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## Video-Based Discussions About Literacy Pedagogy: Face-to-Face Versus Online Formats

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## **Video-Based Discussions About Literacy Pedagogy: Face-to-Face Versus Online Formats**

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### **Abstract**

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This study evaluated the similarities and differences in 50 preservice teachers' (PTs') literacy pedagogy learning outcomes when they engaged in video-based discussions that were both face-to-face (F2F) synchronous and online asynchronous. Across PTs' response sheets, 396 idea units were collected and coded to identify their reports of learning about literacy pedagogy and application of this learning to their subsequent literacy instruction. Multivariate, multilevel, cross-classification logit regressions were used to compare outcomes across formats. Findings include that PTs reported learning similar total numbers of ideas across both video-based discussion formats but reported applying significantly more ideas from learning in the F2F format. Across both formats, PTs reported learning the greatest number of ideas about literacy methods/materials but learned significantly more methods/materials ideas in the online asynchronous format. PTs also reported applying more literacy methods/materials than all other kinds of ideas learned. They reported applying ideas about students' processing the least. However, the differences across formats may not be practically significant. Thus, for a semester-long course, either F2F or asynchronous online formats could be used with similar learning and application outcomes for PTs.

**Keywords:** *video, reflection, preservice teachers, face-to-face, online*

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Aligned with a national trend of university courses increasingly being offered online (Allen & Seaman, 2016; Best Colleges, 2017), literacy teacher education courses at our universities are now being offered in online asynchronous as well as face-to-face (F2F) formats. As a critical part of these courses, we use video-based discussions to support preservice teacher (PT) development because they provide opportunities to consider multiple perspectives, including the advantages and drawbacks of particular practices, and to poten-

tially reconsider beliefs about teaching (Boling, 2004; Copeland & Decker, 1996; Harrison et al., 2006; Hughes et al., 2000; Schrader et al., 2003). Through these processes, teachers gain better understanding of their teaching practices and the complexities of instruction and thus are able to more aptly respond to different instructional situations in the moment (Anders et al., 2000; Baker & Wedman, 2000; Sanny & Teale, 2008).

Video-based discussions include a PT presenting a video clip of their teaching for their classmates to view/discuss in order to develop multiple perspectives about the advantages and disadvantages of the pedagogy (e.g., Arya et al., 2016; Rosaen et al., 2013; Tripp & Rich, 2012; van Es et al., 2014; Zhang et al., 2015). In F2F, this is done in small groups with PTs sitting around a table together viewing and discussing the video for 10–15 minutes. In the online asynchronous format, the video clip is posted on the discussion board, and a small group of PTs view the video and respond to it as well as to discussion board posts by other PTs in the group anytime they wish across a week. This begs the question: Are PTs' video-based discussion outcomes (i.e., learning and application of learning) commensurate across F2F and online asynchronous formats?

Previous research has not compared PTs' video-based discussion outcomes across F2F and online asynchronous formats. Research has examined how video-based discussions support teachers' learning and application of learning to their pedagogy in F2F format (e.g., Arya et al., 2015; Peters et al., 2017; Shanahan & Tochelli, 2014). A few studies explored how video-based discussions supported teachers' learning in online asynchronous format, but these were limited to explorations in math education and did not include exploring teachers' applications of learning to their pedagogy (e.g., Ding, 2019; Llinares & Valls, 2010; Weber et al., 2018).

To address this, our study focused on the following research questions:

1. Do literacy PTs' F2F synchronous and online asynchronous video-based discussions yield similar or different numbers of reported ideas learned and kinds of ideas learned?
2. Do literacy PTs' F2F synchronous and online asynchronous video-based discussions yield similar or different numbers of reported ideas applied and kinds of ideas applied to their subsequent instruction?

### **Sociocultural Framework**

The underlying mechanisms that occur in video-based discussions are explained by sociocultural theory. First, sociocultural theory explains how learning takes “place in an artifact-saturated medium” that mediates the learning process (Cole & Wertsch, 1996, p. 254). For example, video, used as an artifact, allows teachers to share an experience, discuss it, and thus support one another's learning (Arya et al., 2015; Kourieos, 2016; Peters et al., 2017). Further, it allows “teachers to see the complexity and richness of a real classroom setting by capturing voices, body language, interactions, and a more realistic picture of the learning environment” (Koc et al., 2009, p. 1159). Video grounds the discussion “in ways that are virtually impossible when referents are remote or merely rhetorical” (Ball & Cohen, 1999, p. 17). Second, sociocultural theory describes how receiving scaffolded support from peers through discussions can optimize PTs' individual growth in their zone of proximal development and solve problems that could not be solved when working alone (Arya et al., 2015; Kourieos, 2016; Peters et al., 2017; Vygotsky, 1978).

While our investigation did not explore PTs' social interactions or how they scaffolded one another (because we did not have videos or transcripts of those turn-by-turn interactions), we know that these mechanisms took place based on our previous research

(Arya et al., 2015; Christ et al., 2012, 2014). Instead, our investigation explored only the outcomes (i.e., number and kinds of literacy ideas teachers reported learning and number and kinds of literacy ideas teachers reported applying) of these discussions across the synchronous F2F and asynchronous online formats.

