

# Teachers' Beliefs and Their Students' Progress in Professional Development

Journal of Teacher Education  
2022, Vol. 73(4) 381–396  
© 2022 American Association of  
Colleges for Teacher Education  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/00224871221075275  
journals.sagepub.com/home/jte



Emily Rodgers<sup>1</sup> , Jerome D'Agostino<sup>1</sup>, Rebecca Berenbon<sup>1</sup> ,  
Clara Mikita<sup>1</sup>, Christa Winkler<sup>1</sup>, and Mollie E. Wright<sup>1</sup>

## Abstract

We respond to calls for more research to address whether and how successful professional development (PD) experiences (defined here in terms of student progress) are related to changes in teacher beliefs, specifically about effective literacy instruction for young struggling readers. We developed a measure, a Teacher Belief Score, to identify teacher beliefs present in interview data and we used student achievement data to create two contrasting groups of teachers, those whose students had lower progress and those who had higher. While initially in the fall, lower progress and higher progress teachers differed little in their alignment of beliefs with program features; over time, higher progress teachers trended toward beliefs that were aligned with program features, whereas lower progress teachers trended away. Findings suggest the need for an additional component to Guskey's model of teacher change: attributing student progress to the new instructional practices learned in PD.

## Keywords

education reform, inservice education, literacy/reading teacher education, professional development, teacher beliefs

Researchers have long been interested in understanding teacher beliefs (Avalos, 2011) because beliefs about students, teaching, and learning appear to guide teachers' decision-making across a number of areas including social studies (Hintz, 2014); science, mathematics (Isiksal-Bostan et al., 2015); English language instruction (Farrell & Ives, 2015); and pre-kindergarten instruction (Scull et al., 2012). The positive relationship between beliefs and practices also exists in a myriad of instructor roles including pre-kindergarten teachers (Scull et al., 2012), primary and secondary classroom teachers (Devine et al., 2013), and university teachers (Nghia, 2017). It is even assumed that the degree of influence is so great that teaching practices are unlikely to change unless teacher beliefs change (Guskey, 1986; Pajares, 1992).

The relationship between beliefs and practice is particularly relevant for individuals who provide early literacy professional development (PD) in special education; an area well known for its highly polarized debates about best practices for teaching children to read (Cunningham et al., 2005; Stanovich, 2000; Tunmer & Nicholson, 2011). It seems reasonable to expect that the beliefs that teachers adopt and embrace about how best to teach reading likely have a tremendous influence on their practices. Moreover, because special education interventions must be intensive to address often persistent learning difficulties, PD programs that do not address the beliefs of special education teachers stand little chance of resulting in teacher uptake and adoption.

Given the widely accepted view that beliefs about teaching strongly influence what teachers do (Levin et al., 2013),

it is somewhat surprising that education scholars know so little about (a) whether and how beliefs change during PD in early literacy or about (b) whether there is an association between beliefs with early literacy PD practices and student progress (Bobis et al., 2016). Furthermore, we know of no study that follows changes over time in special education teacher beliefs about reading instruction as they participate in early literacy PD, even though such a design would reveal much about whether beliefs change and why.

## Background Literature

Although beliefs and knowledge are often conflated in the literature (Pajares, 1992), many share Richardson's (1996) definition of a belief, which ". . .describes a proposition that is accepted as true by the individual holding the belief" (p. 104). By contrast, knowledge refers to things that are agreed upon and can easily be evaluated (Nespor, 1987). Yet while the two constructs are different from one another, they are also related in that knowledge can be said to represent the agreed-upon facts while beliefs represent the value attached to the knowledge (Cash et al., 2015, p. 98).

<sup>1</sup>The Ohio State University, Columbus, USA

### Corresponding Author:

Emily Rodgers, The Ohio State University, 200C Ramseyer Hall, 29 W. Woodruff, Columbus, OH 43210, USA.  
Email: rogers.42@osu.edu

Individuals tend to rely more on knowledge to make decisions when the task and the steps to achieve the task are well defined, whereas when the task is less well defined and the steps to reach the goal (say, learning to read) are less clear, individuals tend to rely on beliefs to inform decision-making (Nespor, 1987). Beliefs tend to be evaluative in nature and thus carry more weight than knowledge when deciding whether to take up a new practice in contexts where there is less agreement on how to reach a goal.

### *Teachers' Beliefs and Reading Instruction*

In the context of beginning reading instruction for students in special education, it seems reasonable to categorize the task of teaching reading as less well defined, and therefore more likely to be informed by beliefs than knowledge. Given the decades-long reading wars (Shanahan, 2020), the current debate in the popular media (Hanford, 2018; Schwartz & Spark, 2019) and academic journals (e.g., Goodwin & Jiménez, 2021), it also seems reasonable to expect that teachers of beginning reading, particularly of those students having great difficulty learning to read, will have well defined and deeply held beliefs about early reading instruction.

Beliefs about teaching and learning appear to shape teachers' instructional interactions; researchers have usually found a relationship between what teachers believe is pedagogically important and what they actually teach (Anderson, 2015; Borg, 2017; Fang, 1996). Studies that present the counterfactual (i.e., a mixed or a negative relationship between beliefs and practice) usually cite issues with measurement, specifically the use of surveys which might have led respondents to report more socially desirable espoused beliefs (e.g., Schachter et al., 2016).

Historically, reading instruction generally gravitated either toward a phonics-based approach or a whole language approach (DeFord, 1985). More recently, educators cite a balanced approach to literacy which is considered a "compromise" between phonics and whole language (Bingham & Hall-Kenyon, 2013, p. 15). Key differences between these instructional orientations have to do with the degree to which letters and sound relationships are taught in isolation before reading (Tortorelli et al., 2021) compared with the emphasis placed on teaching comprehension and word-solving strategies while reading text (Fisher et al. 2021). In terms of special educators, researchers have documented a preference to allocate more time to explicit phonics-based instruction geared at basic reading skills and less time to reading text (Cunningham et al., 2009).

With regard to beginning reading instruction and reading difficulties, two types of beliefs have been the subject of scrutiny: self-efficacy and instructional orientation (Spear et al., 2018).

Self-efficacy beliefs are beliefs in one's ability to do something to achieve specific goals (Bandura, 1997). Understanding teacher self-efficacy is important because

educators with higher efficacy tend to set higher goals and attribute failure to their own teaching or school factors; whereas educators with lower efficacy linked failure to internal factors related to students (Urbach et al., 2015, p. 324). Believing you have the expertise to bring about change in student reading progress, rather than believing no matter what you try or how much effort you put into teaching, it won't make a difference, likely plays a critical role in instructional decision-making and uptake of new ideas presented in PD (Hollenbeck & Kalchman, 2013; Hoy et al., 2009).

### *Teachers' Beliefs and PD*

Multiple studies have concluded that practices tend to be so strongly aligned with beliefs that educators are unlikely to take up PD if the information taught conflicts with their own practical or personal knowledge (D'Agostino et al., 2015; Friesen & Butera, 2012; Gerde et al., 2019). These studies linking beliefs and instruction are particularly relevant for researchers working to design and disseminate evidence-based reading programs to improve student literacy outcomes. The concern is that if teachers' beliefs about reading instruction are not aligned with instructional practices introduced in PD, many may return to business as usual after the PD (D'Agostino et al., 2015) regardless of the evidence base supporting the new instructional practice (Datnow & Castellano, 2000; Gersten & Woodward, 1992). Others might adapt the innovation to fit their existing pedagogical beliefs (Boardman et al., 2005; Leko et al., 2015). Either scenario, not adopting the innovation or adapting it, weakens the strength of the professional learning and dilutes the contribution of PD to supporting and improving practice.

The findings of many studies that reported an impact on teacher beliefs by PD were inconclusive, partly because teacher beliefs were not measured at the outset of PD. For example, Hamre et al. (2012) concluded that PD had an impact on preschool teachers' beliefs based on their finding that preschool teachers' beliefs were well-aligned with PD designed to improve teacher-student interactions. Yet, because their belief questionnaires were completed after PD, it is unclear whether teachers' beliefs changed as a result of the PD or whether they were always aligned with the PD's instructional orientation from the outset.

Similarly, Carney et al. (2016) concluded that teacher beliefs about mathematics instruction changed after PD. Their findings are questionable, however, because their pre-PD beliefs were retrospectively measured with a survey given at the course conclusion. It may be that they could not recall their beliefs at the outset of the PD, or they may have identified beliefs they held at the outset in a way that would be more socially desirable to demonstrate the positive impact of the effort in which they were engaged.

Thus, to advance the field, it would seem important to measure teacher beliefs at the outset and conclusion of PD

rather than retrospectively (Risko et al., 2008). Such a design would provide better insight as to whether and how beliefs changed during the course of the PD. We also agree with Donovan et al. (2015) who called for studies to examine whether change in beliefs occur when teachers participate in PD and to focus on the direction of change; it may be that beliefs may shift from being more aligned with the program to less aligned.

