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Multiple Audiences for Encouraging Research Use: Uncovering a Typology of Educators

Jennifer Watling Neal,
Department of Psychology, Michigan State University

Kristen J. Mills,
Department of Psychology, Michigan State University

Kathryn McAlindon,
Department of Psychology, Michigan State University

Zachary P. Neal, and
Department of Psychology, Michigan State University

Jennifer A. Lawlor
Department of Psychology, Michigan State University

Abstract

Purpose—We apply diffusion of innovations theory to examine two key research questions designed to inform efforts to improve the research-practice gap in education: (1) Are there distinct types of educators that differ in their prioritization of the compatibility, observability, complexity, relative advantage, and trialability of research? and (2) Are educators' roles or context associated with their categorization in this typology?

Research Methods—Using semi-structured interview data in two Michigan counties from intermediate school district staff (N=24), district central office staff (N=18), principals (N=22), and school building staff (N=23), we first used directed content analysis to code for mentions of compatibility, observability, complexity, relative advantage, and trialability. Next, using the coded data, we conducted a hierarchical agglomerative cluster analysis and follow-up cross-tabulations to assess whether cluster memberships were associated with educators' roles or county context.

Findings—Educators in our sample could be categorized in one of five clusters distinguished primarily by different patterns of prioritization of the compatibility, observability, and complexity of research. Membership in these clusters did not vary by role but did vary by county, suggesting the importance of context for educators' perceptions of research.

Implications for Research and Practice—These findings suggest that narrowing the research-practice gap in education will require attending to multiple audiences of educators with

Correspondence should be addressed to Jennifer Watling Neal, Michigan State University, Department of Psychology, 316 Physics Rd. Rm. 127A, East Lansing, MI, 48824. jneal@msu.edu.

Compliance with Ethical Standards

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distinct priorities that guide their perceptions and use of educational research and evidence-based practices.

Keywords

research-practice gap; use of research; diffusion of innovations; perceptions of research; educators

U.S. federal educational policies including the No Child Left Behind Act (2001) and Every Student Succeeds Act (2015) have called for the use of research to inform educators' adoption of programs and practices. For example, the Every Student Succeeds Act (2015) defines four tiers of research evidence focused on the ability of the research design to causally detect significant positive educational outcomes and ties competitive funding to educators' adoption of evidence-based programs and practices (Penuel, Allen, & Finnigan, 2017). However, despite these imperatives, educators often express doubts about the relevance of research to school settings and the ability of research to improve educational outcomes (e.g., Bartels, 2003; Behrstock-Sherratt, Drill, & Miller, 2011; Coburn & Talbert, 2006). Educators may also prioritize other sources of evidence including teacher experience and parent or community feedback over research (Barwick, Barac, Akrong, Johnson, & Chaban, 2014; Honig & Coburn, 2008). As a result, the research-practice gap in education persists (e.g., Dagenais et al., 2012; Finnigan, Daly, & Che, 2013; Malouf & Taymans, 2016; Neal, Neal, Kornbluh, Lawlor, & Mills, 2015; Tseng, 2012).

Diffusion of innovations theory (Rogers, 1995) offers a particularly compelling lens for delineating the conditions that facilitate or constrain educators' research use (Neal, Neal, Lawlor, Mills, & McAlindon, 2018). Initially proposed in the field of communication, diffusion of innovations theory describes the conditions under which individuals in a social system adopt new ideas or practices (i.e., *innovations*) over time (Rogers, 1995). Because educators are often unfamiliar with research (e.g., Coburn & Talbert, 2006) and rarely report using research in their daily practice (see Dagenais et al., 2012 for review), research use can be conceptualized as an innovation for educators. Thus, based on diffusion of innovations theory, educators' research use may be shaped by their perceptions of five characteristics of innovations: compatibility, observability, complexity, relative advantage, and trialability (Neal et al., 2018; Rogers, 1995). First, educators may consider the *compatibility* or fit of research to their past experiences, settings, values, and needs. Second, educators may consider the *observability* or visibility of the results of research. Third, educators may consider the *complexity* or ease of research use. Fourth, educators may consider the *relative advantage* or benefits of research compared to alternative sources like past experience or intuition. Finally, educators may consider the *trialiability* or degree to which they can experiment with research on a more limited basis. Understanding how educators perceive and prioritize these five characteristics can help determine strategies for encouraging their future research use.

While prior empirical studies of educators' perceptions of research provide some support for the consideration of compatibility, observability, complexity, relative advantage, and trialability (e.g., Bartels, 2003; Coburn & Talbert, 2006; Dagenais et al., 2012; Farley-Ripple, 2012; Neal et al., 2018), less is known about the extent to which different groups of

educators place different priorities on each of these characteristics. In this study, we apply diffusion of innovations theory to examine two key research questions: (1) Are there distinct types of educators that differ in their prioritization of the compatibility, observability, complexity, relative advantage, and trialability of research? and (2) Are educators' roles or context associated with their categorization in this typology? These questions will help narrow the research-practice gap by discerning whether there are multiple audiences with distinct priorities to consider when developing strategies to bolster research use in education.

First, in support of the application of diffusion of innovations theory to understand educators' research use, we present empirical literature on educators' considerations of the compatibility, observability, complexity, relative advantage, and trialability of research. We also explore existing literature that describes how educators' roles and context might affect their consideration of these characteristics of research. Then, in a sample of 87 educators in intermediate school districts (ISDs)[1], district central offices, and school buildings across two Michigan counties, we use directed content analysis and cluster analysis to examine whether a typology of educators exists based on their prioritization of the compatibility, observability, complexity, relative advantage, and trialability of research. We also examine whether educators' categorization in this typology is associated with their roles (i.e., ISD staff, district central office staff, principals, school staff) or context (i.e., county). Finally, we end with recommendations for tailoring strategies to improve research use to multiple audiences in education.

Educators' Perceptions of Research

The terms *research* and *evidence* are often defined as "empirical findings derived from scientific methods" (Tseng, 2012, p. 6). Within the field of education, researchers are often the sole producers of evidence. However, in research-practice partnerships (e.g., Coburn, Penuel, & Geil, 2013; Penuel et al., 2017), action research (Carr & Kemmis, 2003), and youth participatory research (Cammarota & Fine, 2010), educators and students may be also be involved in the co-production or sole production of evidence. To date, previous studies have examined perceptions of research among a range of educators including teachers (e.g., Berstock-Sharratt et al., 2011; Hultman & Hörberg, 1998; Neal et al., 2018; Williams & Cole, 2007), principals (e.g., Cousins & Leithwood, 1993; Cousins & Walker, 2000; Neal et al., 2018), and district administrators (e.g., Coburn, Honig, & Stein, 2009; Coburn & Talbert, 2006, Farley-Ripple, 2012; Neal et al., 2018). However, these studies rarely distinguish between different models of producing and co-producing research evidence (e.g., traditional, research-practice partnerships, action research, youth participatory research). Using quantitative (e.g., Cousins & Leithwood, 1993; Cousins & Walker, 2000), qualitative (e.g., Berstock-Sharratt et al., 2011; Coburn & Talbert, 2006; Farley-Ripple, 2012; Neal et al., 2018), and mixed methods designs (e.g., Williams & Cole, 2007), these studies provide support for diffusion of innovations theory's premise that compatibility, observability, complexity, relative advantage, and trialability matter for educators' research use.

