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LISTENING TO THE TEACHERS: USING WEEKLY ONLINE TEACHER LOGS FOR ROPD TO IDENTIFY TEACHERS' PERSISTENT CHALLENGES WHEN IMPLEMENTING A BLENDED LEARNING CURRICULUM

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Curricular interventions that embed blended learning technologies and pedagogies should support teachers' everyday practice. However, teachers' perspectives of what is happening "in the trenches" are often not systematically considered when evaluating curriculum and PD goals. Responsive online teacher professional development (ROPD) programs afford teachers and instructional designers with opportunities to collaborate on implementation. But in order for ROPD to be effective, curriculum coaches need to know what challenges teachers are facing. In this study, the researchers performed a qualitative inductive analysis to systematically identify and document challenges that teachers faced during the implementation of a blended learning curriculum. 56 middle school social studies teachers who implemented a new blended learning curriculum called GlobalEd 2 (GE2) completed 442 weekly online teacher logs, from which the researchers identified challenges that continued to persist for the teachers. The researchers identified 6 themes of challenges that persisted for teachers, divided into 18 sub-categories. These themes and sub-categories empirically provide a useful taxonomy and rich descriptions of the challenges that teachers commonly face in blended learning. In addition, the method developed in this study is a useful model for future ROPD programs to solicit feedback from teachers during an implementation of ROPD.

Blended learning approaches have the potential to provide learning opportunities to students that are not available exclusively in either live classrooms or online environments (O'Byrne & Pytash, 2015). Known by many other names, such as *hybrid, flipped, open*, and *distributed* learning, blended learning pedagogies typically require students to interact in a live classroom with classmates and a teacher, as well as to sometimes interact in online activities that are outside of the conventional classroom time and space (Cheng & Chau, 2014; Gurrell, Kuo, & Walker, 2010). When used in combination with face-to-face interactions in a classroom, online applications and media can enrich the student experience by fostering unique dialogue and student-centered learning activities (Arnett, Benson, Bridges, Bushko, Duty, & Mohammed, 2015; Delialioğlu, 2012), improving students' confidence and interest in the learning process (Cottle & Glover, 2011; Park & Park, 2012), and expanding the classroom by use of mobile and at-home technologies (Cochrane, 2013; Dalsgaard & Godsk, 2007; Hsu & Hsieh, 2011). Blended learning approaches also address technological needs of the 21st century workforce by providing students the skills they need to succeed in the highly-networked workplaces of the knowledge economy (Carnevale, Smith, & Strohl, 2013). As such, blended learning approaches have become popular among educators and policymakers alike as they prepare students to be effective citizens in our society where digital tools are becoming increasingly ubiquitous.

For blended curricula to be effective, it has become evident that teachers must develop a deep understanding of both the delivery tools and the enactment of embedded pedagogies (An, 2013; Oliver & Stallings, 2014). In addition, teachers need to have the knowledge and confidence necessary to implement and leverage the technologies associated with blended learning in their classrooms (Lawless & Pellegrino, 2007). However, they also need to understand the nuances of the pedagogy. A lack of understanding about why certain tools or activities are structured the way they are greatly increases the likelihood the teachers will adapt the curriculum in unprincipled ways to meet their local classroom needs or implement procedures in ways that do not align with the theories of learning on which curricular activities are built (Lee, Penfield, & Maerten-Rivera, 2009; Ow, Sunhee, & Bielaczyc, 2013). These alterations in curriculum implementation can hinder the ability of a curriculum to nurture positive student learning growth. As such, it is critically important that teachers implementing a new curriculum receive not only up front professional development, but also ongoing support for new skill development and implementation fidelity (Bitner & Bitner, 2002; Lee, Penfield, & Maerten-Rivera, 2009; Oliver & Stallings, 2014). While the literature has acknowledged the importance of ongoing and responsive professional development (PD) to support teacher curriculum implementation, little is known

about what, when, and how to accomplish it (Fishman, Konstantopoulos, Kubitskey, Vath, Park, Johnson, & Edelson, 2013; Lawless & Pellegrino, 2007).

In an effort to add to this body of knowledge, the present study investigated the implementation of GlobalEd 2 (GE2), a multi-state, online social studies curriculum for middle school students. Qualitative inductive analysis was performed to identify themes of persistent challenges that 54 middle school teachers faced when implementing GE2, despite the presence of a long-term, *responsive online professional development* (ROPD) program with a dedicated support staff. The themes of persistent challenge identified in this study provide real-world evidence of what teachers need in blended learning environments, which ROPD programs are well-poised to support. The themes provide essential information about the *process* of blended curriculum implementation, which is an understudied facet of curriculum or PD efficacy. Both the method and findings of this study can directly inform future ROPD targeting of teacher support and allow instructional designers to know what is really working with their ROPD offerings in real time (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2008; Lawless & Pellegrino, 2007).

Responsive Professional Development to Support Teachers with Blended Learning

In the near future, teachers will increasingly need to implement blended learning pedagogies as these methods gain popularity and demonstrate positive results for achievement (Cole, Simkins, & Penuel, 2002; Paiva, Morais, Costa, & Pinheiro, 2015). However, with blended and online learning pedagogies, challenges regularly emerge as students interact in increasingly complex digital spaces. This requires flexibility and adaptation on the part of the teacher as well as a continual alignment with the intent of instructional designers (Hammerness, Darling-Hammond, Bransford, Berliner, Cochran-Smith, McDonald, & Zeichner, 2005; O'Donnell, 2008).

To address the common roadblocks and challenges, PD programs can address specific goals that foster the implementation of curricula (Oliver & Stallings, 2014). PD can support teachers with problems as they arise by connecting curriculum support experts with teachers. Responsive online professional development (ROPD) programs have the specific goal of working with teachers over a long term to collaboratively develop solutions to problems (Fraser, Kennedy, Reid, & Mckinney, 2007; Hodges, Grant, & Polly, 2013). ROPD can also connect curriculum support experts with teachers to create a shared understanding of pedagogical goals and techniques (Riel, Lawless, Brown, & Lynn, 2015). Although the merits of ROPD are laudable, they cannot be fully effective unless teacher needs can be readily identified as they occur in real time and understood in terms of the teachers' specific classroom contexts (Anderson, Wood, Piquette-Tomei, Savage, & Mueller, 2011; Hill, Beisiegel, & Jacob, 2013).

