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Collaborating Online: Tools for Improving Teacher Preparation in Literacy

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Imagine a higher education classroom in which teacher candidates in various teacher preparation programs are working together to design, implement, and analyze a literacy lesson. Some are preservice teachers in initial teacher preparation programs, while others are current teachers, and a few are curriculum specialists working towards advanced certification in graduate literacy specialist programs across the United States. In this manuscript, we refer to teacher candidates as those enrolled in undergraduate and graduate programs leading to initial teacher certifications, as well as those enrolled in advanced graduate programs seeking add-on or advanced teaching certifications; whereas students refers the children these teaching candidates influence in prekindergarten through 12th-grade (P-12) classrooms. Although the teacher candidates in the scenario live in various geographical areas of the United States, they are using online tools to share their varied knowledge and teaching experiences to influence lesson design and outcomes. As they work together, they build and deepen knowledge of the specific skills students need to comprehend text, instructional methods for teaching these skills, and techniques for working with and supporting each other. Collaboration is an essential 21st-century skill, ultimately improving learning outcomes in schools across the country (Anrig, 2015).

In order to develop essential skills for collaboration, teacher preparation programs should provide experiences to foster collaboration among teacher candidates that go beyond the boundaries of particular programs and classrooms. In this scenario, there is added value in having the teacher candidates work together. For example, the graduate candidates in literacy specialist programs may learn and apply coaching practices to work with the preservice teacher candidates. At the same, the preservice teacher candidates are developing their knowledge of children's literacy development and application of effective instructional practices under the

guidance of a supportive colleague. As two teacher educators, we ventured to explore how we could assist our teacher candidates (of various backgrounds, career levels, and geographical locations) in developing literacy knowledge and expertise through ongoing collaboration. In the following sections, we describe how the professional literature shaped our thinking and the implications for our work, as well as envision how one may provide collaborative opportunities in courses across different programs and levels of teacher candidates. Our intent is to encourage teacher educators to consider useful tools and creative ways to build candidates' content and pedagogical knowledge and design practice-based teaching experiences through collaborative opportunities where they learn with and from each other.

Collaboration as an Instructional Practice

Broadly considered, collaboration involves a group of people working together toward a common goal (Goulet, Krentz, & Christiansen, 2003). However, anyone who has participated in a group project where work is divided up and completed individually realizes that genuine collaboration involves more interactivity, participation, and group thinking amongst collaborators. Genuine "collaboration is a particular way of coming together, thinking, and acting" which "matures over time through contributions that each participant makes through the processes involved in consultation, collegial interactions, and cooperation" (Goulet et al., 2003, p. 329). Identified as one of the "Four Cs" (communication, critical thinking, collaboration, and creativity) essential for 21st-century learning, collaboration is recognized as a skill that is necessary in order to yield significant and effective results (National Education Association [NEA], n.d.). Through genuine collaboration, groups create products and processes that change individuals' understandings and actions as well as those of the collective group.

In higher education classrooms, collaborative learning structures have been proven to improve learner achievement, attitudes, engagement, satisfaction, and retention rates when interactions between learners are facilitated and fostered (Agosto, Copeland, & Zach, 2013; Prince, 2004). Learners are encouraged to learn not only from their instructors but from each other as well (Adams Becker et al., 2017). According to Adams Becker et al. (2017), a collaborative learning approach involves learner-centered instruction, learner interaction, group work, and problem-solving challenges. Collaborative learning opportunities formed around authentic problems within the field anchor learning in authentic, meaningful, and purposeful contexts, making them a highly effective way to facilitate the types of learner interactions that lead to authentic collaboration (So & Brush, 2008). These types of experiences produce higher levels of connectedness between learners, which results in improved satisfaction and learning outcomes (So & Brush, 2007). In addition to benefits within higher education classrooms, the skills learners develop through collaborative learning environments, which include higher-order thinking, leadership, and improved self-esteem, may transfer to skills that are required in their future careers (Adams Becker et al., 2017).

In this manuscript, we capture a variety of readily available technology tools, such as wikis, blogs, video conferencing tools, video sharing services, etc., that support collaboration, and therefore learning, across P-12 and higher education settings. In our experience, these tools, albeit common, are often underutilized in today's classrooms or are not always explicitly taught as learning tools in teacher preparation programs. We present them as a means for increasing collaborative instruction in a way that maximizes teaching and learning, and the learning of current and future students.