[1]In Michigan, intermediate school districts (ISDs) are county level entities that coordinate services and professional development for multiple local school districts.

Educators are more likely to use research or evidence-based practices that they perceive as exhibiting high levels of *compatibility* with their past experiences, values, settings, or needs (e.g., Barwick et al., 2014; Berstock-Sharratt et al., 2011; Cousins & Leithwood, 1993; Dagenais et al., 2012). However, educators' perceived compatibility of research is frequently low, and they often describe research as "out of touch" or irrelevant to their classrooms, schools, or districts (e.g., Bartels, 2003; Berstock-Sharratt et al., 2011; Farley-Ripple, 2012). Previous research also highlights the role of *observability* or visibility in educators' use of research. Educators may be more likely to use research when it comes from a highly visible and/or credible source (e.g., a reputable university or their own educator colleagues; Barwick et al., 2014; Coburn & Talbert, 2006; Neal, Neal, Mills, & Lawlor, in press-a) or when they observe others using it (Lysenko, Abrami, Bernard, Dagenais, & Janosz, 2014). Unfortunately, many educators exhibit a limited awareness of the available research as well as difficulties in accessing research results (e.g., Behrstock-Sherratt et al., 2011; Farley-Ripple, 2012; Hultman & Hörberg, 1998; Williams & Cole, 2007). Educators are more likely to use research that they perceive as exhibiting low levels of *complexity*. The clear presentation of findings in non-technical, layperson language may encourage research use among educators (Carnine, 1997; Hultman & Hörberg, 1998). Yet, much of the research presented to educators is perceived as jargon-laden and methodologically complex (Bartels, 2003; Berstock-Sharratt et al., 2011; Coburn et al., 2009). Additionally, educators weigh the *relative advantage* of using research against other forms of evidence that they use in decision-making. Studies suggest that educators may privilege other forms of evidence such as personal experience (Bartels, 2003; Coburn & Talbert, 2006; Hultman & Hörberg, 1998) or advice from colleagues (Behrstock-Sherratt et al., 2001; Hultman & Hörberg, 1998; Williams & Cole, 2007) over research evidence. Moreover, some studies suggest that *trialability* may encourage educators' research use. Specifically, educators may be more likely to use research when they have had prior opportunities to participate in research activities through college coursework or action research projects (e.g., Cousins & Walker, 2000). Finally, building off this body of literature, Neal et al., 2018 applied diffusion of innovations theory in a recent study that examined whether educators invoked compatibility, observability, complexity, relative advantage, and trialability in their discussions of research use. While educators invoked all five of these characteristics, they were most likely to mention compatibility followed by observability and complexity.

Consistent with diffusion of innovations theory (Rogers, 1995), the literature suggests that educators' considerations of compatibility, observability, complexity, relative advantage, and trialability matter for research use. However, in these studies, educators are typically treated as a monolithic group. The value educators place on research use can vary greatly (Proctor, 2015), and some research has suggested that educators' perceptions of research use may be driven by their roles (Colburn & Talbert, 2006; Farley-Ripple, 2012) or by their context (e.g., Ringeisen, Henderson, & Hoagwood, 2003). Unfortunately, few studies comparatively examine the significance of educators' roles or contexts in their decisions to use research or their prioritization of compatibility, observability, complexity, relative advantage, and trialability. If educators in certain roles or contexts prioritize these characteristics differently, it would suggest that strategies to encourage research use in education would need to be sensitive to these factors.

Educator Roles and Perceptions of Research

Educators working in different educational entities may have different roles that shape their perceptions of research use. Countywide or regional intermediate school districts (ISDs), sometimes called educational service agencies (ESAs), act as brokers between the state department of education and local school districts (Butterworth, 1947; Firestone & Rossman, 1986; Koehler, 2009). Educators working in ISDs are tasked with providing services and resources to meet the needs of local districts (e.g., programs, staff, curriculum and instruction support, and cost saving), complying with state and federal mandates, standards, and regulations (e.g., evaluation and reporting), and providing data to local districts. Educators working in district central offices are tasked with fostering and sustaining educational change, as well as promoting student achievement (Farley-Ripple, 2012). At the district level, educators may be exposed to more political pressures to use research, which may uniquely influence their perceptions of research use (Honig & Coburn, 2008; Coburn et al., 2009). Finally, educators working in school buildings are tasked with managing the day-to-day operations of the school and fulfilling student needs. To date, less is known about if and how these different tasks distinctly shape educators' views of the compatibility, observability, complexity, relative advantage, and trialability of research. However, one might anticipate that educators in entities with tasks focused on producing outcomes like educational change might be more likely to prioritize characteristics like relative advantage or observability while educators in entities with tasks focused on meeting district or student needs may be likely to prioritize characteristics like compatibility.

Within school buildings, Coburn and Talbert (2006) have also demonstrated differences between principals and other school staff in their perceptions of research. Namely, principals perceived research and other evidence as valid when it reflected multiple measures of student outcomes (i.e., observability). In contrast, teachers perceived research and other evidence as valid when it aligned with valued academic outcomes and insight into thinking and reasoning (i.e., compatibility). Indeed, as primary implementers of classroom instruction and practices, teachers and other front-line school staff like school psychologists often weigh both compatibility and complexity of research, data, or evidence-based interventions when considering their use (Datnow & Hubbard, 2016; Farrell & Marsh, 2016; McKevitt, 2012).

Educators' Context and Perceptions of Research

While the roles that educators play may shape their prioritization of the compatibility, observability, complexity, relative advantage, and trialability of research, it is also likely that this prioritization is shaped by broader contextual forces. All educators are situated within organizational and regulatory contexts with distinctive politics, resources, norms, and community demographics that shape their sense-making (e.g., Metz, 1986, 1990, 1998; Rubin, 2008; Spillane, 2004) and have implications for their perceptions of research and evidence-based practices (Hoagwood & Johnson, 2003; Neal et al., in press-a; Ringeisen et al., 2003; Tseng, 2012). For example, at the district level, Spillane (2004) found that politics, district resources, and norms of trust shaped Michigan educators' perceptions of new state-level math and science standards. Political tensions between the Michigan governor and the Michigan Department of Education complicated the rollout of the new state-level standards,

making it harder for districts to adopt and enact them. Additionally, educators were more likely to understand and support the state-level standards in districts that were successfully able to capitalize on human, material, and time resources. Educators were also more likely to understand and support the state-level standards in districts that had strong norms of trust.