To know if PD programs are working, researchers have historically tracked the effects of PD participation at the end of interventions with a pre-post research design to examine effects on various teacher and student outcome variables (Fishman et al., 2013; Hill, Beisiegel, & Jacob, 2013). However, pre-post efficacy studies do not paint a complete picture. What have been largely missing from PD program efficacy studies are investigations into *the processes* of professional development: how teachers use these programs over time and what events or challenges trigger teachers' need for PD (Oliver & Stallings, 2014). ROPD needs to consider how teachers think the implementation of curricula is going while it is in process. Waiting until after implementation to study PD efficacy is too late to address challenges that arise during implementation. Evaluating the process of curriculum implementation and the challenges associated with the process affords opportunities for ROPD to have effective impacts on teacher practice before the intervention is over (Anderson et al., 2011; Voogt, Westbroek, Handelzalts, Walraven, McKenney, Pieters, & de Vries, 2011). Although they are a valuable support, the mere presence of ROPD does not immediately solve teachers' implementation challenges. As such, the strength of ROPD comes from its ability to identify challenges as they emerge for individual teachers. However, the efficacy of ROPD programs will remain ambiguous without more specific methods for identifying, tracking, and responding to challenges in the classroom.

METHODS

Participants

Fifty-four middle school social studies teachers in the United States participated in this study. The sample was purposively selected to be representative of a mix of urban and suburban schools in two areas where the research team operated, as well as to accurately reflect the diversity in schools and teaching contexts in the United States. Teachers were recruited using direct communications to all schools in the targeted geographic areas as well as online using social media and direct email. Inclusion criteria were determined before teachers were selected in order to meet the goal of the study for selecting typical social studies classrooms in which teachers would likely implement new curricula within the context of a broader school district. These criteria included that the teachers (a) must have been teaching 7th or 8th grade social studies, (b) must have been teaching two different social studies classes at the time of recruitment with a social studies curriculum approved by the teacher, school, or district, (c) have permission from their principal to participate, (d) have at least two years of experience in teaching

social studies, (e) agreed to allow weekly observations from an outside observer in their classrooms, and (f) agreed to participate in both the curriculum implementation and the associated ROPD to support implementation. Any teacher who met these criteria was selected into the pool to participate in the study. Among the inclusion criteria, the sample was nearly evenly divided among schools that represented urban and suburban segments. As such, the sample was also subdivided geographically, with 26 teachers that taught in a large urban public school district in the Midwest and 28 teachers that taught in multiple suburban public school districts in the Northeast. Teachers were provided a stipend for implementing the curriculum and participating in the ROPD.

In terms of experience with the GE2 curriculum, the sample was composed of 44 teachers that were first-time implementers of GE2 and 10 teachers that had implemented a previous version of GE2 prior to this study, although the version of GE2 in this study was new to all teachers. Thirty-eight teachers indicated that they were also novices or first-time implementers of online or blended learning pedagogies. Participants taught the GE2 curriculum over the course of one semester (14-weeks) and participated in an additional three-week self-paced, online professional development workshop prior to implementation with students.

A combined team of two university professors and six graduate research assistants specializing in education and social studies supported teachers' implementation and was responsible for providing ROPD during implementation.

Context of The Study: The GlobalEd 2 Curriculum and ROPD Program

GE2 is middle school social studies curriculum in which student activities occur in both face-to-face classrooms and an online communications environment. GE2 activities are student-centered and are founded on problem-based learning pedagogies (Ertmer & Simons, 2006; Yukhymenko, Brown, Lawless, Brodowinska, & Mullin, 2014). The defining feature of GE2 is an online communications environment in which students collaborate with other students from other classrooms to develop solutions to real-world problems. Because students may be interacting with students from other time zones, communications can occur at all times of the day. Students have access to the online communications environment when they are out of class, so student interactions often occur outside of normal class hours.

The premise of GE2 is that students are participants in an international negotiations simulation. Students assume the role of scientific advisors to an international negotiations summit concerning a particular world problem. Using structured problem-based learning activities, each GE2 classroom is assigned a "country" attending the summit, and approximately 15-20

countries are represented in each simulation. Students assume the role as a delegate of their assigned country, research the country and the world problem scenario, communicate with other delegates in the simulation, develop solutions to the world problem scenario, and regularly reflect on what they have accomplished and why it would or would not work in the real world.

GE2 is conducted in three phases over 13 weeks. In the *Research Phase* (weeks 1-4), students perform in-depth research about the country and the world problem scenario that they are assigned. During the *Interactive Phase* (weeks 5-12), students message other countries in the simulation to develop proposals to the assigned real-world problem. Most messages are asynchronous and can occur at any time, both in and out of class. However, conferences are also scheduled live and students interact in an instant-messenger style synchronous negotiation. Some conferences occur during normal class times, but due to the number of classrooms and locations in GE2, many students are not in class during live conference days. In either the asynchronous and live conferences, students are encouraged to stay in "country character" and only say and do things that could actually occur in a real negotiations summit. Messages do not display students' real names but instead use identifiers that signify which country students represent. Furthermore, negotiations are moderated by an international relations expert that is known as "Simcon" by the students (i.e., the simulation controller). Simcon guides students in their proposal development, research, and communications. Finally, the *Debriefing Phase* (weeks 13-14) facilitates student reflection and analysis of the negotiations process to draw lessons from their experience. As a result, students have the opportunity to connect social studies, science, and written communication skills into a single activity, promoting an understanding that is far richer than studying the three topics independently.

Before implementation, teachers participated in a three-week, self-paced online PD workshop. Video modules and short comprehension check activities familiarized teachers with GE2 procedures, terminology, and expectations. Also, hands-on, culminating activities led teachers to generate work that they put to use in their class, such as lesson plans, assessment rubrics, and science and social studies terms sheets. After completing the three-week workshop, teachers participated in a one-day version of a GE2 virtual simulation. During the one-day simulation, teachers played the role of a country and worked to solve a problem in the same way and in the same environment that their students would in the upcoming implementation.

