate might be thought of as having four separate, yet overlapping, functions. These are: the scholarship of discovery; the scholarship of integration; the scholarship of application; and the scholarship of teaching. (p. 16)

The scholarship of discovery relates to the pursuit of knowledge (Boyer, 1990). This type of research is also referred to as basic research, aimed at advancing knowledge. According to Boyer, the scholarship of integration involves putting knowledge into perspective, connecting with other disciplines, and communicating the meaning of knowledge effectively to the broader community. Boyer defines the scholarship of application as including serving the needs of the larger community; this may comprise service (scholarly service) that is tied directly to one’s own discipline. The scholarship of teaching entails conducting teaching as research and it aligned with SoTL. Under this definition, Boyer includes teaching activities such as clearly communicating knowledge to students are considered scholarship.

These different and overlapping areas of scholarship reflect a more comprehensive scope of behavior of a community-engaged teacher-scholar, working in a context of growing
responsibilities and viewing education as a common good (Boyer, 1990; Gurung & Schwartz, 2013). Although since the publication of Scholarship Reconsidered, the SoTL has seen much growth (Kern et al., 2015) Boyer’s perspective remains impactful (Wendling, 2020).

The definition of scholarship continues to matter for pedagogical reasons that highlight the value of using evidence-based practices in teaching. Examining the definition of scholarship is also helpful in guiding faculty members into what counts for evaluation (e.g., reappointment, tenure, and promotion) and contributes to making a stronger case for their work.

**How I Found SoTL and Three SoTL Projects**

While reading the personal stories of Bishop-Clark and Dietz-Uhler (2012) venturing into SoTL, I found some parallels with my own experience. Inspired by these authors, I share my story of how I became involved with SoTL and my experiences with three SoTL projects. As Dewar and Perkins (2021) indicated, one way to support scholars is by sharing personal stories of journeys into new ways of conducting research. Thus, I hope that readers connect with aspects of these personal experiences and find ideas and resources to enter SoTL and alleviate some of the tensions mentioned earlier. I hope that this narrative also creates an opportunity for readers to examine their identity(ies) as scholars.

My scholarly training as a behavior analyst started in a laboratory setting working with non-human animals studying basic learning processes. According to Mathany et al. (2017) I identified (and still do, to an extent) as a disciplinary researcher. During my experience as a graduate student and for some years after, frequently I felt that scholarship was disconnected from teaching.

Although I engaged and discovered my passion for teaching during graduate school, my teaching load was low (one course per semester). My first job as an Assistant Professor was at a teaching institution, teaching four courses per semester, where I also was expected to direct and maintain a laboratory, conduct research, and engage in service. The teaching load quickly became daunting. One of the questions that guided me into SoTL was: “How can I make teaching and research more compatible?”

In figuring out an answer to this question, I was (and remain) committed to continuing to better reach my students while teaching effectively. Teaching in a laboratory facilitated envisioning the classroom as a laboratory (Bishop Clark & Dietz-Uhler, 2012) and such framing expanded my definition of scholarship. The discovery of SoTL literature was also key in my immersion into SoTL. I was (and continue to be) fortunate to be surrounded by generous colleagues with experience in SoTL that were willing to teach me. With them, I found journals, conferences, and collaborations emerged resulting in collaborative conference presentations and publications. Students also were key collaborators (Dewar & Perkins, 2021) in how I discovered and continue to engage in SoTL research. Despite this supportive climate, I still experienced the tensions of entering a new field in the form of: “I’m not sure if I am doing this right” and “This type of research is not in my background.”
One lesson that I learned and continues to serve me, is that backgrounds continue to grow and change after graduate school.

The pressures of meeting tenure and promotion guidelines also contributed to the tensions experienced and pushed me into new ways of conducting research, seeking collaborations, and exploring research methods different than those I knew or felt comfortable with. Exploring new research methods may generate tensions related to developing an identity as a scholar (Mathany et al., 2017). I experienced, at that time, some discomfort with research methods that were different to the ones I knew. To alleviate some of these tensions, it was important to seek guidance and advice from others. Examples of some of these collaborations are described below.

**Laboratory as Classroom and Classroom as Laboratory**

In one SoTL project, I worked with a student as collaborator, examining whether students preferred to use a live or a virtual rat in a Learning course (Elcoro & Trundle, 2013). Before examining student preferences, my collaborator and I had to learn about simulation software for learning courses because our experience until that point had been in a real-laboratory setting. The student collaborator was key in this learning process as we were both supporting and guiding each other learning how to use the new software, both switching between the roles of student and teacher as we learned to use the software together. Additional literature on comparisons between pedagogical strategies similar to the one we were studying was also useful.

To assess the students’ preferences, each student experienced both pedagogical strategies (live and virtual rat). To design this part of the study, my experience with single-subject research methodology was useful. In addition, I had to learn and seek advice from colleagues to employ survey methods and corresponding data analysis. Despite these challenges, it was an important experience as a teacher-scholar to focus on how to acquire systematic information about what students prefer in the classroom and how they describe their experiences. The students also valued being seriously considered about their preferences and experiences.

The examination of preferences and experiences with pedagogical strategies is reminiscent of the research on assessments of social validity in applied behavior analysis (ABA). According to Nicolson et al. (2020) relying on socially significant and valid decision-making processes are part of the responsibilities of practitioners in ABA as agents of social change, and several scholars in SoTL have made similar statements about teachers in higher education (Benton Lee & Kayongo-Male, 2017).

After collecting and analyzing the student preference data, we concluded that in an undergraduate operant conditioning laboratory, although there was value in using a virtual rat, students preferred taking the course in a laboratory with live animals (Elcoro & Trundle, 2013). This was an opportunity to use foundational skills and a familiar setting to venture into examining students’ experiences and learn new research methods. This paper was published in the *International Journal for the Scholarship of Teaching and Learning*. I learned about
this journal when conducting the literature review for this project and in workshops and conversations at the SoTL Commons conference (included above in Table 2).

It is important to reiterate that the co-author of this article was an undergraduate student who had taken the Learning course that we were examining. A student perspective in this collaboration was crucial in designing this study. Aspects of the student experience such as background knowledge, level of comfort, conversations among students in in the laboratory, were accessible through this student perspective that otherwise would have been unobservable working in isolation as an instructor.

**More from the Laboratory as Classroom**

Another project conceived and conducted in the laboratory as a classroom was aimed at (1) fostering student learning about the history and use of instrumentation in psychology, (2) demonstrating applied knowledge from various sources via class presentations, and (3) offering a model of a cross-course project to enhance student learning (Elcoro & McCarley, 2015). In this project I collaborated with a colleague with more experience in SoTL than me and with a background on survey research, who at the time was teaching a course on the history of psychology.

The cross-course (Learning and History of Psychology) project emerged naturally as each of the co-authors were teaching the corresponding courses. An active way to teach about instrumentation, by holding the actual apparatuses and bringing them from the laboratory to a classroom, was an underexplored way to cover this topic in psychology, as confirmed by the examination of the literature on teaching about history and instrumentation in psychology. The presentation was a moving museum that was on display for a limited time after the project concluded.

We evaluated content learning via a pre-post assessment on knowledge about instrumentation in psychology as well as students’ level of satisfaction with the course activity. In general, I brought in expertise in instrumentation and teaching laboratory procedures to design class activities and guide students as to how to prepare their presentations, while my co-author had a background in history of psychology, design of surveys and corresponding quantitative and qualitative analyses of surveys in classroom activities.

This project was published in the journal *Teaching of Psychology*, which was an important source for articles in the literature review for this project. I had also heard much about this journal from my co-author in this project and at the Society for the Teaching of Psychology (STP) conferences (n.d.).

**Reflective Practice as Teaching and Scholarship**

Reflective practice a systematic examination of a given practice or an experience such as teaching, for the purpose of refinement and improvement of such practice (Brookfield, 1998; Rodgers, 2002). If the focus is on teaching, a reflective practice may include the examination of teaching methods and experiences and perspectives of instructors and students.
There are several conceptual frameworks (e.g., Brookfield, 1998; Rodgers, 2002) for reflective practices. One such framework by Brookfield outlines four lenses for a reflective practice including: (1) the learner’s motivations and autobiography, (2) looking through the eyes of a learner in which a teacher is to put themselves in a student’s metaphorical shoes, (3) learning from colleagues; reflection is individual and collective, and (4) learning and using the theoretical literature to expand views and deepen understanding.

Rodgers (2002) has elaborated upon some earlier views on reflection from John Dewey, a philosopher, psychologist and educator who extensively wrote about reflection among other numerous topics. Rodgers considered that the function of reflection is to make meaning within one’s own experiences and to connect those experiences with knowledge. According to Rodgers the steps to utilize a learning experience follow four phases: the (1) experience itself, (2) description of the experience, (3) analysis of the experience, and (4) action taken from the learning experience.

Revisiting Boyer’s (1990) definition of scholarship, a reflective practice is considered within the definition of scholarship and many SoTL journals publish reflective practices. For example, the Journal of Scholarly Engagement (see Table 1) includes reflective practices within their category of submissions, offering a detailed guide on how to prepare such type of manuscripts for publication.

Sharing perspectives and experiences in the form a reflective practice is a type of scholarship to: empower others, take action, share challenges and accomplishments (Benton Lee & Kayongo-Male, 2017; Dewar & Perkins, 2021). I learned more about reflective practice and journals that publish such work at a SoTL Commons conference, where I found the motivation and support to prepare a manuscript within this category.

The article, co-authored with two undergraduate students involved a careful examination of guided notes, a pedagogical strategy to help students in note-taking and studying (Elcoro et al., 2020). Guided notes have been addressed in the behavior-analytic literature as evidence-based pedagogical aids (e.g., Twyman & Heward, 2018).

The form of delivery of guided notes was changed across groups. We found that in-class, paper-based delivery of guided notes was most effective and yielded the highest level of satisfaction among students. Still, there was variability that indicated that some students did not find the use of guided notes helpful. Part of the data analysis to figure out students’ perspectives on using guided notes involved reading answers to open ended questions and classifying the answers into the categories of helpful and not helpful. Such classification was done individually by each co-author and involved calculating inter-observer agreement across readers, an index widely used in ABA.

In short, we found that guided notes have advantages and disadvantages and that each student experience is unique. Although we found evidence that guided notes seem to have contributed, in some cases with increasing grades in some assessments, and were liked and preferred by students, we also found evidence to support that they hindered deeper
learning of some concepts and more independent styles of learning, as some students reported relying only on the guided notes to prepare for evaluations.

Conducting this and other types of reflective practices with students as collaborators have yielded the following lessons learned: (1) although reflecting systematically takes a long time, it is crucial for character development and learning, (2) reflecting and growing are interchangeable in their meaning, (3) it is valuable to explore the feelings experienced by students and teachers during learning and to find opportunities to share these explorations as a learning community, and (4) systematic reflection is a form of scholarship (Elcoro & Zahn, 2021).

**Putting it All Together**

These personal experiences are meant to show some possibilities for SoTL and that the expansion of one’s own background to improve teaching is an ongoing process. I once heard that in teaching, one is always expected to perform “at one’s best;” think about when observed by an evaluator or colleague. If we view and understand teaching more like research, as an ongoing, self-correcting process, then we can make these two seemingly disconnected areas much more compatible, while developing more understanding and compassion in evaluations of teaching.

In behavior analysis, and in other fields, trainings can be specific and narrow, but the possibilities to generalize how we conduct research in the laboratory (and other settings) to different settings such as the classroom and other educational settings, is a skill that can be very advantageous in generating SoTL projects. Behavior analysts and professionals in other fields can also benefit from learning about experiences of others venturing into SoTL. It is important to carve more spaces to disseminate SoTL research within behavior analysis, while also exploring fields other than behavior analysis to find those spaces and to disseminate knowledge from behavior analysis valuable in teaching.

**The Rewards and the Value of SoTL in Behavior Analysis to Promote Social Justice**

Enriching the classroom experience with research design, data collection, and evidence-based teaching procedures are all approaches consistent with both behavior analysis and SoTL. Approaching teaching as research in the classroom and other educational settings contributes to the maximization of time spent teaching (Bishop-Clark & Dietz-Uhler, 2012). The practice of SoTL occurs in a communal context that must include a diversity of perspectives and voices (Liston & Rahimi, 2017).