### **Review of Research on Video-Based Discussions**

In this section, we review relevant research about teachers' video-based discussions in F2F synchronous format and online asynchronous format. We include studies that focus on video-based discussions about teachers' own instruction and video case studies of instruction because these tasks are similar and limited research is available on video-based discussions of teachers' own instruction in the online asynchronous format. Further, we incorporate studies across disciplines because very few studies have examined video-based discussions about literacy instruction in the online asynchronous format. We also focus on studies that examined peer-led video-based discussions that were not facilitated by professors because these kinds of discussions are the focus of our study.

#### **Face-to-Face Synchronous Video-Based Discussions**

Research on video-based discussions in the F2F format explore three kinds of outcomes. First, several studies explore teachers' learning from the video-based discussions. Second, studies explore what *kinds of learning* occur. Third, a few studies explore to what extent teachers *apply their learning* from F2F video-based discussions to their subsequent teaching.

#### **Teachers' Learning**

Studies that focus on teachers learning during F2F video-based discussions use different conceptions of learning. For example, a study of early childhood in-service teachers reported qualitative evidence that teachers gain new insights about their own teaching from F2F video-based discussions (Cherrington & Loveridge, 2014). Likewise, in-service teachers' video-based discussions about their own instruction across special education, religion, and English language learning (ELL) qualitatively showed that teachers identify ways to change their practices (Tripp & Rich, 2012). Additionally, in a study of science PTs' F2F video-based discussions of their instruction, researchers used descriptive vignettes to highlight "cogenerative dialogue" among teachers and their subsequent learning (Siry & Martin, 2014, p. 482). Further, in studies of math teachers' F2F video-based discussion outcomes, researchers found that over time PTs increased their depth of noticing and broadened their focus, shifting from more focus on teacher moves and behavior management at first to later focusing more on student interactions and mathematical thinking, thereby learning how to teach more effectively (McDuffie et al., 2014; Mitchell & Marin, 2015).

F2F video-based discussions about literacy pedagogy have resulted in teachers gaining suggestions and insights about how to improve their instruction (Juzwik et al., 2012). In addition, through video-based discussions literacy teachers are able to solve problems that they could not solve independently (Kinzer et al., 2006). Further, when literacy teachers edit or annotate videos for F2F discussion, this deepens their connections and interpretations (Sanny & Teale, 2008). In our previous research on literacy teachers' F2F video-based discussion outcomes, we quantified the number of new pedagogical ideas that teachers reported learning. We found that teachers learned two to five new ideas per F2F video-based discussion session (Arya et al., 2015; Christ et al., 2012, 2014). Our current study similarly focused broadly on PTs' pedagogical ideas learned and quantified these per video-based discussion. This approach facilitated our ability to compare PTs' literacy learn-

ing across F2F synchronous and online asynchronous formats.

### **Kinds of Learning**

A cross-disciplinary analysis of F2F video-based discussion studies identifies three kinds of teacher learning that occur: learning about *instructional methods or materials*, learning about *students' processing*, and learning about *students' engagement*. For example, during F2F video-based discussions, PTs generally identify how to use teaching methods or materials effectively, and this finding is consistent across several disciplines: elementary education, math, English language learning, and literacy (Christ et al., 2014; Harford & MacRuairc, 2008; Kourieos, 2016; McDuffie et al., 2014; Miller, 2009; Peters et al., 2017). In-service teachers primarily identify teaching methods and materials during F2F video-based discussions across the disciplines of math and literacy (Borko et al., 2017; Christ et al., 2012; Sherin & van Es, 2005; Tunney & van Es, 2016). Likewise, during F2F video-based discussions, literacy and elementary education PTs learn about students' engagement (Christ et al., 2014; Harford & MacRuairc, 2008; Miller, 2009). This is also the case for literacy in-service teachers (Christ et al., 2012, 2014). Further, PTs discuss and learn about students' processing during F2F discussions in the field of math (McDuffie et al., 2014; Sherin & van Es, 2005; Walkoe, 2015). Likewise, both literacy preservice and in-service teachers discuss and learn about students' processing during F2F video-based discussions (Christ et al., 2012, 2014). We used these specific categories (methods/materials, student engagement, and student processing) of pedagogical ideas learned in our study to code the kinds of literacy learning that occurred in our PTs' video-based discussions.

### **Application of Learning**

PTs reported applying ideas they learn during F2F video-based discussions about their own teaching in their subsequent instruction, and this occurred across the fields of math, literacy, and social studies (Christ et al., 2014; Hatch et al., 2016; Mitchell & Marin, 2015). In fact, 40% of literacy PTs reported applying ideas learned from F2F video-based discussions to their subsequent teaching (Christ et al., 2014), and 90% of social studies PTs reported applying at least one new idea from video-based discussions to their subsequent teaching (Hatch et al., 2016). Similarly, in-service teachers reported applying new ideas that they learned during F2F video-based discussions, and this occurred across the fields of special education, religion, English language learning, literacy, math, and science (Christ et al., 2014; Kiemer et al., 2015; Shanahan & Tochelli, 2014; Tripp & Rich, 2012). Interestingly, both preservice and in-service literacy teachers most frequently applied ideas about methods or materials after F2F video-based discussions (Christ et al., 2014).