As teachers implemented GE2, they were provided with ROPD that was administered by the curriculum support team. Teachers provided actual feedback from their real-world experience to the curriculum support team through the weekly online teacher log. The key design feature of the GE2 ROPD was the establishment of a *feedback loop* between the teachers and the support team. The feedback loop informed the support team in their development of teaching resources and solutions to challenges. First, using an online weekly teacher log, teachers provided weekly reports of how

events occurred in their classrooms, as well as their plans for the next week. The support team reviewed these reports and developed supportive material and coaching strategies for teachers. These new materials were delivered in a weekly email bulletin. Use of the email bulletin and teacher log created a weekly cycle in which teachers shared information about their implementation of GE2 and were subsequently supported by GE2 staff. In addition to the feedback cycle, teachers had access to a permanent library of GE2 resources via a teacher-only website. The website also contained a blog on which new information and resources were posted, as well as a teacher community forum where teachers could ask questions or share ideas. All resources posted to the website were also indexed in a way that facilitated easy searching of information, curriculum materials, and instructional videos from the GE2 staff whenever teachers needed to revisit a resource or find new information about an activity or concept.

The GE2 ROPD was *responsive* in the sense that the curriculum support team attempted to provide new ideas, materials, and coaching in response to teachers' expressed needs, or point teachers to resources that were already available when needs arose. However, despite this approach, the staff lacked a systematic method for extracting teacher challenges and needs. They expressed difficulty in knowing if they were adequately identifying the teachers' challenges. A significant amount of "group knowledge" existed on common challenges teachers faced from previous iterations of the curriculum or from the literature (e.g., Oliver & Stallings, 2014), but the team lacked an inventory of the types of challenges that their teachers faced. As a result, most of the challenges that were identified were either anecdotal or were explicitly stated by teachers. The inclusion of 56 teachers also introduces a lot of information to review, requiring a more systematic approach to understanding teachers' challenges. The analysis performed in this study was a first attempt at refining this system of identifying and understanding the range of challenges that teachers faced while implementing the curriculum. Although this study examined GE2 ROPD activities specifically, the generalized themes and categories provide an empirical account of the challenges that teachers are likely to face in general when implementing blended learning.

Materials

Teachers' personal evaluations and perceptions of classroom events can reveal rich descriptions of challenges that teachers faced in the classroom. As such, the researchers used the weekly online teacher log from the ROPD to extract evaluative statements from teachers on how their curricular activities went. The teacher participants completed the weekly log in an online form powered by Google Forms. Each week, teachers responded to a number of prompts that asked them to reflect on the activities of the week, how these activities went, and what they planned to do the next week. Teachers were expected to complete a log for each week by the end of the day each

Friday as the previous week was still fresh in their minds, as well as to assist with planning for the next week. For each teacher, 13 teacher logs were completed during the 14-week period (with one week off for the Thanksgiving holiday). Teachers were continuously reminded of late or incomplete teacher logs the next week by ROPD support staff, which promoted high participation.

For this study, the authors selected six questions from the weekly teacher logs for analysis, each of which was believed to possibly contain evaluations from the teachers on how activities in their classrooms went. An *evaluative statement* was defined as any description of an event that assessed how a particular event went (e.g., well or poorly). Any statement in which the teacher suggested that the event did not meet their expectation or students had yet to achieve goals was also coded as an evaluative statement. The direct language focusing on evaluation in prompts 1 and 2 of the teacher log elicited the most evaluative statements from teachers. However, review of the data by researchers revealed that evaluative statements appeared in many of the other prompts as well, and were also included in this study. The teacher log questions used in this study are detailed in Table 1. A complete version of the questionnaire with all of the prompts, including the original question numbering, is available in Appendix A. The results from each week were output into a Microsoft Excel spreadsheet. After the logs were assembled, the primary dataset was composed of 442 weekly teacher logs.

Table 1
Weekly Teacher Log Prompts

Prompts
1. How did the lessons go? Would you have changed anything about the lessons?
2. What goals related to GE2 are you hoping to help your students achieve over the next week of the simulation?
3. What kind of GE2-related activities did you do?
4. If you used any of the GE2 resources, which did you use?
5. If you altered the resources in any way, how did you alter them?
6. Are there any resources that we can provide you with to help you achieve these goals?

Procedure

Using the weekly teacher logs to review comments from the teachers, a basic qualitative inductive analysis procedure was used to identify persistent challenges that teachers faced during their time with GE2 (Merriam, 2009; Thomas, 2006). The process of inductive analysis differs from deductive approaches, such as controlled hypothesis testing, in that the inductive method provides a structured approach to identifying meaningful categories of themes that "emerge" from the language of participants (Thomas, 2006). Because individuals' varied experiences can be accounted for in this process, another strength of this method is that inferences can be made about the processes under study from the data themselves, and theories about what is happening can be generated from "the ground up" (Charmaz, 2006). Inferences drawn from inductive analyses can be later retested as formal hypotheses or compared to more deductive approaches phenomena that are driven by previously established theoretical frameworks.

Before analysis could begin, the data from the weekly teacher logs were transformed from their raw Microsoft Excel output format. Each teacher's 13 weekly logs were compiled into a Microsoft Word file and were imported into NVivo, software for qualitative analysis and coding. In total, there were 442 logs for the 54 teachers.

To reduce the complexity of the data for analysis, the researchers summarized the logs using three steps. First, the researchers identified any area of text that reflected a *classroom event*. The researchers defined a classroom event unit as any use of a verb by teachers in their logs. Reducing classroom activity into a list of discrete events allowed for ease of subsequent analysis and identification of evaluative statements. Second, when a classroom event was identified, the researchers determined whether or not it had an *evaluative statement* by the teacher. The third step was to identify the evaluative statements that were deemed *negative*. A negative evaluative statement was defined as an evaluation that indicated a deficiency in expectations or goals or dissatisfaction with the event. A total of 517 negative evaluative statements about events during GE2 were extracted from the teacher logs of the 54 teachers. The median number of negative statements was 10 per teacher over 14 weeks, with a minimum of three statements and maximum of 24.