At the school level, work by Metz (1986; 1990; 1998) and Rubin (2008) also support the notion that educators' sense-making is shaped by contextual forces. Metz (1986) highlighted how the developmental trajectories of three magnet schools in one Midwestern city were shaped by the politics of desegregation and differing race and class motivations associated with these politics. Moreover, in subsequent work, Metz (1998; 1990) described how differences in building resources (e.g., materials, preparation periods, ancillary school personnel) and community resources (e.g., parent presence) shape educators' perceptions and practices in schools situated in upper middle class, working class, and poor communities. Similarly, Rubin (2008) found that differences in community demographics shaped how educators framed the purpose of detracking classrooms, their perceptions of student abilities, and their teaching practices.

Although past research highlights how politics, resources, and norms shape educators' sense-making (Metz, 1986; Metz, 1998; Rubin, 2008; Spillane, 2004), it is also likely that these contextual forces shape educators' perceptions of research. For example, different political pressures and local regulations may lead to variations in how educators prioritize research characteristics (Koehler, 2009). Educators in a context that has recently adopted new, more stringent accountability standards may more heavily weigh the observability of results when considering research on pedagogical strategies. In this context, it may be imperative to select programs with highly visible student academic outcomes. Likewise, educators who reside in contexts where financial, personnel, and time resources are limited have more at stake when deciding to use research, and may weigh multiple elements including compatibility, observability, and complexity. Finally, educators who reside in contexts with favorable norms toward research or data use may be more likely to consider the relative advantage of research over other sources of evidence.

Past research on how contextual factors can lead to differences between educational units has typically focused on school districts (e.g. Spillane, 2004) and individual school buildings (e.g. Metz, 1986, 1990, 1998; Rubin, 2008). While a focus on districts and buildings is useful in many places, it is less appropriate in Michigan, which is predominantly rural and where the organization of educational units is highly localized. For example, Michigan contains more than 500 public school districts, and the median school district serves fewer than 1500 students. Similarly, it contains nearly 3000 public school buildings, with the median building serving fewer than 400 students. The small size of these units makes it difficult to identify differences between them, or to link such differences to contextual factors at the building- or district-level. However, driven by this unique educational structure, county-level intermediate school districts (ISDs) exist to facilitate the coordination of educational resources and policy. There are only 56 ISDs in Michigan, and the median ISD serves more than 10,000 students. Like other government agencies, ISDs vary in their normative stance toward research, the research-based resources they provide to districts, and the political pressures that constrain their work. To the extent that contextual factors shape

differences in educators' perceptions of research, we anticipate between-context differences will be most readily observable at the county level.

Method

Sample

In our study, we were interested in examining perceptions of the compatibility, observability, complexity, relative advantage, and trialability of research across educators in different roles and in different counties. Therefore, we collected data from educators in two of the most populated counties in Michigan: Lake and River[2]. These counties were composed of a range of rural and urban settings, and the majority of residents in each county were White (U.S. Census Bureau, 2015). The median household income in Lake County was higher (i.e., slightly over $60,000) than the median household income in the River County (i.e., slightly over $45,000; U.S. Census Bureau, 2014). Active ISDs shaped both the Lake and River County contexts by facilitating the coordination of educational resources and policy across districts. For example, the Lake County ISD coordinated multiple initiatives in literacy including an early literacy teacher network as well as a reading apprenticeship program designed to improve adolescent literacy. Lake County ISD also coordinated the collection of survey data on 9th graders social and emotional skills across multiple districts in their county. Similarly, River County ISD organized multiple districts' involvement in a review of core mathematics programs and encouraged the use of school-wide positive behavior interventions and supports (PBIS) across county districts.

To build an initial sampling frame, we started with a set of ISD and district-level superintendents within each county, and asked them to name other individuals in their ISDs, districts, or school buildings who were involved in selecting and deciding to use school programs and practices. As part of our interview protocol, we also asked all study participants to refer additional individuals who held these responsibilities. By using an iterative referral process that combines *criterion-i* and *snowball* purposive sampling strategies (Palinkas, Horwitz, Green, Wisdom, Duan, & Hoagwood, 2015), we identified 170 educators for potential interview. Of these, we sampled 133 based on variation in educators' roles (i.e., ISD staff, district central office staff, principals, school building staff), and interviewed 89 educators. Thus, our response rate was 66.9%. Two educators were dropped from analyses for this study because they provided very limited information (i.e., less than 500 words) in response to questions soliciting their perceptions of research. Therefore, the resulting sample for this study included 87 educators (31 in Lake County and 56 in River County). These 87 educators were employed across a total of 9 districts (3 districts in Lake County and 6 districts in River County) and 2 intermediate school districts (Lake County ISD and River County ISD).

The demographics of the educators participating in this study are presented in Table 1. The 87 educators in the sample were split almost evenly across four different roles: 24 (27.6%) worked as ISD staff (e.g., superintendents, coordinators, consultants, social workers, 18 (20.7%) worked as district administrators (e.g., superintendents, directors, coordinators), 22

[2]We have used pseudonyms for the county names to protect the confidentiality of study participants.

(25.3%) worked as principals or assistant principals in school buildings, and 23 (26.4%) worked as school building staff (e.g., teachers, social workers). Reflecting the demographics of educators in the state of Michigan, most educators in the sample were female (64.4%) and White (83.9%). Additionally, educators in the sample had a range of work experience in their ISD or district and in their current position. On average, educators had worked for 13.2 years in their current ISD or district (*SD*= 11.3) and 6.5 years in their current position (*SD*= 6.4). Table 1 also breaks each of these demographic characteristics down by Lake (N=31) and River (N=56) county participants.

Procedures and Measures

Trained interviewers conducted semi-structured interviews with all participating educators in either Spring 2013, as part of a pilot study (N=18), or between Fall 2015 and Spring 2016 as part of a larger study (N=69). As an incentive, a $500 donation was made to the districts of educators' participating in the pilot study while educators participating in the larger study received a $30 Amazon gift card. All interviews were recorded after asking for the participants' consent and were either carried out in person (86.4%, N= 76) or by telephone (13.6%, N=12). A team of trained graduate and undergraduate students transcribed each of the recorded interviews verbatim. Both educators in the pilot study and those in the larger study received a consistent set of questions and probes that focused on a range of issues regarding their experiences searching for and using information about school programs and practices. About one-third of these interview questions focused specifically on educators' perceptions of research. This study analyzed only this subset of questions, which explored educators' definitions of research (e.g., *When you hear the word "research" in the context of school-based programs, what kinds of things do you think of?*), perceptions of what makes research useful or helpful (e.g., *What, if anything, makes research useful for making decisions about school programs?*), and how their thoughts about how others in their district or ISD view research (e.g., *How do you think others in your district/ISD feel about research?*).