### **Online Asynchronous Video-Based Discussions**

The research available about online asynchronous video-based discussions is sparse compared to the research available about F2F video-based discussions. Most studies focused on math teachers' learning during online asynchronous video-based discussions (Koc et al., 2009; Llinares & Valls, 2009, 2010; Nemirovsky-Galvis, 2004). One study investigated in-service language teachers' learning during online asynchronous video-based discussions (Ding, 2019). We found no studies that explored teachers' application of ideas learned through online asynchronous video-based discussions in any discipline.

### **Teachers' Learning**

Only one study of teachers' learning from online asynchronous video-based discussions addressed learning outcomes. Sixty percent of math in-service teachers reported learning ideas based on their colleagues' feedback during online asynchronous video-based

discussions about their own instruction (Krammer et al., 2006). Other studies of teachers' online asynchronous video-based discussions focused primarily on student performance, teacher–student interactions, conversation roles (e.g., clarifying, providing information), and content-specific pedagogical considerations (e.g., purpose and goal of lesson, use of technology), rather than teachers' learning outcomes, creating a gap in the literature (Ding, 2019, Koc et al., 2009; Llinares & Valls, 2009, 2010; Nemirovsky-Galvis, 2004; Rhine & Bryant, 2007). Our study aimed to address this gap by exploring literacy PTs learning from online asynchronous video-based discussions.

### **Kinds of Learning**

Preservice and in-service teachers across disciplines discussed the same three kinds of learning in online asynchronous video-based discussions as were discussed in the F2F synchronous format. First, both groups of teachers discussed how to use methods and materials effectively in elementary and secondary math (Koc et al., 2009; Llinares & Valls, 2009, 2010; Rhine & Bryant, 2007). Second, both groups of teachers discussed students' information processing in math (Koc et al., 2009; Krammer et al., 2006). Third, PTs discussed engagement and classroom management issues based on their own instructional videos in secondary education (Rhine & Bryant, 2007; Weber et al., 2018). As mentioned previously, these three categories of kinds of learning were used in our study to code the PT's literacy learning.

### **Methods**

To answer our research questions, we used a quasi-experimental, within-subjects design, which reduced the between-participant variance because the same participants engaged in both conditions, and thus the design had greater statistical power.

### **Participants**

We focused on PTs who were taking undergraduate literacy methods courses at the university where the problem-of-practice question was initiated. We focused on PTs because enough courses/participants were available from which to collect data and run statistical comparisons. Fifty White PTs participated in the study. Six were male, and 44 were female. All PTs had taken at least two previous literacy methods courses, which also contained some online components (e.g., discussion boards, video-sharing). Two PTs invited to participate in the study declined (i.e., 5%). They had no discernable shared characteristics.

### **Setting and Course Description**

The research was conducted across four undergraduate reading methods practicum courses, taught by the same instructor, which were designed to prepare PTs in literacy assessment and instruction. Instruction in each course occurred in both F2F and online asynchronous formats (i.e., a hybrid, or blended learning, course format). PTs engaged in different instructional activities throughout the courses. First, they read and discussed journal articles about a particular aspect of literacy pedagogy. This always occurred on online asynchronous discussion boards. Second, PTs engaged in professor-led video case study discussions about that same aspect of pedagogy (usually videos of the professor engaging in the focal practices). These discussions modeled and guided PTs' engagement in critical thinking, reflection, and discussion about pedagogical practices. They at first occurred F2F, but later in the semester some also occurred on online asynchronous discussion boards. Third, PTs planned and implemented literacy lessons with K–8 children who attended the local community center where the course was taught. These 1-hour F2F lessons each week were video recorded. All of these practices prepared PTs for video-based discussions of their own instruction.

## **Video-Based Discussions**

The focus of our study was PTs' video-based discussions. About five times per semester ( $M = 4.62$ ), PTs viewed and reflected on their literacy lesson video to identify what went well, what did not go so well, and how to address what did not go so well. They prepared this reflection to share with their peers and chose a 2- to 3-minute video clip from the lesson and the focal topic that they wanted to discuss with their peers. PTs engaged in the five peer-led video-based discussions in either F2F or online asynchronous discussion board formats (approximately half in each format). Each video-based discussion included three to four peers each sharing their lesson reflection, one 2- to 3-minute video clip, and what they wanted their peers to focus on in the discussion. Then, after viewing the clip, the peers discussed it, often generating learning about literacy pedagogy and ideas for future instruction. Immediately after these discussions, PTs were asked to complete a response log responding to this prompt: "What, if anything, did you learn?" The task was the same across both formats but implemented differently based on the allowances and constraints of each format. For F2F video-based discussions, PTs showed their clips on laptops and iPads. For online asynchronous discussions, clips were uploaded to the online learning platform, Moodle, and then discussed using discussion boards.