### *A Model of Change*

Our interest in this study is whether and how PD influences beliefs about early reading instruction and in understanding the mechanism for change within that context. We assume that the relationship between beliefs and actions is bidirectional and “interactive” (Richardson, 1996, p. 104). Beliefs may drive actions but beliefs can be altered by experiences. Beliefs about instruction are influenced by many factors, including personal experience, formal knowledge, experience with instruction (Leko et al., 2015), years of teaching experience (Isiksal-Bostan et al., 2015), school expectations (Liou et al., 2019), and school-imposed barriers (Farrell & Yang, 2017; Hos & Kekec, 2014; Mansour, 2013) to name just a few.

The model of change that informs our work is Guskey’s “Model of the Process of Teacher Change” (Guskey, 1986, p. 7). Guskey proposed that PD can change teacher beliefs if student learning improves during the PD. Within this model, improved student learning can be considered a catalyst for changing beliefs, not merely a result of beliefs changing.

### *Purpose for the Current Study*

Understanding better the relationship between beliefs about literacy instruction and teaching is critical for those providing PD, particularly in the context of working with special education teachers. It is expected that teachers tasked with improving the progress of struggling readers might have well-defined and deeply held beliefs about the best way to teach reading in that context.

To our knowledge, no study has examined whether student progress in PD influences beliefs in reading instruction, specifically in the context of inservice teachers working in special education settings. We intentionally differentiated student progress from student outcomes in this study because post-assessments come after the PD concludes and thus cannot influence beliefs during the PD. As we describe in the “Method” section, we instead used formative measures that teachers administered throughout the PD to gauge student progress.

Given our proposal that student progress may be the agent for change in beliefs about reading instruction, we also examined whether teachers attributed the progress to expertise gained from the PD or factors unrelated to the PD. Thus, we examined not only instructional beliefs, but beliefs about

efficacy as well to see whether progress is attributed to the PD.

The purpose of this study, therefore, was to examine teacher beliefs over a year-long literacy PD initiative for special educators teaching students having great difficulty learning to read. We examined beliefs at the beginning of the PD and near the conclusion 7 months later for two groups of special education teachers: those whose students eventually made considerable reading progress during the intervention (high progress group [HP]), and those whose students made significantly less progress (low progress group [LP]). We paid particular attention to the interplay between student progress and the degree to which teachers’ instructional and efficacy beliefs were maintained or changed over the course of the PD and school year.

These questions guided our inquiry:

1. Research Question 1 (RQ1): Do teachers whose students made higher progress become more aligned in their instructional beliefs with the program over the course of the PD?
2. Research Question 2 (RQ2): What kinds of trends in instructional and efficacy beliefs are apparent from fall to spring, and do the trends differ between the two groups of teachers?

We assumed that teachers whose students made higher progress would be more aligned with the intervention’s instructional practices from the start and stay aligned, or, if they were not, we anticipated that they would become aligned with it as time went on as their students experienced more success. We also hypothesized that teachers whose students eventually had lower progress would not be well aligned with program in the fall, or if they were, that their beliefs would be less aligned with the program as their students gained less over time.

## **Method**

We used multiple analytic methods to both describe teacher beliefs and investigate the relationship between student progress and teacher belief alignment to the PD as they learned how to design and deliver a lesson format for struggling readers.

### *Data Sources*

We collected data within the context of a funded project to develop an effective literacy intervention for 6- to 9-year-old students with diagnosed reading disabilities. Faculty partners at four university sites sent a flier advertising the opportunity to school district administrators and teachers they knew, and teachers made their own decision about whether to participate. Teachers had to have at least two students on their caseload who qualified for the intervention to be eligible.

PD was in the form of two face-to-face graduate-level courses that met weekly in fall and spring semesters; approximately 30 class meetings in all (approximately 4,500 min of PD per teacher). Teachers taught at least two students in a school setting, participated in school visits from coaches, and taught lessons while their colleagues observed at least once per semester. The teachers ( $n = 117$ ) were taught by trained literacy coaches connected to a university site and a faculty member who coached them.

The PD and teaching of students began concurrently. Participating teachers taught 40-min, one-to-one lessons at least three times a week to two students. The intervention emphasized learning to read while reading text as opposed to learning to decode words in isolation. Teachers learned how to scaffold students' decoding while reading and to teach students to be active problem-solvers when they encountered difficulty. They also learned how to select leveled books at increasingly higher text levels to challenge students' current ways of problem-solving.

Each lesson included instruction in fluent reading to increase automaticity and support comprehension (Baker et al., 2008; Hudson et al., 2009). Teachers provided students scaffolded support designed to increase strategy use including monitoring, searching, self-correcting, and checking to decode unfamiliar words while reading connected text (Tunmer & Nicholson, 2011). Although the lesson components were the same for each lesson, lessons were not scripted.

Teachers administered two formative assessment devices to monitor student progress: (a) a Running Record each lesson to find students' Text Reading Levels (TRL; Clay, 2001) and (b) a weekly Word Identification Fluency measure (WIF; Zumeta et al., 2012).

Four data sources were used for this investigation: the two teacher-administered student progress measures (TRL and WIF), a Program Implementation Fidelity Score, and interview transcripts. At the end of each week, teachers entered each student's progress measures into a secure database that we created for data collection.

**Text Reading Level.** Each teacher was given the same set of 322 already-leveled books that they chose to customize each student's lessons. Teachers learned to choose books for instruction at the highest text level that they determined the student could read with support and to take a Running Record (Clay, 2001) on it the next day for formative assessment purposes. A Running Record is an oral reading assessment that is administered and scored in standard ways to obtain the student's percentage of accuracy and to document reading behaviors. Reliability evidence for percent accuracy calculated on Running Records is high (Denton et al., 2006) and concurrent validity evidence is convincing (Gómez-Bellengé et al., 2005).

To check the teachers' reliability with calculating percentage accuracy rates on Running Records on leveled books, we checked their scoring twice during the year, giving everyone

the same Running Record to score in a test-like setting. Both times, all teachers reached exact or adjacent agreement with the first author's percent of accuracy, demonstrating good reliability with scoring and high fidelity with administering the assessment.

**Word Identification Fluency.** The WIF provides a measure of automatic word recognition; arguably a ". . . hallmark of competent reading behavior" (Fuchs et al., 2004, p. 9). Weekly, teachers assessed the number of high-frequency words that a student could identify in 1 min from a list of 50 high-frequency words. The WIF's ability to predict the WRMT-R WID and TOWRE Sight Word subtests is reported in Zumeta et al. (2012).

**Program Implementation Fidelity Measure.** We collected program implementation fidelity scores for each teacher; a point-based measure used to assess teachers' overall fidelity of implementation. Criteria included (a) participation in the two graduate courses, (b) carrying out student instruction as prescribed by the program (using a 1–1 lesson format, using only the program's lesson components, and monitoring student progress), and (c) participating in school visits from the program coach. Teachers were rated from one to three on each of the three fidelity criteria, where one indicated low fidelity and three indicated high fidelity. All teachers scored at a high level of fidelity.

**Semi-structured interviews.** Interviews are a common source of data in studies measuring teacher beliefs (Schraw & Olafson, 2014). We interviewed all teachers twice: once in fall (October), shortly after training began, and again in spring (April or May), when graduate coursework was nearly complete. The individual telephone interviews were conducted by trained doctoral students and lasted approximately 40 min each ( $n = 960$  min of interviews across the 12 teachers). Teachers were asked about their literacy goals for their students and how they decided what literacy skills to focus on during each lesson. The questions did not directly ask teachers about their beliefs; instead, they focused on the students and the specific instructional context, thus responses would more likely represent beliefs-in-action, rather than simply espoused beliefs. The protocol contained four open-ended questions:

1. Research Question 3 (RQ3): What are the literacy goals for your students this year?
2. Research Question 4 (RQ4): How do you decide which instructional procedures to use for each lesson?
3. Research Question 5 (RQ5): What impact, if any, do you expect participating in this PD will have on your teaching?
4. Research Question 6 (RQ6): What impact, if any, do you expect participating in this PD will have on your student's learning?

The interviewers took detailed notes on the interview protocol sheet and transcribed the interview immediately afterwards. Teachers were later given the transcribed interviews to review and add to or remove comments.

### *Procedures: Identifying Higher and Lower Progress Teachers*

We focused our analysis on 1 year of our study when the lesson components were developed and ready for use and teacher enrollment was the largest during the project. Our goal was to create two groups of teachers at the end of year-long PD with clear contrasts in student achievement in order to inform our questions about the relationship between student progress and beliefs. To do so, the second author used hierarchical linear modeling (HLM) to compute student progress rates for all students ( $n = 165$ ) and teachers ( $n = 51$ ) on the TRL and WIF. For each student, their weekly WIF scores ( $n = 3,108$ ) and the last TRL score per week ( $n = 3,355$ ) served as the outcome data.

