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Generalization Training in Special Education Teacher Preparation: Does It Exist?

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Abstract

Enormous resources are committed by universities to prepare special educators to impact student outcomes of our most vulnerable and neediest learners. Generalizing teaching skills from university to K-12 classrooms must be a component of teacher preparation curriculum; otherwise, we continue to merely train our teacher candidates and hope they sustain and generalize their newly acquired skills. Through self-reported surveys and extant data analysis, we identify the extent to which our sample of special education teacher preparation programs are teaching their teacher candidates to generalize newly acquired teaching skills to in-service settings in K-12 classrooms. Results indicate ambiguity with familiarity of generalization techniques and fidelity of implementation. Programming for generalization is absent in reviewed course syllabi, and student teaching supervisors report a disconnect between university and classroom realities. We recommend a systematic approach to programming for generalization by increasing awareness of generalization techniques through professional development, including accountability measures in course syllabi, focusing on high-leverage practices to create more cohesive preparation programs, and improving communication between instructors and student teaching supervisors. Limitations and future research recommendations are discussed.

Keywords

generalization, preservice, in-service, teacher preparation

To say that using an evidence-based practice approach in K-12 classrooms is important is an understatement. Evidence-based practices (EBP) are defined by Detrich, Keyworth, and States (2008) as using data to guide decisions about selecting, using, and assessing the effects of interventions on student learning and outcomes. They should be used whenever possible but particularly with students having special needs and students at risk for learning because they are more likely to improve student outcomes than non-evidence-based approaches (Cook, Landrum, Tankersley, & Kauffman, 2003; Detrich et al., 2008). There are even legal mandates for the use of EBPs under IDEA, 2004. Unfortunately, one cannot assume that EBPs are being taught in university classrooms (Begeny & Martens, 2006). Even if EBPs are being taught in special education teacher preparation programs, they often are not generalizing from university to K-12 settings (Scheeler, 2008; Scheeler, Bruno, Grubb, & Seavey, 2009) and if they are, teachers may not be implementing them

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with fidelity (Kretlow & Helf, 2013), all of which impacts the effectiveness of instruction for our most vulnerable and neediest learners.

From a purely economic perspective, preservice teachers enroll in university teacher preparation programs, spending on average US$ 30,400 (resident) to US$ 78,400 (nonresident) for a 4-year bachelor's degree ("Teaching Certificate Cost," 2016) to become certified and prepared to teach. Faculty who are preparing future teachers spend countless hours designing and delivering quality programs. Likewise, student teaching supervisors work tirelessly to provide performance feedback to preservice teachers in classroom settings. From an ethical and professional perspective, it is meaningless to spend these resources to teach new behaviors (in this case, teaching behaviors), unless we can ensure behaviors will be maintained over time and used in settings (i.e., K-12 classrooms) other than the site where the initial training occurred (i.e., university classrooms).

Nearly 50 years ago, Baer, Wolf, and Risley (1968) argued that generalization must be actively programmed for all learners, rather than passively expected. In teacher education, process-product research throughout the 1970s and 1980s led to identifying and increasing teaching behaviors associated with student outcomes (Brophy & Good, 1986). Yet, without programming for generalization (i.e., training preservice teachers in ways that promote generalization), less than 30% of skills learned by preservice teachers transferred to actual classroom settings (Engelmann, 1988). Renewed efforts to establish "what works" in teacher education continues to demonstrate a lack of generalization from controlled settings to actual classrooms (Grossman, 2005).

When we consider that the results of failing to implement and sustain the use of EBPs are endured by the children our students teach (Vaughn, Klingner, & Hughes, 2000), generalizing teaching skills from university to K-12 classrooms must be a component of teacher preparation curriculum; otherwise, we continue to merely train our teacher candidates and hope they sustain and generalize their newly acquired skills. Most university teacher preparation programs are not designed for following up with teacher candidates when they become in-service teachers. This may be unrealistic given other demands on teacher educators. Making sure to systematically include programming for generalization as part of the teacher preparation program, however, may be a realistic, practical solution. Vaughn et al. (2000) pointed out that there is often a "blame game" when it comes to explaining the lack of sustaining research-based practices from training settings to classrooms. It is wrong to blame teachers for not using what they learned in university classrooms when they become in-service teachers if they have not been taught to generalize their newly acquired teaching skills and techniques. Scheeler (2008) suggested that there is a missing link in teacher preparation between preservice teacher preparation and in-service teacher performance, that is, systematically programming for generalization of newly acquired skills in our teacher preparation programs.