After a list of negative evaluative statements was generated, the researchers began an open coding procedure in which *process codes* (Saldaña, 2013; Charmaz, 2006) were used to provide descriptions of the classroom events with which teachers expressed dissatisfaction or deficiency. The use of process codes in this phase allowed for the researchers to reduce the dataset down to particular activities that were challenging to teachers. One negatively evaluated event could have multiple process codes.

After process codes were assigned to every negative evaluative statement, statements were then categorized based on the types of processes being described by teachers in each statement. The key function of this inductive process is the cyclicality of assigning codes and combining codes into more abstract categories: definitions for categories are not established until the end of the analysis. Multiple passes through the data were conducted to assign new process codes as new ideas and distinctions emerged. To assist with generating distinctions, the researchers kept a log of how categories were defined, why individual cases belonged to particular categories, and how certain cases or categories were similar or not when assignment was difficult for particular cases.

From the list of negative evaluative statements, 83 top-level process codes were identified that described various activities, processes, and events with which teachers provided a negative statement. The 83 process codes were then sorted into categories and themes.

RESULTS

Categories and themes of teachers' persistent challenges were extracted from the full list of negative evaluative statements that was created during data preparation. After categories were determined, the categories were further collapsed into six broad themes of persistent challenges that teachers faced. Table 2 lists the 18 categories and into which themes of teacher challenges they fall. More detailed descriptions of these themes and their constituent categories are provided in the paragraphs that follow. Multiple examples from the data are provided for each category as well to better illustrate the category. The frequency of each category's appearance is also provided in parentheses. As a supplement, the full listing of the 83 constituent process codes is provided in Appendix B.

Table 2

Observed Themes and Categories of Persistent Blended Learning Teacher Challenges

Note: Nested sub-codes that were observed within the categories are presented in Appendix B. Frequencies of each category's appearance are in parentheses.

Themes	Observed Categories
1. Challenges in working with students on curriculum activities	• Communicating with peers and online participants from other schools (164)
	• Studying the problem and gathering information (147)
	• Critically evaluating problems and tasks (81)
	• Having enough background knowledge (47)
2. Challenges with student self-management	• Doing self-guided, self-initiated work (66)
	• Keeping activities active and relevant (56)
	• Focusing and staying on task (29)
3. Challenges with establishing work expectations	• Balancing work of different grain and group sizes (62)
	• Establishing goals and expectations (54)
	• Doing work out of class (26)
	• Understanding curriculum roles and participation patterns (24)
4. Challenges with curriculum orchestration	Finding and prioritizing time to do curriculum (81)
	Implementing curriculum as prescribed (64)
	Completing work, being productive, and meeting deadlines (49)
5. Outside-of-classroom challenges	• Navigating school factors (35)
	• Navigating variation in scheduling and synchronous activities (27)
6. Technology challenges	• Addressing technology problems that emerge (35)
	• Usability of technology to do curriculum activities (29)
	• Addressing technology fluency of teachers and students (17)

1. Challenges in working with students on curriculum activities.

The most frequently cited challenges by teachers were those associated with facilitating the specific activities of the GE2 curriculum with their students. However, this theme of challenges was the most anticipated by the researchers as most teachers were novices with regard to implementing the types of activities in GE2. Although the activities in the GE2 curriculum may not extend to other blended learning curricula, many of the challenges expressed in this theme are common with any interactive technology in which students are expected to generate research projects from the Internet, to communicate and share documents with others over the web, or gain a mastery over the content area being studied.

Teachers frequently expressed concerns about their students' understanding of the content area under study and the required background knowledge in order to be successful (category: *having enough background knowledge*, 47 instances). As with any curriculum, teachers need to ensure that students understand enough about the problem and content area in order to fully participate in the curricular activities. However, this is especially challenging in blended learning environments as students are often expected to participate in individual and group work. The teacher is not always available to help all students simultaneously to understand content or employ differentiation strategies:

- "As the class averages a second grade reading level, it takes most of the class just to get them to understand what they are reading, let alone to understand the objectives."
- "The questions were difficult for students to answer. An adult may understand what the questions says but a 13 year old that has never been exposed to material such as this will be lost."

When promoting their students' learning of new information, teachers faced challenges with facilitating their students' reading, research, and information evaluation skills (category: *studying the problem and gathering information*, 147 instances). Any curriculum involves finding new information and learning new skills within a domain. However, Internet-based information gathering and evaluation skills are more common to blended learning environments than conventional textbook learning. These skills are essential to be successful in GE2 negotiations, so teachers expressed a need for additional support in promoting self-driven inquiry, information evaluation skills, and the application of information they find to the negotiations:

- "I provided the guided questions for the research on their country and topic…it seems that students are completely unaware as to how to do research."

- "Some students struggle with reading and have difficulty using the GE2 research resources and continue to be reluctant and therefore demonstrate off task behaviors."
- "We are having difficulty researching information that would answer the questions the students need to research in order to participate. We need a little direction."
- "I would have liked to have time for students to do the research in class. Students had to practice what they learned in class while at home."

In addition, many teachers were new to problem-based learning and student-centered approaches. Teachers expressed the challenges that they faced while trying to facilitate student-led research and finding ways to guide students instead of "telling" them what to do:

- "Trying to prep the students for the issue area conferences has been tough. The topics are well above their understanding and I felt like I was giving them answers rather than them constructing their own ideas as a group."
- "I typed up a list of items I thought would be helpful for students to research in prep for the simulation."

The emphasis on communicating with others online brought a separate set of challenges in implementing GE2 (category: c*ommunicating with peers and online participants from other schools,* 164 instances). Writing is an essential skill in GE2 and students have a large number of opportunities to develop and practice their writing via the online communications environment. Teachers and students cannot always anticipate what others will do, nor can teachers fully anticipate their own students' behavior or level of interaction in an open-ended communications environment. In their logs, teachers frequently mentioned challenges associated with facilitating students' development of their ability to productively communicate and interact with others:

- "I have a few groups who keep absentmindedly responding whenever they feel about it and I can't help but think had I been more stricter & more structured and created a protocol for sending communiqués from the beginning then they would be more careful about them."
- "Students were frustrated. It was very difficult to write closing statements with so many students—at all different levels and behaviors."
- "Some students did not fully understand the importance of maintaining a diplomatic-professional persona during the live simulation."
- "I would have given students an individual chart so they could use it to refer to as they continued communicating with different countries."