Following Fanghanel (2103),

I propose that SoTL is a democratic form of inquiry as it enables multiple voices (including academics, students, and student support specialists, for example) to be heard in the public space; it is also a dialogic mode of inquiry because of the dissemination strategies it uses, which are based on discussions and dialogue, where “going public” means more than just publishing in academic journals. (p. 61)
One aspect of SoTL in line with a commitment to diversity and inclusion is its openness to collaborations across disciplines and different levels of experience (Divan et al., 2017). In SoTL, scholars are faculty members, staff, graduate, undergraduate students, and other community members (Booney, 2018; Mathany et al., 2017). This approach disrupts the hierarchy of experts in academia and opens possibilities for community members to be active participants in scholarship that addresses social needs. This approach to scholarship promotes academic and cultural humility (Liston & Rahimi, 2017; Mathur & Rodriguez, 2021).

To plan experiences working with students as research collaborators in SoTL, Booney (2018) offers useful recommendations, including lessons learned about tailoring experiences through flexibility and mentoring. Reflecting about such work is a valuable source of ideas and lessons learned to mentor students in scholarship, empower colleagues, and to build a more inclusive definition of scholarship (Dewar & Perkins, 2021). Listening to and learning about needs from our communities is also essential in engaged scholarship (Benton Lee & Kayongo-Male, 2017).

Viewing teaching as transformative and transgressive is to kindle passion for learning and to exert changes of social relevance through learning (hooks, 1994). Rather than viewing teaching solely as instilling knowledge, in a unilateral (from teacher to students) fashion, transformative and transgressive teaching opens possibilities for social change. In this sense, and from a behavioral perspective, learning is a relative permanent change in behavior as a result of experience(s) (Powell et al., 2017). The generation of transformative experiences involves the responsibility of openly receiving and incorporating feedback (Nicolson et al., 2020) and perspectives from students and colleagues with different views and backgrounds to enrich the dialogue and create the academic experience of scholarship.

Efforts to incorporate diversity and inclusion in the behavior-analytic literature can find inspiration in SoTL, particularly in the examples of SoTL as a way to promote social justice (see more examples in Liston & Rahimi, 2017). As mentioned earlier, a critical view of teaching can help in identifying biases that can damage the professional advancement of members of minority groups in the professoriate (Atkinson & Grether, 2017). Also, SoTL, particularly the practice of reflection to learn from experience, offers a framework to learn to become culturally responsive teachers as Moeller et al. (2017) experienced while conducting a study-abroad service-learning program in Belize. To be responsive to community needs rather than imposing a research area by an individual is in line with understanding education as shared process and as a common good (Boyer, 1990).

As mentioned at the beginning of this chapter, there is no clear distinction between disciplines as knowledge is not fragmented (Marr, 2009). Likewise, real-world problems and community needs are also not clearly delineated (Willermet et al., 2017). The integration of knowledge from different fields and different community members can only offer better solutions to these complex real-world problems. In a course dedicated to the world-wide problem of access to clean water, Willermet et al. (2017) taught students how to move from awareness to action learning from different disciplines (anthropology, chemistry, and
biology) empowering students to become agents of social change. This is a very compatible topic with issues related to sustainability and ABA.

SoTL research can inspire research in behavior analysis and vice versa. One such example mentioned earlier, was how the literature on social validity in ABA can inform ways to tailor assessments in the classroom that value the presence and contributions of students as active members of the learning community. Such literature on social validity also highlights the power dynamics between the instructor in the classroom (the practitioner in ABA, Nicolson et al., 2020) and how such awareness is key when making ethical and meaningful changes in the lives of students.

There is a current, strong, and much needed movement to include cultural responsiveness in the curriculum of behavior analysis. Mathur and Rodriguez (2021) presented an introduction to critical race theory, cultural competence, responsiveness, and humility and other social justice concepts for teachers of behavior analysis to include in the curriculum. Systematic adoption of these concepts into the behavior analysis curriculum is crucial and a matter of social justice itself (Mathur & Rodriguez, 2021). SoTL research by Spitzman and Balconi (2019) on the integration of social justice into teaching can also contribute to such a task in behavior analysis and other fields.

At this point, it is important to acknowledge that many behavior analysts mentioned thus far have been practicing research that aligns well with SoTL. Learning about SoTL can inspire behavior analysts to conduct novel and valuable scholarship by diversifying research methodology and venturing into different types of scholarship that may not play a central role in some traditional venues. Exploring connections between behavior analysis and SoTL can make us better teacher-scholars and more responsible agents of social change. After all, we are all students continuously learning.
References


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The Office of the Cross Chair in The Scholarship of Teaching and Learning at Illinois State University (n.d). *Conference and Workshops*. https://sotl.illinoisstate.edu/conferences/


Chapter 9.

Syllabus Design to Foster Community in Online Courses

Aura Lippincott

The syllabus often serves as one of the first interactions that a student has with an online course. Students are asked to read the syllabus as one of the first course activities that they engage in. Does this first impression have an impact on course community? Does the syllabus help to set the stage for how students interact with the instructor and one another, either helping to foster a positive course climate, build rapport and community, or by working against these goals? Are there specific syllabus attributes that influence the community of a course? The goals of this chapter are to 1) explore answers to these questions by examining scholarship of teaching and learning (SoTL) about the potential role of the syllabus in fostering online course community and 2) identify syllabus features or attributes that may promote or impede the development of online community. First, what is the role of community in online courses and what do we know about how course community is fostered?

Online Course Community

Online course community is well established as a critical component of successful online learning environments (Sun & Chen, 2016). In an extensive review of the literature around online community, Trespalacios, et al. (2021) identified course/instructional strategies, technology use, and faculty/staff as the most noted by researchers and practitioners to effectively facilitate and foster community. The faculty/staff grouping included presence, facilitation, and instructor communication style. In another review of the scholarly literature defining community in distance learning, Sadera, et al. (2009) noted several attributes important to fostering community, including shared purpose, trust, respect, collaboration, familiarity, rapport, openness, and rules of community behavior (Shea, et al., 2002; Chapman, et al., 2005; Vesely, et al., 2007, as cited in Sadera, et al., 2009).

An extensive body of research-supported best practices informs faculty, instructional designers and others involved in online course design on how to encourage and promote online community. These practices include consistent instructor presence, regular feedback, opportunities for interaction and dialog, as well as clearly communicating expectations around course interactions (Quality Matters, 2020). Purposefully designed practices such as these serve to reduce the distance implicit in distance learning and humanize the online learning environment through increased social presence and by promoting a learning environment in which participants feel safe to interact and learn together (Ambrose, et al.,
Vesely, et al. (2007) found that both students and faculty value course community, but that they also believe that it is harder to achieve in online courses. A meticulous and multi-faceted approach to planning for classroom community is important to promote its success. This chapter focuses on the syllabus to foster online community, a less researched area but one that may have important influences on online community.

As one of the major determinants of online course community – along with course design and instructional strategies (Pilcher, 2016; Trespalacios, et al., 2021), the instructor has an opportunity to use the syllabus to foster or set the stage for community right from the start. The syllabus may be the vehicle by which faculty plan or design the course with elements that foster community (the syllabus as plan, discussed later). The syllabus may also be the end product that lays out and communicates to students how the online course will function as a community and what that means in terms of roles and expectations (the syllabus as communication and the syllabus as socialization mechanism, discussed later).

Along with using the syllabus to plan the course and inform students about class activities and expectations, what other syllabus attributes and uses may help set the stage for an online community to flourish? How might the instructor use the syllabus to build the shared purpose, trust, respect, collaboration, familiarity, rapport, and openness that Sadera (2009) and others have identified as necessary for online community? As a first step to address these questions, it is useful to take a step back to review the roles and functions of the syllabus.

**Syllabus Functions**

The syllabus varies widely in use and presentation. Matejka and Kurke (1994) outline four functions of a syllabus, including a plan, a contract, a communication device, and a cognitive map. Fink (2012) builds on this understanding by identifying several additional roles, including the syllabus as a teaching tool, as evidence for teaching evaluations, as a resource or vehicle for scholarship of teaching and learning, and as a tool to socialize students to the academic environment. A syllabus may serve any combination of these purposes; however, of interest here are those related to student-focused uses, including syllabus as plan, contract, communication device, and socialization process.

The use of the syllabus to inform students of the requirements, policies, and expectations points to the syllabus as plan or as Fornacieri and Dean (2014) characterize it, “an operational roadmap.” The syllabus as plan benefits faculty as a tool for mapping out the overall course design activity and benefits students by providing the course content, schedule, and overall roadmap up front (Fink, 2012). While necessary and helpful, this syllabus approach, if used as the sole or primary function, may emphasize content, schedule, and other operational aspects while missing syllabus functions that speak to the learning community, collaboration, and interaction aspects of a course.

The syllabus as a contract is a widespread but controversial use in which the document is viewed as a compulsory agreement that a student enters into that outlines the requirements and expectations for the course. A contract-focused syllabus may be written in extensive detail with the intent of clearly communicating course and administrative policies,
proactively answering student questions, closing loopholes, and anticipating student grievances (Fornaciari & Lund, 2014; Sulik & Keyes, 2014, as cited in Neaderhiser, 2016). Controversy centers around the use of the term contract, pointing to an interpretation that it is a binding legal document. This interpretation has not held up in courts of law (Kauffman, 2015). Slattery and Carlson (2005, p. 160), however, point out the “evidentiary” role of the syllabus, maintaining that clearly communicated policies can help to avert lawsuits and resolve disputes, such as student claims of instructor divergence from the syllabus. While recognizing the evidentiary role of the syllabus, the authors caution against the inclusion of “legalistic statements,” commenting that these “can easily undermine student/faculty relationships.” They suggest being clear about rules without being “cold and accusatory” (p. 162). The recommendation to clearly communicate policy while paying careful attention to tone is an important insight that will be discussed in more detail in a later section.

Another concern revolves around the notion that a contract approach amplifies a power imbalance in that a contract implies negotiation, yet one party of the contract does not have equal power to negotiate (Neaderhiser, 2016). Neaderhiser (2016) cautions that syllabi that are approached contractually create a negative environment, placing students and instructors in an adversarial relationship to the detriment of the learning experience. A collaborative approach to contract-focused syllabus construction may moderate this adversarial relationship by including both parties in defining the syllabus (Kaplan & Renard, 2015). Fornaciari and Dean (2014) identify an emerging understanding of the “syllabus as collaboration,” which seeks to redistribute power and involve students more directly in the learning process with the goal of increasing student ownership of their learning. The notion of collaboratively designing the syllabus goes further than some scholars believe to be appropriate, particularly for novice college students (Weimer, 2002; Hess, 2008, as cited in Fornaciari & Dean, 2014). Others have reported success with ceding control of some elements of the syllabus to novice learners (McMurtrie, 2020). Nevertheless, the concept of students as collaborators in the learning process is a powerful idea that can be expressed in the syllabus without direct input from students in the syllabus construction. Doing so may contribute to a shared sense of purpose amongst the students and instructor, which may help to foster community.

The syllabus as contract, whether a literal contract with signatures or a metaphorical contract (Neaderhiser, 2016), has been subject to considerable and ongoing debate. Supporters argue that the syllabus plays a key role in clearly defining student and teacher roles, expectations, and requirements for classroom behaviors, and serves to both inform and protect all parties. Detractors argue that a contractual approach amplifies issues of power and authority that can negatively impact student-teacher rapport and student motivation. An interesting question is whether the syllabus can serve both purposes – communicating roles, responsibilities, rules of behavior, and policies in a manner that builds rapport and supports student motivation. As noted previously, one answer may be to involve students in a collaborative syllabus construction. Another answer may be in the overall use
of positive tone, inclusive and motivational language and other learner-centered approaches discussed later in the chapter.

The syllabus as a tool to support the socialization of a course (or of the larger college/university experience) articulates the idea that faculty can help students to understand the roles and expectations, including norms and behaviors around course climate, by communicating about these elements in the syllabus (Sulik & Keys, 2014; Danielson, 1995; Collins, 1997). Sulik and Keys (2014) found, in an analysis of 39 introductory-level sociology syllabi, that “course syllabi constructed the student-teacher relationship at the college level” (p. 158). This construction included outlining student and teacher roles and obligations, as well as “norms for social interaction in the classroom” that “helped to create a climate conducive to mutuality, respect, and learning” (p. 158). The authors postulate a great deal of power in the syllabus to support the teacher-student relationship that community is built upon. While they did not address best practices related to how these elements are best constructed, the authors urged further research into the kinds of syllabi that best promote student success and that promote course climates that are diverse and inclusive. Indeed, inclusivity that helps to promote positive climate and community may require reviewing the norms of social interaction through a diversity, equity, and inclusion lens, as recommended by Fuentes, et al., (2021), and discussed later in the chapter.