Separate three-level HLM analyses were performed to estimate each student's TRL and WIF progress. At Level 1, a time variable was used to predict either the weekly WIF or TRL scores per student. The individual student slopes at Level 1, thus, indexed the degree of progress on each measure, which were predicted at Level 2 with student pretest scores and demographics, which served as covariates to adjust for initial achievement and background differences among the students. The average adjusted TRL and WIF slopes for each teacher were computed at Level 3. The teacher-specific residuals at Level 3 from each of the two analyses served as the primary measure of the average progress rates of students for each of the 51 teachers.

The TRL and WIF teacher-specific residuals were standardized, and a composite student progress index was computed by averaging the TRL and WIF standardized residuals for each teacher. The 51 composite scores were then ranked from highest to lowest. The second author then selected the 1st, 2nd, 4th, 5th, 7th, and 8th teachers for the HP group ( $n = 6$ ). Although the correlation between the TRL and WIF residuals was  $r = .83$ , there were some teachers who were higher on one index and lower on another, and vice versa. The third- and sixth-ranked teachers were skipped for selection because of this discord between two indices. To form the LP group ( $n = 6$ ), the 50th, 49th, 48th, 47th, 43rd, and 42nd ranked teachers were selected, again skipping teachers with discordant TRL and WIF standardized residuals.

The effect size between the average composite scores of the two groups was 2.06, indicating that the student progress between the two teacher groups was considerable. On the TRL, the average progress difference between the HP ( $M = 0.41$ ) and LP ( $M = 0.24$ ) was significant,  $t(10) = 3.90, p = .003$ , and on the WIF, the average difference between the HP ( $M = 0.52$ ) and LP ( $M = .28$ ) also was significant,  $t(10), p = .002$ . On

average, teachers in the HP group taught students who gained four tenths of a book level on the TRL and one half of a word on the WIF per week, versus students in the LP group who gained about a quarter book level and a quarter of a word per week on the TRL and WIF. Thus, students taught by the HP group had nearly twice the progress rates as students taught by LP teachers.

Our decision to select 12 teachers was based on two factors. Choosing more teachers for each group would have diminished the effect size, and thus, a less clear contrast in student achievement. Choosing fewer teachers for each group would have increased the risks of not having enough qualitative data to identify themes and limited the power of the quantitative analysis.

As displayed in Table 1, all teachers were female and white; three teachers in the higher progress group had master's degrees compared with two in the lower group. Teaching experience was comparable across the two groups, with half early-career (0–5 years) and half mid-career (6–15 years). All teachers received full points on the Program Implementation Fidelity Measure; that is, they completed both courses, 100% of the lessons they provided were one-to-one, they only used the program's lesson components, they monitored student progress consistently at the end of each week and weekly across the year, and they participated in at least two required school visits with the coach, one per semester. In addition to teaching the intervention to two students, the teachers' other roles were similar to each other: they offered modified reading instruction in pull-out settings in small groups to elementary-aged students.

### *Data Analysis*

The second author provided the co-authors with the 24 transcribed interviews (two each per selected teacher) without informing the co-authors about the teachers' group membership (until after coding and analysis were complete). Three of the authors (excluding the second author who knew which teachers were HP and which were LP) conducted data analysis in three broad phases: data reduction, data display, and conclusion drawing (Marshall & Rossman, 2014).

#### *Coding interviews*

*Data reduction.* First, the transcribed interviews were condensed, an initial data reduction strategy suggested by Saldaña and Omasta (2016), to prepare the interview data for analysis. Several principles guided condensing the transcripts: removing extraneous information in the transcript (Saldaña & Omasta, 2016, p. 113), keeping what is essential to the person's experience, and using the person's own words (Miles & Huberman, 1994, p. 86). The first author compared each condensed interview with its corresponding transcript and original interview notes and found that the condensation did not add or remove relevant information that was originally collected in the interview notes.

**Open coding.** We began with open coding of the condensed interviews; our goal at first was to open up the text, (Corbin & Strauss, 2015). Given the literature we reviewed about the possible role of student progress in influencing beliefs, we focused on what teachers said about student progress. We used successive analysis (Miles & Huberman, 1994), working in sequence from a single case to multiple cases. Initially, we used gerunds, working together line by line through the same interview, asking ourselves with each line, “What is the teacher saying here about students’ progress?” We used a constant comparative method to identify and refine the codes (Glaser & Strauss, 2017).

Our first pass yielded 36 initial codes that were defined in a code book. Using a strategy suggested by Saldaña (2015), we examined the 36 codes to group them in thematic categories; we found that all 36 codes could be grouped in one of two categories: one category of codes referenced beliefs about reading instruction and the other category of codes had to do with explaining (attributing) student progress.

**Recoding.** Next, two of the three coders began anew and, working side by side, recoded all of the condensed interviews in light of the two categories that emerged in opening the data. We highlighted text that addressed the two categories, asking ourselves as we read and reread the transcripts: What is the teacher saying about reading instruction? How is the teacher explaining progress? Again, we used a constant comparative approach to identify and refine codes during the recoding. Our analytic deduction led to the identification of 12 codes, 6 related to instructional orientation beliefs and 6 related to efficacy, as displayed in Table 2. We developed a coding manual for the 12 codes and then invited a different research assistant to code 50 highlighted statements from four interviews, achieving 86% agreement overall; 87% for the codes in the category Instructional Beliefs and 85% in the category Efficacy Beliefs. We then examined the coded transcripts to determine which teachers mentioned the belief and at which time point.

**Creating a Teacher Belief Score.** We next created a Teacher Belief Score to describe the strength of each teacher’s alignment with the intervention’s emphases. For each of the seven intervention-aligned beliefs, teachers were given a 1 if they expressed the belief or a 0 if they did not. These results were then aggregated and examined by timepoint (fall, spring) and progress group (HP, LP).

Dichotomous scores were then used to generate continuous Rasch measures for each teacher for both fall and spring using Facets software version 3.81.0 (Linacre, 2019). The teacher measures were used to quantify and summarize the extent to which teachers expressed the seven program-aligned beliefs at a given timepoint. Rasch item difficulties were also calculated for these beliefs based on fall data. Infit and outfit statistics were inspected to assess model fit. Satisfactory fit implies that the data conform to the unidimensional Rasch

model. Finally, we compared Rasch Teacher Belief Scores across groups and timepoints using a t-test to determine if the two groups’ beliefs differed in the fall, and an analysis of variance (ANOVA) to examine potential HP and LP belief differences in the spring.

## Results

### Changing Belief Alignment Over Time

The Rasch analysis yielded scores indicating the extent to which each teacher’s beliefs were aligned to the program at a given timepoint. The scores on average were not significantly different between HP and LP groups at baseline,  $t(10) = -.84, p = .421$ . Time (fall, spring) and group (HP, LP) were included as factors in an ANOVA, along with the interaction between the factors. As can be seen in Table 3 and Figure 1, there was a significant interaction indicating that change in beliefs differed between HP and LP teachers. Teacher belief scores increased for HP teachers and slightly decreased for LP teachers.

Rasch item difficulties are plotted against teacher belief scores in Figure 2. For ease of interpretability, measures were linearly transformed to correspond to a 0–100 scale. Higher item difficulty indicated that fewer teachers expressed the belief, while beliefs with lower difficulty were expressed more commonly across teachers. For example, the belief with the highest item difficulty, defining progress by students using strategies, was only expressed by 3 out of 12 teachers in fall. Conversely, 11 out of 12 teachers mentioned program fit in fall, which had the lowest item difficulty.

### Trends in Alignment of Instructional and Efficacy Beliefs

**HP teachers were initially aligned or became aligned.** Although the Teacher Belief Score showed no significant differences in teachers total belief alignment in the Fall, a different pattern emerges when we examine the beliefs separately. As displayed in Table 4, high progress teachers tended to be already aligned with the program’s instructional orientation, and if they were not, became aligned with them by the end of the year.