Finally, teachers had concerns with helping their students reflect on and analyze the content that they were encountering in their research and negotiations (category: *critically evaluating problems and tasks*, 81 instances). Related to the self-initiated work category, this category of challenges is related to getting students to take a step back from their work, reflect, and think abstractly about the curricular activities to make critical connections between concepts. Some of the teachers' reactions to events in their classroom exemplified the challenge of promoting critical analysis or thinking outside the box:

- "More involvement, and improve their listening skills and think or reason."
- "Struggling with separating the global with the country needs and issues. Explaining similar and different because of the reasons."
- "If I was to do this lesson over I would give students more time to discuss growth with their peers. I did not expect this to happen originally, and when it did occur I did not have enough time to let students have meaningful discussions."

Blended learning environments offer students the ability to interact with other students and experts, as well as for students to pursue personalized trajectories for projects. The activities appearing in this theme are not unique to blended learning environments but are more likely to appear in blended learning curricula due to their student-centered nature and emphasis on information retrieval, analysis, and communication. This increase in interactivity is new to many teachers and likely needs to be supported for blended learning interventions to be successful. PD goals that address the concerns of this theme by developing teachers' confidence and skill in using interactive pedagogies will be useful in any blended learning environment.

2. Challenges with student self-management.

Blended learning environments afford a greater deal of autonomy to students. This opportunity can have two sides, however. On one side, students have greater flexibility to engage in more interactive learning activities that connect students with others, deliver information to students on demand, and provide a space for students to exercise creativity and initiative. On the other side, the greater autonomy puts more responsibility for learning on the student. Open-ended activities require higher amounts of interaction on part of the student when compared to conventional classroom lectures or textbook reading. The teachers who implemented GE2 expressed many challenges associated with students' time management, level of initiative, and persistence in participating in GE2, especially as time went on. Multiple categories of challenges reflected these self-management issues.

The primary challenge in this theme was that teachers expressed difficulty in promoting students' self-initiation of curricular activities, both on and offline (category: *doing self-guided, self-initiated work*, 66 instances). Teachers often cited students' low level of initiative as a point of frustration when doing GE2 activities (especially in group work). As a result, teachers desired to improve their skills in finding ways to increase student initiative and inquiry:

- "The class are not self starters and had difficulty working independently on homework, Reading on their own."
- "They are not self starters. They are not used to the PBL way of learning."
- "It took more prying from me than I had hoped."
- "The guiding questions are a start but still don't seem to be enough. I have had to do a significant amount of prompting and steering to get them on a searchable course."

Teachers emphasized the challenge in helping students stay focused when working on GE2, especially when they were communicating with other students online or doing research online (category: *focusing and staying on task,* 29 instances). This common frustration was not surprising, as blended learning's expansion of curricular activity to the Internet increases the opportunity for distraction and paying attention to unproductive websites:

- "Because this group is especially chatty, it was a challenge to keep them focused on the task."
- "Students were finding it difficult to stay on task this week. Many of them noted that countries they had reached out to [online] were no longer in communication with us. I discussed that sometimes negotiations break down and they need to determine a possible reason for this."
- "At times, I almost think I should have put all of the higher functioning students in one group and allow them to move at a faster pace with little guidance and spend more time on direct instruction with the other groups."

Teachers reported difficulty in keeping the level of activity high, such that students needed to stay active in order to maintain their level of motivation and excitement about topics they were researching (category: *keeping activities active and relevant,* 56 instances). Teachers also voiced the importance of developing their skills in illustrating the relevance of curricular activities and content to students' lives and interests. Many of the teacher log examples from this category of challenges exemplify the need for teachers to facilitate student engagement and on-task work:

- "Students are hard to motivate because they feel like they've done everything they could do. I provided an incentive to the group with the best [opening] statement."
- "Students have expressed that they are ready for this to be done. I think the negotiation phase was too long because they lost focus and interest."
- "Tried to make it more exciting somehow. I feel like making them read the entire scenario individually would be incredibly dull so if I broke it into pieces and they had to be experts on a portion then it would go better."

Several benefits that are promised by blended learning environments are due to the greater degree of student flexibility that these environments afford. Student-centered pedagogies supported by blended learning pedagogies indeed put more of the participatory responsibility on students. As a result, teachers' roles change to guiding students to becoming self-starters and developing their ability to meet expectations (Ertmer & Simons, 2006). The challenges identified in this theme signify that teachers often need support in understanding what is expected of students in a blended learning curricula, how to motivate students to stay engaged with curriculum, and how to promote on-task, productive work when they are working on their own.

3. Challenges with establishing work expectations.

Because of the increase in student autonomy in blended learning, students' work output can also significantly vary. Increases in interactivity, communications, and multimedia options can lead to different understandings by students in what is expected in curricular activities. Teachers' understandings of curricular expectations can also vary due to the range of digital tools that can be employed in a blended learning environment. In addition, student-centered and blended curricula often focus on projects as the focus of work instead of quizzes or tests, which have more ambiguous expectations than the completion of a test. In GE2, students' written proposals, research, and communications all significantly varied based on how the online simulations went and the ideas that the students encountered. As a result, teachers expressed challenges with understanding the work output expectations of the curriculum, as well as challenges in expressing their own work expectations to their students (category: *establishing goals and expectations,* 54 instances):

- "A CLEAR indication of what this simulation is. I am incredibly unclear about it."
- "Communiqués were difficult to visualize for many students."
- "They have not been taking notes according to my specifications."
- "Trying to get them to have a better understanding of what the overall problem is."
- "Some of my students are frustrated because they have been viewing the simulation like a game. So they want to win, but that's not necessarily the objective."

Some teachers also shared challenges in understanding how one was supposed to participate in range of open-ended activities in the online environment, or what types of roles are appropriate, helpful, or necessary for students and teachers to play (category: *understanding roles and participation patterns,* 24 instances):

- "The conference was a little frustrating due to the fact that [other participant] nations were only commenting on individual statements and a little off topic."
- "Students still struggle with the idea of being the country and not just a seventh grade student focusing on a troubled country."