The syllabus as socialization has a clear connection to the use of the syllabus as a communication device in that it may inform students of the norms, behaviors, and expectations of the course or college. Fink (2021) differentiates two components of the communication function of the syllabus, communication of the content itself and how the content is expressed. The expression of content has a signaling function that Fornaciari and Dean (2014) assert “means acknowledging that we send powerful expectations about what we and the course will be like through our syllabi” (p. 708). The communication or signaling aspects of syllabi include tone, language use, and what these imply for the instructor-student relationship.

In summary, with the exception of the syllabus as contract, the syllabus uses described above may be put into service of online community building as means to communicate to students, help them to understand the course roadmap, what the journey will involve, and how students and instructors will participate in the journey. The syllabus as contract may represent a challenge to course community if it leads to negative perceptions or dynamics that interfere with the classroom climate or faculty-student rapport. However, including student behavior guidelines and norms for online community that create safe learning environments are identified as important best practices to foster community in online courses. The concepts of tone, language use, and inclusivity can inform how to achieve these goals in the syllabus.

**Syllabus Tone and Language Use**

Slattery and Carlson (2005, p. 159) observe that “syllabi differ widely in the tone they adopt: warm and friendly, formal, condescending, or confrontational.” In an influential
study, Harnish and Bridges (2011) found that syllabi written in a “friendly,” “warm” tone elicited student perceptions of an instructor who is more motivated, more approachable, and friendlier. While the authors noted that further study was needed to determine whether these perceptions persisted through the course, first impressions can set instructor/student interaction and engagement on a positive path. Denton and Velloso (2017) furthered this research in their examination of the influence of instructor gender and perceptions of instructor competence related to syllabus tone. They found that “regardless of instructor gender, participants receiving the friendly syllabus perceived the instructor as being more approachable, more caring, and more motivating, but not any more or less competent, compared to those receiving the unfriendly syllabus” (p. 173).

Gurung, et al. (2021) found that a warm syllabus tone increases the likelihood that students will seek help from the instructor and suggested the inclusion of “reach out” statements that invite students to contact the instructor. While this study does not specifically address online course community, but rather the role of the instructor in supporting student mental health, the findings are relevant given the central role that instructors play in fostering online community.

Tone is important, and so is word choice. Noting that “teachers cannot force students to do anything regardless of the imperative tone of the syllabus,” Womack (2017, p. 513) recommends using language that is more cooperative and collaborative to engage and motivate students in the shared learning experience. Baecher (1998) discusses the power dynamics that emerge in syllabi through pronoun uses. The author argues that “a balanced syllabus is not one in which power is shared, but rather one in which power is made explicit” through honest use of “I” to denote what the instructor will do, “you” to denote what the students will do/are responsible for and “we” to denote what the instructor and students will do together. Baecher warns against the false “we” that is sometimes used to promote community or soften the power dynamics but instead masks the authority that the instructor has in the classroom, fooling no one. It is not hard to imagine how these power dynamics can work again or erode the potential for online community.

Tone and language may be one answer to the question about whether the syllabus can simultaneously build rapport and generate the feelings that community is built upon while also clearly communicating course rules and policies. Other strategies have been identified in the scholarship of teaching and learning. In a study of the communication techniques that faculty used to overcome the tensions and conflicts that can arise in syllabus construction, Thompson (2007) identified “welcoming” and “tension balancing” strategies that may mitigate some of the effects of power, authority, and tone in a syllabus. The author reported that faculty involved in the study struggled with “the tension that exists between being caring while simultaneously establishing authority and the rigor of the course” (p. 67). They used welcoming techniques including “getting acquainted, being positive, selling the course, and using inclusive language” in order to create “a favorable first impression of the teacher” and overcome “some of the more serious information included in the syllabus by making students feel more comfortable” (p. 58). Interestingly, these strategies sought to
mitigate the impact while maintaining the overall syllabus construction approach, for example, covering the rules quickly, offering disclaimers, and connecting the rules to student success (p. 68). The author noted some examples of faculty negotiating with students through offering options in assigned work. It is important to note that the research methods used in this study were a combination of syllabus document review, faculty interviews, and classroom observations during which faculty discussed the syllabus and introduced themselves/the course. Additional research is needed to better understand if these findings translate to online courses, which may or may not have faculty-student interaction prior to syllabus access. However, it may still be of value to consider the implications of these findings, particularly if using a more traditional or contract-based approach to syllabus design.

Syllabi that are written in a warm tone with thoughtful wording can shape a positive first impression of an instructor and a course. While these strategies can be applied to conventional syllabus approaches, a few alternative syllabus designs have emerged that promote the idea that syllabi can and should reflect more than the content, schedule, and policies of a course. These approaches construct the syllabus with a learner rather than teacher or content-focus.

**Learner-Centered Syllabus**

The learner-centered syllabus engages many of the concepts discussed above in an overarching approach that follows a general shift from content or teacher-focused instruction toward “learner-centered” instruction (Richmond, et al., 2016). The shift from teaching to learning and from content delivery to active learning are key features of the learner-centered approach. Cullen and Harris (2009, p. 117) note that a learner-centered course syllabus “should include some of the key elements that define the learner-centered approach, namely an attempt to create community, a sharing of power and control over what is learned and how it is learned...” The learner-centered syllabus is characterized by positive tone, communication, and collaboration, as well as formative assessment and “a sense of ownership of the learning experience” (Richmond, et al., 2019; Cullen & Harris, 2009).

In an experimental design that compared student perceptions of teacher-centered versus student-centered syllabi, Richmond, et al. (2016) found that learner-centered syllabi positively impact student perceptions along two important dimensions: perceptions of master teacher behaviors and professor-student rapport. The authors used instruments that measured master teacher behaviors and professor-student rapport to ascertain student perception of a hypothetical instructor providing a teacher-centered syllabus and a learner-centered syllabus (Keeley, et al., 2006; Wilson & Ryan, 2013, as cited in Richmond, et al., 2016). The students rated the instructor with the learner-centered syllabus as “more creative, caring, happy, receptive, reliable, and enthusiastic” and as having higher engagement in the class. This instructor was rated as “having significantly more student engagement in their class and was perceived as more receptive, reliable, and fair.” Further evidencing the importance of tone, the authors found that “tone and pedagogy primarily influenced relationship and rapport variables rather than perceptions of knowledge and preparedness.
When connected back to attributes reported by Sadera (2009) and others that promote online community – shared purpose, trust, respect, collaboration, familiarity, rapport, openness – a learner-centered syllabus that leads to student perceptions of caring, receptive, and enthusiastic instructors bodes well for the start of online community. Whether a learner-centered syllabus can help to sustain community is an unanswered question.

UDL Syllabus

Universal Design for Learning (UDL) is situated directly within this shift towards learner-centeredness, with its focus on designing instruction and learning environments that remove barriers to learning for all students. UDL seeks to remove barriers by acknowledging and designing for learner variability. Variability encompasses differences in cognitive ability, physical impairments, and students with “atypical backgrounds in the dominant language, cognitive strategies, culture, or history of the average classroom who, therefore, face barriers in accessing information when presented in a manner that assumes a common background among all students” (Rose, et al., 2006, p. 3). Courses that are designed and facilitated according to UDL principles provide multiple means of engagement, action, and expression, and representation to account for these differences (CAST, 2018). Importantly, UDL posits that the use of multiple means benefits all students, not just students with disabilities. A commonly used example of universal design is the curb cut for individuals in wheelchairs, which also benefits people pushing a baby stroller or a shopping cart. An educational example is the use of captioned videos to assist students with hearing impairments, but that also helps ESL students, students with learning disabilities, or simply students who, for a variety of reasons, want to read rather than listen. UDL is a comprehensive approach to course design that goes beyond the scope of this exploration; however, there are key practices relevant to this syllabus design discussion that can support diverse online learners and promote the inclusivity that online community is built upon.

At the most basic level, syllabi that are designed according to UDL principles are accessible in that they can be used by learners who may have physical impairments, such as vision impairment (CAST, UDL on Campus, n.d.). Accessible syllabi are documents, files, or webpages that are structured and tagged, use alt-text to describe images and graphs, and utilize display text for hyperlinks. Along with ensuring that the syllabus can be accessed with assistive technology, these essential accessibility practices include all students right from the start without the need to reach out for assistance and accommodation (Womack, 2017), which may present a barrier and negatively impact feelings of belonging.

Another example of UDL practices applied to syllabus design is the use of visual or multimedia alternatives to the text-based information presented in the syllabus. An example of this UDL practice includes using an instructor photo or captioned video introduction that accompanies the instructor’s text biography. Providing these alternatives may reach students who are also a part of the course community but who may approach or process information differently.

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WebAIM is an excellent source for accessibility standards, guidelines, and learning resources to create accessible syllabi and other digital resources.
in different ways. The use of images in syllabi is an area of faculty experimentation and SoTL investigation that goes beyond UDL. Experimentation and scholarship in this area range from the placement of selected visual elements to accompany mostly text-based design to syllabi that are primarily image/visually based, such as an infographic syllabus or a syllabus presented in comic strip/graphic novel format. The research on student impact of image use in syllabi is mixed (see, for example, Harrington & Gaberty-Quillen, 2015; Kaur, 2021). Though Richmond (2016) found some connection between learner-centeredness in syllabi and the use of images and Nusbaum, et al. (2021) reported that students rated a hypothetical instructor using a visual design as more approachable and kinder than one who did not. It is important to note that UDL generally emphasizes format alternatives (e.g., text and images) rather than fully replacing one format for another format.

UDL is fundamentally about equity and inclusiveness – welcoming all students as capable learners through flexible design, which can be reflected in the syllabus design. A related approach is an inclusive or equity-minded syllabus, an emerging area of syllabi construction that aligns with the learner-centered and UDL approaches.

Inclusive and Equity-minded Syllabus

Diversity, equity, and inclusion (DEI) have become central to discussions about student success in all aspects of higher education. The Center for Urban Education (2018) asserts that equity-minded syllabi play an important role in helping faculty to support diverse students through:

“...demystifying the implicit norms and ambiguous processes that characterize college, such as how to be a "successful" student. Syllabi can welcome them into a classroom where they will be cared for and validate their pursuit of a college degree and ability to be successful. They can send the message that while students need to work hard in college, faculty are there to support and work in partnership with them. Finally, syllabi can affirm the belonging of racially minoritized students in higher education by representing their experiences in course materials and deconstructing the presentation of white students and white experiences as the norm” (p. 4-5).

These themes are highly resonant with the syllabus as course plan, communication vehicle, and socialization mechanism with the important added dimension of utilizing these functions through a lens of “equity-minded practice” (p. 4).

Fuentes, et al. (2021) identify several features and strategies to address equity, diversity, and inclusiveness in syllabi. Many of their recommendations are specific to the design of the course content (for example, representation in course readings, addressing DEI in course outcomes, and rewriting course descriptions to reflect diversity). Other recommendations include the addition of diversity and inclusion statements, which, the authors note, can positively impact class climate (Branch et al., 2018 as cited in Fuentes, et al., 2021). Establishing communication ground rules is recommended with the caveat that dictated ground rules that promote “civil discourse” may privilege certain forms of discourse. The authors further note that “it can be helpful to generate more comprehensive
communication guidelines in collaboration with students...” (p. 77). Taken as a whole, these syllabus construction recommendations can “set a tone” for the classroom environment that is welcoming to students of diverse backgrounds.

The “Liquid Syllabus” is a recent approach to syllabus design focused on access, equity, and humanizing online courses (Pacansky-Brock, et al., 2019). A liquid syllabus is an open, web-based, mobile-friendly, visually focused syllabus that instructors can use to establish social presence through welcoming introductions that use text, video, and images. This approach provides students “the opportunity to be greeted with a warm, smiling face and hear supportive words prior to reading the content (more like a face-to-face classroom experience)” (p. 12). The liquid syllabus utilizes multiple means of representation (CAST, 2018) to “more effectively support the understanding of content by students from different cultural backgrounds who represent diverse groups of people” (p. 12).

