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Learning From Secondary Blended Teaching Practitioners: Selecting Activities and Connecting In-Person and Online Learning

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Implementation of blended teaching (BT) practices is increasing rapidly in K-12 classrooms. This trend creates an urgent need for professional development to support BT. An understanding of how experienced teachers implement BT can inform teacher educators and professional development leaders as they develop training to support this practice. We interviewed 24 secondary educators implementing BT strategies to determine what activities they include in the online space and how they connect them to in-person learning. Qualitative thematic analysis of the interviews revealed that experienced blended teachers used a variety of online activities, providing opportunities for learners to interact with content, other learners, and the instructor. Learner-content interactions allowed learners to participate in passive, interactive, and creative activities. Instructors connected online activities to in-person activities by: (a) using online data to inform in-person activities, (b) fostering classroom community through online and in-person activities, and (c) preparing for and reinforcing in-person learning via the online space. Our findings provide direction to teacher educators and administrators overseeing professional development efforts for BT.

Keywords: Distance education and online learning, Improving classroom teaching, Secondary education, Teacher professional development, Teaching/learning strategies

LEARNING FROM SECONDARY BLENDED TEACHING PRACTITIONERS: SELECTING ACTIVITIES AND CONNECTING IN-PERSON

Blended Teaching (BT), a combination of in-person and online instruction, has experienced rapid growth in K-12 environments (Graham, 2019; Schwirzke et al., 2018). However, professional development (PD) to sup- port effective BT implementation lags behind its adoption (Barbour, 2017; Trust & Whalen, 2020). The limited research in this area is evident from the scarcity of articles in recent literature reviews. Philipsen et al. (2019) identified 15 peer-reviewed articles on PD for BT, and Short and Graham et al. (2021b) found 21 articles on the topic. Articles from this second review primarily focused on PD models and BT tools, leaving a need for under- standing BT decision-making. Insufficient PD was also apparent during the COVID-19 pandemic when educators had to hastily implement "emergency remote teaching" (Hodges et al., 2020). Going forward, teacher educators and K-12 PD leaders need to better support the implementation of effective BT practices.

The meta-analysis of PD for blended teaching from Philipsen et al. (2019) proposed a framework identifying key PD structural characteristics. However, additional research is needed to explore the content of these PD programs (An, 2021). The Blended Teaching Readiness (BTR) framework synthesized BT competencies and provided validated instruments for eval- uating content proficiency for BT. The core BT competencies in the BTR framework focus on online integration, data practices, personalization, and online interaction (Graham, Borup, Pulham, & Larsen, 2019; Archibald et al., 2021). Of these areas, online integration is the most crucial for effective BT, as combining online and in-person instruction leverages the strengths of each modality (Gerbic, 2011; Graham, Borup, Short, & Archambault, 2019). Online Integration enables educators to optimize in-person time by using online activities to meet learning goals more efficiently, preventing "course and a half syndrome" wherein an educator is reluctant to eliminate activities from the course's pre-blended design, layering additional online instruction atop in-person instruction (Kaleta et al., 2007, p. 125).

Understanding the experiences of teachers using BT strategies to stra- tegically and effectively combine multi-modal activities can guide teacher educators and PD leaders in preparing teachers for BT readiness. We ad- dressed the following research questions:

1. What activities do blended teachers choose to do online?
2. How are blended teachers connecting online activities to in-person ac- tivities?

These questions lead to essential knowledge for developing BT competence.

Literature Review

In this section, we define BT and explore its growth. We then review theoretical frameworks that our findings build upon. These frameworks include competencies important to effective BT, the Passive Interactive Creative (PIC) portion of the PICRAT framework (Kimmons et al., 2020), and Moore's (1989) Three Types of Interaction. This section closes with a review of relevant research related to BT PD.

Definition of Blended Teaching

The terms "blended teaching" (BT) and "blended learning" are often used interchangeably, one focusing on the activity of the teacher and the other on the activity of the students. We use the term "blended teaching" unless we are directly quoting a source. BT must be accurately defined, and its development understood, prior to productive academic conversations on the topic (Barbour, 2017). We support a definition that represents a combining of instructional modalities (online and in-person) but does not adhere to a specific pedagogical method (Graham, 2019; 2021). Models of BT were mostly identified through observation of existing teaching practices and require particular pedagogical approaches, e.g. the flipped model from Horn et al. (2014) or the HyFlex model by Beatty (2019). To guide teachers in BT pedagogical decision making, our research includes participants who implemented a variety of models.

Growth and Effectiveness of Blended Teaching

The adoption of BT in secondary schools is rapidly increasing, although quantifying and verifying this growth is challenging due to varying definitions of BT and its independent implementation by educators (Graham, 2019). National surveys cited by Graham (2019) indicate an 8.6% increase in districts claiming BT implementation between 2007 and 2008. Schwirzke et al. (2018) attributed BT growth to factors such as acceptance of BT practices, increased availability of tools and resources, and recognition of BT's potential to enhance learning.