In a review of extant research on generalization of teaching techniques from university to K-12 settings, Scheeler (2008) found no studies that specifically described the extent to which teacher preparation programs systematically program for generalization. Likewise, Clift and Brady (2005) reviewed 105 empirical studies on student teaching and coursework and found no studies evaluating the long-term effects of practice and/or student learning. Only one experimental study was conducted to determine the effectiveness of generalization training on preservice teachers (Scheeler et al., 2009). The researchers conducted two experiments to assess the effectiveness of a model to promote maintenance and generalization of a specific teaching skill. In the first experiment, preservice teachers were trained to mastery on a specific skill but were not trained to generalize the skill. Maintenance of the behavior deteriorated in this condition across settings (courses to student teaching). When a generalization training component (programming common stimuli) was added in Experiment 2, preservice teachers maintained the new

behavior at high levels and generalized it to their own classrooms as in-service teachers. The researchers concluded that systematically programming for generalization resulted in increased maintenance and generalization of teaching skills across time and settings. Although Baer and colleagues (1968) warned almost 50 years ago that generalization is not automatic, rather, it must be programmed, the dearth of research in this area in teacher preparation is alarming. Clearly, preparing our teacher candidates to generalize newly acquired skills and techniques from university to K-12 settings is still woefully absent in the research literature, but is it present in practice?

Although generalization is a familiar term to most teacher educators, knowing specific generalization strategies may be less familiar and may be a reason for lack of systematically including it as part of teacher preparation curricula. Seminal work by Stokes and Baer (1977) examined 120 articles relating to generalization and developed nine categories of programming generalization. These included train and hope, sequential modification, introduce natural maintaining contingencies, train sufficient exemplars, train loosely, use indiscriminable contingencies, program common stimuli, mediate generalization, and train to generalize. Although train and hope is the least effective method, it passively dominates in teacher education programs (Gable, 2014).

Five of the nine original strategies—sequential modification, natural maintaining contingencies, train sufficient exemplars, program common stimuli, and mediate generalization—have emerged in research as most appropriate in teacher education for proactive implementation (Epps & Lane, 1987; Scruggs & Mastropieri, 1994; Stokes & Osnes, 1989). Sequential modification refers to modifying settings, responses, and students to provide similar contingencies to those during the initial training setting. Natural maintaining contingencies refers to shaping responses that would be naturally reinforced in the generalized setting. Train sufficient exemplars refers to providing enough examples so that a generalized response occurs. Program common stimuli means bringing elements used in the training setting to the generalized setting. Mediate generalization refers to incorporating self-management strategies to ensure generalization.

Another reason for omitting generalization training may be a disconnect between university classrooms and real-world settings. Faculty may not know what is happening when students leave their classrooms to go to student teaching settings, to work with actual students. This begs the question of how cohesive are teacher preparation programs with settings their students are transitioning to? Feiman-Nemser (2001) discussed the fragmentation of teacher preparation programs between university coursework and student teaching experiences and suggested that courses taught by individual faculty rarely build on or connect to one another, resulting in students having difficulty developing a vision of good teaching or making connections among different domains of knowledge and skill. The National Council for Accreditation of Teacher Education's (NCATE; 2010) Blue Ribbon Panel on Clinical Preparation and Partnerships for Improved Student Learning concluded that there needs to be an immediate shift in the way we prepare teachers. To that end, the Panel recommended moving away from coursework loosely linked to real-world classroom settings and, instead, develop programs that are clinically based in conjunction with academic coursework (Maheady, Smith, & Jabot, 2014). A move in this direction would support increased generalization of skills but is not enough. Systematically programming for generalization must also be considered.

In this study, we identify whether or not special education teacher preparation programs are teaching their teacher candidates to generalize newly acquired teaching skills to in-service settings in K-12 classrooms. The central research question leading this study was, "What are teacher preparation programs in special education doing during student teaching to promote generalization of teaching techniques to K-12 settings?"

Data collection and analysis were guided by the following sub-questions:

Research Question 1: How familiar are special education student teaching supervisors with terminology of generalization techniques?

Research Question 2: Is generalization identified as a topic in student teaching syllabi and to what extent is the degree of implementation?

Research Question 3: What are the opinions of special education student teaching supervisors on programming for generalization?