Each of these syllabus approaches – learner-centered, UDL, and inclusive or equity-minded – demonstrates student-centered techniques for creating syllabi that are intentionally designed to welcome all learners as collaborators and members of a learning community facilitated by a teacher invested in their success. In doing so, these approaches significantly further the objectives of the syllabus as plan, communication vehicle, and socialization mechanism by designing it first and foremost for the diverse humans who will be using it as individual learners and as members of learning communities.

Syllabus Design Features to Foster Community: Practical Strategies

The preceding discussion explored a selection of the rich literature around the syllabus as an important and influential document that deserves thoughtful design. It has an impact on student perceptions of a course and an instructor, which can, in turn, generate feelings that promote or impede connections, rapport, and community. The syllabus conveys a multitude of dimensions about a course, including the content and overall design, course policies, and course expectations. It hints at who the instructor is, their approach, and their expectations about the instructor-student relationship. It also hints at the climate of the course and how the course community will take shape and flourish. Student-focused, learner-centered syllabi make these hints explicit. While there is still much research to be done in this area, these promising findings can inform faculty practice in the design of syllabi for online courses that aim to foster community as a component of an effective student learning experience. Students will form an impression of the course and the instructor regardless of whether the following syllabus design practices are employed. As Collins notes (2007, p. 115),

“My syllabus enacts my theory of teaching—even if I didn't know I had a theory of teaching. Actually, all of our teaching enacts our theory of teaching, but the syllabus is the place where it gets codified tangibly, publicly. Whether I think teaching is a process of individual discovery or a matter of dispensing knowledge to passive students or a construct of interdependent collaborative communities, that theory will, and should, show up in my syllabus.”
Even an awareness that a syllabus may be interpreted differently by diverse students or may be a barrier to some students is a valuable insight. Going further by engaging in the intentional design of the syllabus to embrace all learners and promote a positive classroom community in which all students thrive is a worthy undertaking. This next section summarizes the findings discussed in this chapter as actionable steps that faculty can take in syllabus design or redesign efforts.

**Adopt a learner-centered approach to syllabus design.**

Learner-centered syllabi extend beyond a content and schedule roadmap to include elements that make students feel welcome and that emphasize the importance of student engagement in course community. These values may be expressed in statements of teaching philosophy, inclusivity statements, or even explicit expressions of the value placed on the social learning that will take place in the online community.

**Use a rubric to evaluate the existing syllabus for attributes of learner-centeredness.**

There are several syllabus rubrics that can be used to guide the evaluation and redesign of a syllabus or to develop a new syllabus. Palmer, et al. (2014) developed a rubric that specifically evaluates learner-centered attributes. Other rubrics, questionnaires, and checklists that can be used to evaluate syllabi are provided in Tables 1 and 2.

**Use positive tone and welcoming language.**

Use positive, warm, and welcoming tone along with honest and accurate language that reflects the roles, responsibilities, and expectations of the instructor and students. As noted previously, two of the strongest influences on course community are the instructor and the course design (Pilcher, 2016). The language (tone and rhetoric) of the syllabus has an influence on how students perceive the instructor and the course. The use of warm, welcoming, inclusive, and collaborative language invites students into the learning environment as active agents of their own learning and members of a community of co-learners and learning facilitators (instructors) who are invested in student success. Specific examples of welcoming (warm)/non-welcoming (cold) and cooperative/paternalist language are provided in several of the sources cited in Table 1: Syllabus Design Examples (below), including Womak (2017), pages 514-515.

**Address and welcome diverse learners.**

Create documents that comply with document accessibility standards and check for accessibility barriers by using the built-in accessibility checking tools in Microsoft Word and Adobe Acrobat. Alternatively, adopt a liquid syllabus (Pacansky-Brock, et al., 2019) approach by publishing the syllabus on the web. In addition, use UDL principles, such as multiple means of representation, to help students understand and connect with the information presented in the syllabus. For instance, include a table of contents for lengthy documents or add visual/graphical representations of information in text-heavy documents. Consider addressing students from diverse backgrounds and experiences through the addition of accessibility, diversity, and inclusivity statements that welcomes students with diverse backgrounds, perspectives, and experiences.
Establish norms for communication and interaction.

As discussed previously, online community requires participants to develop feelings that include shared purpose, trust, mutual respect, and rapport. Rules or norms of behavior can help to foster these feelings and create an environment in which students feel safe to learn together. Using the same best practices of warm tone and positive collaborative language, address ground rules for communication and interaction in the syllabus.

Consider collaborative design of elements of the syllabus.

Consider carving out time to discuss and agree upon rules and norms as a group exercise with students. Using a collaborative approach may help to address issues of diversity, equity, and inclusion, including those that arise from privileging certain forms of discourse (Fuentes, et al., 2021).

Address collaboration and social learning in the syllabus.

While this chapter does not focus on program design or course design elements that foster community, these are, of course, critical components of online student retention and success. Course design best practices for community building include the design of activities that promote student-instructor and student-student interaction. The design of a course, as represented in the syllabus, can include formal activities that help to build community, such as introduction discussions or group work, as well as informal or unstructured activities, such as encouragement to form study groups. Provide support for these informal collaborations by referring students to institution-supported collaboration and communication platforms. Program design approaches that have been shown to positively impact course community include learning communities and cohort models, in which students undertake a “program of study as a single unit” (Lipson Lawrence, 2002). Cohort models have been implemented at a variety of levels, from undergraduate (Opacich, 2019), including First Year experience (Araújo, et al., 2014; McCluskey, Weldon & Smallridge, 2019), to graduate programs at the masters and doctoral levels (Maher, 2005; Lee & Akkary, 2010). Cohorts have been shown to help student members bond as a community leading to increased satisfaction, retention, and student success. Cohort models are a programmatic approach that requires extensive curricular and programmatic planning to implement at the degree level. Encouraging the formation of learning communities designed around shared experiences or interests that transcend individual courses may lead to some of the same benefits to student satisfaction, retention, and success.

Seek out expertise

Collaborate with campus colleagues, such as faculty peers, instructional designers, accessibility experts, DEI and UDL experts, and teaching and learning center colleagues, to provide input and gain feedback from multiple perspectives on the syllabus design.

Consult SoTL Resources

Table 1 and Table 2 collect resources that may be helpful for syllabus evaluation and redesign efforts. Resources include before/after examples of syllabi components that have
been redesigned to improve learner-centeredness, increase inclusivity, and reduce barriers that may inhibit student engagement in the course community.

**Table 1**

*Syllabus Design Examples*

<table>
<thead>
<tr>
<th>Resource</th>
<th>Recommendations and Practices</th>
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<tbody>
<tr>
<td>Womack, A. (2017). <em>Teaching Is Accommodation: Universally Designing Composition Classrooms and Syllabi</em>. <em>College Composition and Communication, 68</em>(3).</td>
<td>Womack shares three strategies to improve a syllabus to make it more inclusive for diverse learners, including learners with disabilities. She provides especially useful before and after examples of her application of these three strategies in the redesign of her syllabus.</td>
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<tr>
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<td>Strategy 1: Creating Accessible Document Design</td>
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<tr>
<td></td>
<td>▪ Use images along with text</td>
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<td></td>
<td>▪ Utilize design strategies for readable text</td>
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<tr>
<td></td>
<td>▪ Use a table of contents, hyperlinks, and structured headings</td>
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<td></td>
<td>Strategy 2: Engaging Students with Cooperative Language</td>
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<tr>
<td></td>
<td>▪ Avoid “paternalistic,” authoritarian, antagonistic, and punishment-focused language</td>
</tr>
<tr>
<td></td>
<td>▪ Use positive and “cooperative” language</td>
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<tr>
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<td>Strategy 3: Empowering Students through Flexible Course Plans</td>
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<tr>
<td></td>
<td>▪ Expand deadlines</td>
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<td></td>
<td>▪ Allow choice</td>
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<td></td>
<td>▪ Build flexibility into grading methods</td>
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<tr>
<td>Collins, T. (1997). <em>For Openers... an Inclusive Course Syllabus</em>. In Wm. E. Campbell &amp; Karl A. Smith, Eds. <em>New Paradigms for College Teaching</em>. Interaction Book Company.</td>
<td>Collins offers a thoughtful approach that asks the instructor to reflect on beliefs and assumptions about teaching and through a series of questions, leads the instructor through a syllabus design process that makes explicit the “norms and grounds rules of higher education,” and that focuses on student success.</td>
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<tr>
<td></td>
<td>▪ The first phase of the design is a preparation phase, which includes reflecting on teaching beliefs and closely examining the course goals,</td>
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objectives, and related skills, and analyzing the resources that will be needed for students to succeed.

- In the second phase, Collins describes a comprehensive approach to building the syllabus. He addresses each part of the document with recommendations about tone-setting and inclusivity, focusing on student success. Throughout, Collins provides helpful specific examples of language that convey a focus on student success versus language that does not.

Richmond, A.S., (2016). Constructing a Learner-Centered Syllabus: One Professor’s Journey. IDEA Paper #60. Throughout this detailed guide to constructing a learner-centered syllabus, Richmond discusses the rationale and research underpinning this approach. Guidance is organized around several categories, including community, power and control, tone and focus, and evaluation and assessment. Concrete examples are provided to demonstrate the strategies, and a helpful questionnaire, “Self-Assessment of How Learner-Centered Your Syllabus Is,” is included to guide faculty in the evaluation of their syllabi.


Project Syllabus. (n.d.). Society for the Teaching of Psychology http://teachpsych.org/otrp/syllabi/index.php Project Syllabus is a database of peer-reviewed exemplary syllabi, many of which exhibit learner-centered characteristics. This resource provides many examples of syllabi (in the psychology discipline) and makes available “Pointers for Preparing Exemplary
<table>
<thead>
<tr>
<th>Resource</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDL Syllabus. (n.d.). UDL On Campus. CAST.</td>
<td>CAST’s UDL on Campus site supports the implementation of UDL principles and practice in higher education.</td>
</tr>
<tr>
<td></td>
<td>The UDL Syllabus contains examples of common syllabus components designed according to UDL practices, including instructor introduction, student resources, goals and objectives, assessments, and student expectations.</td>
</tr>
<tr>
<td>UDL Syllabus Rubric. (n.d.). UDL Universe: A Comprehensive Faculty Development Guide. Sonoma State University.</td>
<td>This resource from Sonoma State University has several examples of visually enhanced syllabi and provides an extensive rubric to guide the development of a UDL syllabus.</td>
</tr>
<tr>
<td>Six Principles of an Inclusive Syllabus Design. (n.d.). Center for Teaching and Learning, UMass Amhurst.</td>
<td>This resource outlines six principles of an inclusive design including, learner-centeredness, Universal Design for Learning, language and tone, supportive policies, and accessibility. Each principle is explained with useful recommendations for application. A highly detailed checklist is included for the design and evaluation of syllabi according to these principles.</td>
</tr>
<tr>
<td>Pacansky-Brock. M. (n.d.). Create a Liquid Syllabus.</td>
<td>This openly licensed, self-paced online course demonstrates 13 steps to creating a liquid syllabus, an open, web-based, mobile-friendly, visually focused</td>
</tr>
</tbody>
</table>
syllabus that instructors can use to reduce barriers to access and welcome students.

| Center for Urban Education. (n.d.). Syllabus review guide: A inquiry tool for promoting racial and ethnic equity and equity-minded practice. Rossier School of Education, University of Southern California. | A 5-part self-paced activity to explore reactions to racial equity, learn why syllabi matter, learn about equity-mindedness, reflect on/deconstruct own syllabus, and examine an example syllabus to identify equity-minded syllabi practices. |

*Note. A selection of resources that offer helpful demonstrations of the practices presented in this chapter (left column). The right column contains a brief description of each resource.*

**Table 2**

*Syllabus Design Examples: Rubrics and Syllabi Outlines*

- Brantmeier, E., et al. (n.d.). Inclusion by design: Survey your syllabus and course design: A worksheet (Modified).