Practice-Based Teaching Experiences

Many agencies and professional associations are calling for increased opportunities for practice-based teaching experiences within teacher preparation programs (Adams Becker et al., 2017; Benedict, HoldHeide, Brownell, & Foley, 2016; International Literacy Association [ILA], 2018). Well-structured practice-based opportunities provide teacher candidates with experiences integrating the knowledge and skills they have acquired in authentic contexts while receiving critical feedback, which develops important teacher decision-making skills (Benedict et al., 2016). Recently released standards for literacy educator preparation programs from ILA (2018) note that teacher candidates should receive collaborative, reflective feedback from supervisors, other teachers/colleagues, and peers. In addition, collaborative teaching and learning models, such as co-teaching, are becoming increasingly more prevalent in schools across the country because teachers benefit professionally from these collaborative experiences (Graziano & Navarrete, 2012). Opportunities for collaboration in preparation programs result in teacher candidates' improved decision-making, reflective practice, more effective instruction and assessment, and a sense of shared responsibility in student learning; ultimately, these benefits produce gains in student achievement (Graziano & Navarrete, 2012).

Some teacher preparation programs have begun to explore ways to provide collaborative practice-based opportunities for their candidates using the new affordances of technology, including wikis, blogs, video conferencing tools, podcasts, and more. For example, Donne (2012) utilized a collaborative wiki with graduate students as a means of building knowledge about different disabilities. Video conferencing tools have also been used successfully in teacher preparation programs to foster collaboration between candidates in different geographical locations. In a study conducted by Howell, Rintamaa, Faulkner, and DiCicco (2017), candidates from three universities viewed and commented on a novice teacher implementing a lesson using

a web-based video conference tool; meanwhile, candidates used another app to text responses to key questions posed by their professors during the lesson. After the lesson, the novice teacher joined the video conference to support candidates' reflections of the lesson, resulting in growth for both the candidates and the novice teacher (Howell et al., 2017). Finally, another study conducted across two countries explored how candidates collaboratively designed teaching sequences in small groups utilizing chat rooms, video conference tools, and wikis, then subsequently created podcast-based teaching units through the virtual world Second Life (Dooley & Sadler, 2013). Each of these examples shows how technology can be successfully used to facilitate practice-based opportunities that foster knowledge development, reflection, and collaboration.

Theoretical Foundations

Elements of collaborative learning structures are rooted in social constructivist theories. According to Vygotsky (1978), learning is a social process that takes place through interactions with others. Individuals construct meaning as they talk to each other and interact with various tools. Even more importantly, social interactions with experts provide guidance to novices about the social and cultural ways of thinking and acting in a discipline, known as apprenticeship. Therefore, Vygotsky's (1978) sociocultural learning theory validates that learning is a social event that should be meaningfully scaffolded and allow learners multiple attempts to collaboratively refine their learning with peers' and experts' guidance and feedback.

Building off of social constructivist theories, Gee (2000) explains that workers in the 21st century must "collaboratively, interactively, and continuously design and redesign their work processes, functions, and relationships" (p. 414) in order to be successful in a hypercompetitive, highly connected society. New Literacies Studies examines how people participate in social and

cultural groups (Lankshear & Knobel, 2011). As they develop their social and cultural agency, they "generate, communicate, and negotiate meanings, as members of Discourses, through the medium of encoded texts" (Lankshear & Knobel, 2011, p. 50). Discourses, or ways of being defined as how members of a community write, speak, listen, act, value, feel, believe, think, etc. (also referred to as identities), are learned through mentorship, time, and practice as the novice internalizes the value judgments the more experienced other makes when engaging in community practices (Gee, 2017). Increasingly, development of these identities is occurring, at least partly, through digital technologies, which provide newer, more expanded ways of collaboratively learning with experts in a community (Lankshear & Knobel, 2011).

We utilized these principles of sociocultural theory, New Literacies Studies, and the related literature as a foundation for developing our vision, which promotes collaboration between graduate and preservice teacher candidates in literacy education preparation courses. The graduate literacy specialist candidates practice much-needed coaching skills while building the content and pedagogical knowledge of preservice teacher candidates in need of apprenticeship into literacy education practices.