Data Analysis Plan

In the current study, we were interested in understanding whether educators could be categorized into a typology based on their prioritization of five characteristics of research: compatibility, observability, complexity, relative advantage, and trialability. Given this focus, there were two major steps to the analysis of our data. First, we conducted a directed content analysis of our qualitative data (Hsieh & Shannon, 2005). Second, using the codes derived from the directed content analysis, we conducted a cluster analysis to determine whether these five characteristics could be used to create a typology of educators based on their perceptions of research.

Directed content analysis—Because the five characteristics explored in this study were drawn from diffusion of innovations theory (Rogers, 1995), we employed directed content analysis. Directed content analysis is appropriate in cases where research is intended to extend an existing theory, and involves establishing and defining a priori coding categories (Hsieh & Shannon, 2005). Based on existing diffusion of innovations theory (Rogers, 1995) and the empirical work on educators' perceptions of research, we developed a codebook that

included operational definitions, essential features, key words and phrases that might signify a code, and example quotes for compatibility, observability, complexity, relative advantage, and trialability (see Table 2 for operational definitions). Next, to ensure a uniform unit of analysis that would allow us to test inter-coder reliability and compare the prevalence of codes across interviews, we broke each interview into 100-word coding segments. Each 100-word segment that included the subset of interview questions relevant to this study was then coded for mentions of compatibility, observability, complexity, relative advantage, and trialability.

Three coders were trained until they reached reliability with gold standard codes established by the study's two primary investigators on three interview transcripts. After training, at least two coders independently coded all remaining interview transcripts. The coders met to resolve discrepancies about a particular code in a particular interview until they achieved 80% agreement. For example, if one coder identified observability 20 times in an interview and a second coder identified observability only 10 times, this represents an agreement of 50% (i.e. 10/20), so they would meet to resolve discrepancies in coding observability in this interview. In contrast, if one coder identified observability 12 times in an interview and a second coder identified observability 10 times, this represents an agreement of 83% (i.e. 10/12), and they would not meet to resolve the remaining discrepancies. This process was designed to reduce the number of discrepancy-checking meetings required between coders, and yielded an overall interrater reliability of $\kappa = 0.877$. Because this process sometimes yielded small discrepancies in the number of times the two coders observed a specific code in a given interview, we averaged the two coders' code frequencies within each interview-code pair. In the example above where one coder identified observability 12 times in an interview and a second coder identified observability 10 times, for analysis we treat observability as having been mentioned 11 times in interview #1. Finally, to ensure that cluster analysis results reflected more than general tendencies toward verbosity, we converted these average frequencies to proportions.[3] Specifically, if interview #1 included an average of 11 codes of observability and had a total of 100 eligible segments, the proportion score would be 0.11. These proportion scores serve as indicators of the amount of priority that an educator places on specific characteristics in their discussions of research.

Cluster analysis—To determine whether a typology of educators existed based on their proportion scores for compatibility, observability, complexity, relative advantage, and trialability, we first conducted a hierarchical agglomerative cluster analysis using Ward's method with squared Euclidean distance as the dissimilarity measure (Everitt, Landau, Leese, & Stahl, 2011). Both the Duda-Hart (Duda & Hart, 1973; Milligan & Cooper, 1985) and Calinski-Harabasz pseudo-F index (Calinski & Harabasz, 1974) stopping rules suggested a five-cluster solution. We used multivariate analysis of variance (MANOVA) to assess whether the clusters were distinct from one another with respect to the mean of their members' proportion scores, and used cross-tabulations paired with Fisher's exact tests to examine whether cluster memberships were associated with educators' roles or context (here, operationalized as county).

[3]An initial attempt to conduct a cluster analysis with raw frequencies simply distinguished educators based on the length of their interview rather than their prioritization of particular characteristics of research.

Results

Descriptive analyses of research characteristics

Figure 1 presents mean proportion scores for the compatibility, observability, complexity, relative advantage, and trialability of research in the full sample. These mean scores suggest that, on average, educators tend to mention the compatibility of research most (M = .43, SD=.15), followed by observability (M=.27, SD=.15), complexity (M=.17, SD=.13), relative advantage (M=.06, SD=.08), and trialability (M=.05, SD=.06). However, within the sample, there is substantial variation in the proportion scores for these five characteristics. This is illustrated by examining the bars in the figure, which represent one standard deviation above and below the mean score for each characteristic. Given this variation, cluster analysis can help illuminate types of educators that differ in their prioritization of these five characteristics of research.

Are there distinct types of educators?

The results of the cluster analysis indicate the presence of five distinct types of educators that differ in their prioritization of the compatibility, observability, complexity, relative advantage, and trialability of research. Namely, Figure 2 presents mean proportion scores for these characteristics for each of the five clusters identified by the cluster analysis. Additionally, each of the five clusters is described in detail below using a descriptive name that typifies the pattern by which educators in that cluster prioritized these characteristics.

Cluster 1: No distinct priority—The first cluster included 24 (27.6%) educators in our sample. Mean proportion scores for educators in this cluster were moderate to low for all five characteristics of research: compatibility (M=.31, SD=.08), observability (M=.29, SD=.08), complexity (M=.11, SD=.09), relative advantage (M=.05, SD=.06), and trialability (M= .06, SD=.06). Overall, this pattern of moderate to low proportion scores suggests that educators in this cluster do not prioritize any particular characteristic when considering the use of research.

Cluster 2: Need it to fit—The second cluster included 35 (40.2%) educators in our sample. Educators in this cluster exhibited mean proportion scores that were high for compatibility (M=.55, SD=.09) and comparatively lower for all other characteristics: observability (M=.24, SD=.10), complexity (M=.13, SD=.09), relative advantage (M=.06, SD=.07), and trialability (M=.06, SD=.07). This pattern indicates that educators in this cluster show a distinct prioritization of compatibility in their discussions of research, suggesting that they need the research to fit their settings and experiences:

> Regrettably, I've found a lot of times folks are studying numbers, but they're not actually studying the numbers in context to the situation: To the culture of the district, to the children, and actually having the experience of seeing what other factors are involved because people can't be quantified in simple numbers because they all come from homes of varying functionality. They all live in communities that have different cultures and there are different cultures within a community. (River County District Director)

As this district director's quote illustrates, educators in this cluster judged research based on its fit with the background, culture, and experiences of the children and staff in their schools, districts, and ISDs. These findings are consistent with the literature on educational sense-making which suggests that educators' perceptions are often driven by district culture (Spillane, 2004) as well as community demographics and resources (e.g., Metz, 1986, 1990, 1998; Rubin, 2008).