All six HP teachers were aligned with at least two instructional features in fall and spring and one of them, (Tracy) was even aligned on three of the four features; referring to progress in fluency, reading texts, and comprehending both at the outset and end of PD when discussing how she decided which instructional procedures to use during a lesson. The trend to become more aligned was clearer for the HP group who by spring, had nearly every teacher aligned with all beliefs associated with the program. In fall, for example, Rachel referred to comprehending better and reading at higher levels, but not strategy use or fluency, but then added

**Table 1.** Teacher Characteristics ( $n = 12$ ).

Characteristics	Lower progress teachers		Higher progress teachers	
	<i>n</i>	%	<i>n</i>	%
Sex				
Female	6	100.0	6	100.0
Race				
White	6	100.0	6	100.0
Highest degree obtained				
Bachelor's	3	50.0	4	66.7
Master's	2	33.3	2	33.3
Master's plus coursework	1	16.7	—	—
Doctorate	—	—	—	—
Years of employment in education				
0–5	3	50.0	2	33.3
6–15	2	33.3	4	66.7
16+	1	16.7	—	—
Years as special education teacher				
0–5	3	50.0	3	50.0
6–15	3	50.0	3	50.0

Note. Lower progress teachers include Amber, Belinda, Jocelyn, Maria, Melissa, and Nina. Higher progress teachers include Carolyn, Claire, Dorothy, Olivia, Rachel, Tracy.

**Table 2.** Final Categories and Codes With Explanations.

Code	Definition
Category 1: Instructional Orientation Beliefs	
Aligned with the program	
Comprehension	Teaching emphasizes comprehending
Reading whole texts	Using texts (whole stories)
Fluent reading	Teaching student to read with better fluency
Strategy instruction	Teaching students to use problem-solving strategies
Not aligned with the program	
Using words/subwords	Emphasizing letter-sound relationships
Changing attitude/behavior	Student attitude and behavior are key for teaching success.
Category 2: Efficacy Beliefs	
Progress is attributed to PD	
Student expertise	Student gained new knowledge and skills
Teacher expertise	Teacher gains in expertise
Program fit	Match between program features and student needs
Progress is not attributed to PD	
Student confidence	Student's happiness or confidence mattered
Student factors that cannot change	Teacher faces challenges with student the teacher does not have control of
Reading more	More time spent reading

Note. PD = professional development.

both in spring as she discussed her instructional decisions, saying, “My student, Jay still struggles with encoding and decoding words, but incorporating more strategies, like trying to use meaning to solve the word, seems to have helped.”

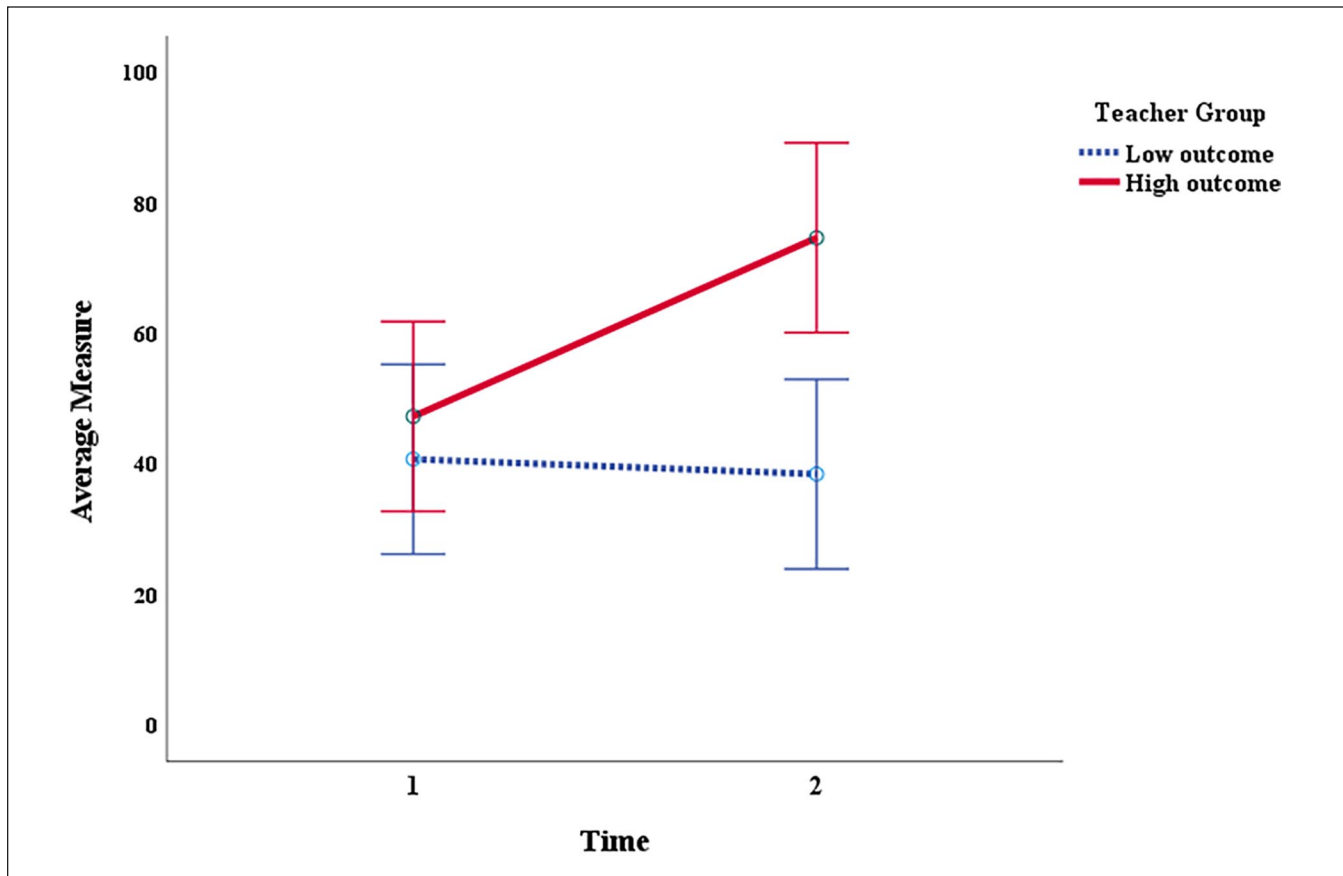
*LP teachers were less aligned, and few became aligned.* By contrast, as Table 4 also displays, no LP teacher was aligned on more than one instructional feature at both time points.

Instead, only four of the six LP teachers showed alignment in fall and spring and only on one instructional component; Amber and Maria referenced reading texts in interviews, Jocelyn referred to comprehension, and Melissa discussed fluency. With the exception of reading texts, few LP teachers' beliefs trended toward the program. By spring, Maria was the only LP teacher to add comprehension in her second interview, resulting in two of six LP teachers referring to

**Table 3.** ANOVA Results.

Predictor	Type III sum of squares	df	M square	F	p	Partial $\eta^2$
Intercept	9.18	1	9.18	8.95	.007	.31
Outcome group	9.65	1	9.65	9.42	.006	.32
Time	3.33	1	3.33	3.25	.087	.14
Outcome Group $\times$ Time	4.65	1	4.65	4.53	.046	.19
Error	20.50	20	1.03			

Note. The dependent variable is teacher belief score. ANOVA = analysis of variance.

**Figure 1.** Teacher belief scores by time and outcome group.

Note. Error bars represent 95% confidence intervals.