Method

Special education graduate programs of the top 19 universities in the United States identified by U.S. News and World Report (2016) were contacted and asked to participate in a survey pertaining to generalization training during student teaching. We collected data through e-mailed self-report surveys and extant data analysis. We asked respondents to indicate their familiarity with the term "generalization," familiarity with identified techniques that promote generalization (Stokes & Baer, 1977), and provide examples from their student teaching courses. In addition, we asked respondents to provide responses on obstacles to systematically promoting generalization and steps programs can take to enhance generalization of newly acquired teaching techniques. A juried panel of researchers consisting of two faculty members and three doctoral students from a large northeastern research university vetted survey items by evaluating and providing feedback on relevance and clarity. We then made minor changes to the survey to elicit more specific information from potential respondents. Completion of the survey was voluntary, and confidentiality was ensured. We provided a lottery incentive to win one of three US$50 gift cards upon completion of the survey, and to maintain anonymity, respondents' names for the lottery were not affiliated with survey responses.

Participants

Our target respondents were student teaching supervisors from the sample frame of special education schools. We examined student handbooks and course catalogues from each university to identify student teaching course numbers. Given variations in program structures (i.e., multiple student teaching opportunities), we targeted the faculty member responsible for the culminating student teaching course. Once course numbers were obtained, we identified faculty information (e.g., contact information) via departmental websites. If a student teaching supervisor was not evident, we explored faculty webpages for information or contacted administrative support staff at the respective university. Using these procedures, we obtained contact information for student teaching supervisors for all 19 universities.

Survey Instrument

We designed the format and content of the survey to measure supervisors' familiarity with the term *generalization* and known strategies to promote generalization (Stokes & Baer, 1977). Five strategies were included in the survey (program common stimuli, sequential modification, train sufficient exemplars, natural maintaining contingencies, and mediate generalization) due to the proactive nature and appropriateness of these strategies for preservice teachers (Epps & Lane, 1987; Scruggs & Mastropieri, 1994; Stokes & Osnes, 1989). We used Likert-type scale items to assess respondents' familiarity with each strategy, for example, "How familiar are you with the generalization strategy *natural maintaining contingencies*?" To eliminate a neutral choice option, we provided respondents with choices of *not at all familiar, a little familiar, somewhat familiar*, and *very familiar* (see Table 1 for complete set of Likert-type scale items). After respondents completed the items about generalization and strategies to promote it, we provide a definition with examples (see Table 2) and asked respondents to indicate whether each strategy is utilized within their student teaching program. To assess whether respondents' familiarity with given strategies matched actual definitions, we then asked respondents to provide an example from their

Table 1. Survey Quantitative Results.

Survey items	*M*[a]	Range[a]	Utilized[b]
1. How familiar are you with the term *Generalization* in regards to training special education teachers?	3.75	3-4	—
2. How familiar are you with the generalization strategy *program common stimuli*?	2.37	1-4	4
3. How familiar are you with the generalization strategy *sequential modification*?	2.37	1-4	3
4. How familiar are you with the generalization strategy *train sufficient exemplars*?	3.25	1-4	5
5. How familiar are you with the generalization strategy *natural maintaining contingencies*?	3.37	1-4	7
6. How familiar are you with the generalization strategy *mediate generalization*?	2.25	1-4	5

[a]Mean and range of responses to quantitative survey items using a Likert-type scale (i.e., 1 = *not at all familiar*, 2 = *a little familiar*, 3 = *somewhat familiar*, 4 = *very familiar*).
[b]Number of respondents who indicated "yes," generalization strategy utilized in student teaching program (total respondents; $n = 8$).

Table 2. Generalization Strategies and Definitions Provided in Survey.

Strategy	Definition and example
Program common stimuli	Bringing elements used in the training session (e.g., data collection sheets developed to observe student behavior, or games to practice math facts) into the natural setting (classroom), and/or bringing elements of the natural setting (e.g., Direct Instruction reading materials) into the training session (university classroom) to serve as discriminative stimuli to facilitate performance of the teaching behaviors across setting.
Sequential modification	After a behavior is successfully changed in one setting, the same technique is applied to all settings where the target behavior is desirable. Responses, settings, and experimenters are all sequentially and systematically modified to provide contingencies similar to those found in the training session.
Train sufficient exemplars	A strategy whereby enough training examples are provided so that a generalized response occurs. For example, a preservice teacher learns about feedback and practices delivering specific feedback in class. Next, the preservice teacher provides specific feedback to other students in a group demonstration. During student teaching, the preservice teacher is reinforced for using specific feedback with pupils and receives corrective feedback from supervisor. Eventually, the preservice teacher only uses specific feedback with pupils to correct errors and reinforce correct responses because a generalized response has occurred.
Natural maintaining contingencies	Shaping responses to those that would be naturally reinforced in the generalized setting. For example, collaboration is highly valued and encouraged in today's inclusive classrooms. A preservice teacher who learns effective communication and collaboration techniques and later uses them in the natural school setting is reinforced by supervisors and peers for being a "team player."
Mediate generalization	Using self-management training to ensure that a generalized response occurs. An example would be, after teaching a lesson, a student teacher evaluates the lesson by checking a list of effective teacher behaviors (e.g., gain attention of the students, provide review, state goal, use signals for group responses) used during the lesson, determines a percentage of behaviors exhibited, and graphs them.