Opportunities to engage in F2F versus online asynchronous video-based discussions were staggered across the semester; typically every other session was F2F then online. All PTs engaged in video-based discussions either F2F or online each week (not both). For example, in Week 2, all PTs engaged in F2F video-based discussions; in Week 3, they all engaged in online asynchronous video-based discussions. While the weeks that PTs engaged in video-based discussions varied some across classes (due to teaching schedules each semester, holidays, school closings, etc.), PTs in the same class were always engaged in the same format for video-based discussions at the same time.

## **Data Collection**

Two-hundred thirty-one response sheets were collected from the 50 participants. This was about five responses each. These were collected immediately after PTs' video-based discussions across both F2F and online asynchronous formats (as described in the previous section) in each of the four course sections. These data allowed us to code PTs' literacy learning.

At the end of the semester, PTs were asked to review what they had written on each of their response sheets and report whether they had applied each of these ideas in their subsequent teaching throughout the semester. If they had applied their learning, they were asked to report how they had applied it. These data allowed us to code PTs' application of literacy learning.

To encourage honest responses, PTs were not graded on their amount of learning or their report of application of learning to subsequent instruction. Instead, they earned points for F2F video-based discussions by (a) being present for the discussion group in class; (b) sharing their reflection, video clip, and focus for the discussion; and (c) participating in the 10- to 15-minute discussion. For online asynchronous video-based discussions, PTs earned points by meeting the criteria for participating on the discussion board: (a) post reflection, video clip, and focus for the discussion and (b) respond to others on the board a minimum of three times.

## **Data Coding**

The first two authors collaboratively coded the data by (1) preparing data, (2) identifying idea units, (3) coding literacy ideas that PTs reported learning, and (4) coding literacy ideas that PTs reported applying. All decisions were discussed until consensus was reached.

## **Preparing Data**

PTs' video-based discussion responses were entered verbatim into a database. For each, the PT's pseudonym and the date of the response were also entered. Participants' demographic data and date of response (i.e., time) were used as control variables.

## **Identifying Idea Units**

All responses were broken into idea units. Each idea unit included one idea learned related to the literacy teaching practice being discussed. For example, in one video-based discussion response, PT Amy (all names are pseudonyms) wrote the following:

I learned that when you are working with students on making text-to-self connections, it is beneficial to explain why this is important and how it helps them to understand the text better. Also, when students are struggling with making connections to the story, it may be helpful to focus on a specific part of the text or a picture that the students could relate to and ask questions to help trigger a connection. This may help them take a specific part of the text and make a connection that aligns with that.

This response contained two idea units: (1) explain why it is important to make connections and (2) ask a question related to a specific part of the text to support the student in making a connection. Each idea unit was moved onto a separate row of a database with the PT's pseudonym and the date of the video-based discussion response. Breaking each response into idea units allowed us to quantify how many literacy ideas each PT learned in each video-based discussion session. There were 396 idea units regarding what PTs learned about literacy instruction across the dataset.

## **Coding Ideas That PTs Reported Learning**

Based on kinds of learning categories from our literature review and applied in our previous F2F video-based discussion research, we categorized each idea unit according to the kind of idea learned that it represented: (a) literacy instructional methods or materials, (b) students' literacy engagement, or (c) students' literacy processing (Christ et al., 2012, 2014). For example, Amy reported learning two ideas about literacy methods/materials. She learned to (1) explain why it is important to make connections and (2) ask a question about a specific part of the text to facilitate making a connection. These reports of literacy ideas learned were the first outcome variable.

Twenty-one percent of PTs' reports of learning lacked sufficient detail to categorize (e.g., "iPads can be distracting and also very useful") and were coded as "uncodeable." Also, some idea units addressed multiple kinds of learning and were coded as multiple categories to reflect this (e.g., literacy methods/materials and literacy engagement).

## **Coding Ideas That PTs Reported Applying**

Together, both coders reviewed the PTs' final response sheet entries to identify which ideas they subsequently reported applying to their literacy teaching. Coders identified each idea unit in the database as "applied" or "not applied." For example, Amy did not report applying either of the ideas listed above in her subsequent teaching, so they were coded "not applied." PTs' reports of applying literacy ideas learned was the second outcome variable.

## **Data Analysis**

Analyzing the above data required addressing issues regarding the outcome vari-

ables (differences across PTs, sessions, and literacy ideas; discrete outcomes; multiple outcomes) and explanatory variables (false positives, differences in effect sizes, indirect effects, interactions across levels). How this was accomplished is presented in Table 1.