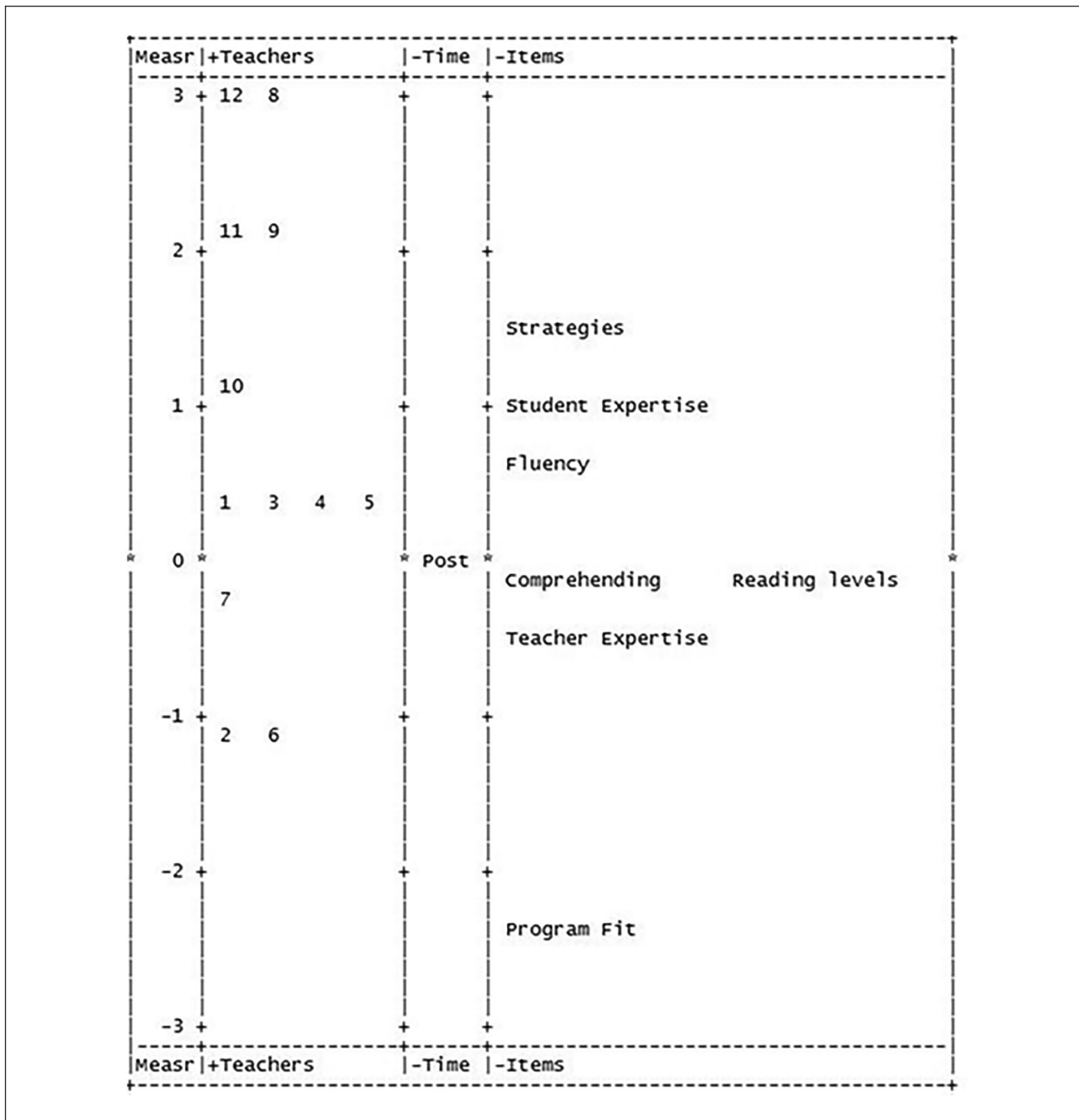
comprehension in spring, compared with five of six HP teachers. Few LP teachers became aligned with the other three instructional beliefs associated with the program (strategy instruction, fluency, and comprehension).

*LP teachers' instructional beliefs trended away by Spring.* The intensity of beliefs trending away from the program's instructional orientation was greater for the LP teachers than the HP. Three LP teachers, (Amber, Melissa, and Nina) never mentioned comprehension when interviewed in Spring about their instructional decisions, even though they referred to it in the fall. Belinda never mentioned fluency and Melissa never mentioned strategy instruction even though they had in

the fall and they were all key instructional components of the program that would have been emphasized in the weekly PD meetings. Instead, they referred to instructional components not aligned with the program, emphasizing word and sub-word parts. Melissa, for example, said in spring, "I'm spending time on word work with DeAndre. He is getting better at word blends, but they can still be confusing. Now we're focusing on word endings." Blends and word endings were not a part of the instructional approach that she was learning about in PD.

Furthermore, three teachers in the LP group, Belinda, Jocelyn, and Nina were never aligned with two of the four program instructional emphases. Belinda never mentioned





**Figure 2.** Teacher and item map at post.

Note. Teachers 1–6 were in the low student progress group, whereas Teachers 7–12 were in the high student progress group.

teaching comprehension, or reading texts at higher level. Instead, she discussed how she was working on improving students’ use of words and subwords. In fall, she said that her student Deborah “will know a word one day but will forget it two days later.” She said “Deborah needs to focus on each letter of the word.” Later in the school year, Belinda recounted a story about Deborah. “She was working on breaking words apart on her own—without prompting.” Similarly, Jocelyn and Nina

never referred to fluency or strategy use; two other key features of the program.

*A growing trend to attribute progress to student factors, not PD.* At the outset of PD, almost all teachers (six HP teachers and five LP teachers) expressed the belief that participating in the program would increase their expertise and make a difference to student progress. In fact, there was almost an air

**Table 4.** Trends in Aligned Instructional Beliefs at Fall and Spring by Progress.

Instructional component	Teacher group	Aligned Fall	Aligned Spring	Total
Comprehension	Higher progress	Claire Rachel Tracy	Claire Rachel Tracy Carolyn Olivia	5/6 83%
	Lower progress	Amber Jocelyn Melissa Nina	Jocelyn Maria	2/6 33%
Reading texts	Higher progress	Carolyn Dorothy Olivia Rachel Tracy	Carolyn Dorothy Olivia Rachel Tracy Claire	6/6 100%
	Lower progress	Amber Maria	Amber Maria Jocelyn Melissa Nina	5/6 83%
Fluency	Higher progress	Dorothy Tracy Carolyn	Dorothy Tracy Claire Olivia Rachel	5/6 83%
	Lower progress	Belinda	Melissa Amber Maria	3/6 50%
Strategy instruction	Higher progress	Carolyn Claire	Carolyn Claire Dorothy Rachel Tracy	5/6 83%
	Lower progress	Melissa	Amber Belinda	2/6 33%

of optimism across the interviews, that what they were about to learn over the year would make a difference to student progress. LP teacher Amber said, for example, that she expected that being a part of the program would accelerate her students' learning, whereas Belinda, another LP teacher, said that even with a few weeks of instruction, the one-to-one attention was "making a huge difference" and her fourth graders were "soaring." Jocelyn's (LP) statement was perhaps the most enthusiastic, "This program will have a really good impact on my students; I am excited!"

At the same time in fall, two thirds of the teachers in each group, also attributed progress to a factor not aligned with expertise: that of improving student confidence. The belief that more confidence would help their students make progress was pervasive with only one teacher in each group not

referring to growing confidence to explain how progress would occur.

We expected that by spring, all HP teachers would continue to attribute their student's positive progress to the teachers' growing expertise, or their students' growing expertise, or some aspect of fit with the program, and those who did not in the fall, would become aligned by spring. For the most part, this trend of being aligned or becoming aligned with the belief that progress was due to the PD, was supported. By spring, five of six HP teachers (Dorothy, Olivia, Tracy, Rachel, and Claire) all referred to their growing expertise and the fit of the program to explain their students' progress. (See Table 5).

We were not surprised to find LP teachers trending away from the view that the program would be a good fit (Amber,

**Table 5.** Trends in Efficacy Beliefs.

Efficacy	Low progress		High progress	
	Fall	Spring	Fall	Spring
Attributed to PD				
Student's expertise	Amber Belinda Maria	Jocelyn Melissa	Dorothy	Dorothy Claire
Teacher expertise	Belinda Maria Melissa Nina	Belinda Maria Melissa Amber	Dorothy Olivia Tracy Carolyn	Dorothy Olivia Tracy Claire Rachel
Program Fit	Nina Jocelyn Amber Maria Melissa	Nina Jocelyn	Claire Dorothy Olivia Rachel Tracy Carolyn	Claire Dorothy Olivia Rachel Tracy
Not attributed to PD				
Confidence	Belinda Maria Melissa Jocelyn	Belinda Maria Melissa Amber Nina	Carolyn Claire Olivia Tracy	Carolyn Claire Olivia Tracy Dorothy
More reading	Nina	Nina Jocelyn	Olivia	—
Student internal factors	Belinda Jocelyn Nina	Belinda Jocelyn Amber Maria Melissa	Olivia Claire	Olivia Carolyn Rachel Tracy

Note. PD = professional development.

Maria, and Melissa); instead, they referred to factors internal to the student to explain their (lack of) progress. We were surprised to find, however, that the number of HP teachers who attributed progress to factors internal to the student increased by spring, from four to five of the six teachers. One HP teacher, Carolyn, never mentioned anything in spring related to her expertise or the program, even though she had just spent 7 months of PD learning to use new instructional practices and had referenced those views in the fall interview. During her spring interview, she spoke instead of factors internal to the child as being responsible for the progress, saying, "Something must have clicked." She also spoke of the student's new confidence as playing a role in the good progress. Surprisingly, not once in the 45-min spring interview did HP teacher Carolyn refer to the PD as having anything to do with the progress the student made. Instead, she appeared to believe that her students' progress was more likely related to maturation or some other attribute within the child; and not her new instructional practices.

## Discussion

The purpose of this study was to understand and explore the interplay between teacher beliefs and student progress during

a year-long PD initiative. We were interested in whether beliefs changed in relation to teacher success (defined here as high or low student progress) and the direction of change. The question is an especially relevant one for anyone wanting to use PD to implement and scale a new program. If a teacher believes that an instructional approach is good for students, they will likely teach in accordance with that belief (D'Agostino et al., 2015; Friesen & Butera, 2012; Gerde et al., 2019). Given that we propose student progress may be the agent for change in beliefs about reading instruction, we also examined whether teachers attributed the progress to expertise gained from the PD or factors unrelated to the PD. Thus, we examine not only instructional beliefs, but beliefs about efficacy as well, to see whether progress is attributed to the PD.