Source. Generalization strategy definitions taken from Scheeler (2008).

Table 3. Survey Qualitative Response Rates.

	Survey items	Response rate (%)	Accuracy (%)
1.	If you responded *yes* to *programming common stimuli* in student teaching, please provide an example.	75	66
2.	If you responded *yes* to *sequential modification* in student teaching, please provide an example.	100	100
3.	If you responded *yes* to *train sufficient exemplars* in student teaching, please provide an example.	80	75
4.	If you responded *yes* to *natural maintaining contingencies* in student teaching, please provide an example.	71	60
5.	If you responded *yes* to *mediate generalization* in student teaching, please provide an example.	80	100
6.	Please indicate any other strategies your program uses to promote generalization.	50	—
7.	In your opinion, what is most important to promoting generalization from university classrooms to K-12 classrooms?	100	—
8.	In your opinion, why does generalization from university classrooms to K-12 classrooms not occur?	100	—
9.	In your opinion, how can generalization of teaching techniques from university classrooms to K-12 classrooms be improved?	87	—

Note. For Items 1 to 5, response rate indicates whether respondent provided an example of the generalization strategy. Some respondents marked *yes* to strategy being used but did not provide an example. Accuracy = whether respondents' examples correspond with supplied definitions. Items 6 to 9 response rates are out of total respondents (n = 8).

own programs. See Table 3 for open-ended items and response rates.

In addition to familiarity with generalization terminology, we sought to measure supervisors' opinions on programming for generalization. We asked three open-ended items: (a) In your opinion, what is most important to promoting generalization from university classrooms to K-12 classrooms? (b) In your opinion, why does generalization from university classrooms to K-12 classrooms not occur? and (c) In your opinion, how can generalization of teaching techniques from university classrooms to K-12 classrooms be improved?

Data Analysis

Descriptive statistics of frequencies and means for the six Likert-type scale survey items were prepared. In the analysis of qualitative data collected from the opinion open-ended survey items, we examined within and across responses (Miles & Huberman, 1994) and analyzed results based on emergent themes from key-words-in-context (Ryan & Bernard, 2003). To do this, we identified recurring words throughout individual responses. For example, when discussing why generalization does not occur, respondents included the word "lack," or a synonym of that word, in six out of eight responses. We analyzed themes emerging from the context in which respondents used the word "lack." Following this analysis, we combined thematic results from each open-ended question to formulate theme statements for concise presentation. We compared and analyzed results from qualitative data from the generalization strategy example survey items with quantitative results (Onwuegbuzie & Teddlie, 2003). The first and second author independently conducted reliability assessments on whether respondents' generalization strategy examples accurately matched provided definitions. Each author read all respondents' examples and recorded either *yes* (example matches definition and is an accurate example) or *no*

(example does not match definition and is not an accurate example). Independent recordings were compared, and 100% reliability was obtained on the first attempt.

For extant data analysis, we used Innovation Configuration tools (Hall & Hord, 1987; Roy & Hord, 2004), which evaluate programs and assess fidelity of implementation. We rated whether or not the term "generalization" was present in course syllabi and, if so, the degree of implementation that was stated on the syllabus. We rated degree of implementation using a 4-point, Likert-type scale (i.e., 1 = *no mention of generalization*, 2 = *generalization mentioned*, 3 = *generalization mentioned plus readings/tests/papers/projects*, and 4 = *prior level (3) plus supervised practice and feedback*). Departmental websites and student handbooks were used to identify student teaching courses and locate student teaching syllabi. A graduate student not familiar with the study and the second author conducted reliability of Innovation Configuration analysis. The graduate student received a sample syllabus and was trained on the degrees of implementation. Innovation Configuration scores by the graduate student and second author on the sample syllabus were compared and total agreement was reached on the first attempt. Following the sample syllabus, all syllabi obtained for this study received Innovation Configuration ratings. The graduate student and second author then compared ratings and recorded 100% reliability on the presence and degree of implementation of generalization.

Results

We conducted an exploratory analysis into special education graduate programs to examine what special education programs are doing in preservice student teaching to promote generalization of teaching techniques to K-12 settings. The three research questions guiding our analysis were as follows:

Research Question 1: How familiar are special education student teaching supervisors with terminology of generalization techniques?