**Explanatory Model**

We modeled PTs’ number of literacy ideas learned in each session, number of literacy ideas learned of each kind in each session, and number of literacy ideas applied from each session with a multivariate outcome, multilevel analysis (Goldstein, 2011). Because the outcomes are count variables with high standard deviations relative to their means, they resemble a Poisson distribution. We entered the variables according to time constraints, expected causal relationships, and likely importance.

$$\text{Ideas\_learned\_applied}_{jk} = F(\beta + f_k + \beta_1 \text{Female\_PT}_k + \beta_{wk} \text{Video-based\_discussions}_{jk}) + e_{jk} \quad (1)$$

In **Ideas\_learned\_applied**, the outcome *y* (*number of literacy ideas learned, number of literacy methods/materials ideas learned, number of literacy engagement ideas learned, number of literacy processing ideas learned, or number of literacy ideas applied*) in session *j* by PT *k* via the link function *F* for a Poisson distribution has a grand mean intercept  $\beta_0$ , with unexplained components (*residuals*) at the lesson and PT levels ( $e_{jk}$  and  $f_k$ , respectively).

Table 1  
*Statistics Strategies to Address Each Analytic Difficulty*

Analytic difficulty	Statistics strategy
Outcome variables	
<ul style="list-style-type: none"> <li>Differences across teachers, sessions, or ideas (T1 ≠ T2; S1 ≠ S2; I1 ≠ I2)</li> <li>Discrete variable (yes vs. no)</li> <li>Multiple outcomes (Y1, Y2)</li> </ul>	<ul style="list-style-type: none"> <li>Multilevel analysis (aka Hierarchical linear modeling; Goldstein, 2011)</li> <li>Logit/probit (Kennedy, 2008)</li> <li>Multivariate outcome models (Goldstein, 2011)</li> </ul>
Explanatory variables	
<ul style="list-style-type: none"> <li>False positives</li> <li>Compare effect sizes (e.g., kinds of ideas differ?)</li> <li>Indirect, multilevel mediation effects (X → M → Y)</li> <li>Cross-level interaction effects (e.g., teacher gender x online)</li> </ul>	<ul style="list-style-type: none"> <li>Two-stage linear step-up procedure (Benjamini et al., 2006)</li> <li>Lagrange multiplier tests (Bertsekas, 2014)</li> <li>Multilevel M-tests (MacKinnon et al., 2004)</li> <li>Random effects model (Goldstein, 2011)</li> </ul>

First, we entered a PT attribute: *female\_PT*. Because only omitting nonsignificant variables does not yield omitted variable bias, we safely removed nonsignificant variables to increase precision and reduce multicollinearity (Kennedy, 2008). Next, we entered attributes of video-based discussions: online (vs. F2F) and number of discussions (**Video-based discussions**).

An alpha level of .05 was used. As noted above, we reduced the likelihood of false positives with the two-stage linear step-up procedure (Benjamini et al., 2006). To test whether idea attributes (**Ideas**) differed from one another, we applied Lagrange multiplier tests (Bertsekas, 2014).

We tested whether number of sessions (level 2) or online format (level 1) mediated the relation between female teacher (level 2) and each outcome with the multilevel M-test (MacKinnon et al., 2004). With nested data, incorrectly modeling interaction effects across levels (e.g., Teacher X session) can bias the results, so we used a random effects model (Goldstein, 2011). If the coefficient of an explanatory variable (e.g.,  $\beta_{vj} = \beta_{v0} + f_{vj}$ ) differed significantly across levels ( $f_{vj} \neq 0?$ ), then we tested for cross-level moderation with structural variables (e.g., PT gender).

All explanatory model results discussed below describe first entry into the regression, controlling for all previously included variables. Ancillary regressions and statistical tests are available in online Appendix A (<https://tinyurl.com/yy4mnf6a>).

## Results

We answer research questions 1 and 2, respectively, by presenting summary statistics about PTs' reports of the (1) numbers and kinds of literacy pedagogy ideas learned and (2) numbers and kinds of literacy pedagogy ideas applied per session for F2F synchronous versus online asynchronous video-based discussion formats. Then, we present the results of the explanatory models to show similarities and differences in PTs' reports of learning about literacy pedagogy across the formats.

### Numbers and Kinds of Literacy Pedagogy Ideas Learned per Session

#### Descriptive Statistics

On average, PTs reported learning similar total numbers of ideas about literacy pedagogy during each of their 111 F2F synchronous (1.95 ideas) and 120 online asynchronous (1.97 ideas) video-based discussion sessions (Table 2).

In an F2F session, PTs reported learning an average of 1.1 literacy methods/materials ideas. For example, Mary reported learning to get the student's "opinion on what kind of books he likes" to help her choose a book that would better capture his interest. PTs reported learning an average of 0.23 literacy engagement ideas per F2F session. Jackie reported that she learned she should "find a more interactive book." She explained that this was because "hotspots [clickable interactive features] make it more attention grabbing." Additionally, PTs reported learning 0.1 literacy processing ideas, on average, in each F2F session. For instance, based on an F2F session, Janice reported learning that her student needed to "try chunking or sounding out" as a reader process to decode an unfamiliar word.