Teachers in our study were not free to use their preferred instructional practices because they were part of a funded study and their fidelity to the program was closely monitored. Thus, in our somewhat controlled context, teachers' beliefs about progress, and trends in their beliefs, could be compared in accordance with their success or not with the program.

We assumed, given the literature, that eventual high progress teachers would be aligned with the intervention from the start or become more aligned with it as time went on and

students experienced success. We also hypothesized that teachers whose students had lower progress would not be well-aligned with program in the fall and would move further away by spring, or they never would be aligned at either point in time.

Interview data analysis revealed 12 beliefs held by the teachers related to how they were oriented to instruction and to what they attributed the student progress, 7 of those beliefs were aligned with program features and 5 were not. In fall, the HP and LP teachers did not differ in beliefs according to their Teacher Belief Score, but by spring, HP teachers tended to increase their alignment with the program, whereas LP teachers tended to become less aligned.

In this study, we avoided measurement issues associated with surveys; that of teachers choosing responses to survey statements that are considered desirable (Schachter et al., 2016). Instead, relying on interview data, we were able to allow the beliefs to come from the teachers themselves as they talked about their decision-making. We improved on previous studies by measuring teacher beliefs at the outset and conclusion of PD, rather than retrospectively, an approach recommended by Risko et al. (2008), thus avoiding measurement problems identified by previous researchers (Carney et al., 2016; Hamre et al., 2012). Moreover, the creation of a Teacher Belief Score is a novel approach to measure beliefs; it allowed us to examine the direction of change in beliefs, as suggested by Donovan et al. (2015).

### ***Beliefs About Instruction Are Amenable to Change***

We found much movement in beliefs over the course of PD as the 12 teachers trended toward and away from initial beliefs expressed at the beginning of the PD in response to the same questions about teaching and learning. The belief movement that we documented across the teachers lends support to the notion that the relationship between beliefs and practices may be an interactive one as Richardson (1996) and Borg (2017) have argued.

### ***Positive Student Progress Associated With Changing Beliefs***

We extend the work of those who operationalized success in terms of teacher perception of the experience (Tondeur et al., 2017; Vescio et al., 2008) by defining success instead in terms of student progress; information that teachers collected in each lesson throughout the PD. Teachers whose students made better progress tended to grow in alignment with instructional-related beliefs, adding support to Guskey's (1986) model that successful experiences can affect beliefs in a positive direction. We also found the counterfactual to be the case; teachers whose students did not make positive progress, trended away in their beliefs; so much so that

nonsignificant differences in the fall in their Belief Score became significant by spring.

The fan effect we saw in Figure 1 is reminiscent of Stanovich's Matthew Effect in reading; a model that he used to describe how students making progress continue to make progress, while those who do not, fall further away (Stanovich, 2009). Teachers in our PD whose students experienced progress became more aligned with beliefs associated with the program, while those who did not seem to move on their original beliefs about reading instruction. They had no reason to, as Guskey's model predicted.

### ***Guskey's Model of Change Modified***

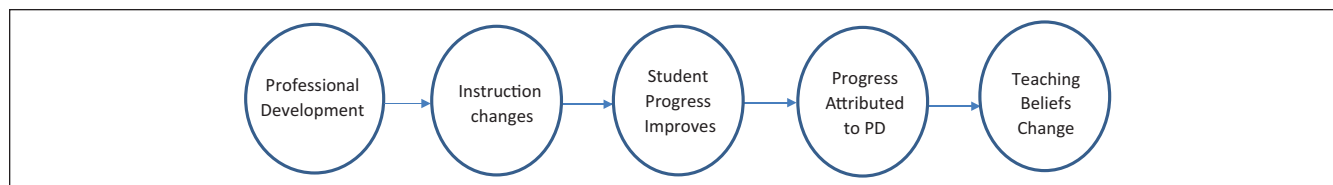
Our findings support the view that successful experiences, defined here as student progress, can influence beliefs, just as Guskey posited, however, our findings reveal that HP teachers might attribute progress to factors within the child over which they had no control, rather than their own growing efficacy with new instructional practices. Just because Carolyn, for example, experienced success in terms of student progress did not mean that she attributed success to her new instructional practices.

Similarly, other HP teachers added reasons in spring having to do with factors external to their PD or their expertise, to explain progress. This HP trend to attribute progress to factors beyond their control is worrisome given the important role of efficacy in adopting new instructional procedures. Put another way, shifts in instructional practices and student progress in PD may not necessarily translate to changed efficacy beliefs (Ruiz et al., 1995). Thus, we propose adding a new component to Guskey's Model of Change, "Progress attributed to PD", as a likely mediating variable between student progress and teacher beliefs (Figure 3).

### ***Design of Literacy PD***

It seems vital that educators experience success with the intervention they are learning to implement, as noted by Johnson (2011) and theorized by Guskey (1986). Taking this idea further, we define success, not simply as feeling positive about the new learning, but in terms of experiencing students making progress in response to the intervention. Conversely, not experiencing student success during the PD may diminish the belief that one can be successful (Johnson, 2011, p. 45); in particular, if others participating in the PD are experiencing success. One implication is that the design of PD needs to be flexible enough to provide tailored coaching as needed to support educators who are adopting new instructional practices but not experiencing student success.

It also seems advisable to include in PD design ways to make the association between student progress and new instructional practices explicit. This might mean including time to examine one's beliefs and relate them to the new instructional practices, as Farrell and Ives (2015) recommended. The questions, "What is the same about this new



**Figure 3.** Modified Guskey's model of teacher change.

Note. Modified from Guskey's Model of the Process of Teacher Change in T. R. Guskey (1986). PD = professional development.

practice and the one you have been using? How does this new practice extend what you have been doing? How is it different?" can help create a bridge between the old practice and the new, and thus mediate the relationship between student progress and changing beliefs. If the PD design leaves this to chance, some might entirely attribute the student's progress to other factors, such as maturity or improved behavior, than the new instruction.

Finally, we also think it is important for PD designs to include regular systems of feedback about student progress. Our intervention design included two formative assessments that teachers administered and interpreted, Running Records in every lesson and the WIF weekly. These formative assessments provided direct, immediate, and ongoing feedback about how students were progressing and thus may have been responsible for HP teachers' shifting beliefs to become aligned with the intervention as time went on. If we relied on pretest and posttest outcome data only, it is hard to imagine that teacher beliefs would have shifted.

## Limitations

Although there were many study strengths, such as interviewing each teacher twice 7 months apart, and identifying beliefs based on what the teacher expressed (as opposed to asking them to rate the degree they ascribed to predetermined beliefs), there were potential limitations to the data collection process as well. As Clarke and Robertson (2001) remind us, we need to be aware of the context in which the interviews took place. The teachers were all participating in two graduate courses (the structure of the PD) when interviewed by graduate students of the project directors. The context could have influenced what the teachers said; perhaps some might have been swayed by the context to talk about teaching and learning in ways that were aligned with the PD (Mansour, 2013; Spruce & Bol, 2015). Yet, given that the interviews were uniform across interviewers, lasted for 40 min each time, yielded variation in responses, and that care was taken to lower the stakes by assuring anonymity, we feel a certain amount of confidence that what the teachers said reflected what they believed at that time.

Another limitation lies in the fact that contextual factors beyond our control likely mediated the relationship between beliefs about instruction and student progress. As we wrote in the "Background Literature" section, a number of contextual factors have been identified as playing a role in whether

or not beliefs about instruction shift. Even though our HP and LP teachers had similar professional experiences and training, we knew little else about their backgrounds or contexts during PD. Other factors suggested by previously reviewed research, such as instructional settings, and local and state policies, could have affected the relationship between beliefs about instruction and what one teaches.

## Conclusion

The enduring interest in teacher beliefs is well justified particularly given the worldwide investment in high-quality PD designed to improve practice. In the United States alone, nearly US\$600 million dollars in grants were awarded by the U.S. Department of Education between 2010 and 2012 to fund interventions to improve academic outcomes for high needs students (Boulay et al., 2018). Knowing that teachers' beliefs may trend away, no matter the evidence-base that might be presented to support the practice and no matter the success that the teachers experience, can inform the structure of PD, and thus help to support teaching improvement. Indeed, teachers might learn new procedures very well in PD and have good knowledge about how to enact them, but if they do not believe the procedures are worthwhile for their students, they may be unlikely to implement and sustain the new practice as others have demonstrated in previous studies. Thus, we agree with Hintz (2014) who argued for the need to study how teachers participating in PD reconcile their beliefs with the new concepts and how they translate those ideas into practice.