Teachers expressed challenges in assigning varying grain sizes of work as well. Students typically worked as individuals, groups, and as a whole class in GE2, and balancing these different work expectations were a challenge (category: *balancing work of different grain sizes*, 62 instances). This was especially problematic when individual-level work was necessary for group-level work in the simulation:

- "I observed that some groups have been more effective than others in negotiating. I intend to have the students in these groups share out what has worked best for them. I feel these tips will be helpful to the other groups."
- "Students were reluctant to work in groups when I first assigned them on Monday."
- "Students still have an issue with sharing the work as it relates to the group work. I have to remind them that the project is a group effort and that everyone is needed."

Teachers also emphasized the challenge in actually performing the namesake activity of blended learning: blending the classroom to take advantage of out-of-class time via the online environment (category: *doing work out of class,* 26 instances). Another promise of a blended learning experience is that student learning does not stop when students leave the classroom. However, in order for this to happen, students need to continue to engage with curricular activities outside of the classroom. Teachers in GE2 stated multiple times that this was difficult to promote, and wanted to develop strategies for improving both the quantity and quality out-of-class work:

- "Some students never do their homework and turning assignments on time which slows the class down because they are not ready to continue to the next part of the lesson."
- "When anything is assigned outside of class the students come in not prepared."

In order to maximize the pedagogical benefits of blended learning environments, the four categories in this theme all emphasize the importance of ROPD programs to aid teachers' understanding in developing clarity in curricular work expectations, promoting online participation (especially out of class), and managing the balance between individual and group work. The increased interactivity and opportunity for variation in students' work in blended learning environments give students new ways to express themselves and find relevant connections in the material they are studying. However, these categories illustrate the need for teacher support in setting realistic and relevant group expectations.

4. Challenges with curriculum orchestration.

Teachers using student-centered pedagogies become facilitators and guides to students, orchestrating a complex workplace for students to generate and share ideas as well as pursue their individual interests (Ertmer & Simons, 2006). In this theme, GE2 teachers expressed some common challenges to performing general student-centered classroom orchestration tasks. In addition, the teachers shared some challenges that are more specifically aligned with facilitating the types of activities afforded by blended learning environments.

One of the most cited challenges by teachers was the lack of time to do all the activities (category: *finding and prioritizing time to do curriculum,* 81 instances). Problem-based and student-centered curricula often allow for a range of activities to be completed by students to achieve the same goal. Many activities can take a substantial amount of time if enough time if a particular class meeting does not have enough time to cover an activity:

- "This is a fantastic unit and the kids have enjoyed it, but its total effectiveness is limited by the amount of time we can afford."
- "This week has been daunting for me. I felt very overwhelmed with the amount of time I would need to commit to my instruction in order for GlobalEd to be successful."
- "They were begging for additional time, and enrichment teachers allowed them."
- "They are often complaining that they want more GlobalEd time even after they've spent their highly rigorous engagement hour on the projects."

The challenge of having time to do activities is certainly not a new revelation. A survey of any group of teachers would likely reveal the need for additional time with their students. However, in blended environments, ROPD can support teachers' prioritization of activities and their recognition of what can be passed over, what must be completed, and how to best achieve these goals. GE2 teachers expressed this sentiment by suggesting a focus on gaining additional skill in prioritization, the ability to adapt curriculum, and a better sense on where they can be flexible with their curricular changes:

- "There is an abundance of resources and simply not enough time to use them."
- "I need to pare lessons down and cut some out if we are going to meet any deadlines."
- "I limited the amount of time spent on the lesson to fit my school's schedule."

However, in any curriculum, some key curricular activities must be completed, and often in correspondence with a schedule. In GE2, there are specific prescribed procedures that need to be performed by certain dates. Students need to be divided into issue area working groups, groups need to regularly research and message other countries by certain dates, and teachers need to facilitate class-wide sharing and refinement of ideas (category: *implementing curriculum as prescribed*, 64 instances). The teachers expressed multiple examples of orchestration challenges and frequently asked for guidance from the GE2 curriculum support team:

- "I'm still learning how much time things will take them. I would be more stringent about using the rubric and having another group proofread communiqués."
- "I should have broken them into groups of three. It became a fast game of 'who gets chosen last for kickball' and one group got along pretty poorly."
- "The material is new to me as well and I am trying to figure it out."

Teachers also provided examples of challenges with students completing their self-initiated projects by the specified deadlines and making sure that their working time in both the classroom and out-of-class was productive (category: *completing work, being productive, and meeting deadlines,* 49 instances):

- "I would have ensured that students were working more productively in groups. They ended up drawing heavily on websites (a.k.a. plagiarizing)."
- "The demands of the simulation and the outcome have been difficult for them."
- "The opening statement took my kids over two hours alone and I had to hold them from their next period class to hit their deadline, they worked very hard. It is very difficult to fit in."
- "25% of each issue area group is usually allowing the other group members to shoulder the burden."
- "I need to help students in terms of negotiations and help guide them towards productivity."

5. Outside-of-classroom challenges.

This theme presents an area more applicable to blended learning environments than other traditional approaches. In blended environments, teachers must navigate competing school factors, balance other curricula and students' other classes with an always-available online environment, and manage issues that influence learning from out of the classroom. Because blended learning occurs in part out of the traditional classroom, a new array of challenges emerges when teachers implement blended learning environments that expand class time. In the case of GE2, teachers often cited challenges associated with balancing the more complex blended learning environment with their school's required other curricula, or working with other teachers to expand learning opportunities out of the classroom using the online environment (category: *navigating school factors*, 35 instances):

"GlobalEd cannot take the place of the curriculum and its pacing guide in our district. We have a pacing guide as do most cities that must be followed. I would spend 1-2 days/wk on GE, but I have been spending much, much more."

- "Teachers feel I am saying my class is more important than the class they are supposed to be in. Any suggestions?"
- Teachers also had many challenges navigating factors outside of the teacher's control that took scheduled time away from students' interaction in both the classroom and the online environment, such as holidays and school-wide activities:
- "We have a long weekend and will not meet until Wednesday. Our goals are probably not realistic for a 40 minute class."
- "We only had two classroom teaching days this week due to holiday, parent teacher conference day and field trip day, so it was difficult to maintain momentum."