Cluster 3: Need to see it—The third cluster included a smaller set of 8 (9.2%) educators in our sample. Educators in this cluster exhibited mean proportion scores that were high for observability (M=.60, SD=.09) and comparatively lower for all other characteristics: compatibility (M=.26, SD=.12), complexity (M=.25, SD=.09), relative advantage (M=.04, SD=.04), and trialability (M=.08, SD=.08). This pattern indicates that educators in this cluster show a distinct prioritization of observability of research, suggesting that they need to be able to see the research and its results:

> For me, research is again seeing the program in action at a school, being able to go to school districts websites to find out if the program worked or if it didn't. In other words, hearing the success stories. Being able to go to a website where I can find out more information about the program how it got started, the components, the main components of it, and steps needed to have the program at my school. (Lake County Principal)

This quote from a Lake County principal illustrates how educators in this cluster focused on the accessibility of research and the ability to observe the results of research in other schools, districts, and ISDs.

Cluster 4: Don't need to see it—The fourth cluster included 13 (14.9%) educators in our sample. Unlike educators in the *Need it to fit* cluster and the *Need to see it* cluster, educators in the *Don't need to see it* cluster were distinguished by much lower mean proportion scores for observability (M=.08, SD=.07). They also exhibited moderate mean proportion scores for compatibility (M=.39, SD=.08), and low mean proportion scores for all other characteristics: complexity (M=.19, SD=.14), relative advantage (M=.10, SD=.13), and trialability (M=.01, SD=.02). This pattern indicates that educators in the *Don't need to see it* cluster still value compatibility but do not perceive observability as a key priority. For these educators, there was no need to see the research or its results:

> I think the practitioners are doing research as we speak and I think they sometimes don't value formal research. So sometimes they don't value it. Sometimes they just say "Give me", you know. "Just tell me what you want me to do!" (laughs) They don't need to know why, some do, some don't (…) I think it's, generally the teachers in the classroom don't care to know that much about it. They would want to know that it meets their needs, it meets their kids needs, not so much this programs has raised scores by x amount. (Lake County District Assistant Superintendent)

As this quote illustrates, this district assistant superintendent views his teaching staff as caring more about the fit of research to their needs and students' needs than the visibility of the actual results.

Cluster 5: Multiple priorities—The fifth cluster included the smallest set of 7 (8%) educators in our sample. Educators in this cluster were distinguished by high to moderate mean proportion scores for compatibility (*M*=.50, *SD*=.08), observability (*M*=.34, *SD*=.08), and complexity (*M*=.41, *SD*=.17). Like educators in other clusters, these educators also exhibited low mean proportion scores for relative advantage (*M*=.05, *SD*=.06) and trialability (*M*=.02, *SD*=.03). Educators in this cluster often describe multiple characteristics as priorities for the use of research in their ISDs, districts, or schools:

> Yeah, I'm sitting in a meeting looking at assessments for K-1 yesterday with <a district curriculum director> and I'm thinking of all things you have to do you're stuck in here with me looking at these assessments, which somebody else should be doing. But, so, it's really, he's a very bright guy but he doesn't have the time to look at research. He's got to go basically on our suggestions or <local university's> or somebody else that's outside pushing in. (River County ISD Supervisor)

> I look at John Hattie's *Visible Learning*. There's some great stuff in there as far as what different things you can do. But, it's really difficult reading. So he might talk about classroom size is not one of those high impacts, so I can understand and you might talk about, for example, that relationship piece. But then again what does that look like in the classroom? (River County Principal)

Each of these quotes touches on elements of the compatibility, complexity, and observability of research. Both recognize the compatibility of research with specific district or classroom needs, but also highlight how interpreting research findings is complex or time-consuming. Finally, both mention credible sources of research (e.g., university, ISD, John Hattie) that increase observability.

Comparing differences across clusters—A MANOVA analysis revealed the presence of significant differences between the five clusters on compatibility, observability, complexity, relative advantage, and trialability as a set of dependent variables (Pillai's trace = 1.77, $F(20, 324)= 12.85$, $p < 0.0001$). Post-hoc ANOVA analyses revealed no significant differences between the five clusters in mean proportion scores for relative advantage ($F(4, 82)= 1.42$, $p= 0.23$, adjusted $R^2= 0.02$) or trialability ($F(4, 82)= 2.20$, $p= 0.08$, adjusted $R^2= 0.05$). However, these analyses did reveal significant cluster differences in mean proportion scores for compatibility ($F(4, 82)= 35.18$, $p< 0.0001$, adjusted $R^2= 0.61$), observability ($F(4, 82)= 48.19$, $p< 0.0001$, adjusted $R^2= 0.69$), and complexity ($F(4, 82)= 14.77$, $p< 0.0001$, adjusted $R^2= 0.39$). The adjusted R^2 values suggest that cluster membership explained 61% of the variance in compatibility, 69% of the variance in observability, and 39% of the variance in complexity. Therefore, we used additional post-hoc t-tests to determine significant differences between pairs of clusters for each of these three characteristics. To account for inflated type-1 error due to multiple comparisons (i.e., 30 tests), we assessed statistical significance using a Bonferroni corrected significance level of $\alpha= .0017$ (i.e., 0.05/30).

Educators in the *Need it to fit* and *Multiple priorities* clusters were distinguishable from educators in other clusters based on their relatively high prioritization of compatibility. Specifically, educators in the *Need it to fit* cluster had significantly higher mean proportion scores for compatibility than educators in the *No distinct priority* ($t(57)= 10.37$, $p< .0001$), *Need to see it* ($t(46)= 5.41$, $p< .0001$), and *Don't need to see it* ($t(41)=7.68$, $p< .0001$) clusters. Likewise, educators in the *Multiple priorities* cluster had significantly higher mean proportion scores for compatibility than educators in the *No distinct priority* ($t(29)= 5.36$, $p< .0001$) and *Need to see it* ($t(13)= 4.42$, $p< .001$) clusters.

Educators in the *Need to see it* cluster were distinguishable from educators in other clusters based on their relatively high prioritization of observability. Educators in the *Need to see it* cluster had significantly higher mean proportion scores for observability than educators in every other cluster: *No distinct priority* ($t(30)= 9.04$, $p< .0001$), *Need it to fit* ($t(41)= 9.87$, $p< .0001$), *Don't need to see it* ($t(19)= 15.84$, $p< .0001$), and *Multiple priorities* ($t(13)= 6.17$, $p< .0001$). In contrast, educators in the *Don't need to see it* cluster were distinguishable from educators in other clusters based on their relatively low prioritization of observability. In addition to having significantly lower mean proportion scores for observability than educators in the *Need to see it* cluster, educators in the *Don't need to see it* cluster had significantly lower mean proportion scores for observability than educators in every other cluster: *No distinct priority* ($t(35)= 7.96$, $p< .0001$), *Need it to fit* ($t(46)= 5.39$, $p< .0001$), and *Multiple priorities* ($t(18)= 8.08$, $p< .0001$).