*Note: The citations above provide rubrics and syllabus outlines that can be used as guides to evaluate and redesign or create effective syllabi.*

**Closing**

Research specifically linking the syllabus with online community is lacking; however, a breadth of research focuses on how the syllabus – its roles, functions, components, design, and tone or wording – impacts and influences students. This research sheds light on the questions posed in the introduction to this chapter and can guide practitioner application.
and future research about the syllabus and online course community. While further research is needed to demonstrate the relationship between the syllabus attributes and approaches discussed here and online course community, several studies point to the positive impressions that students have about instructors and courses when syllabi are learner-centered, written with a positive and welcoming tone, focus on students as collaborators in learning and that are designed to maximize inclusivity and minimize barriers. Further, syllabi that demonstrate an awareness of student differences and that address equity, diversity, and inclusion invite diverse students to see themselves and to be themselves in online courses. Taken together, these syllabus components, attributes, and design features can establish a positive and inclusive course climate right from the start that may, in turn, foster and promote a positive and impactful online course community.

It is important to recognize again in this closing that the syllabus is one component of a complex mix of factors that influence online classroom community. Initial impressions, perceptions, and dynamics, whether positive or negative, may change throughout a course. Instructor involvement, feedback, and instructional strategies will play a large role, perhaps overcoming some syllabus constructs and working in concert with others to build and maintain strong community throughout the course. In the end, the follow-through and implementation of the syllabus promises – whether made at the start or adjusted along the way – is what will matter. As Collins (2007, p. 102) so astutely observes, “a badly taught course with a great syllabus is still a badly taught course.”


https://www.pfw.edu/dotAsset/bdf64113-75c4-487a-ba68-dfccc3044ce9c.pdf

https://doi.org/10.1177/0098628321994632


Attaining a college degree is a major milestone in a student’s life. It takes a partnership between students and faculty, as well as university support, to assure students reach the goal. Institutions of higher education must be quick to adjust in the face of emergencies to assure that all students enrolled can continue to successfully access and participate in their coursework. In March 2020, coronavirus effectively upended life and shut down college campuses across the United States. Students and faculty were suddenly forced from in-person teaching and learning to a fully virtual environment to maintain personal safety and to control the spread of COVID-19 (Cevasco et al., 2020). The rapid shutdown may have caused challenges that were particular to students with disabilities as they tried to navigate the new learning environment. For example, few colleges made online resources available to support students with disabilities adjust to the change. In the New York Tri-state area, an epicenter for the COVID-19 outbreak, 17% of colleges had no link to accessibility services on their websites whatsoever (Melio-Erwin et al., 2021).

The abrupt move to online learning environments due to coronavirus mitigation efforts underscored and compounded the challenges students with disabilities faced in the classroom pre-pandemic. While students with disabilities comprise about 11% of the college going population in the United States, only 41% of these students graduate from a two-year college. The graduation rate drops to about 33% for those attending four-year schools (Sanford, et al., 2011).

One factor contributing to the low graduation rates is the change and/or lack of personal and educational support systems. Special education programming and modifications that were available at the secondary level disappear once students graduate from high school making it difficult for students with disabilities to acclimate to the college environment. Further, special education programs at the secondary level often overlook training in skills that foment academic success like self-advocacy, time management, and study skills leaving students with disabilities underprepared to function with the level of independence needed in a college classroom and more so for online courses. Other factors
such as federal aid restrictions, and commonly held stereotypes about students with disabilities have also contributed to low graduation rates for this group (Snider, 2021). With this, faculty and university leaders must work to support the academic success of students with disabilities by not only providing reasonable accommodations, but the social-emotional services necessary to allow students equitable opportunity to earn a college degree regardless of the instructional modality. This case study utilizes responses from an existing survey administered to students with disabilities at one university in New England to critically reflect on their experiences in online learning that took place after a critical incident, the shutdown of college campuses due to COVID-19 and the changes to the learning environment that came with it.

Background

Transition from high school to college can be problematic for students with disabilities because of the fundamental differences in federal legislation supporting their participation in education. In K-12 settings, the Individuals with Disabilities Education Act (IDEA) mandates schools provide all students with disabilities with a free and appropriate education that includes modifications and accommodations specific to the needs of each student on a written individual education plan (Getzel & Toma, 2008). Once students with disabilities transition to college, educational support is governed by Section 504 of the Rehabilitation Act of 1973 and Americans with Disabilities Act Amendment Act (ADAAA) which provides equal access to education but is not prescriptive in the way students are identified or accommodated, thus placing the onus on the students to seek out services (Littlepage & Clemson, 2018). As a result, fewer students receive accommodations and services due to the hesitancy to self-identify, the inability to articulate the impact their disability has on learning, and the lack of self-advocacy skills (Littlepage & Clemson, 2018). In addition, as students transition to college an emphasis on effective executive functioning skills becomes necessary to promote student success. Students with well-established time management, organization and study skills can navigate the college environment more successfully. When a student takes online classes, these executive functioning skills become even more important.

Conceptual Framework

Educational policy and best practices supporting students with disabilities have long been guided by federal and state legislation. Under ADAAA and Section 504, institutions are required to provide accommodations to qualified students with disabilities to allow them equal access to their education. Guidance provided by the United States Office of Civil Rights amid the pandemic stated that regardless of the teaching modality (online or on-ground), all students with disabilities must continue to receive accommodations and auxiliary aids (Office of Civil Rights, 2020). Accommodations are adjustments designed to level the playing field for students with disabilities while maintaining the integrity and standards of the academic program. For decades, higher education institutions have been retrofitting college classes to meet the needs of individuals with disabilities by providing reactive
accommodations. Colleges have been providing this type of support as a way of meeting the requirements under the ADAAA and Section 504.

The success of individuals with disabilities in college academics can be impacted by the teaching pedagogies used by faculty members. Equitable access for all types of learners is at the foundation of Universal Design for Learning (UDL). UDL is a researched based approach to teaching and learning that gives all students an opportunity to succeed. Within the UDL framework are three principles to guide instruction: Engagement, Representation, and Action & Expression (Rose et al., 2006). Engagement refers to the “why” of learning. Within the development of course content, instructors should provide multiple means of engagement. Representation refers to the “what” of learning. Instructors should provide multiple ways for students to interact with the course curriculum. Lastly, Action & Expression refer to the “how” of learning. In this principle, instructors are encouraged to think about multiple ways students can show their learning (CAST, 2018). UDL encourages instructors to remove any barriers to learning within the development of their content, rather than retrofitting a course to meet a needed disability accommodation. By creating a course that is accessible to all, the instructor is building in flexibility that can be adjusted to meet each student's individual strengths and challenges.

Although UDL would not erase the need for disability related access accommodations, it would dramatically eliminate the need for many systematic accommodations by allowing choice and alternatives within the curriculum design. Providing accommodation is a legal mandate to give the student with a disability an equal opportunity. UDL is a researched based framework to improve and optimize teaching and learning for all students (CAST, 2018).

**Method & Sourcing**

The primary source used in this case study was a set of existing survey data from students who receive learning accommodations through the campus disability services office at a state university in New England. The office regularly surveys students to gauge needs and satisfaction with services provided. Student responses are anonymous. We collected in-depth responses to six open ended questions from the spring 2021 administration that were specific to the abrupt transition to online learning per the protocol for critical incident narrative inquiry (Butterfield, et al., 2005; Flanagan, 1954). We collected 29 sets of responses written by both graduate and undergraduate students. In the instance of quotes and other data points, pseudonyms were used to maintain confidentiality. Students preferred pronouns were used in quotes and descriptions.

A two-phase qualitative approach was used to analyze the content across each set of responses by all three researchers. Parallel themes were distinguished using inductive coding and the constant compare method of coding where researchers individually compared documents to identify key terms, quotes, and phrases that cut across the preponderance of the data (Taylor & Bogdan, 2016; Saldana, 2013; Thomas, 2006). In phase two, the analysis of the primary documents generated by each researcher was compared to cultivate themes and findings presented in this chapter. Using this protocol, all researchers reviewed and
Results & Discussion: Mixed Reactions

Participating in online courses clearly presented both benefits and challenges for students with disabilities. Although the modality switch was necessary due to COVID-19, it gave students with disabilities the opportunity to try online classes for the first time. For some it was an unwanted change due to individual learning preferences like “being able to just ask questions while things are being explained and having more interactive lectures (Kris North, Freshman).” For others, asynchronous courses gave students flexibility to be more productive. Students like Ann Major had the opportunity to create their own schedules, work at their own pace, and around their disabilities to maximize success. “Given my disability, sometimes I am not well enough to go to class in person. However, having remote classes made it easier for me to participate and join classes even if I wasn’t feeling well enough that day (Ann Major, Sophomore).” For some students with disabilities, staying at home made them feel safe, decreased their stress, and gave them more opportunities for self-care.

Challenges: Faculty Knowledge & Understanding of Disability

The switch to online learning was not only challenging for students but also for many faculty members. Although universities quickly rallied to give the faculty the tools necessary to teach online, there was still a steep learning curve. While some students expressed concern regarding the professors’ ability to teach online in general, the majority conveyed concern about how well faculty understood the unique needs of students with disabilities in this modality. Samantha Cole expressed the frustration she and other students with disabilities experienced regardless of the learning modality. “I don’t think the problem is with remote learning as it is with professors who have practically zero knowledge or training on how to help students with disabilities. They aren’t consciously aware of what tools or compassion to use (Samantha Cole, Senior).”

Students with disabilities were more distressed about moving to online learning because of COVID-19 than their non-disabled peers. Fears of not being able to meet academic requirements and performing poorly in online classes propagated concerns that students would be impeded in accessing advanced courses in their chosen majors thus delaying graduation (Zhang, et al., 2020). These fears are not unfounded given that students with disabilities experience more financial hardship, access issues, and other health-related challenges in participating in education than their non-disabled peers under pre-pandemic conditions (World Bank, 2021). While many students in this research study mentioned non-academic concerns that impacted their study habits at home, Samantha captured the essence of the issue, that students like herself need more flexibility from faculty in an online environment to be successful. She stated the following about that faculty in online learning:

Not only [do faculty] have higher expectations for students to handle remote learning on their own, but they have not allowed for late work due to outside
influences. For example, I am in a toxic household. But I do not always want to disclose this to a professor. They do not understand students could be stuck at home working online in an abusive environment [in addition to disabilities] (Samantha Cole, Senior).

Using a more inclusive course design, universities and faculty can support students with disabilities who are coping with multiple stressors outside the classroom. For instance, flexible deadlines, chunking longer projects, creating more and varied options for asynchronous participation can help alleviate some student stress and provide opportunities to practice executive functioning skills. A redundant assessment cycle in an online class can allow faculty to gauge the learning of students who may be absent from class more regularly due to disability related health issues (Martin et al., 2019). The effectiveness of an inclusive design approach was illustrated by a takeaway from Pat Bell. Pat noted that even though they were facing outside stressors during the semester, they were most successful in an online class where the professor “provided notes for the reading and allowed submission of assignments online and in different formats. (Pat Bell, Senior).”

Communication

Issues related to communication with faculty are evident in the majority of responses from students with disabilities as they were thrust into online learning. Students reported both a desire for, and a lack of clarity in communication around instruction and expectations. Students also noted a perceived lack of access to faculty in the online environment. Slow response times to student inquiries and assignments contributed to additional angst amid the change. Many students like sophomore Lena Landis, specified that “a support needed from my professors was better communication. I often had trouble hearing back from my professors via email which was stressful.” Students found it challenging to gain understanding of the content with little access to faculty stating, “if you weren’t grasping a concept, it could be difficult to figure it out when both sources [of information presented] pretty much took the same approach to explaining the problems (Jennifer Toney, Sophomore).” When faculty were available and effective communication was present, students thrived. This was the case with Alicia James, who was able to meet with a faculty member to discuss her needs. “One of my professors had a zoom meeting with me and asked what my disabilities were and what I needed help with and the services I received. It helped them understand what I struggled with and how they can support me during the class (Alicia James, Graduate Student).”

Effective communication between faculty and students is the critical element that drives the teaching and learning. In an in-person setting, communication between students and faculty is fluid. However, the fluidity is compromised in online settings, particularly when a course is taught asynchronously and there is limited access to a “live” instructor. Therefore, the need for effective communication is enhanced in online environments (Poe & Stassen, n.d.). For students with learning disabilities or anxiety disorders, the need for specific and frequent communication is vital for success (Konen, 2021). This is especially
salient in times of crisis, like the critical incident that forced rapid and notable change to the regular learning environment.