An additional challenge with scheduling occurs when live events are scheduled in a blended learning environment (category: *navigating variation in scheduling and synchronous activities,* 27 instances). In the case of GE2, live conferences regularly occurred in which students participated in an online instant-messenger-style communications forum. As exciting as a live event was for students, teachers expressed challenges in getting students to simultaneously participate at times that were not during normal class time. In addition, students from around the United States participated in GE2, so the times of live conferences never aligned for all classrooms:

- "The conference was not during class time. Pulling students from other classes is frowned upon and difficult to do. However, I did contact teachers about this."

- "Economics conference went extremely well, despite the fact that students were put outside by the next classroom teacher (the conference was held during Science class)."
- "I am working on changing the schedule so that my whole class can experience the live conference even if most of them are just watching on the smart board."

Promoting participation in live events and in curricular activities out of the classroom are all new challenges that will become more prevalent as blended learning pedagogies expand active learning opportunities to domains outside of the immediate classroom. Blended learning environments provide students with online and face-to-face places to meet, collaborate, and work on meaningful projects. Each of these spaces has particular benefits to successful learning. However, this theme suggests that helping teachers navigate the complexities of their school and the increased time commitments of a blended learning approach will be increasingly necessary.

6. Technology challenges.

In this theme, teachers expressed three categories of concerns with the technologies that were used in GE2. The most frequently cited challenges were when technologies broke down or did not work as expected (category: *addressing technology problems that emerge*, 35 instances). In addition, teachers expressed challenges associated with understanding how technologies work and having enough skill for their students or themselves to use the technology (category: *addressing technology fluency of teachers and students,* 17 instances). Some teacher log entries best exemplify these two categories of similar challenges, as teachers provided negative evaluations related to the technology not working, having enough access to technology, or discomfort with using technology:

- "One computer has been unable to show the entire simulation page (the message list is hidden), and so that group had to wait for a computer."
- "The technology component has been a real issue from the beginning. Your technology committee and our IT people should discuss in advance to GE2 what these iPads have and don't have."
- "I know that adding more iPads is an unreasonable request, but it would really help."
- "I am not good with technology, but I had to problem-solve my way out of it, but it took quadruple the time."

When performing the daily activities associated with GE2, teachers also expressed concerns with the design and ease of use of the GE2 tech platform for some students (category: *usability of technology to do curriculum activities,* 29 instances):

- "It was a lot for the students to navigate the message board."
- "The students had a hard time understanding the inline response style of the forums, causing a few of them (the ELL students, mainly), to reply to the wrong message."

The usability and proper function of technology is something that can be directly supported via professional development. Although it is desirable for technology to function properly at all times, it is also normal for breakdowns to happen. Teacher and students are the primary people who interact with blended learning technologies. ROPD can support teachers' ability to problem solve and troubleshoot technology issues as they arise. Strategies for real-time feedback from teachers and rapid development of technology solutions can ensure that blended learning implementations go smoothly.

DISCUSSION

The six themes of 18 categories identified in this study highlight areas that future ROPD efforts and research should be focused upon to improve implementation of blended learning interventions. To fully leverage the potential of blended learning technologies, classroom time should be reimagined to include spaces outside of the classroom. Using blended interactive technologies, learning opportunities can be expanded without necessarily increasing the amount of time that is required to implement complex activities. This, however, inevitably involves significant support in addressing the challenges identified in this study. Effective ROPD programs would be those that address the obligations of teachers and students both in and out of class, in addition to common digital learning issues, such as using new interactive communications technologies, using information from the Internet, and facilitating student-centered pedagogies via the web.

The analysis performed in this study employed a method that can be used to identify teachers' challenges as they occur. The results of the study illustrated the high value that can be realized for the curriculum support team and instructional designers, as teachers are often an untapped resource for ideas. The data collected in this study are easy to obtain via free software. Support teams can solicit teachers' perceptions of how things are going in actual implementations and by using their own words. Although struggle with new curriculum should always be expected and sometimes even desired to promote teacher learning, ROPD can support teachers' transition to new curricula by simplifying the complex contexts of new curriculum implementation in what are often highly politicized and high stakes K-12 classrooms. In addition, understanding the struggles that teachers face during curriculum implementation can help maintain or improve the fidelity of implementation and the intended outcomes of curricular interventions. This is particularly

true with newer student-centered pedagogical approaches that increase the complexity of the classroom and are by definition less clear through problem- and project-based approaches. ROPD that develops prioritization, information filtering, and curriculum adaptation skills will likely make significant impacts on teachers' implementation of blended learning curricula. Process-based studies such as the one in the present study are not meant to replace summative, pre-post efficacy studies of ROPD programs, but instead provide another essential perspective into the causes and effects of ROPD on teacher practice.

One limitation of this study was that it relied on self-reported information from teachers. With self-reported information, teachers might be more inclined to share only positive events or what they think researchers want to hear. However, in this study, the weekly logs were not used to evaluate teachers' performance in a way that was risky to teachers' careers, such as high stakes testing or performance evaluations. The researchers believed that the teacher logs were used as a formative feedback tool, which reduced the incentive to provide false or socially acceptable information. In addition, the logs were administered over a substantial period of time (14 weeks), which likely also reduced motivation that teachers had to be dishonest due to the sheer number and repetitive nature of the logs. Prompts were the same each week and information provided in them were meant to be only used "in the moment," not to reflect their overall teaching skill or goals in a summative way. Interestingly, this study provided evidence that teachers were actually quite fond of sharing in-depth negative evaluations of their classroom activity. Each teacher provided a high amount of negative evaluations, as teachers provided a median of 10 negative evaluative statements, and the overall total was 517 over the 14-week period. Negative information indicates things that are not working to expectation, and it highlights areas that need to be reviewed. As such, negative evaluations or information about deficiencies are actually more helpful to a researcher in cases of ROPD improvement as it identifies direct areas for further study.