Online Tools for Collaborative Practice

Literacy teacher preparation programs and courses are designed to build pedagogical content knowledge, which candidates apply as they make important instructional decisions (Shulman, 1986). Yet, teachers at different stages of their learning journey have different needs. Preservice teachers in teacher preparation programs are developing foundational knowledge of students' language and literacy development while learning effective instructional techniques for guiding students on their path towards literacy. Graduate literacy specialist programs deepen this knowledge to support candidates in becoming literacy leaders within their educational contexts.

Specialized literacy professionals from graduate programs may diagnose and remediate literacy difficulties, serve as a resource for other teachers, collaborate with others to improve student literacy learning, lead and facilitate schoolwide teacher professional learning, and/or lead, coordinate, and evaluate literacy programs within schools or larger systems (ILA Standards, 2018). Teacher preparation in the 21st-century at all levels undoubtedly should make use of technological tools to enhance learning, provide exposure and practice with a variety of applications that may be used in the classroom, and model appropriate classroom practices of authentic technology integration. The following sections provide an introduction to specific types of tools and online applications, see Table 1, that may be used to foster collaboration among students in teacher preparation programs.

Table 1. Suggested Collaborative Technology Tools for Use in Teacher Preparation Programs

Content Knowledge		
Types of tools	Wikis	
	Blogs	
	Discussion Boards	
Specific applications	WordPress	https://wordpress.com/create-blog/
	Blogger	https://www.blogger.com/
	SeeSaw	https://web.seesaw.me/
	Edmodo	https://www.edmodo.com/
	Twitter	https://twitter.com/
Pedagogical Knowledge		
Online Office Suites	G Suite by Google	https://gsuite.google.com/
	Office 365	https://www.office.com/
OER Libraries	OER Commons	https://www.oercommons.org/
	MERLOT	www.merlot.org
	Project Gutenburg	http://www.gutenberg.org/
	CK-12	www.ck12.org
	Curriki	https://www.curriki.org/
Practice-Based Teaching Opportunities		
Video Conferencing	Skype	https://www.skype.com/en/
	FaceTime	
	Google Hangouts	
	Zoom	https://www.zoom.us/

Video Sharing Services	GoReact	https://get.goreact.com/
	NowComment	https://nowcomment.com/
	Vosaic	https://vosaic.com/

Collaborative Technology Tools to Build Content Knowledge

Content knowledge refers to a teacher's knowledge of their subject matter, including facts and details of the discipline and the organization and representation of knowledge within the discipline (Shulman, 1986). More simply stated, content knowledge is the "what" in teaching. In literacy education, content knowledge includes knowledge of the components involved in reading and writing, specific strategies good readers use, writing techniques for different genres, etc. One collaborative online tool that may be used to build content knowledge is a wiki.

A wiki is a collaborative website or a single webpage that can be created, accessed, and edited by anyone, including a community of learners (Donne, 2012). Wikis are easily shared and constructed among collaborators and often provide tools for monitoring the wiki creation including user contributions and edits. Thus, wikis provide a collaborative learning environment to construct shared knowledge of a topic as participants engage in dialogue and expand on the information provided by peers (Donne, 2012). In addition, wikis afford users access to the information and editing tools from anywhere at any time of the day, eliminating barriers related to time and space when candidates are collaborating across programs or institutions.

Additional tools are readily available to support the development of content knowledge and effectively support collaboration. Blogs and discussion boards, similar to wikis, may be used to build content knowledge, but allow users to further discuss and deepen understanding through commenting and questioning of the content under examination. Blogs may be created on a

variety of platforms, such as WordPress and Blogger, whereas discussion boards are typically housed within Learning Management Systems. A web-based application that can be used to foster content knowledge development and collaborative conversations is SeeSaw. In this application, learners are able to create and manage a digital portfolio of their work in which others are able to comment on what is posted. Finally, social media networks, such as Edmodo and Twitter, provide opportunities to share, build, and deepen content knowledge. Edmodo is specifically designed to foster communication and share content among P-12 students, teachers, administrators, and parents. Twitter, a broadly recognized social media outlet, is commonly used by educators as a professional learning network in which content is shared by posting links and/or concisely worded tweets, and learners "follow" people and topics of interest. Hashtags are utilized as a sorting mechanism and ease the user's ability to sift through and follow content. Although each of these tools has specific features that support collaboration in different ways, they may all be used to develop and extend teacher candidates' content knowledge.