**Socialization & Isolation**

College campuses are vibrant places that offer myriad opportunities for social interaction both in and out of the classroom. For many students with disabilities, the move to online classes took away the convivial interactions with peers instead replacing them with discussion boards. Most students commented on the loss of social connections with friends or classroom interactions such as Pat, who “Really missed the natural socialization of in person classes.” Pat added, “Living in a single [dorm room] without being able to have visitors on top of having issues with depression and motivation was difficult (Pat Bell, Senior).” Socialization is important because interacting with others helps individuals learn social norms and how they fit into the larger world. Social connectedness also leads to greater happiness and health. When social outlets are lost people begin to feel alone. Junior Denise Vernon summed it up, “I hated the isolation factor.”

Young adults with disabilities are more likely to report lower levels of personal wellbeing associated with loneliness and social isolation. This is especially salient among those who, like many college students, are not employed, live in a rented living space, and lack access to environmental assets (Emmerson et al., 2021). Coupled with COVID safety protocols such as social distancing and quarantining which increased isolation, moving to online learning for students with disabilities may have increased risk to their mental health compared to their non-disabled peers. Kris North, saw online learning as a double-edged sword. “Learning remotely kept many of us safe, which was a pro. For me, learning remotely increased my dissociation and it is harder for me to learn on my own or not in a classroom environment (Kris North, Freshman).”

Further, socialization is a cognitive process. Evidence suggests that when people feel lonely, social cognitions stop working properly thus impacting the ability to learn how to negotiate a new social environment with ease. As such, executive functioning becomes crucial because it helps people manage time and organize ideas to improve social and other outcomes (Hawkley & Capitanio, 2015). Students in this study indicated a lack of focus and increased distractions contributed to poor time management as courses moved online.

Faculty can support students by providing links to electronic resources such as access to virtual appointments with academic support personnel and campus counseling centers. Posting these resources on syllabi and including them with course material on the online learning platform can contribute to online academic success. Moreover, the role that positive and frequent communication plays in creating connectedness and reducing student anxiety within the virtual classroom cannot be understated.

**Skills for Success in Online Learning**

**Executive Functioning**

Transitioning to the online environment put a significant amount of focus on the use of effective executive functioning skills. Executive functioning skills are typically seen as a
set of mental skills, such as working memory, self-control, time management, and follow-through (Hawkley & Capitanio, 2015). For many, executive functioning skills were not specifically taught but are essential for success in college. The online environment created the need for students to have well established time management and organizational skills to effectively manage multiple online classes with various requirements and expectations. Almost all students responded that they had to use some type of executive function skill during the semester to be successful within their classes. Within their responses, they identified time management as the number one skill needed to successfully complete an online course, followed by study preparation and organization.

While many students reported having gained additional time during the week by moving to online classes, they struggled to use effective time management skills to take advantage of the found time. An example is Sophomore Nancy Weston who lamented, “I tried using a planner but eventually gave up.” Students found the flexibility of being able to attend classes remotely to be particularly helpful for their disabilities but were challenged with being motivated and dedicated enough to stick to a schedule and get work completed. Some students, like Samantha, found it helpful to work with a learning specialist weekly to receive assistance in time management and organization.

Meeting once a week with an advisor helped me stay on track. I also kept a whiteboard with a weekly schedule next to my desk at home. Because the majority of my classes were asynchronous, plus my thesis class, I was able to work on my own schedule which helped immensely (Samantha Cole, Senior).

Self-Advocacy

There is exigency for self-advocacy skills among college students with disabilities. The goal of self-advocacy is for students to identify and ask for what they need to become successful learners and to transition into adulthood with the skills necessary for success (D’Alessio, K.A. & Osterholt, D.A., 2018). However, not all students entering college have learned these skills. Prior to college, students with disabilities often have a case manager or school counselor who advocates for their needs. Upon enrollment these supports disappear, and students are left to learn to advocate for themselves.

Teaching self-advocacy skills to students with disabilities allows them to understand their learning profile, explain their strengths and challenges, and communicate effectively with their faculty members. Lena Landis felt that the best way to self-advocate was to “[make] sure to still be just as open with my professors about my disability in the virtual setting as I would have been in the in-person classroom setting.” Like Lena, many students indicated they used self-advocacy skills to get the support they needed to make the most of out of their online courses. Marie Allen noted that to be successful, “[I] advocated for what I needed, used the note taking portal, and began using a screen reader (Marie Allen, Sophomore).”
Connecting with Disability Services

Campus disability services offices can play a key role in teaching both executive functioning and self-advocacy skills. Students reported that training, support meetings, and one-on-one support with learning specialists are consistently offered, and participation is encouraged. While all students in this study gave positive lip service to the staff and availability of services, few accessed them during the pandemic citing that they preferred an in-person meeting to get help. Those, like first-year student Courtney Sales who did reach out noted that “they were very helpful and were there even if I just needed to talk and it was not school related which everybody really needed through this pandemic.” Students also suggested that training in how to be successful in online learning specific to one’s disability, as well as providing a checklist of strategies for online success would help them feel more confident in their course work. Interestingly, students who chose not to access support through the disability services office were more likely to report struggles with their online learning. Concerns among these students included increased anxiety about work completion, lack of organization and focus, and feeling disconnected.

Disability services staff can also provide student support by working collaboratively with faculty to help them better understand and implement student accommodations. Marie noticed her classes were going more smoothly after her professors partnered with a disability services staff member. "I'm pleased with how receptive they and my professors are to the accommodations I request... [They] sent me personal copies of presentations, navigated any quiz/test obstacles. Thank you for your help this year! (Marie Allen, Sophomore).”

Assistive Technology

The use of assistive technology for online success was also a common theme among student responses. Assistive technology can be any tool that helps people who think and learn differently succeed in the classroom or on the job. Examples can include high-tech items like speech to text software or can be as simple as a highlighter. The move to an online learning environment allowed for better integrated use of digital media into course content as well as the delivery of lessons. Students identified a positive connection to having digital access to class materials when asked about the pros of online learning. Several students mentioned the benefits of having access to class recordings or narrated slides to relisten to class lectures and fill in their notes. Others found using assistive technology such as SmartPen and Read & Write Gold helpful in learning course material when reviewing notes. Most disability services offices can help students acquire assistive technology when needed.

Recommendations

The findings of this study highlighted the need for improvement within the instructional design of online classes, the preparation of students in developing effective executive functioning skills, and overall training in teaching and working with college students with disabilities. As we look towards meeting the needs of more students, it is recommended that faculty members incorporate the principles of Universal Design for Learning (UDL) into their courses to promote accessibility. Incorporating UDL into online classes is easy. It can be accomplished by; 1. know your student populations’ strengths and
weaknesses, 2. use digital materials, 3. share content in a variety of ways, 4. offer choices for how students demonstrate their knowledge and 5. use an access statement to encourage students to self-advocate.

In addition to improving lesson design, consideration should be given to providing faculty with training to help them better understand how different disabilities affect the learning process and the purpose of accommodation. Lily, a sophomore, shared her hope for policy support in creating a more inclusive campus. “I just wish professors had more training for how to help students with disabilities. It should be part of their licensing/contract to take some courses. Professors just simply are not educated on working with students with disabilities (Lily Miles, Sophomore).” Building a more inclusive campus, be it virtual or physical, requires that universities put policies in place that bolster faculty competence in supporting diverse student needs. Failure to do so fosters social injustice and a lack of equity in access to education for college students with disabilities.

Future Research Directions

Further research should focus on the ways that faculty are prepared to teach students with disabilities as part of the university onboarding process and as part of their professional growth. The National Standards for the Quality of Online Teaching (Virtual Learning Leadership Alliance & Quality Matters, 2019) indicate in Standard F that “The online teacher personalizes instruction based on the learner’s diverse academic, social, and emotional needs (p. 21)”. The current research highlighted the faculty need for assistance with understanding how learning is impacted for students with various disabilities and how to incorporate best pedagogical practices such as using UDL to foster academic success. There is a disjunction between our findings and the national standards that suggest that future research should specifically focus on how faculty are trained to instruct students with disabilities in an online setting, as well as attune to best practices for online communication as outlined in Standard D Engaging Students (p. 16).

Conclusion

Overall, this case study revealed that there was a mixed response to the switch to online learning for students with disabilities. Some students found it helpful and enjoyed the flexibility, others found it hampered academic success and social-emotional health. Students faced some barriers such as a decrease in focus and challenges in obtaining faculty support. However, students were resilient and found ways to successfully navigate the new learning environment like meeting with learning specialists to help them stay on track and making use of assistive technology to support online learning. One key area that can be improved in both online and in-person settings is increasing faculty awareness about inclusive teaching. Incorporating UDL into lesson planning can dramatically eliminate the need for many systematic accommodations by allowing choice and alternatives within the curriculum design. However, more research is needed to clearly understand all the challenges that students with disabilities encounter in online learning and their voices should be a central part of developing solutions that work.
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Over the past 30 years, the college student population has become increasingly neurodivergent (Zeedyk et al., 2018), and researchers have pointed to a number of reasons for this happy outcome. In 1990 the United States Congress enacted the Americans with Disabilities Act (ADA) mandating that post-secondary institutions guarantee the necessary conditions and opportunities to allow all students to engage and learn. In addition to ADA, numerous other improvements such as early detection and intervention, and advances in K-12 educational and social supports (Chiang et al., 2012) have made pursuing a college degree increasingly possible for individuals with Autism Spectrum Disorder (ASD). For example, of the approximately 50,000 high school graduates diagnosed with Autism Spectrum Disorder (ASD), Wei et al. (2015) estimate that 32% enroll in post-secondary education. Gobbo et al. (2018) interviewed faculty members in the STEM (science, technology, engineering, and math) fields and found that 35% of students in their respondent’s classrooms had a diagnosis of ASD.

The landscape of the college classroom has also shifted in recent decades with 84% of American undergraduate students taking at least one course online in the 2019/2020 academic year (National Center for Education Statistics, 2021). The massive and global shift to on-line learning necessitated by the Covid-19 pandemic in Spring 2020 will likely have lingering effects on college teaching with remote and hybrid learning options continuing even after it is safe for students and faculty to return to the classroom. Students, faculty, and administrators have invested in the technology and infrastructure to support online learning, and the convenience of remote learning allows for greater access to post-secondary education for more students, as being on campus is no longer a necessary prerequisite to access (e.g., Govindarajan & Srivastava, 2020). However, the online learning environment does present challenges related to social isolation, organization, and engagement (e.g., Garcia-Morales et al., 2021), that may present a particular burden for college students with ASD. The purpose of this chapter is to provide faculty members with ready to implement strategies to support college students with ASD, both in the online and in-person classroom.

While more students with ASD are entering college (e.g., Zeedyk et al., 2018), many struggle to meet the practical and social demands of the post-secondary environment (Nuernberger et al., 2013; Pinder-Amaker, 2014; VanBergeik et al., 2008; White et al., 2011).
Reviews of attrition and graduation records found that the completion rate for students with disabilities including ASD is approximately 40% (e.g., Sanford et al., 2011; White et al., 2011) compared to 60.4% overall (Hanson, 2021). High attrition rates are concerning both for the students with ASD who are not attaining degrees and for post-secondary institutions that are losing admitted students. For students, attaining a post-secondary degree is a significant predictor of positive outcomes in adulthood (e.g., employment, financial independence, personal relationships, Trostel, 2015). On the institutional side, student retention is paramount for both private and public institutions to ensure continued revenue streams and/or institutional support from public avenues. These realities speak loudly to the need to tackle the issue from both a macro societal level and at a practical level for universities and colleges looking at retention. Altruistically, students with disabilities, including ASD, have a legal right to be in the classroom and as faculty, it is our responsibility to ensure that we provide appropriate accommodations to allow them access to the learning experiences arranged in our courses.

There is evidence to suggest that faculty and institutions may not be aware of students in their classrooms who have a diagnosis of ASD. Results of two studies suggest that there are a number of college students with ASD who are unaccounted for in the statistics cited above. Both Cai & Richdale (2016) and Cox et al. (2017) report that 100% of their college-aged participants with ASD describe pragmatism in their diagnosis disclosure to their institution, only doing so when necessary (e.g., to secure academic accommodations). Students who do not disclose their diagnosis fall outside of the supports mandated by ADA. Unfortunately, even the students who disclose their diagnosis may not receive supports tailored to their needs. Historically, student accessibility centers have supported students with physical or learning disabilities (Geller & Greenberg, 2009). Student accessibility centers may therefore be ill-equipped to support students with ASD, whose needs often relate more to social, communication, and organization supports as much as academic ones (e.g., Kranke et al., 2013).