Research Question 2: Is generalization identified as a topic in student teaching syllabi and to what extent is the degree of implementation?

Research Question 3: What are the opinions of special education student teaching supervisors on programming for generalization?

Of the 19 surveys sent, eight were completed, generating a response rate of 42%. One additional survey was returned but because it was only partially completed, we did not include it in the analysis. In addition, seven syllabi (37%) out of our sample frame were publicly available and used for extant data analysis. Due to anonymity of survey responses, identifying overlap between which universities responded to the survey and which syllabi were analyzed was not possible.

Demographic Results

Respondents reported a consistent range when asked, "How long have you been in your role as student teaching supervisor/coordinator?" Out of the eight respondents, two (25%) reported 0 to 2 years of experience, two (25%) reported 2 to 5 years, two (25%) reported 5 to 10 years, and two (25%) reported 10+ years of experience. Similarly, when asked, "How long have you been a teacher educator?" four (50%) reported 5 to 10 years, and four (50%) reported 10+ years being a teacher educator. In total, 15 out of 19 potential participants (79%) hold a PhD.

Terminology and Techniques

Mean and range results for the six Likert-type scale items dealing with familiarity with the term generalization and generalization strategies can be found in Table 1 along with the number of respondents who indicated *yes* when asked if their student teaching course utilized generalization strategies. Familiarity with the term generalization received high ratings (M = 3.75, range = 3-4). Across all generalization technique terms, participants indicated slightly higher means of familiarity

than number of respondents using the strategies with consistency between mean, range, and utilization. The least familiar generalization strategy was mediate generalization (M = 2.25, range = 1-4) with five respondents reporting to use the strategy. The most familiar generalization strategy was natural maintaining contingencies (M = 3.37, range = 1-4) with seven respondents reporting utilization. Natural maintaining contingencies was also the greatest utilized strategy. Sequential modification was the least utilized strategy (three respondents; M = 2.37, range = 1-4).

Survey items 1 to 5 in Table 3 show response rates and accuracy of examples provided after respondents indicated whether the given generalization strategy was being implemented in their student teaching program. For example, out of the four respondents who indicated program common stimuli was used in their program (see Table 1), only three of the four (see Table 3) provided an example for analysis on whether examples provided were actually examples based on given definitions (see Table 2).

Program common stimuli. Two examples provided for "program common stimuli" corresponded with the operationalized definition, whereas one example did not. An example given of program common stimuli was, "We use manipulatives in our math methods course that students also can check out and use in their placements." The example that did not match the definition was, "Our student teaching is connected to a seminar so we often discuss observations of what we have seen in the classroom."

Sequential modification. All examples provided accurately reflected "sequential modification." One respondent wrote that his or her program, "uses case studies to practice skills in the classroom and then modifying the context to the real classroom with real students." Another respondent stated, "Preservice teachers practice teaching strategies in coursework and also in seminar where they take turns facilitating or directing instruction (discussion) and they use similar strategies in their student teaching."

Train sufficient exemplars. Respondents who provided examples of "train sufficient exemplars" resulted in 75% accuracy. An example provided was, "We practice using behavior specific praise in the university classroom, it is modeled by the instructor, practiced and then applied to the K-12 classroom." An inaccurate example provided was, "We try to catch preservice special educators using good practices and provide them with feedback about what they did that seemed to be effective."

Natural maintaining contingencies. Although "natural maintaining contingencies" had the highest mean rating of generalization strategy familiarity (3.37) and the highest reported utilization (seven out of eight respondents), the accuracy of examples provided was the lowest (60%). An accurate example was, "Lots of communication skills practiced in multiple settings—then, this is reinforced when students work within their student teaching settings." A non-example was, "Students are provided opportunities to practice and role play parent coaching techniques during a course, then apply them within a home visit."

Mediate generalization. All examples provided by respondents accurately reflected "mediate generalization." Most statements involved aspects of self-reflection techniques, such as in this statement, "Our students collect video of themselves teaching, then collect data on specific child or teacher behaviors in that video. This data is analyzed by the student, and shared with their supervisor during a debrief meeting, as well as in a weekly seminar."