Finally, educators in the *Need to see it* and *Multiple priorities* clusters were distinguishable from educators in other clusters based on their relatively high prioritization of complexity. Educators in the *Need to see it* cluster had significantly higher mean proportion scores for complexity than educators in the *No distinct priority* ($t(30)= 4.07$, $p< .001$) and *Need it to fit* ($t(41)= 3.66$, $p< .001$) clusters. Likewise, educators in the *Multiple priorities* cluster also exhibited significantly higher mean proportion scores for complexity than educators in these two clusters: *No distinct priority* ($t(29)= 6.49$, $p< .0001$) and *Need it to fit* ($t(40)= 6.70$, $p< .0001$).

Are educators' roles or context associated with their categorization in this typology?

Tables 3 and 4 present cross-tabulations and Fisher's exact tests to examine whether cluster memberships were associated with educators' roles or county context. As illustrated in Table 3, educators' roles were not significantly associated with their cluster categorization ($p = 0.389$, Fisher's Exact Test). In contrast, as illustrated in Table 4, educators' counties were significantly associated with their cluster categorization ($p = 0.037$, Fisher's Exact Test). Notably, Lake county educators were overrepresented in the *Don't need to see it* cluster while the *Multiple priorities* cluster included only River county educators.

Discussion

Although U.S. federal policies have called for use of research in education (e.g., No Child Left Behind Act, 2001; Every Student Succeeds Act, 2015), there is still a well-documented research-practice gap (e.g., Dagenais et al., 2012; Finnigan, et al., 2013; Malouf & Taymans, 2016; Neal et al., 2015; Tseng, 2012). In this study, we added to a growing body of literature

aimed at bridging this research-practice gap by exploring educators' perceptions of five characteristics of research drawn from diffusion of innovations theory (Rogers, 1995) – compatibility, observability, complexity, relative advantage, and trialability – that might facilitate or constrain its adoption and use. Prior research suggests that educators consider compatibility (e.g., Berstock-Sharratt et al., 2011; Dagenais et al., 2012; Farley-Ripple, 2012), observability (e.g., Coburn & Talbert, 2006; Lysenko et al., 2014; Farley-Ripple, 2012), complexity (e.g., Carnine, 1997; Coburn et al., 2009; Hultman & Hörberg, 1998), relative advantage (e.g., Bartels, 2003; Coburn & Talbert, 2006; Hultman & Hörberg, 1998) and trialability (e.g., Cousins & Walker, 2000) in their perceptions of research and evidence-based practices. However, in these studies, educators are often treated as a uniform group. This study extended previous research by examining whether educators could be categorized into a typology based on their prioritization of these research characteristics and whether educators' roles or context were associated with their categorization in this typology.

Findings revealed substantial variation in the extent to which educators prioritize compatibility, observability, complexity, relative advantage, and trialability in their discussions of research. Moreover, cluster analysis revealed five distinct types of educators, distinguishable by their pattern of prioritization of three of these characteristics: compatibility, observability, and complexity. Although 27.6% of educators in our sample were categorized in a *No distinct priority* cluster that suggested they do not prioritize any particular set of characteristics when considering the use of research, the majority of educators in our sample were categorized in one of the other four clusters that each indicated distinct patterns in educators' prioritization of one or more of these characteristics. These findings suggest that educators comprise multiple audiences that may be more or less responsive to different characteristics of research or evidence-based practices.

Cluster analysis results suggest that some educators place a high priority on a single characteristic of research. For example, 40.2% of educators in the sample were categorized in a *Need it to fit* cluster that prioritized the compatibility of research much higher than any other characteristic. These educators were primarily concerned with the extent to which research or evidence-based practices fit with their past experiences, values, settings, or needs. In contrast, 9.2% of educators in the sample where categorized in a *Need to see it* cluster that prioritized the observability of research much higher than any other characteristic. These educators focused most heavily on the accessibility of research results, the reputation of research sources, or the observation of other educators using research. Interestingly, the *Don't need to see it* cluster of 14.9% of educators in the sample exhibited an opposite pattern. These educators were distinguishable by their lack of prioritization of the observability of research. While they were clearly not interested in the visibility of research, educators in the *Don't need to see it* cluster did exhibit moderate interest in the compatibility of research with their past experiences, values, settings, or needs. Finally, 8% of educators in our sample were categorized in the *Multiple priorities* cluster. Unlike other educators who prioritized a single characteristic of research, these educators presented a balanced perspective that placed a similar priority on the compatibility, observability, and complexity of research. For these educators, the use of research is complex and is shaped by multiple characteristics.

Although ISD staff, district central office staff, principals, and school building staff each have different roles with distinct tasks (e.g., Coburn & Talbert, 2006; Farley-Ripple, 2012; Honig & Coburn, 2008; Koehler, 2009), these roles were not significantly associated with cluster categorization. ISD staff, district central office staff, principals, and school building staff were equally likely to be categorized in each of the five clusters identified in this study. Perhaps educators' roles are not a driving force behind their prioritization of different characteristics of research. Alternatively, other contextual variables – like educators' counties – may be more important for determining the pattern by which they prioritize different characteristics of research. Indeed, consistent with past literature suggesting the importance of context for educators' sense-making (e.g., Metz, 1986; Metz, 1998; Rubin, 2008; Spillane, 2004) and perceptions of research (e.g., Hoagwood & Johnson, 2003; Ringeisen et al., 2003; Tseng, 2012), we found that educators' county was significantly associated with their cluster categorization. This is important because it suggests that efforts to promote the use of research evidence in education must attend to contextual differences in the audiences toward which those efforts are directed. In this study, we were not able to tease apart specific contextual forces that might have driven differences between educators in Lake and River county. However, past research suggests that differences in politics, resources, norms, and community demographics may each play important parts in shaping educators' perceptions of research (e.g., Metz, 1986, 1990, 1998; Rubin, 2008; Spillane, 2004).

If all the educators in a county (or other context) are viewed as a monolithic group, then their average profile as an audience might resemble the pattern seen in Figure 1. However, the pattern seen in Figure 1 actually emerges through the combination or mixing of the profiles of the several distinct audiences seen in Figure 2. Moreover, different counties are composed of unique combinations of these audiences. For example, both counties in the study included *Need it to fit* and *Need to see it* audiences, but only River county included the *Multiple priorities* audience, and the *Don't need to see it* audience was overrepresented in Lake county. While the priorities that educators place on using research evidence in these two counties are, on average, quite similar, this similarity masks important differences in audience composition. Therefore, to be effective, the promotion of the use of research evidence must appeal not to the average educator in a context, but instead to educators in each of the specific audiences found in a particular context.