The challenges faced by individuals with ASD in college likely stem from core diagnostic characteristics (e.g., social and communication challenges; restricted interests) as outlined in the Diagnostic and Statistics Manual (DSM-5; American Psychiatric Association, 2013). These challenges are likely exacerbated in the online classroom. The Centers for Disease Control (e.g., Baio et al., 2014) estimate that approximately half of individuals diagnosed with ASD have not been diagnosed with a co-morbid intellectual disability and indeed the challenges faced by individuals with ASD at college largely fall outside of academic concerns. In a 2014 review, Gelbar et al., found that 45% of the studies focused on supporting college students with ASD describe non-academic supports for students with ASD have not been diagnosed with a co-morbid intellectual disability and indeed the challenges faced by individuals with ASD at college largely fall outside of academic concerns. In a 2014 review, Gelbar et al., found that 45% of the studies focused on supporting college students with ASD describe non-academic supports for students with ASD. Elias and White (2018) asked students with ASD about their largest concerns related to their college experiences and only 20% reported academic issues as being their biggest barrier to success. Anxiety, depression, and loneliness were the issues most often referenced. Cai and Richdale (2016) ran qualitative focus groups consisting of 23 students with ASD and 15 family members, these authors then conducted thematic analysis focused on the reported
college experiences of the students. One emergent theme was that students felt academically but not socially supported, and many reported that they were unable to complete their studies due to problems outside of academics (e.g., excessive stress, high dependence on families, and social isolation). Further, Mayes et al. (2011) suggest that anxiety increases with IQ for individuals with ASD, the subsection of the ASD population more likely to pursue a college degree.

While the causes of distress or dissatisfaction with college for students with ASD are often cited as non-academic in nature it is prudent for academic faculty members to recognize the role they play in supporting the needs of college students with ASD, and, in turn, support their institutions in retaining students. Faculty members are often the most consistent university employees that students have contact with (e.g., Kezar & Maxey, 2014), and as a result heavily influence a student’s college experience. This is particularly true of commuting and on-line students who do not benefit as directly from residential life and other on-campus community supports.

Faculty members play a crucial role in the inclusion of students with disabilities (Barkley & Major, 2020; Thomas, 2016). Researchers working with non-ASD populations have noted that students’ school engagement behaviors (e.g., positive feelings about school, positive relationships with teachers; Kiuru et al., 2015) are positively correlated with academic persistence. For students for whom social differences are a hallmark of their diagnosis (i.e., individuals with ASD), positive relations with faculty may prove to make or break a successful college experience.

The purpose of this chapter is to offer practical suggestions that faculty can implement in their classrooms immediately. Direct analysis of each of the below suggestions is needed before the function of each in improving the college experiences of individuals with ASD can be understood. When available, evidence from work with individuals with ASD and other diagnoses has been mapped onto what we do know about the diagnostic criteria of ASD, and best practices in post-secondary teaching. Before discussing these practical strategies, it is important that faculty members recognize a few important things. First, students with ASD have earned their spot in the college classroom and are entitled to equal access to content and learning opportunities. Second, faculty may or may not be aware of the students in their classroom who have a diagnosis of ASD. Third, ASD is a diagnosis that may inhibit a student’s ability to succeed in your class. Fourth, in order to succeed, these students may require supports other than traditional academic interventions that more closely align with the social challenges characteristic of their diagnosis.

**Fostering positive relationships with students**

Educational philosophers have long acknowledged the importance of the relationship between students and teachers. According to Plato, the relationship between teachers and students must be established before learning of any sort can occur (McEwan, 2011). Recently, authors have discussed the importance of the student-faculty relationship in student retention and college persistence, specifically (e.g., Harris et al., 2011; Thomas, 2016). Harris et al. (2011) studied interactions between faculty and students with disabilities
and go so far to assert that the relationship is so crucial that, “students who interact with
faculty members get better grades, are more satisfied with their education, and are more
likely to stay in school” (p. 27).

Given the documented social communication differences and higher than average
reports of anxiety (e.g., Elias & White, 2018), it is likely that the importance of the student-
faculty relationship is equal to or even greater for students with ASD. The benefits of a
positive relationship with faculty are clear and are in direct opposition to the problematic
outcomes that befall so many college students with ASD. For example, the ability to request
help from faculty when needed is an important indicator of college success (Zajacova et al.,
2005; Hsieh et al., 2007), and is a skill often lacking for college students with ASD (e.g.,
Paradiz et al., 2018). Thomas (2016) asserts that it is the relationship with their instructor
that allows students to feel confident advocating for themselves when they need help.

Authors have described elements of positive relationships between faculty and
students, but these elements can be challenging to quantify. For example, Anderson and
Carta Falsa (2002) describe an open relationship, positive rapport, and a relaxed and
supportive environment as being indicators of a positive student faculty relationship, but the
types of interactions and environmental variables that contribute to these outcomes remain
an empirical question. Specifying and quantifying these variables empirically will allow
individual faculty members and institutions to focus on improving these elements. Based on
available data, faculty may consider implementing the below suggestions that may contribute
to improved relationships between them and their students.

Interactions with faculty outside of the classroom (e.g., email, before/after class
conversations) are positively correlated with improved academic outcomes (e.g., increased
motivation, greater academic self-confidence; Komarraju et al., 2010). In an effort to
promote communication between themselves and their students, faculty should aim for their
initial 1:1 interaction with students outside of class to be low-stakes and positive. From a
behavior analytic orientation, the goal of faculty members should be for the initial
interactions with their students to be reinforcing, increasing the probability that interactions
will become more frequent in the future. If faculty wait for an academic or classroom social
problem to arise to initiate an interaction, they run the risk of creating a punishing
environment for 1:1 interaction with faculty that may carry-through the overall college
experience for that student.

While not empirically validated, a simple strategy such as being proactive and sending
a welcome email rather than waiting for students to initiate an interaction. Faculty can also
consider requiring 1:1 communication as a small part of their student’s grade. For example, a
faculty member could require a brief video-conference call or in-person meeting in lieu of a
quiz or weekly participation points. This would allow for a positive first 1:1 interaction,
potentially opening the door for future interactions should one be needed if things are not
going well later in the semester. In addition, common sense practices such as treating
students courteously as you would a coworker and learning their names (and using them
often) may facilitate an environment that supports positive relations between faculty and students.

**Syllabus development**

“The prof gave us points for participating in class so it was obviously important but then she told me I was participating too much.” – Jack, College Freshman

Issues related to restricted and repetitive patterns of behavior may impact the college classroom experience of individuals with ASD. The diagnostic criteria of ASD provided in the DSM-5 describes an insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, etc.) For college students, this could translate to difficulties with vague, incomplete, or oft-changing syllabi. For example, McKeon et al. (2013) surveyed professors and 85% of their respondents reported that they have witnessed atypical executive functioning behavior in their classrooms, such as disorganization and time-management. Researchers have also discussed challenges related to pivoting with unexpected challenges (e.g., Anderson & Butt, 2017; Elias & White, 2018; White et al., 2017). Each of these challenges may be exacerbated by loose or disorganized syllabi.

Faculty may help mitigate some of these potential challenges by first identifying any vagueness in their syllabi. For example, many faculty include a participation component in their classroom policies and with good reason; Weaver & Qi (2005) describe a link between participation and success in the college classroom. While not yet explicitly studied with college students, researchers have demonstrated that without instruction individuals on the autism spectrum can have difficulty learning from those around them (e.g., observational learning; MacDonald & Ahearn, 2017). This could make it challenging for students on the spectrum to observe and adjust their participation, and other classroom behavior based on what they see in class. Vague participation parameters (e.g., “students should actively participate in each class”) could contribute to troublesome outcomes for students with ASD, for example, participating too little or too much.

When outlining participation policies faculty should consider each of the following. What would be the mode of participation that would work best in a particular course (e.g., calling out, hand raising, random selection), times when participation is welcome (e.g., during or after a lecture), and if contributions of different types will be scored equally (e.g., a clarifying question, a related comment, a comment that integrates class content, etc.) This is an example of not lowering the bar for students with ASD, but rather being explicit about what that bar is in a way that could be helpful for all students. Similar thoroughness with regards to technological detail should be applied to all classroom policies of import to individual faculty members. For example, what constitutes tardiness and the related consequences, parameters and procedures for excused absences, and preferred methods of communication outside of class. To ensure that they have included sufficient technological detail would be to have a colleague review classroom policy and determine whether or not they would be able to step in and run a class session in the same way that you do.
Mitigating the social pressures in your classroom

“We had to get into groups to compare homework and everyone seemed to know a partner and then be (the professor) just put me in a group. I was so thrown off I couldn’t talk.” Ben, college freshman

It would be easy to assume that the social communication challenges characteristic of an ASD diagnosis (DSM-5) relates to social environments in the traditional sense and are not within the purview of academic faculty. Gobbo and Schmulsky (2014) conducted qualitative focus groups with faculty and one theme that emerged when discussing students with ASD were issues with social skills deficits that manifest in the classroom (e.g., missing social cues related to when and how to respond in a group). Further, best practices for college teaching (e.g., Richmond et al., 2021) detail requiring student-led activities (e.g., flipped classrooms, peer led learning such as interteaching, student presentations, group work). Kumar et al. (2019) discusses how award-winning teachers of on-line courses incorporate active responding, group activities, and opportunities for students to create and present course content. Even in an online classroom, the pressures on a student’s social communication skills can be great. Hallmarks of an ASD diagnosis that may present a barrier to a student engaging in such active academic settings include issues with back-and-forth conversation, poorly integrated verbal and nonverbal communication, abnormalities in eye contact and body language, deficits in understanding and use of gestures, and difficulties adjusting behavior to suit various social contexts (American Psychiatric Association, 2013).

Instead of shying away from requiring important peer-peer learning opportunities, faculty might consider providing frequent opportunities for directed and supported low-stake socialization early and throughout the semester. For example, assigning small groups and providing them timeframe in which to discuss a specific topic or problem to solve. McKeon et al. (2013) suggest not only assigning groups, but also roles for each group member. Similar to requiring “get to know you meetings” with faculty, these low-stakes interactions allow students to contact reinforcement provided by peers, potentially mitigating stressors when interactions related to content are required later in the semester. Being explicit about your expectations for the project/task (e.g., learn 2 facts about your partner’s hometown) may go a long way in allowing students with ASD to connect with classmates.

In conclusion

The promising data related to the increased numbers of individuals with ASD enrolling in college are tempered by data related to attrition within this population, with non-academic reasons often reported as being the primary reason for unsuccessful college experiences. While the college success of students with ASD may be heavily influenced by their interactions with individual faculty members, unfortunately studies show that faculty are often underprepared to meet the needs of these. For example, many faculty have limited understanding of the ASD diagnosis (e.g., Wenzel and Rowley, 2010, Tipton and Blacher, 2014) and many have limited understanding of their responsibilities mandated by ADA to accommodate this ever-growing population of college student (e.g., Stevens et al., 2018). Faculty members may consider advocating for additional training and informational sessions
from their campus student accessibility centers. Murray et al. (2009) found that even brief participation in such training has a positive impact on faculty support for students with disabilities.

Efforts by faculty and institutions to support students with ASD will likely benefit other students as well. Meyers Hoffman (2014) discusses that while 42% of all students fail to complete their undergraduate degrees, only 15-25% report doing so for academic or financial reasons. In addition to the classroom-based strategies outlined above, institutions may consider providing structured social supports for all entering freshman in an effort to help all students navigate the social and emotional pressures of the college environment (e.g., Harris et al., 2011).

Given the paucity of research focused on college students with ASD, post-secondary institutions may also consider supporting research and clinical work focused on individualized social skills support. Empirical demonstrations of successful individualized social skills interventions are largely focused on young children (e.g., White et al., 2007), however, there is burgeoning evidence to suggest that social skills interventions can be successful at the college-level. Numerous authors have suggested that conversation skills may be one set of social skills most relevant to the challenges posed by college for the ASD population (e.g., Dotson et al., 2010; Orsmond et al., 2004). Researchers have demonstrated that efficacy of conducting social skills intervention with adolescents and college-aged students (e.g., Ashbaugh et al., 2017; Beaulieu et al., 2013; Mann & Karsten, 2020). While the direct correlation between these interventions and the participants’ college persistence have not been directly examined, the outcomes are promising and suggest that institutions of higher education should consider the further development of individualized social supports for college students.