Collaborative Technology Tools to Build Pedagogical Knowledge

Pedagogical knowledge refers to teachers' knowledge of the best ways to teach their subject matter and how students learn the subject matter, including specific instructional approaches and tools, how to represent discipline knowledge to novices through illustrations, analogies, common student misconceptions, and an understanding of what makes concepts easier or more difficult to learn (Shulman, 1986). Therefore, pedagogical knowledge is often referred to as the "how" in teaching. In literacy education, pedagogical knowledge includes knowledge of instructional frameworks such as guided reading, approaches such as interactive read alouds or shared writing, and curriculum materials that improve specific aspects of literacy learning. As teachers write lesson plans, they share their pedagogical knowledge and teaching decisions

explicitly when they determine how to have students interact with the desired content. Tools that can be used to co-create lesson plans and facilitate discussion of teaching decisions include online office suites and resource libraries that house open educational resources (OER).

Online office suites are web-based applications that allow users to collaborate on word processing documents, presentations, spreadsheets, and notes among other types of documents that may be included within specific applications. The documents are saved in the cloud allowing real-time access and co-creation of the documents from anywhere at any time by anyone who has been given access to the document. Documents created in online office suites are more private than wikis, as only individuals who have been given permission may access the document. In addition, online office suites allow users to suggest edits and make comments to the side of the document with questions, notes, and helpful feedback. Therefore, online office suites are ideal for facilitating collaboration among candidates in different geographical locations. For example, preservice candidates may share their lesson plans with a graduate literacy specialist candidate who provides feedback and asks questions about the decisions made during planning. Using the commenting and editing tools available in the online office suite, they collaboratively discuss and revise the lesson plan prior to implementation.

Two popular online office suites currently available as of this publication are Office 365, which requires a subscription through Microsoft, and G Suite by Google, which is available for free to individual users with limited cloud storage. Google applications are becoming more popular in classrooms across the country as schools and districts participate in Google Classroom for Education, offering free and subscription services depending on the needs of the school or district.

OER, freely accessible and openly licensed resources for teaching and learning, are another tool that can be utilized in teacher preparation programs to foster collaboration (Wiley & Hilton, 2018). OER resource libraries allow users to create and collaborate on materials that are openly shared within the community and beyond. Depending on the type of Creative Commons license assigned to a resource, it may be retained, reused, revised, remixed, and/or redistributed, allowing users to adapt and modify resources to better fit their needs and then reshare their work (Wiley & Hilton, 2018). Several OER libraries currently exist for P-12 education, including OER Commons, MERLOT, Project Gutenberg, CK-12, and Curriki. While the features included within each of these resource libraries vary, many allow users to comment on and evaluate OER that have been contributed to the community. OER resource libraries may be utilized as a tool for collaborating on the design of lesson resources between preservice teacher candidates and graduate literacy specialist candidates in a way similar to online office suites with the added benefit of contributing to the global teaching community.

Collaborative Technology Tools to Foster Practice-Based Teaching Opportunities

Practice-based opportunities allow candidates to combine and apply their content knowledge and pedagogical knowledge to authentic and meaningful experiences working with students or teachers in coaching situations. However, challenges often remain in how to integrate practice-based opportunities into teacher preparation programs and curriculum given the constraints of higher education institutions. Often there are not enough faculty to meet the demands of conducting school-based observations to give immediate and ongoing feedback to candidates. In addition, challenges remain in supporting candidate collaboration across classes, programs, and institutions, particularly when sharing practice-based experiences. Video conferencing tools and video sharing applications that restrict access to the public, but allow

commenting by users may be used to overcome these challenges and promote collaboration among candidates and instructors.

Video conferencing tools are web-based applications that allow individuals to connect with each other through the Internet via audio and/or video. Multiple individuals may connect at a time allowing collaboration between two individuals or a larger group. Through some services, these meetings may be recorded for review at a later time. Video conferencing provides a venue for viewing the presentation of a lesson in an off-campus classroom and follow-up coaching conversations. However, one of the constraints is that participants must find a common time to meet together virtually. Many popular video conferencing applications include Skype, FaceTime, Google Hangouts, and Zoom, which often offer free limited use of the services or additional services with a paid subscription.