The results of this study should be interpreted in light of some limitations that provide clear directions for future studies of educators' perceptions of research. First, the data in these studies are cross-sectional in nature. Longitudinal research could build on our findings by determining whether educators' cluster members are stable over time and whether these memberships predict educators' future use of research or evidence-based practices. Second, although our sampling strategy maximized variation on educators' roles, our sample of educators was still relatively small and geographically limited to two counties in Michigan. We were therefore unable to determine what specific contextual forces at the county- or district-level predict cluster membership. Future studies should attempt to replicate our findings with sufficient samples of educators across multiple counties or districts. This would provide more fine-grained information that would allow researchers to explore the extent to which politics, resources, norms, and community demographics account for the

association between county and cluster categorization. Supplementing educator interviews with additional in-depth observations (e.g., Farley-Ripple, 2012) or analyses of archival documents (e.g., Neal, Lawlor, Neal, Mills, & McAlindon, in press-b) could also help pinpoint the role of these contextual forces in educators' perceptions of research. Such work is necessary to provide insight into what shapes educators' perceptions of research and to inform policy directions for increasing educators' research use.

Third, the vast majority of educators in our study discussed a traditional model of research where educational researchers are the sole producers of evidence. However, alternative models of research view researchers and educators as co-producers of evidence (i.e., *research-practice partnerships*; e.g., Coburn et al., 2013) or view educators (i.e., *action research*; e.g., Carr & Kemmis, 2003) or students (i.e., *youth participatory action research*; e.g., Cammarota & Fine, 2010) as producers of evidence. Because these alternative models directly involve educators and/or students in the production of research, they are often described as boosting the compatibility, observability, and trialability of findings (Coburn et al., 2013). However, because so few of the educators in our sample discussed experiences with these models, we were unable to examine whether these types of models lead to differences in the prioritization of compatibility, observability, complexity, trialability, and relative advantage.[4] Future studies could purposively sample educators with involvement in traditional models of research as well as research-practice partnerships, action research, and youth participatory action research to see if such differences are present.

Our findings also offer some practical implications for educational leaders who are interested in encouraging research use among their staff. Some educational leaders might initially assume that most of their staff consider the same characteristics when weighing the use of research evidence while other educational leaders might assume that their staff have different considerations that align with distinct educator roles (e.g., teachers, principals, central office staff). However, our study suggests that both of these assumptions might be mistaken. Instead there are several distinct audiences of educators that prioritize different characteristics of research, and membership in these audiences does not align with particular educator roles. Therefore, encouraging research use in a particular school, district, or county first requires asking: *what audiences are here*? In our study, we answered this question by examining in-depth interviews. However, this is likely not feasible in most practice scenarios. To facilitate educational leaders' rapid identification of the audiences in their setting, it would be helpful for researchers to develop a brief quantitative measure that could be used to assess educators' prioritization of the compatibility, observability, complexity, relative advantage, and trialability of research. Here, it may be possible to adapt already existing measures designed to tap perceptions of these characteristics related to other types of innovations like new policies or information technologies (e.g., Moore & Benbasat, 1991; Pankratz, Hallfors, & Cho, 2002). In the absence of a formal measure, educational leaders could also engage in informal conversations with their staff about research. From these conversations, they could determine who in their staff prioritizes compatibility (i.e., *Need it to fit*), who prioritizes observability (i.e., *Need to see it*), who minimizes observability (i.e.,

[4]Of the 87 educators in our sample, only 6 (6.8%) mentioned partnerships with a research university and only 6 (6.8%) mentioned action research. No educators mentioned youth participatory action research.

Don't need to see it) or who prioritizes multiple characteristics of research (i.e., *Multiple priorities*). This would allow educational leaders to tailor messages and professional development opportunities regarding research use to different targeted audiences based on these priorities.

To conclude, we have found that educators vary in how they prioritize the different characteristics of research. Educators with similar patterns of prioritization form clusters or "audiences" for which efforts to improve the use and usefulness of research might be tailored. Membership in a specific audience does not appear to depend on the educator's role (e.g. principal vs. teacher), but the mix of audiences present does appear to vary by context (e.g. county). These findings all suggest that efforts to narrow the research-practice gap in education will require attending to multiple audiences of educators who show distinct patterns in their prioritization of different characteristics of research, and which may vary across contexts.

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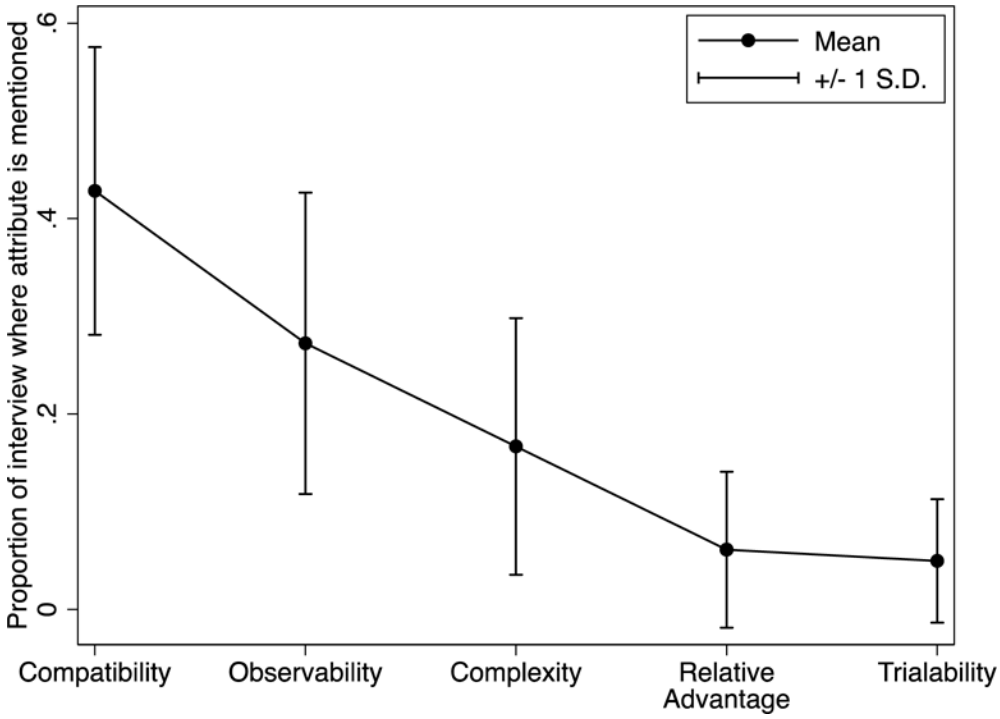