At least two truths exist when it comes to college students with ASD: 1) compared to their peers they are completing college at a different rate, and 2) faculty are often their primary campus contact. The purpose of this chapter was to provide faculty members with strategies to support students on the autism spectrum in their classrooms. The impact of each of these strategies remain empirical questions, and along with providing readily implementable strategies it is the author’s hope that this chapter inspires much needed research in this area.
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Chapter 12.
Integrating Behavioral Science and Rightful Presence to Support Diversity, Equity, and Inclusion (DEI) in Online Learning Environments

Kaston D. Anderson-Carpenter

Introduction
Supporting diversity, equity, and inclusion through inclusive learning is becoming increasingly prevalent in the pedagogical literature. Many educational approaches have been designed from a White-centered ontology, centering Eurocentric methodologies to evaluate effective teaching. More recent work has challenged those practices and argued for inclusive learning as a practice toward critical justice. Inclusive learning includes several principles rooted in critical theories that seek to engage students and instructors in equitable learning. In turn, equitable learning aims to enhance student capacity, identity, and sense of belongingness in society.

Some Current DEI Pedagogical Practices
Jacquart et al. (2019) cite five principles of inclusive pedagogy: (a) fostering a growth mindset, (b) examining inclusive conceptions of authority, (c) promoting transparency, (d) encouraging flexibility, and (e) continually promoting self-reflection for students and instructors. The principles provide an integrative and iterative framework that can guide intervention development and evaluation in inclusive teaching and universal design (Figure 1). The integrative nature of the framework suggests that each principle works in concert with others to support inclusive pedagogy and engaging in inclusive teaching requires a commitment to the principles. Overall, the five principles can support not only educational resilience, but also better school performance through social development (Yeager & Dweck, 2012). As we will see below, the Jacquart et al. model provides a framework of inclusive teaching’s conceptualization and implementation.
Note. Conceptual model integrating Jacquart et al. (2019) rightful presence framework into behavioral inclusive technology pedagogical framework. The iterative and integrative process of the conceptual model demonstrates that each of the five constructs (i.e., fostering growth, conceptualizing authority, transparency, flexibility, and self-reflection) individually and collectively support the development and implementation of behavioral approaches to inclusive teaching.

**Fostering growth.** In a pedagogical context, fostering growth refers to the degree to which students believe they can expand their abilities (Dweck, 2006; Yeager & Dweck, 2012). To foster growth through building capacity and self-efficacy, it is critical to explore how *set* (i.e., instructor and student mindsets and expectations) and *setting* (i.e., psychosocial and environmental classroom setting) influence student outcomes. Teaching course content from an inclusive, growth perspective often requires instructors to use multiple modalities in conveying information in culturally responsive ways. This might include providing illustrative exemplars with which students can identify different tangible tools, or diverse learning experiences.

In a recent study, Gupta and Chen (2022) used artificial intelligence chatbots to support inclusive learning. Not only did the chatbots serve as a flexible tool for instructors to support student success, but students also reported increased opportunities for growth and self-reflection. Additionally, international students noted that chatbots were instrumental
in explaining concepts in their first language while also helping them learn English. An added benefit of inclusive chatbots is that they can support learning and engagement for students who have audio and/or visual impairments. Although more research is needed to further evaluate the effectiveness of chatbots in inclusive pedagogy, Gupta and Chen’s work serve as promising evidence that technological integrations can aid in student success.

To further illustrate this principle, consider how fostering growth would be demonstrated in teaching a large health psychology course. For many undergraduate students, health psychology aids in preparing for advanced study in the social and natural sciences, medicine, public health, and other fields. As part of the course content, students learn about health theories and frameworks. Building student capacity and self-efficacy in learning health frameworks might include providing illustrative applications in cultures outside the United States (e.g., the Roma) or even communities within the country (e.g., Indigenous and First Nations). Instructors might also prompt students to learn and critique theories through short individual and group activities. For example, teaching the minority stress model (Meyer, 1995, 2010) may help students understand how stressors such as discrimination may play a role in health outcomes for sexual minority adults. Building student capacity and self-efficacy (i.e., set) through exemplars could serve as contextual prompts (i.e., setting) for an in-class activity related to critiquing the model. Students might note that the model was not originally developed with transgender, genderqueer, and non-binary individuals in mind. They might also argue that the model may not explain all the mechanisms of minority stress, particularly in international contexts. In each of these instances, providing positive reinforcement can not only build their capacity to critically reflect on health frameworks, but also enhance their efficacy to apply the same critical skills to theories outside health psychology.

**Inclusive conceptions of authority.** Fostering student growth necessitates examining the amount and kind of authority that supports student learning (Jacquart et al., 2019). Many higher education instructors are not trained in inclusive teaching, and they may rely on the pedagogical models in which they were trained as students. Nevertheless, inclusive teaching calls for both instructors and students to reflect on the concept of authority in the learning environment. This principle requires one to ask several questions that challenge intellectual and pedagogical hegemonies. These questions include:

1. What narratives and perspectives are being discounted or dismissed in how we deliver content?
2. How do we ensure *all* students feel as if they belong and not simply welcomed?
3. To what extent do our methods, class activities, and content engage multiple cultures respectfully and with humility?
4. To what extent does our pedagogical approach perpetuate existing paradigms of supremacy?

Answering these questions can facilitate a process of deconstructing and reconstructing classroom authority with students, and not just for students. Furthermore, inclusive authority
increases students’ sense of agency in their own learning processes. Supporting inclusive conceptions of authority can be accomplished by enhancing and evaluating social validity. Scholars have previously identified techniques for addressing social validation of goals, procedures, and effects (Francisco & Butterfoss, 2007); in a pedagogical context, reflecting on the previous four questions raised in the present writing offer an avenue for ensuring the learning environment is equitable for all students.

**Promoting transparency.** Part of deconstructing the historical paradigms of pedagogy includes transparency between students and instructors. Promoting transparency fosters bidirectional accountability, which can facilitate trust. Often, students’ first contact with the course is via the syllabus; as such, policies, procedures, and course schedules that are described clearly can help students understand the course structure. Professors can discuss course components in greater detail during the first day of class, which may benefit students who retain information more efficiently through auditory stimuli.

Class assignments with clearly defined goals, objectives, instructions, and assessment criteria also promote transparency and accountability. From the student’s perspective, it allows them to link the assignment to the course goals, identify the skills they should acquire from completing the assignment, and the specific criteria they must meet to complete the assignment successfully. From the instructor’s perspective, such assignments allow them to evaluate student success with reduced bias, focus on supporting students’ efforts to complete assignments successfully, and—in some cases—allow instructors to foster student creativity. Moreover, transparent class assignments provide students with a basis for asking thoughtful and/or clarifying questions and for instructors to assess gaps in student learning.

**Encouraging flexibility and self-reflection.** In addition to promoting transparency, Jacquart et al. (2019) argues that encouraging flexibility and self-reflection are critical components of enhancing inclusive pedagogy. In these components, the focus is not on how students master a skill or concept, but rather that they do. To this end, instructors might provide multiple exemplars of mathematical problems, or a variety of real-world applications to illustrate an abstract concept. Regardless of the approach, using multiple avenues of delivering information to students aids in equitable teaching that reaches as many students as possible.

Encouraging flexibility can also foster creativity among students in demonstrating their skill development and mastery. Consider an advertising course in which students are required to create a community-responsive advertisement to promote wellness. Some students might create commercials, billboards, or other traditional products to demonstrate their mastery. Others might use social media flyers, infographics, or other products to communicate their skill acquisition. For students who are musically inclined, they may opt to write and perform a song as a TikTok®. Such an assignment might allow students to share what they have learned in ways that matter to them while encouraging their ingenuity.

As with the prior principles, encouraging flexibility should be accompanied by self-reflection. It is through self-reflection that students and instructors can evaluate the extent to
which the learning environment is responsive to inclusion and equity. In addition, this principle offers them an opportunity to identify areas of motivation and growth. Self-reflection is commonly accomplished through institution-sponsored student evaluations at the end of the course. However, such evaluations often do not allow for meaningful discussions throughout the course. Instructors can create opportunities for self-reflection through more frequent class climate check-ins, discussion prompts, and experiential learning activities. Although these are but a few exemplars, they offer suggestions for engaging students in self- and group-reflection through an inclusive pedagogical lens.

**Rightful Presence Framework**

Numerous approaches have been offered in the scientific literature to address the lack of inclusive pedagogy. However, many of the practices lack a clear focus on the sociopolitical implications of existing theories. To address this gap, scholars have introduced the Rightful Presence Framework; this framework upends the prevailing White-centered, patriarchal paradigms in pedagogy. The framework rests on three tenets (Calabrese Barton & Tan, 2020):

1. Integrating political struggle into disciplinary learning
2. Making intersections between justices and injustices more visible in the present while orienting toward new social futures
3. Shared rewards and risks between those in power and not in power; Creating cultures of disruption toward justice and collectively questioning modes of power and authority

As the tenets suggest, the Rightful Presence Framework aims to integrate elements from intersectionality (Crenshaw, 1989, 1991) and power (Pansardi & Bindi, 2021) frameworks into inclusive teaching. Intersectionality, first conceptualized and applied at the intersection of race and gender, draws from Black feminist thought (The Combahee River Collective, 1979). It argues that individuals’ multiple intersecting identities contribute to inequities of power, privilege, discrimination, and oppression. Over the past 30 years, the application of intersectionality has been extended to populations such as sexual and gender minorities (Ching et al., 2018; Williams et al., 2020), people with disabilities (Brown & Monloney, 2018), and immigrants (Terriquez et al., 2018). In a pedagogical context, frameworks of intersectionality and power provide a basis for instructors to engage in the Rightful Presence Framework to support student learning and success.

Several studies have highlighted the need and utility for grounding pedagogical practices in the Rightful Presence Framework. Yeh et al. (2021) conducted a qualitative inquiry into the framework’s role in addressing social injustices in mathematics teaching, arguing for the teaching of mathematics to move away from focusing on answering problems with precision and accuracy. Instead, teaching should use the process of solving problems through applying concepts centered on the students’ realities, which can often be difficult. By doing so, students learn how to use those processes to then advance social justice through mathematics.
Other scholars (Calabrese Barton & Tan, 2020; Lalish et al., 2021) have explored the role of rightful presence in the classroom. Lalish and colleagues used rightful presence and with high school STEM interns who may be underrepresented in biomedical research. In the intern program, rightful presence was used to support students’ conceptualizations of their identity within science. Furthermore, it aimed to foster their sense of belonging among their peers, which was facilitated by their mentors. These findings are supported by other research (Farias et al., 2017) in that rightful presence yielded greater inclusive membership and mutual trust among students in a year-long sport education learning environment. By engaging in inclusive pedagogy through rightful presence, students and instructors can engaging in transforming unjust narratives and position youth as receivers of knowledge (Calabrese Barton et al., 2020).

Conclusion

Overall, inclusive design that draw on rightful presence and Jacquart et al.’s (2019) pedagogical framework can enhance students’ sense of identity, foster a sense of community, and promote trust between students and instructors. Engaging in principles such as flexibility and self-reflection, for example, can aid student and instructor creativity. Moreover, they challenge instructors and students to transform oppressive narratives (e.g., negative stereotypes regarding potential careers) in ways that honor diversity and inclusion in the classroom. More broadly, the integrated framework invites students and instructors to bring their full, authentic selves to the learning environment.
References


Behavioral Pedagogies and Online Learning is a collaborative effort that started with a teaching conference aimed at providing support for teachers in higher education during the COVID-19 pandemic. Dedicated colleagues presented evidence-based practices in teaching and their experiences. The positive feedback encouraged us to compile this book that now gathers more contributors. Many of the chapters elaborate on the adaptation of behavior-analytic approaches to online instruction, including topics such as building equity for diverse student learners, universal design for learning, and creativity. Given the generality and relevance of the topics, we have compiled what we consider is a revitalization of behavioral instruction toward online education.