Table 2

*Summary Statistics of Video-Based Literacy Discussion Sessions (N = 231 sessions by 50 teachers)*

Session Variable	Online format (n = 120)				Face-to-face format (n = 111)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Ideas learned	1.967	1.236	1	7	1.946	1.327	1	7
Applications of ideas learned	0.292	0.541	0	3	0.477	0.672	0	3
Methods/materials ideas learned	1.417	1.009	0	6	1.099	1.035	0	5
Student engagement ideas learned	0.158	0.467	0	3	0.225	0.499	0	2
Student process ideas learned	0.175	0.423	0	2	0.099	0.300	0	1
Methods/materials ideas applied	0.258	0.494	0	3	0.306	0.615	0	3
Student engagement ideas applied	0.042	0.239	0	2	0.108	0.366	0	2
Student process ideas applied	0.008	0.091	0	1	0.000	0.000	0	0

In an online asynchronous session, PTs reported learning an average of 1.42 literacy methods/materials ideas. For example, Colin reported learning that, “in order to help students make connections with a text, it will help to ask more specific personalized questions [rather] than just broad questions.” Also, PTs reported learning, on average, 0.16 literacy engagement ideas in an online session. For example, Matthew reported learning that it is important “to find one [a book] the student can relate to keep them engaged.” Further, PTs reported learning an average of 0.18 literacy-processing ideas in an online session. Lavern reported learning “to work with my student more to ensure he understands directionality” as a literacy process to read text in the correct sequence.

### **Explanatory Models**

Most of the differences in ideas PTs reported learning about literacy differed much more across sessions (66%) than across PTs (34%). This is likely because some sessions provided video content that presented more new ideas about literacy for an individual PT to learn than did others. The total number of literacy ideas PTs reported learning from each session did not differ significantly by number of sessions, gender, or session format (online vs. F2F; see Table 3, top panel, models 1 and 2).

However, PTs reported learning significantly more literacy methods/materials ideas during online sessions than F2F sessions (0.25; see Table 3, second panel, model 2), accounting for 6% of the variance. Other kinds of ideas PTs reported learning (literacy engagement, literacy processing) showed no significant differences across number of sessions, gender, or session format (Table 3).

Table 3

*Significant, Unstandardized Parameter Coefficients of Two-Level, Cross-classification Regressions Modeling Total Number of Literacy Pedagogy Ideas Learned (with standard errors in parentheses)*

Explanatory variable	Models of literacy ideas learned			
	Model 1	Model 2	Model 3	Model 4
	Total literacy ideas learned from each session			
Number of sessions	0.193 (0.148)	0.192 (0.144)	0.192 (0.144)	0.192 (0.144)
Female PT (vs. male PT)	0.011 (0.535)	0.004 (0.535)	0.004 (0.535)	0.004 (0.535)
Online asynchronous format (vs. F2F format)		0.546 (0.372)	0.546 (0.372)	0.546 (0.372)
Variance at each level	Variance explained at each level			
PT (34%)	0.000	0.000	0.000	0.000
Session (66%)	0.000	0.009	0.009	0.009
Total variance explained	0.000	0.006	0.006	0.006
	Total literacy methods/materials ideas learned per session			
Number of sessions	0.163 (0.130)	0.162 (0.130)	0.162 (0.130)	0.162 (0.130)
Female PT (vs. male PT)	-0.163 (0.190)	-0.208 (0.164)	-0.208 (0.164)	-0.208 (0.164)
Online asynchronous format (vs. F2F format)		0.253 * (0.119)	0.253 * (0.119)	0.253 * (0.119)

Variance at each level	Variance explained at each level			
PT (40%)	0.000	0.000	0.000	0.000
Session (60%)	0.000	0.097	0.097	0.097
Total variance explained	0.000	0.058	0.058	0.058
	Total literacy engagement ideas learned per session			
Number of sessions	0.183	0.178	0.178	0.178
	(0.128)	(0.123)	(0.123)	(0.123)
Female PT (vs. male PT)	-0.430	-0.422	-0.422	-0.422
	(0.391)	(0.391)	(0.391)	(0.391)
Online asynchronous format (vs. F2F format)		-0.277	-0.277	-0.277
		(0.303)	(0.303)	(0.303)
Variance at each level	Variance explained at each level			
PT (34%)	0.009	0.009	0.009	0.009
Session (66%)	0.000	0.006	0.006	0.006
Total variance explained	0.003	0.007	0.007	0.007
	Total literacy processes ideas learned per session			
# Sessions	0.153	0.151	0.151	0.151
	(0.118)	(0.117)	(0.117)	(0.117)
Female PT (vs. male PT)	-0.145	-0.146	-0.146	-0.146
	(0.138)	(0.138)	(0.138)	(0.138)
Online asynchronous format (vs. F2F format)		0.033	0.033	0.033
		(0.097)	(0.097)	(0.097)
Variance at each level	Variance explained at each level			
PT (19%)	0.074	0.074	0.074	0.074
Session (81%)	0.000	0.001	0.001	0.001
Total variance explained	0.014	0.015	0.015	0.015

*Note.* F2F = face to face; PT= preservice teacher. The outcomes in Tables 3 and 4 were simultaneously modeled in one analysis to reduce bias in the standard errors (due to correlated residuals). To facilitate reader comprehension, these results are presented in separate tables. Each model included a constant term. \*p < .05.