This study provides a window into the processes and subjective experiences of teachers in ROPD to support the enactment of blended curricula. It is worth mentioning that although this study does not attempt to make claims as to the causality of challenges faced by teachers on their curricular implementation, it is an essential step to develop definitions for the challenges that teachers face with rich qualitative descriptions. As a result, this study's findings are valuable toward illuminating themes of challenges and factors influencing curriculum enactment toward a broader research agenda for understanding what works in ROPD. Once identified, themes can be pursued more quantitatively to identify correlational and causal relationships between the challenges that teachers face, other classroom factors, and the quality of teacher curriculum implementation.

An additional area of future research would be to examine the differences in expressed challenges between novices and more experienced teachers with blended curricula. Although these differences were not examined in this study, the categories identified here provide a foundation from which differences in expressed challenges can be identified, measured, and further investigated. The changes to teachers' perceived challenges over time as they interact with ROPD resources and activities could be investigated as well. The written log analysis approach in this study provides ample, low-cost data to investigate changes in teachers' needs, as they perceive them over time. The method gives stable, defined variables that can be further used in quantitative studies to reveal interesting mediating effects of teachers' perceived challenges on use of ROPD, perceived challenges on teacher practice, and how ROPD influences teacher practice as a result of its use.

With process-based methods that examine the timeframe during implementation, researchers can identify points at which intended and enacted curriculum do not match and identify factors that influence curricular implementation. This is the strength of the ROPD approach. To understand the full picture of PD efficacy, researchers must consider teachers' classroom practice *as it happens*. Although pre-post efficacy studies are valuable in understanding the effects of PD on certain outcome variables, they do not tell the whole story of what is happening during the process of implementation. Scholars have demonstrated that teachers often need significant support in specific areas in order to implement novel online learning curricula (Oliver & Stallings, 2014) and student-centered pedagogies (Ertmer & Simons, 2006). However, curriculum designers also need to know what is happening during the process of implementation to understand the myriad ways that curriculum are adapted to meet individual classroom contexts. If the goal of PD is to influence teachers' practice, PD programs that do not change during curriculum implementation could fail to meet the emergent needs of teachers. Process-based studies afford curriculum support teams the opportunity to listen to teachers' perspectives before, during, and after blended curriculum implementation and provide targeted, just-in-time support in response. As teachers are the ultimate "end users" of curricula, listening to their perspective during implementation is a critical function of ROPD design for today's blended classroom.

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APPENDIX A
Weekly Online Teacher Log Prompts

Original ordering as presented to teachers. Response option indicated in brackets. Note: Only a subset of prompts was used in this study.

1. Your name [open-ended text field]
2. Week of log entry [select from dropdown, weeks 1-14 listed with corresponding calendar dates]
3. Did you conduct any GE2-related activities this week? [y/n]
4. What kind of GE2 related activities did you do? [open-ended]
5. How long did you spend on the activities in total over the span of the week? [open-ended]
6. If you used any of the GE2 resources, which did you use? [open-ended text field]
7. If you altered the resources in any way, how did you alter them? [open-ended text field]
8. On a scale of 1-5, how engaged were your students this week during GE2 activities? [scale of 1-5]
9. How did the lessons go? Would you have changed anything about the lessons? [open-ended text field]
10. What goals related to GE2 are you hoping to help your students achieve over the next week of the simulation? [open-ended text field]
11. Are there any resources that we can provide you with to help you achieve these goals? [open-ended text field]

APPENDIX B
Observed Themes and Categories of Persistent Teacher Challenges

Categories are sorted by the individual process codes that were identified in the data.

Theme	Category	Process Codes
Challenges in working with students on curriculum activities	Having enough background knowledge	• Having prior experience • Having prior exposure • Talking about activities versus doing activities
	Studying the problem and gathering information	• Researching • Reading • Filtering information • Understanding curricular domain / content • Using concepts from the curriculum
	Communicating with peers and online participants from other schools	• Writing • Argumentation / scientific explanation • Messaging other students online • Presenting / sharing
	Critically evaluating problems and tasks	• Analyzing information • Reflecting / debriefing • Synthesizing information

APPENDIX B, *Continued*

Challenges with student self-management	Doing self-guided, self-initiated work	• Developing solutions and solving problems • Developing ideas • Thinking outside the box • Taking initiative • Planning and preparing • Handling frustration
	Focusing and staying on task	• Staying on topic when interacting with others • Productive use of time and staying on-task • Increasing efficiency • Preventing distractions
	Keeping activities active and relevant	• Needing hands-on activities • Doing more than reading text • Finding relevance to students' everyday lives
Challenges with establishing work expectations	Establishing goals and expectations	• Understanding scope and goals of activities • Understanding proper formats of work output • Having an end state for activities
	Understanding curriculum roles and participation patterns	• Doing individual work for group projects • Determining roles • Performing tasks based on roles • Assigning roles to strengths of students • Having the right mindset
	Balancing work of different grain and group sizes	• Working out of classroom • Doing homework • Working in other classes • Doing work out of class

APPENDIX B, *Continued*

Challenges with curriculum orchestration	Finding and prioritizing time to do curriculum	• Finding time to implement • Timing, sequencing, chunking curriculum to make it meet class needs
	Implementing curriculum as prescribed	• Getting feedback from support staff, other teachers, and school • Comfort and anxiety with new curriculum • Adaptation of curriculum • Determining class dynamics with new curriculum
	Completing work, being productive, and meeting deadlines	• Productivity varies between student groups • Keeping track of different group projects • Developing class goals and expectations • Choosing what to assign to groups and individuals • Increasing participation and engagement • Supporting and scaffolding understanding • Working with individual students and differentiation • Getting students to work as groups
Outside-of-classroom challenges	Navigating variation in scheduling and synchronous activities	• Making schedules that work with other teachers • Short weeks, holidays, and illnesses • Managing live online events
	Navigating school factors	• Balancing GE2 with other school curricula • Balancing school and outside obligations

APPENDIX B, *Continued*

Technology challenges	Addressing technology problems that emerge	• Technology breaking down when needed • Working with technology staff at schools
	Addressing technology fluency of teachers and students	• Understanding the interface and tools • Finding new technology to solve challenges • Integrating class and school technologies • Bring your own device (BYOD) integration and fairness
	Usability of technology to do curriculum activities	• Not enough devices to do work • Usability of the platform and finding technologies that work • Understanding different ways to do activities using the online technologies (there's not just one way)