Student Teaching Syllabi

Publicly available syllabi (n = 7; or 37% of sample) were analyzed to answer the research question, "Is generalization identified as a topic in student teaching syllabi and to what extent is the degree of implementation?" Using Innovation Configuration, Likert-type scale ratings, six syllabi scored a rating of one (i.e., no mention of generalization). One

syllabus scored a rating of three (i.e., generalization mentioned plus readings/tests/etc.), however, generalization was not mentioned in terms of student teachers generalizing teaching techniques, rather, generalization was mentioned in the context of student teachers' teaching students to mastery and skill generalization. The syllabus stated,

> Beginning special education professionals teach to mastery and promote generalization of learning. Describe how you taught your focus learner to mastery. What, specifically, did he/she master? How did you plan for generalization? In what ways, specifically, were you hoping your focus learner would generalize skills? Were you successful in promoting generalization? If so, how do you know you were successful? If not, what would you do next in your teaching to program for generalization?

Opinions of Supervisors

Following a key-words-in-context analysis (Ryan & Bernard, 2003), we developed thematic statements for each question presented to respondents. The first open-ended question presented to student teaching supervisors was, "In your opinion, what is most important to promoting generalization from university classrooms to K-12 classrooms?" Two key words that appeared in multiple responses were "practice" and "field work." Based on responses, our theme statement is: Opportunities to practice specific instructional strategies in K-12 classrooms with feedback.

Second, we asked, "In your opinion, why does generalization from university classrooms to K-12 classrooms not occur?" A reoccurring word in responses to this question was "lack." Respondents expressed lack of knowledge, lack of connections between field and coursework, lack of technology, and lack of context from theory to application, as reasons to why generalization does not occur. When combining emergent themes from all responses, our theme statement addressing this question is: Disconnect between instructors' knowledge/practices and classroom realities, in combination with insufficient practice, models, student teaching, and observation opportunities.

The third question we asked respondents was, "In your opinion, how can generalization of teaching techniques from university classrooms to K-12 classrooms be improved?" "Student teaching" emerged again as a reoccurring concept, yet not solely for preservice teachers to receive more fieldwork, but for instructors and researchers to spend more time in K-12 classrooms. Our theme statement is: Reduce disconnect between instructors/researchers and classroom realities, and increase application of course content in student teaching.

Discussion

In this study, our purpose was to evaluate what our sample of special education programs are doing in preservice student teaching to promote generalization of teaching techniques to K-12 settings. We sent surveys to student teaching supervisors and conducted extant data analysis of syllabi. Using results gleaned from a 42% survey response rate and 37% syllabi analysis, our findings suggest that most respondents are very familiar with the term generalization but less so with specific generalization techniques. Techniques that were more familiar to respondents were identified as being utilized more in student teaching courses, however, accuracy of examples provided fluctuated, indicating ambiguity in systematically and accurately promoting generalization. In addition, no syllabi mentioned promoting generalization from preservice student teaching to K-12 settings. Respondents underscored disconnect between university instruction and classroom realities, emphasizing the need for enhanced opportunities to practice in K-12 settings. We conclude that although systematic programming for generalization of newly acquired teaching skills is critical in teacher preparation programs, it is not yet taking place in the programs we sampled.

Terminology and Techniques

A high rate of familiarity with the term generalization is expected given Stokes and Baer's (1977) seminal research and the importance of generalization in behavior analysis

(Cooper, Heron, & Heward, 2007). A lack of research surrounding preservice teachers' programming for generalization (Scheeler, 2008) may indicate participants are more familiar with generalization in terms of K-12 students generalizing academic and social skills as opposed to training preservice teachers to generalize EBPs from preservice to in-service settings, however, the principles of generalization and techniques are applicable and critical to the success of all learners.

It is important to consider potential disconnects between terminology awareness and implementation. In other words, a participant's unfamiliarity with a specific generalization technique term (e.g., sequential modification) does not necessarily indicate a lack of implementation. Knowingly, we cross-analyzed familiarity ratings, percentage of utilization, and accuracy of examples. Given variable familiarity ratings, low utilization percentages, plus inaccurate conceptions of strategies suggest a lack of programming for generalization. Accurate examples do indicate some generalization practices are taking place, however, a systematic approach is not apparent.

Student Teaching Syllabi

An absence of terminology and implementation of generalizing teaching behaviors in student teaching syllabi supports our conclusion of an insufficient approach to generalization in preservice teacher preparation programs. Scheeler (2008) conducted a review of the literature on generalizing effective teaching behaviors from university to K-12 settings and found no studies that specifically described the extent to which teacher preparation programs in special education provide systematic approaches to generalization. We continued that literature search post-2008 and likewise did not locate any studies that described teacher preparation programs that were systematically programming for generalization. Scheeler, Budin, and Markelz (2016) highlight the importance and responsibility for teacher preparation programs to include systematic programming for generalization, but acknowledge ongoing deficiencies in this area by teacher preparation programs.