Another option for sharing video-recorded lesson presentations is through a video sharing service that allows commenting, such as GoReact, Vosaic, and NowComment. These services do not require special equipment and provide a venue for candidates to upload a video-recorded lesson. After the lesson is uploaded to the application, others may make time-stamped comments on elements of the lesson, allowing participants to respond to these comments in a conversational format. GoReact requires the purchase of a license but provides the opportunity for video, audio, or text feedback live or at a later time. Vosaic is a subscription, web-based application that allows users to video-record and upload lessons. Educators or peers are then able to view the lesson and identify key moments within the video to provide feedback. The learner has the opportunity to review and react to the feedback, and ultimately make adjustments to their teaching practice. Vosaic requires the purchase of a subscription for users that upload video; however, users may view videos for free.

NowComment is a free service that allows for text commenting at a later time and, additionally, allows commenting on other text and multimedia formats such as Word documents, PDFs, and other online multimedia. However, when uploading videos, NowComment requires that users first upload the video to a video sharing website, such as Vimeo or YouTube and then copy and paste the embed code (sharing link) into NowComment. Using this service, candidates may post a lesson plan and embed their lesson video into the same document on NowComment, enabling discussion about both components. In addition, candidates could safely share student assessment results for collaborative analysis.

A Vision for Collaborative Tools in Action

Lesson study is a professional development approach that has been shown to positively impact preservice and in-service teachers' pedagogical approaches (Lewis, Perry, & Murata, 2006). A lesson study involves a team of teachers who collaboratively design a lesson then view the lesson in action. While one person teaches the lesson, the others take detailed notes about the teaching and learning as it unfolds. Afterward, the team reviews student data and notes about the lesson to reflect on the teaching and learning more broadly. They then use this data and reflection in an ongoing cycle to design future lessons (Lewis et al., 2006).

We designed the following fictional, but feasible, example based upon a lesson study model to illustrate how these tools may be utilized in teacher preparation classrooms to support collaboration among candidates in individual classes and programs, or even among different programs and institutions. A visual of the example with types of collaborative tools recommended for each stage is provided in Figure 1. This particular example demonstrates how candidates in a preservice undergraduate teacher preparation program develop content and pedagogical knowledge, and subsequently use that knowledge in a practice-based experience. In

addition, we show how to facilitate collaboration with graduate literacy specialist candidates as they deepen content and pedagogical knowledge and practice literacy coaching skills by providing feedback to the preservice teacher candidates.