## Numbers and Kinds of Literacy Pedagogy Ideas Applied From Each Session

### Descriptive Statistics

In contrast to the finding that online synchronous sessions prompted more ideas, results indicate that PTs applied ideas more from the F2F sessions (0.48) than online asynchronous sessions (0.29), on average (see Table 2). In each F2F session, PTs reported applying an average of 0.31 literacy methods/materials ideas. For example, Mary applied the language experience approach, a literacy method, and had the child focus on a holiday they celebrated. PTs reported applying an average of just 0.11 literacy engagement ideas. For example, Tammy reported applying the idea to let her students choose an app book to increase their literacy engagement. PTs did not report applying any literacy-processing ideas (Table 2). In each online session, PTs reported applying an average of 0.26 literacy methods/materials ideas, 0.04 literacy engagement ideas, and 0.01 literacy-processing ideas (because some ideas fell into multiple categories, these do not sum to the total number of ideas PTs reported applying per online session, which is 0.29; see Table 2).

### Explanatory Models

Our explanatory model showed that PTs, sessions, and kinds of literacy ideas were linked to the numbers of ideas PTs reported applying to subsequent instruction. Female PTs reported applying fewer literacy ideas from each session, compared to male PTs ( $-0.65$ ; see Table 4, model 1), accounting for nearly 3% of the variance. However, this finding should be interpreted with caution due to the small number of male participants. Furthermore, PTs reported applying significantly fewer literacy ideas from online versus F2F sessions ( $-0.55$ ; see Table 4, model 2), accounting for about 2.6% of the variance. Further, PTs reported applying significantly more literacy engagement ideas learned than all other kinds of ideas learned (literacy methods/materials [ $LM = 4.74$ ;  $p < .05$ ], literacy processing [ $LM = 10.28$ ;  $p < .01$ ]; see Table 4, model 4) and significantly fewer literacy-processing ideas learned than literacy methods/materials ideas learned [ $LM = 4.56$ ;  $p < .05$ ]. Kinds of ideas PTs reported applying accounted for about 4% of the variance. Most of the differences in ideas PTs reported applying occurred across sessions (68%) rather than across PTs (32%). All mediation tests and all interactions were not significant.

Table 4

*Significant, Unstandardized Parameter Coefficients of Two-Level, Cross-classification Regressions Modeling Total Applied Literacy Pedagogy Ideas (with standard errors in parentheses)*

Explanatory variable	Total applied literacy ideas from each session			
	Model 1	Model 2	Model 3	Model 4
Number of sessions	0.093 (0.088)	0.086 (0.086)	0.084 (0.086)	0.084 (0.086)
Female PT (vs. male PT)	$-0.645^{***}$ (0.183)	$-0.629^{***}$ (0.183)	$-0.599^{**}$ (0.185)	$-0.568^{**}$ (0.188)
Online asynchronous format (vs. F2F format)		$-0.554^*$ (0.155)	$-0.560^{***}$ (0.155)	$-0.487^{**}$ (0.159)

Learned more ideas			0.187	
			(0.163)	
Methods/materials ideas learned			0.001	
			(0.173)	
Student engagement ideas learned			0.545 **	
			(0.191)	
Students processes ideas learned			-1.168 *	
			(0.509)	
Variance at each level	Variance explained at each level			
PT (32%)	0.091	0.091	0.107	0.204
Session (68%)	0.000	0.038	0.038	0.038
Total variance explained	0.029	0.055	0.060	0.091

*Note.* F2F = face to face; PT= preservice teacher. The outcomes in Tables 3 and 4 were simultaneously modeled in one analysis to reduce bias in the standard errors (due to correlated residuals). To facilitate reader comprehension, these results are presented in separate tables. Each model included a constant term. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

<sup>a</sup>Lagrange multiplier tests show that the regression coefficient of learned methods/materials ideas significantly exceeded those of other kinds (engagement [LM = 5.73;  $p < .05$ ], processes [LM = 14.94;  $p < .001$ ]), and that of engagement idea significantly exceeded that of processes idea [LM = 4.64;  $p < .05$ ].

## Discussion

This study compared PTs’ reports of learning about literacy pedagogy, kinds of learning (literacy methods/materials, literacy engagement, literacy processing), and application of this learning to their subsequent literacy teaching across F2F and online asynchronous video-based discussion formats. In the following sections, we discuss our findings in the context of existing research.

### Literacy Pedagogy Ideas Learned

We found that PTs reported being able to generate new ideas about literacy pedagogy across both formats. This coheres with previous research in other fields, such as math (Koc et al., 2009; Krammer et al., 2006; Llinares & Valls, 2009, 2010; McDuffie et al., 2014; Mitchell & Marin, 2015; Siry & Martin, 2014). Further, it extends what was known about literacy video-based discussions by showing that not only F2F synchronous video-based discussions yield new pedagogical ideas (Arya et al., 2015; Juzwik et al., 2012; Kinzer et al., 2006; Sanny & Teale, 2008; Shanahan & Tochelli, 2014), but online asynchronous video-based discussions yield a similar average overall number of ideas learned as well.