We also agree with the perspective that in order to understand teaching practices and to improve teaching, we must have an understanding about what teachers believe (Nespor, 1987; Pajares, 1992) and how that affects practice. This study contributes to the gap in the literature related to the status of teacher beliefs at the outset of a PD program designed to improve early literacy instruction, and trends in those beliefs in relation to student progress.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.


## Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work

was supported by a grant from the U.S. Department of Education's Office of Innovation and Improvement i3 (U411C140095). The views and opinions expressed in this article are those of the authors and not necessarily supported by the USDOE.

### ORCID iDs

Emily Rodgers  <https://orcid.org/0000-0001-5971-1382>

Rebecca Berenbon  <https://orcid.org/0000-0002-8744-3132>

### References

- Anderson, D. (2015). The nature and influence of teacher beliefs and knowledge on the science teaching practice of three generalist New Zealand primary teachers. *Research in Science Education, 45*(3), 395–423. <https://doi.org/10.1007/s11165-014-9428-8>
- Avalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and Teacher Education, 27*(1), 10–20. <https://doi.org/10.1016/j.tate.2010.08.007>
- Baker, S. K., Smolkowski, K., Katz, R., Fien, H., Seeley, J. R., Kame'enui, E. J., & Beck, C. T. (2008). Reading fluency as a predictor of reading proficiency in low-performing, high-poverty schools. *School Psychology Review, 37*(1), 18–37. <https://doi.org/10.1080/02796015.2008.12087905>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.
- Bingham, G. E., & Hall-Kenyon, K. M. (2013). Examining teachers' beliefs about and implementation of a balanced literacy framework. *Journal of Research in Reading, 36*(1), 14–28.
- Boardman, A. G., Argüelles, M. E., Vaughn, S., Hughes, M. T., & Klingner, J. (2005). Special education teachers' views of research-based practices. *The Journal of Special Education, 39*(3), 168–180. <https://doi.org/10.1177/00224669050390030401>
- Bobis, J., Way, J., Anderson, J., & Martin, A. J. (2016). Challenging teacher beliefs about student engagement in mathematics. *Journal of Mathematics Teacher Education, 19*(1), 33–55. <https://doi.org/10.1007/s10857-015-9300-4>
- Borg, S. (2017). Teachers' beliefs and classroom practices. In P. Garrett & J. M. Cots (Eds.), *The Routledge handbook of language awareness* (pp. 75–91). Routledge. <https://doi.org/10.4324/9781315676494>
- Boulay, B., Goodson, B., Olsen, R., McCormick, R., Darrow, C., Frye, M., Gan, K., Harvill, E., & Sarna, M. (2018). *The investing in innovation fund: Summary of 67 evaluations: Final report* (NCEE 2018-4013). National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- Carney, M. B., Brendefur, J. L., Thiede, K., Hughes, G., & Sutton, J. (2016). Statewide mathematics professional development: Teacher knowledge, self-efficacy, and beliefs. *Educational Policy, 30*(4), 539–572. <https://doi.org/10.1177/0895904814550075>
- Cash, A. H., Cabell, S. Q., Hamre, B. K., DeCoster, J., & Pianta, R. C. (2015). Relating prekindergarten teacher beliefs and knowledge to children's language and literacy development. *Teaching and Teacher Education, 48*, 97–105. <https://doi.org/10.1016/j.tate.2015.02.003>
- Clarke, A., & Robertson, A. (2001). Lifting a corner of the research rug: A case for meta-interviews in qualitative studies. *Teaching and Teacher Education, 17*(7), 773–782. [https://doi.org/10.1016/S0742-051X\(01\)00031-2](https://doi.org/10.1016/S0742-051X(01)00031-2)
- Clay, M. M. (2001). *Running records*. Heinemann.
- Corbin, J., & Strauss, A. (Eds.). (2015). *Basics of qualitative research*. Sage.
- Cunningham, J. W., Spadorcia, S. A., Erickson, K. A., Koppenhaver, D. A., Sturm, J. M., & Yoder, D. E. (2005). Investigating the instructional supportiveness of leveled texts. *Reading Research Quarterly, 40*(4), 410–427. <https://doi.org/10.1598/RRQ.40.4.2>
- Cunningham, A. E., Zibulsky, J., Stanovich, K. E., & Stanovich, P. J. (2009). How teachers would spend their time teaching language arts: The mismatch between self-reported and best practices. *Journal of Learning Disabilities, 42*(5), 418–430.
- D'Agostino, J. V., Rodgers, E., Harmey, S., & Brownfield, K. (2015). Introducing an iPad app into literacy instruction for struggling readers: Teacher perceptions and student outcomes. *Journal of Early Childhood Literacy, 16*, 522–548. <https://doi.org/10.1177/1468798415616853>
- Datnow, A., & Castellano, M. (2000). Teachers' responses to Success for All: How beliefs, experiences, and adaptations shape implementation. *American Educational Research Journal, 37*(3), 775–799. <https://doi.org/10.3102/00028312037003775>
- DeFord, D. E. (1985). Validating the construct of theoretical orientation in reading instruction. *Reading Research Quarterly, 20*(3), 351–367.
- Denton, C. A., Ciancio, D. J., & Fletcher, J. M. (2006). Validity, reliability, and utility of the Observation Survey of Early Literacy Achievement. *Reading Research Quarterly, 41*(1), 8–34. <https://doi.org/10.1598/RRQ.41.1.1>
- Devine, D., Fahie, D., & McGillicuddy, D. (2013). What is “good” teaching? Teacher beliefs and practices about their teaching. *Irish Educational Studies, 32*(1), 83–108. <https://doi.org/10.1080/03323315.2013.773228>
- Donovan, D. A., Borda, E. J., Hanley, D. M., & Landel, C. C. (2015). Participation in a multi-institutional curriculum development project changed science faculty knowledge and beliefs about teaching science. *Journal of Science Teacher Education, 26*(2), 193–216. <https://doi.org/10.1007/s10972-014-9414-z>
- Fang, Z. (1996). A review of research on teacher beliefs and practices. *Educational Research, 38*(1), 47–65. <https://doi.org/10.1080/0013188960380104>
- Farrell, T. S., & Ives, J. (2015). Exploring teacher beliefs and classroom practices through reflective practice: A case study. *Language Teaching Research, 19*(5), 594–610. <https://doi.org/10.1177/1362168814541722>
- Farrell, T. S., & Yang, D. (2017). Exploring an EAP teacher's beliefs and practices in teaching L2 speaking: A case study. *RELJ Journal, 50*(1), 104–117. <https://doi.org/10.1177/0033688217730144>
- Fisher, D., Frey, N., & Lapp, D. (2021). Veteran teachers' understanding of “Balanced Literacy”. *Journal of Education*, <https://doi.org/10.1177/00220574211025980>
- Friesen, A., & Butera, G. (2012). “You introduce all of the alphabet. . . But I do not think it should be the main focus”: Exploring early educators' decisions about reading instruction. *Early Childhood Education Journal, 40*(6), 361–368. <https://doi.org/10.1007/s10643-012-0530-0>
- Fuchs, L. S., Fuchs, D., & Compton, D. L. (2004). Monitoring early reading development in first grade: Word identification