We recognize that no mention of generalization in student teaching syllabi does not imply generalization strategies are completely absent. In fact, our data on utilization percentages and accurate qualitative examples demonstrate that student teacher supervisors are, indeed, programing for generalization to some degree. But we believe current programming for generalization is occurring passively and unsystematically as a welcome by-product of effective teacher preparation techniques, such as providing adequate opportunities to practice (i.e., train sufficient exemplars). Programming for generalization should be actively conceptualized and explicitly programmed. Specifically identifying generalization in syllabi would begin placing higher value and importance on the necessity to generalize teaching behaviors. Furthermore, attaching accountability measures such as assignments and grades to generalization strategies would establish systematic programming for generalization by predetermining strategies and measuring outcomes. For example, the syllabus would state as a graded assignment, "student-teachers will use the generalization strategy of program common stimuli by developing and presenting a set of 3-5 classroom rules to be displayed during student-teaching with the intention of taking that display to their first job." The importance of classroom rules is well documented (Good & Brophy, 2008), so the explicit activity of creating a stimulus in student teaching (i.e., poster of rules) will remind the new teacher of her training on classroom rules as she is beginning her career, increasing the likelihood of adequately establishing classroom rules. This is just one example of how the goal of systematic programming for generalization can diminish the loss of effective strategies from preservice training to in-service implementation.

Opinions of Supervisors

It is important to analyze qualitative data on student teaching supervisors' opinions to explore why those on the front line believe

programming for generalization does not occur. Participant responses provide insight into the importance of generalization, lack thereof, and suggestions for improvement. Respondents report opportunities to practice specific instructional strategies in K-12 classrooms with feedback is most important to programming for generalization. Two critical components are revealed in this thematic statement. The first component is sufficient practice in K-12 classroom settings. Rose and Church (1998) found that studies that produced the highest levels of acquisition and maintenance of teaching skills involved common elements including training in teachers' own classrooms and a feedback component. Furthermore, research suggests graduates of programs with well-designed clinical experiences feel better prepared, are rated more effective by their supervisors, and contribute more to student learning (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009; Darling-Hammond & Bransford, 2005). Student teaching supervisors' statements from our survey support current research, emphasizing the necessity for practice in K-12 settings.

The second critical component, as reported by respondents, is the importance of effective feedback. Student teaching in K-12 classrooms provides many benefits, but without performance feedback, the preservice teacher may develop ineffective teaching habits due to practicing incorrect techniques. Stormont and Reinke (2014) contend that feedback on newly acquired skills should be immediate, as well as specific, positive, and corrective. Immediate performance feedback prevents the learner from practicing errors and has been shown to be effective for enhancing treatment integrity of new skill acquisition (Cavanaugh, 2013).

Generalization is not occurring. According to surveyed participants, generalization is not occurring due to a disconnect between instructors' knowledge/practices and classroom realities, in combination with insufficient practice, models, student teaching, and observation opportunities. Given the unfamiliarity with generalization strategies, we did not expect respondents to state that "generalization is not occurring because there is little sequential modification," however, their responses, and subsequent thematic statement, illuminate important barriers to systematic programming for generalization. The first barrier is that instructors are disconnected from classroom realities, therefore, implementing generalization strategies is more difficult. For example, sequential modification requires taking a preservice student from practicing a teaching skill in a controlled environment (i.e., university classroom) to a dynamic environment (i.e., K-12 classroom). If a physical modification of the environment is not feasible, the instructor can sequentially modify examples and scenarios. An instructor who is unfamiliar with classroom realities, however, does not have an accurate endpoint toward which to sequentially modify.

The second barrier to generalization highlighted by respondents is insufficient practice, models, student teaching, and observation opportunities, or in terms of a generalization strategy, insufficient opportunities to train sufficient exemplars. Practicing skills to mastery is essential for acquiring skills that generalize (Engelmann, 1988; Rose & Church, 1998; Scheeler, 2008). Key features of effective practice include focusing on a criterion of performance at a challenging level with sufficient frequency and quantity (Ambrose, Bridges, DiPietro, & Norman, 2010). The breadth of knowledge and skills necessary to be effective classroom teachers perhaps limits preparation programs' abilities to train sufficient exemplars within isolated courses. For example, evidence-based math strategies may be taught and practiced during the course on math instruction, but may never be practiced again as preservice teachers move on with their coursework and do not gain experience student teaching in a math class due to placement in a different setting.

Improving generalization. Respondents report that reducing disconnect between instructors/researchers and classroom realities, while increasing the application of course content in student teaching, will improve generalization.