However, our findings related to kinds of literacy learning PTs reported are nuanced. PTs learned significantly more ideas about literacy methods/materials in the online asynchronous video-based format, as compared to the F2F format. However, while this finding is statistically significant, it may not be practically significant. For example, the difference between literacy methods/materials ideas PTs reported learning across the two formats

was 0.317. Thus, it would take more than three sessions for a PT to potentially learn one more idea in the F2F format, as compared to the online format. Given that PTs engaged in video-based discussions only five times, there was little practical difference in their reported learning (i.e., less than one idea). Therefore, in most cases, using either format will have similar results for PTs' literacy learning about ideas related to methods/materials.

Additionally, across both F2F and online asynchronous formats, the number of ideas PTs reported learning about students' literacy processes was woefully low (0.099 and 0.175, respectively). In a practical sense, this was one idea, on average, about literacy processing across every 10 video-based discussions. PTs' learning about engagement was also similarly low across both formats. Thus, we conclude that, irrespective of format, these video-based discussions did not support PTs' learning about students' literacy processing and engagement well. The low numbers of ideas learned about literacy processing coheres with our previous research on F2F video-based discussions (Christ et al., 2014). We conjecture that these findings suggest PTs' need scaffolding from a more knowledgeable other (e.g., the professor; Vygotsky, 1978) to analyze and interpret students' literacy processing and engagement (Arya & Christ, 2013). For example, professor-facilitated video-based discussions can support PTs' using the artifact-saturated medium to collaboratively notice and think (Cole & Wertsch, 1996) about students' literacy processing and engagement. This can help them generate new learning over time that they would not be able to develop independently (Peters et al., 2017).

### **PTs' Literacy Pedagogy Ideas Applied**

Our study was the first to compare literacy PTs' reports of applications of learning across online asynchronous and F2F video-based discussions. This extends previous reports of PTs' application of literacy ideas learned in F2F video-based discussion formats (Christ et al., 2014; Shanahan & Tochelli, 2014). These extensions show that there were significant differences between the total number of literacy ideas that PTs reported applying across formats, with fewer ideas being applied that were learned in the online format. One possible reason for our finding that the F2F format yielded more applications of literacy learning to subsequent instruction may be that there were qualitative differences in the learning process related to the social construction of knowledge among peers in each format of video-based discussion (Vygotsky, 1978). We wonder if some aspect of being F2F supported PTs' decisions to apply ideas differently. Future research that includes both fine-grained analysis of PTs' conversations and interviews with PTs to better understand their experiences in each of these formats might provide insights to help explain these differences.

Further, it is important to note that while students learned fewer ideas about literacy engagement (as compared to literacy methods/materials), they were more apt to apply these ideas. This could be because when students are less attentive or disengaged PTs have a more challenging time teaching, so they are more motivated to apply these ideas.

### **Implications**

Several implications for literacy PT education can be drawn from our findings. First, either F2F synchronous or online asynchronous format, or both, can be used to support PTs' literacy pedagogical learning. So, regardless of the course format, video-based discussions are suitable for enhancing PTs' literacy learning. This allows courses to be offered in different formats and still reap the benefits of video-based discussions.

Second, literacy teacher educators should use video-based discussions (in either format) to specifically support PTs' learning about methods/materials, because PTs reported

more new ideas learned about methods/materials than any other kind of learning. Likely, this is because these ideas are more concrete as compared to ideas about engagement or reader processing.

Third, student-led video-based discussions (like those used in this study) should not be relied on to help PTs generate ideas about literacy processing. Instead, video-based methods that involve the professor's guidance and support (e.g., for noticing and thinking about students' literacy processing) might be a better choice to support PTs' learning in these areas. This is because this kind of understanding is more complex and challenging to develop.

Fourth, PT educators should use video-based discussions to support PTs' learning about literacy engagement. While PTs generated low numbers of ideas about literacy engagement, they were significantly more likely to apply their learning about this to their subsequent teaching, as compared to applying other kinds of learning.

Finally, if the goal is for PTs to apply what they learn from video-based discussions to their subsequent teaching, then F2F discussions should be encouraged. Engaging in F2F discussions is important, because they yield significantly more applications of learning as compared to online asynchronous format discussions.

### **Limitations and Future Research**

This study has four important limitations, which suggest directions for future research. First, the sample was limited, notably with only four male teachers. Future studies can include a larger sample with greater diversity, including more male teachers. Second, the present study was limited by its sole focus on PTs taking a literacy methods course in a teacher education program. Future research might explore whether similar findings occur for in-service literacy teachers and school-based professional development. Third, our study focused on comparing PTs performance in just one activity (i.e., video-based discussion for reflection). Future research might investigate whether there are differences across F2F and online asynchronous formats for other methods designed to support teachers' improvements of specific issues in their literacy instruction. Fourth, we did not have transcripts of PTs' conversations or interviews with PTs about their literacy learning or applications to allow for more fine-grained analysis to explore whether the length or content of PTs video-based conversations might explain our outcomes in terms of the differences in applications of ideas learned across formats. Future research might include these kinds of data to explore this further. For example, PTs could be interviewed to understand why they do or do not apply certain literacy ideas learned.

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