- fluency versus nonsense word fluency. *Exceptional Children*, 71(1), 7–21. <https://doi.org/10.1177/001440290407100101>
- Gerde, H. K., Wright, T. S., & Bingham, G. E. (2019). Preschool teachers' beliefs about and instruction for writing. *Journal of Early Childhood Teacher Education*, 40(4), 326–351. <https://doi.org/10.1080/10901027.2019.1593899>
- Gersten, R., & Woodward, J. (1992). The quest to translate research into classroom practice: Strategies for assisting classroom teachers' work with "at risk" students and students with disabilities. In D. Carnine & E. Kameenui (Eds.), *Higher cognitive functioning for all students* (pp. 201–218). PRO-ED.
- Glaser, B. G., & Strauss, A. L. (2017). *Discovery of grounded theory: Strategies for qualitative research*. Routledge.
- Gómez-Bellengé, F.X., Rodgers, E., Wang, C., & Schulz, M. (2005, April). Examination of the validity of the Observation Survey with a comparison to ITBS. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Quebec.
- Goodwin, A. P., & Jiménez, R. T. (2021). The science of reading: supports, critiques, and questions. *Reading Research Quarterly*, 56 (S1), S7–S22.
- Guskey, T. R. (1986). Staff development and the process of teacher change. *Educational Researcher*, 15(5), 5–12. <https://doi.org/10.3102/0013189X015005005>
- Hamre, B. K., Pianta, R. C., Burchinal, M., Field, S., LoCasale-Crouch, J., Downer, J. T., Howes, C., LaParo, K., & Scott-Little, C. (2012). A course on effective teacher-child interactions: Effects on teacher beliefs, knowledge, and observed practice. *American Educational Research Journal*, 49(1), 88–123. <https://doi.org/10.3102/0002831211434596>
- Hanford, E. (2018, September 10). Hard words: Why aren't kids being taught to read? *APM Reports*. Retrieved from <https://www.apmreports.org/episode/2018/09/10/hard-words-why-american-kids-arent-being-taught-to-read>
- Hintz, K. (2014). "A better vision of what social studies can be": How elementary teachers' philosophies influence their use of the History Alive! Textbook. *Theory & Research in Social Education*, 42(1), 96–126. <https://doi.org/10.1080/00933104.2013.876697>
- Hollenbeck, A. F., & Kalchman, M. (2013). Professional development for conceptual change: extending the paradigm to teaching reading comprehension in US schools. *Professional Development in Education*, 39(5), 638–655.
- Hos, R., & Kekec, M. (2014). The mismatch between non-native English as a foreign language (EFL) teachers' grammar beliefs and classroom practices. *Journal of Language Teaching and Research*, 5(1), 80–87. <https://doi.org/10.4304/jltr.5.1.80-87>
- Hoy, A. W., Hoy, W. K., & Davis, H. A. (2009). Teachers' self-efficacy beliefs. In K. R. Wenzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 627–653). Routledge.
- Hudson, R. F., Pullen, P. C., Lane, H. B., & Torgesen, J. K. (2009). The complex nature of reading fluency: A multidimensional view. *Reading & Writing Quarterly*, 25(1), 4–32. <https://doi.org/10.1080/10573560802491208>
- Isiksal-Bostan, M., Sahin, E., & Ertepinar, H. (2015). Teacher beliefs toward using alternative teaching approaches in science and mathematics classes related to experience in teaching. *International Journal of Environmental and Science Education*, 10(5), 603–621. <https://doi.org/10.12973/ijese.2015.257a>
- Johnson, B. W. (2011, Fall). Personal epistemology and self-efficacy in the special education teacher. *Journal of the American Academy of Special Education Professionals*, 45–51.
- Leko, M. M., Kulkarni, S., Lin, M.-C., & Smith, S. A. (2015). Delving deeper into the construct of preservice teacher beliefs about reading instruction for students with disabilities. *Teacher Education and Special Education*, 38(3), 186–206. <https://doi.org/10.1177/0888406414557677>
- Levin, B. B., He, Y., & Allen, M. H. (2013). Teacher beliefs in action: A cross-sectional, longitudinal follow-up study of teachers' personal practical theories. *The Teacher Educator*, 48(3), 201–217. <https://doi.org/10.1080/08878730.2013.796029>
- Linacre, J. M. (2019). *Winsteps® Rasch measurement computer program*. Winsteps.com.
- Liou, Y. H., Canrinus, E. T., & Daly, A. J. (2019). Activating the implementers: The role of organizational expectations, teacher beliefs, and motivation in bringing about reform. *Teaching and Teacher Education*, 79, 60–72. <https://doi.org/10.1016/j.tate.2018.12.004>
- Mansour, N. (2013). Consistencies and inconsistencies between science teachers' beliefs and practices. *International Journal of Science Education*, 35(7), 1230–1275. <https://doi.org/10.1080/09500693.2012.743196>
- Marshall, C., & Rossman, G. B. (2014). *Designing qualitative research* (6th ed.). SAGE.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). SAGE.
- Nespor, J. (1987). The role of beliefs in the practice of teaching. *Journal of Curriculum Studies*, 19(4), 317–328. <https://doi.org/10.1080/0022027870190403>
- Nghia, T. L. H. (2017). What hinders teachers from translating their beliefs into teaching behaviors: The case of teaching generic skills in Vietnamese universities. *Teaching and Teacher Education*, 64, 105–114. <https://doi.org/10.1016/j.tate.2017.02.003>
- Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307–332. <https://doi.org/10.3102/00346543062003307>
- Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula (Ed.), *Handbook of research on teacher education* (pp. 102–119). Macmillan Publishers.
- Risko, V. J., Roller, C. M., Cummins, C., Bean, R. M., Block, C. C., Anders, P. L., & Flood, J. (2008). A critical analysis of research on reading teacher education. *Reading Research Quarterly*, 43(3), 252–288.
- Ruiz, N. T., Rueda, R., Figueroa, R. A., & Boothroyd, M. (1995). Bilingual special education teachers' shifting paradigms: Complex responses to educational reform. *Journal of Learning Disabilities*, 28(10), 622–635.
- Saldaña, J. (2015). *The coding manual for qualitative researchers*. SAGE.
- Saldaña, J., & Omasta, M. (2016). *Qualitative research: Analyzing life*. Sage Publications.
- Schachter, R. E., Spear, C. F., Piasta, S. B., Justice, L. M., & Logan, J. A. (2016). Early childhood educators' knowledge, beliefs, education, experiences, and children's language-and literacy-learning opportunities: What is the connection? *Early Childhood Research Quarterly*, 36, 281–294. <https://doi.org/10.1016/j.ecresq.2016.01.008>

- Schraw, G., & Olafson, L. (2014). Assessing teachers' beliefs: Challenges and solutions. In H. Fives & M. G. Gill (Eds.), *International handbook of research on teachers' beliefs* (pp. 87–105). Routledge.
- Schwartz, S., & Sparks, S. D. (2019, October, 2). How do kids learn to read? What the science says. *Education Week*. <https://www.edweek.org/teaching-learning/how-do-kids-learn-to-read-what-the-science-says/2019/10>
- Scull, J., Nolan, A., & Raban, B. (2012). Young learners: Teachers' conceptualisation and practice of literacy in Australian preschool contexts. *International Journal of Early Years Education*, 20(4), 379–391. <https://doi.org/10.1080/09669760.2012.743101>
- Shanahan, T. (2020). What constitutes a science of reading instruction? *Reading Research Quarterly*, 55, S235–S247. <https://doi.org/10.1002/rrq.349>
- Spear, C. F., Piasta, S. B., Yeomans-Maldonado, G., Ottley, J. R., Justice, L. M., & O'Connell, A. A. (2018). Early childhood general and special educators: An examination of similarities and differences in beliefs, knowledge, and practice. *Journal of Teacher Education*, 69(3), 263–277.
- Spruce, R., & Bol, L. (2015). Teacher beliefs, knowledge, and practice of self-regulated learning. *Metacognition and Learning*, 10(2), 245–277. <https://doi.org/10.1007/s11409-014-9124-0>
- Stanovich, K. E. (2000). *Progress in understanding reading: Scientific foundations and new frontiers*. Guilford Press.
- Stanovich, K. E. (2009). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Journal of Education*, 189(1–2), 23–55. <https://doi.org/10.1177/0022057409189001-204>
- Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. *Educational Technology Research and Development*, 65, 555–575. <https://doi.org/10.1007/s11423-016-9481-2>
- Tortorelli, L. S., Lupo, S. M., & Wheatley, B. C. (2021). Examining teacher preparation for code-related reading instruction: An integrated literature review. *Reading Research Quarterly*, 56(S1), S317–S337.
- Tunmer, W. E., & Nicholson, T. (2011). The development and teaching of word recognition skill. In M. L. Kamil, P. D. Pearson, E. B. Moje, & P. Afflerbach (Eds.), *Handbook of reading research* (Vol. IV, pp. 405–431). Routledge.
- Urbach, J., Moore, B. A., Klingner, J. K., Galman, S., Haager, D., Brownell, M. T., & Dingle, M. (2015). "That's My Job" Comparing the beliefs of more and less accomplished special educators related to their roles and responsibilities. *Teacher Education and Special Education*, 38(4), 323–336.
- Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education*, 24(1), 80–91. <https://doi.org/10.1016/j.tate.2007.01.004>
- Zumeta, R. O., Compton, D. L., & Fuchs, L. S. (2012). Using word identification fluency to monitor first-grade reading development. *Exceptional Children*, 78(2), 201–220. <https://doi.org/10.1177/001440291207800204>

### Author Biographies

**Dr. Emily Rodgers** is a professor of Reading and Literacy in Early and Middle Childhood in the College of Education and Human Ecology at The Ohio State University. She studies educational policies and instructional practices that influence the reading and writing development of young students, as well as the learning of inservice teachers as they take up new instructional practices. Her lines of inquiry have their roots in her early career as a classroom teacher, a reading specialist and a special education teacher in Newfoundland, Canada.

**Dr. Jerome V. D'Agostino** is a professor of Quantitative Research, Evaluation, & Measurement in the College of Education and Human Ecology at The Ohio State University. Dr. D'Agostino's research focuses on measurement validation methods and the evaluation of programs for disadvantaged youth and families. His work is at the interstice of policy and methodology.

**Drs. Rebecca Berenbon, Clara Mikita, and Christa Winkler** were doctoral candidates and **Mollie E. Wright** was a masters student in the College of Education and Human Ecology at The Ohio State University when this manuscript was prepared.