To address application of course content in student teaching, teacher preparation researchers are focusing on High Leverage Practices (HLPs) that serve as a common core for teacher preparation programs (Ball & Forzani, 2011). HLPs are "a set of practices designed that are fundamental to support K-12 student learning and that can be taught, learned, and implemented by those entering the profession" (Windschitl, Thompson, Braaten, & Stroupe, 2012, p. 880). Although time limitations within preparation programs require prioritization of content knowledge, pedagogical skills, and student teaching, HLPs designate a set of practices to be addressed across preparation programs. Common practices can be systematically programmed for generalization from university classrooms, through student teaching, to in-service.

Implementing HLPs and reducing the disconnect between university instructors and classroom realities may also create more cohesive preparation programs. Feiman-Nemser (2001) discusses the fragmentation of teacher preparation programs between university coursework and student teaching experiences. The author argues that courses taught by individual faculty rarely build on or connect to one another, resulting in students having difficulty developing a vision of good teaching or making connections among different domains of knowledge and skill. More cohesive preparation programs are one of the reasons NCATE (2010) is calling for teacher education programs to be turned upside down with clinically rich programs. Student teaching should be integrated throughout a preservice teacher's training where coursework and classroom realities intertwine, rather than the capstone semester. Systematic programing for generalization would prove beneficial in clinically rich programs as knowledge and practices revolve between university classrooms and student teaching experiences.

Implications for Practice

In this study, we offer an exploratory analysis into the generalization practices of a small sample of teacher preparation programs in special education. Our findings may be interpreted as a positive step in highlighting the need to include systematic programming for generalization in special education teacher preparation programs and courses. Although generalization is a familiar term, specific generalization strategies are less familiar. Furthermore, variable reporting of utilization and accuracy of generalization strategies suggest ambiguity in programming for generalization. Professional development opportunities for teacher educators may increase awareness of specific generalization practices and how to incorporate these practices into courses and student teachings. Furthermore, an effort to include designated classes or projects within course syllabi specifically to address generalization may promote accountability to instructors and preservice teachers.

Last, actions can be taken to reduce the reported disconnect between universities and classroom realities. Increases in communication and interaction between course instructors and student teaching supervisors may allow for greater awareness of disparate realities. Through awareness, adjustments can be made to produce a more cohesive program. Bridging the divide of these realities with shared experience is the first step in creating a continuum of knowledge and practice where systematic programming for generalization can occur.

Limitations and Future Research

In this study, there are several limitations that need to be addressed. First, the small sample size of respondents diminishes the ability to generalize our findings to the greater teacher preparation community. Given the absence of research on programming for generalization, however, and as an exploratory analysis, our findings should be used to advance future research. Second, we only surveyed one faculty member and analyzed one syllabus from each institution. In addition, the degree of connectedness by those faculty to their program (e.g., tenured faculty vs. adjunct professor) was

not measured. Although student teaching is a critical component in the development of effective teachers, it is only one semester in that development. Our study, therefore, was not able to analyze the extent to which each institution is programming for generalization in other courses or by other faculty members. It is our belief that all of the proposed generalization strategies can and should begin in the university classroom with continued programming for generalization in student-teaching settings. Consequently, future research should examine entire programs (i.e., freshman through graduation coursework and fieldwork) at teacher preparation programs to thoroughly analyze the extent to which institutions are programming for generalization.

Third, we recognize the limitations of our survey instrument. Expert researchers vetted survey items to increase content validity, however, ambiguity or appropriateness of survey questions may have impacted participants' responses. In addition, we did not run statistical analyses using measures of internal consistency to estimate survey reliability. We, therefore, recommend that future researchers utilize survey instruments that are both comprehensive and robust to maximize validity and reliability of results.

Conclusion

Generalization is taking a behavior that is learned in one setting and applying it in another setting. The goal of systematic programming for generalization in teacher education is to diminish the loss of effective strategies from preservice training to in-service implementation. Echoing Baer and colleagues (1968), we affirm generalization must be programmed for rather than expected. Thankfully, there are guides in research literature (Stokes & Baer, 1977) that can be used for programming generalization in teacher preparation programs. Programming common stimuli, sequential modification, training sufficient exemplars, natural maintaining contingencies, and mediating generalization provide a framework that teacher education programs can follow to ensure preservice teachers are generalizing practices and applying them with learners in natural settings. If teacher preparation programs are not sending highly effective teachers into the field capable of generalizing their preservice training, we are not only doing them a disservice, but a disservice to our most vulnerable and neediest learners.

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