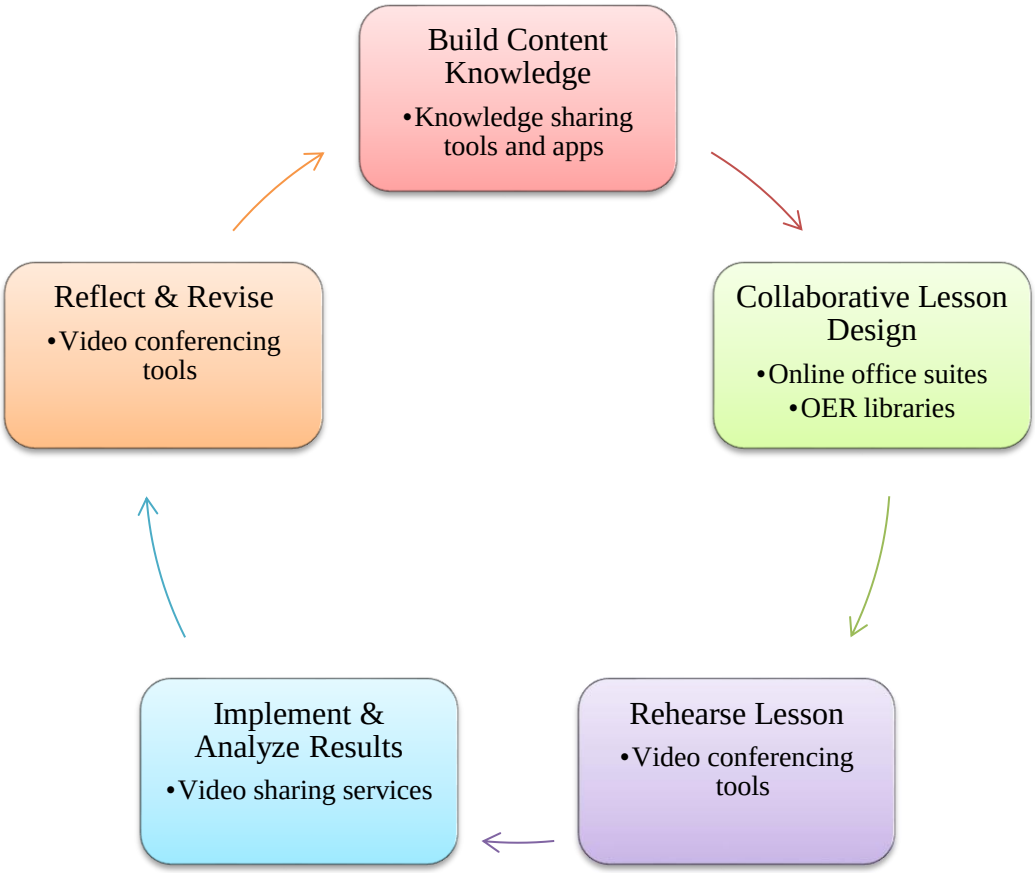
To begin, between the two classes, candidates collaboratively create a wiki to demonstrate knowledge of the literacy skills required of students as they develop the ability to closely analyze a complex text. As candidates research and understand the skills required of students and best practices for teaching these skills, they add this knowledge to a shared wiki. Over the course of several weeks, the candidates visit, revise, and expand the wiki to create a common knowledge base between the classes. Meanwhile, the instructors guide the development of the wiki through strategic lessons and class activities.

Next, candidates between the classes are grouped into a learning community of four to eight students. These groups may be formed by the candidates' preferred grade level, student population, or content area, but should consist of an equal number of preservice teacher candidates and literacy specialist candidates. This learning community is then tasked with creating a collaborative lesson using Google Docs or another online office suite. As the learning communities create these lessons, the instructors support the effort with ongoing feedback and targeted lessons that build and refine candidate knowledge of literacy skills, pedagogical approaches, and, specifically for the literacy specialist candidates, knowledge of adult learning theory.

Next, using Skype or another video conferencing tool, the learning community rehearses the lesson to build rapport and an ongoing relationship with colleagues. The group then chooses a preservice teacher candidate to implement and record the collaboratively created lesson with a class of students. The video-recorded lesson and resulting student work are posted on

NowComment and viewed by others in the learning community. All participants analyze the student work and leave feedback to support further development of the lesson for use in other classes. In addition, the group may meet again through a video conferencing tool to facilitate discussion about the teaching decisions the preservice teacher candidate made, the lesson implementation, and provide an opportunity for coaching between the literacy specialist and preservice teacher candidates. This work may also be extended by allowing other preservice teacher candidates to teach and record the revised lesson, while the learning community continually works to analyze and improve the impact of their lesson on student knowledge. As preservice teacher candidates develop valuable pedagogical knowledge, the literacy specialist candidates develop valuable skills working with colleagues in coaching situations.

Figure 1. Collaborative Tools for Lesson Study



Challenges

Literacy teachers, in all stages of their careers, require ongoing learning opportunities to deepen their literacy knowledge. Changes in grade level assignment, curriculum, standards, and progress in innovative tools impact their literacy instruction over time. Further, intricacies of the individual readers in each classroom have the potential to present a unique scenario that, in turn, requires a sophisticated level of literacy knowledge (Rosenblatt, 1994). How do we ensure that teachers are entering the field with this knowledge, and then have the means to sustain it over time?

Developing teacher candidates' skills and knowledge of tools for collaborating with colleagues across time and space is an important component of teacher preparation programs in the 21st-century. The collaborative tools and example discussed in this manuscript provide a starting point for facilitating collaboration across classrooms, programs, and institutions but in no way provides an exhaustive list of available tools. In addition, instructors and students have many barriers to overcome, including time to meet, lack of authentic relationships, and quality of the results of these collaborations. Ultimately, what candidates put into these experiences will affect their own learning outcomes. However, in a global learning community, these experiences are invaluable additions to teacher preparation programs.

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