Figure 1.
Mean proportion scores, full sample

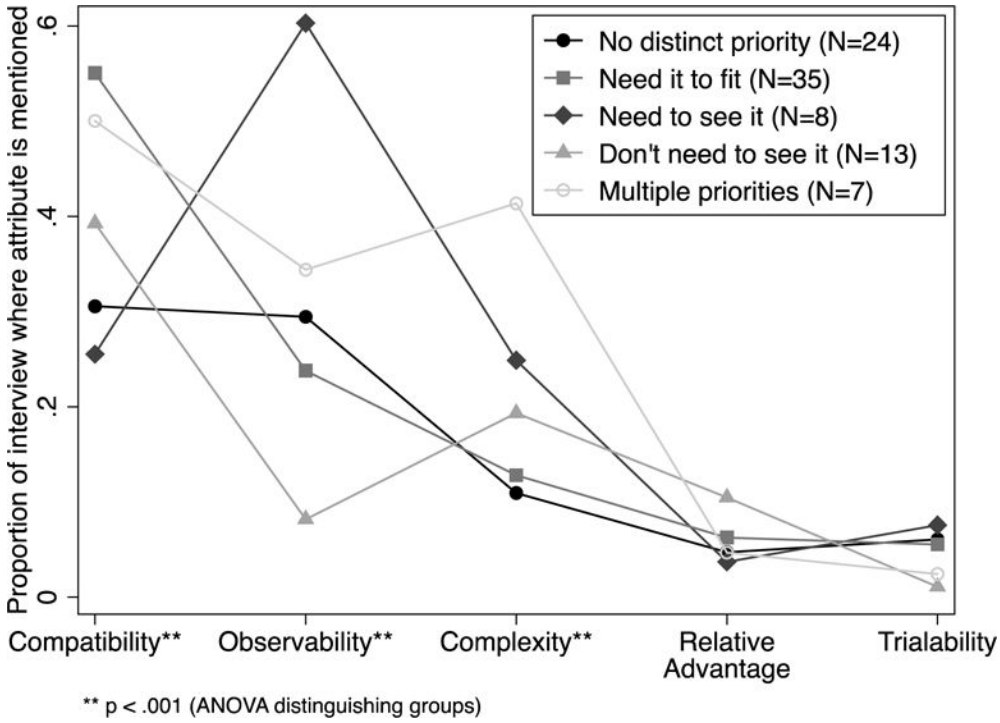

Figure 2.
Mean proportion scores, by cluster

Table 1

Participant demographics

	Lake (N=31)	River (N=56)	Participants (*N*= 87)
Role			
ISD Staff	11 (35.5%)	13 (23.2%)	24 (27.6%)
District Staff	5 (16.1%)	13 (23.2%)	18 (20.7%)
Principal or Assistant Principal	7 (22.6%)	15 (26.8%)	22 (25.3%)
School Staff	8 (25.8%)	15 (26.8%)	23 (26.4%)
Race			
White	25 (80.6%)	48 (85.7%)	73 (83.9%)
Black or African American	5 (16.1%)	6 (10.7%)	11 (12.6%)
Other Race	1 (3.2%)	1 (1.8%)	2 (2.3%)
Missing	0 (0%)	1 (1.8%)	1 (1.1%)
Ethnicity			
Hispanic or Latino(a)	0 (0%)	2 (2.3%)	2 (2.3%)
Sex			
Female	23 (74.2%)	33 (58.9%)	56 (64.4%)
Male	8 (25.8%)	23 (41.1%)	31 (35.6%)
Average Length of Time in Current ISD or District	8.4 years (SD= 7.2)	15.9 years (SD=12.3)	13.2 years (SD= 11.3)
Average Length of Time in Position	5.7 years (SD=5.3)	6.9 years (SD=6.9)	6.5 years (SD= 6.4)

Table 2

Codes and operational definitions

Code	Codebook Definition
Relative Advantage	Research is **compared** to an alternative source of evidence. Examples of alternative sources of evidence might include but are not limited to nothing, personal experience, teacher judgment, advice from colleagues, or anecdotes/testimonials. Relative advantage excludes cases where two sources of evidence are mentioned but a comparison is not explicitly made.
Compatibility	Research is discussed in terms of its **match or mismatch** to classroom, school, district, individual, student, or community values, beliefs, roles, past experiences, specific needs, resources, demographics, or culture. Here, discussion of a lack of available research data to fit school, district, or administrator, or student values, past experiences, needs, or work would also count. Chunks may be coded as compatibility if interviewees discuss views or attitudes or usefulness of research as being contextually bound. The interviewee may mention the fit of research to the school or classroom context. The interviewee may mention that individuals in different roles have different perspectives or uses for research. Chunks may also be coded as compatibility if the interviewee discusses researchers as being out of touch with practice.
Observability	Research is discussed in terms of **its visibility or lack of visibility**. Examples might include: discussions of access to research, observations of or interactions with other schools, districts, administrators, or organizations who are using research, direct interactions with researchers, or mentions of the source of research as having a strong reputation.
Complexity	Research is discussed in terms of how **easy or difficult** it is to use or how easy or difficult its content is to comprehend. Discussions of jargon and difficulties interpreting research results would count here. Discussions of clear language, non-technical or visual presentations of research could also count here. Finally, discussions of evidence-based practices or interactions with research that are time or resource intensive would count here. In addition, this code also includes mentions of the ease or difficulty in discerning whether something counts as research.
Trialability	The degree to which a school, district, or administrator can **try out or experiment** with research is discussed. Examples of trialability might include references to trying out the research process is undergraduate or graduate coursework, writing about research or other opportunities to directly participate in research on a limited basis. **Note:** Experimentation with research does not have to involve implementation in a school or district to count as trialability. For example, learning about research methods in a course could count here.

Table 3

Cluster frequencies by educator role.

Cluster	Role			
	ISD Staff (N=24)	**District Staff (N=18)**	**Principals (N=22)**	**School Staff (N=24)**
No distinct priority (N=24)	8	7	6	3
Need it to fit (N=35)	11	5	8	11
Need to see it (N=8)	1	1	5	1
Don’t need to see it (N=13)	2	3	2	6
Multiple priorities (N=7)	2	2	1	2

$p = 0.389$ (Fisher’s Exact Test)

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Table 4

Cluster frequencies by educator county context

	County	
Cluster	**Lake (N=31)**	**River (N=56)**
No distinct priority (N=24)	6	18
Need it to fit (N=35)	15	20
Need to see it (N=8)	2	6
Don’t need to see it (N=13)	8	5
Multiple priorities (N=7)	0	7

$p = 0.037$ (Fisher’s Exact Test)