However, research evaluating the effectiveness of BT has not kept pace with its growth. Barbour (2017) noted that much of the research supporting BT effectiveness comes from the Christensen Institute, an organization advocating for the practice. Early research suggests that BT only produces similar or slightly improved results compared to in-person programs. Despite this, Barbour emphasized that it is still important to implement BT effectively. Researchers have warned against treating BT as a "treatment effect" and recommended evaluating specific BT-supported pedagogies, focusing on identifying new opportunities offered by BT, determining which opportunities enhance student learning, and identifying best practices for

implementation (Arnett, 2014; Graham, 2021). Such a focus is important because successful BT initiatives require careful planning, professional development, ongoing support, and consistent follow-through, as improvements in student outcomes may take several years to manifest (Schwirzke et al., 2018).

Blended Teaching Competencies

PD efforts during the emergence of BT focused on technology tools (Graham, Borup, Pulham, & Larsen, 2019), but it became clear that BT involved more than just adding technology to traditional teaching (Bjekic et al., 2010). Educators need specific competencies to effectively engage in BT, some of which are unique to this mode of instruction (Pulham et al., 2018). Various researchers have identified essential BT competencies (Akarawang et al., 2015; Bjekic et al., 2010; Pulham & Graham, 2018). Graham, Borup, Pulham, and Larsen (2019) developed and validated an instrument with 13 competencies to measure BT readiness, focusing on online integration, data practices, personalization, and online interaction.

This study focuses specifically on competency in online integration, which is foundational to BT as BT is based on effectively combining in-person and online instruction. Strategic and effective integration of these modalities can amplify student learning. This integration includes the implementation of BT management practices to establish expectations for the respectful and efficient use of learning tools, including monitoring student activities during the transition from in-person learning to working online (Graham, Borup, Short, & Archambault, 2019).

Three Types of Interactions

Moore's (1989) interaction framework classified student learning interactions into three categories—learner-content (L-C), learner-instructor (L-I), and learner-learner (L-L; See Figure 1). Initially described for distance learning, this framework applies to BT. L-C interaction includes learners interacting with the content through various media. L-C interactions should result in a change in the learner's understanding or perspective. L-I interaction includes interacting with the instructor synchronously in person or virtually, or through asynchronous digital communication. This interaction can support student interest in course topics, foster learners' motivation, and address individual student needs. L-L interaction includes students interacting with one another. This type of interaction can be essential to developing critical collaboration skills. Moore suggested that an appropriate mix of all three learner interactions leads to more effective learning

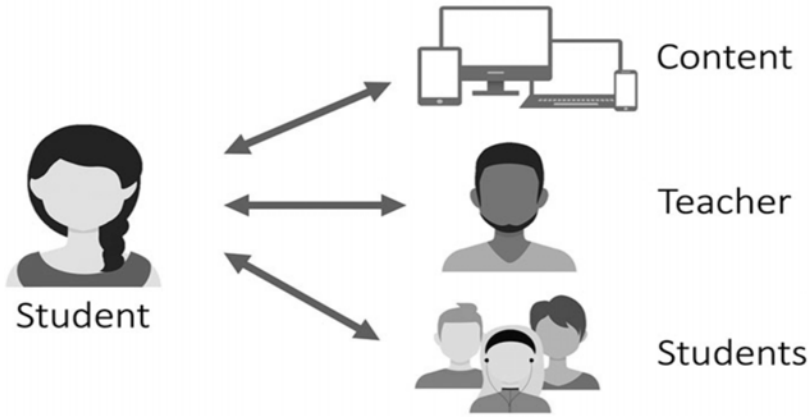

Figure 1. Three Types of Interaction

Note. Original source of this figure- K-12 Blended Teaching (Graham, Borup, Short, & Archambault, 2019.)

PICRAT Evaluation

Kimmons et al. (2020) developed the PICRAT framework to guide effective educational technology integration. We focus on the PIC (passive, interactive, creative) portion of the framework. PIC addresses what students are doing with technology, and is used to determine whether passive uses of technology could be more interactive or creative (Kimmons et al., 2022). Passive uses of technology include reading a digital text or watching an instructional video. Interactive uses include engaging in formative assessments that provide immediate feedback, collaborating with other students, completing digital activities, or exploring virtual simulations. Creative uses include creating digital presentations of learning via blog posts, videos, or slides.

Professional Development for Blended Teaching

BT practitioners need to navigate new roles through intentional planning and decision-making (Bjekić et al., 2010; Castañon, 2023; Philipsen et al., 2019). Some BT PD programs have focused on tools, design, and lesson development to help teachers apply BT strategies in their classrooms (Moore et al., 2017). Other PD efforts have emphasized personalized learning pedagogies, video instructions for students to rewatch, online activities that support independent and collaborative learning, and integrating

digital and in-person learning (Rieckhoff et al., 2018; Yang et al., 2021). PD has also often modeled BT by blending learning experiences for educators themselves (Short & Graham et al., 2021; Stevens et al., 2018). Despite these efforts, further understanding is needed regarding "effective BL [blended learning] implementation with pedagogical practices, instructional designs, and implementation strategies" (Yang et al., 2021, p. 10). This study aims to provide additional insights into these areas.

Methods

This research study is part of a larger project that collected interview data from 62 K-12 teachers, exploring their BT practices. Other studies using this data include research on barriers and enablers to blended teaching (Hanny et al., 2021) and competencies within the blended teaching readiness framework (Short et al., 2021a), including personalization specifically (Short, 2024; Short & Graham, in review). A description of participants follows, along with descriptions of data collection and analysis processes.

Participants

This study draws on a subset of participants from a larger study about competencies in the K-12 BTR framework. The pool of participants included 62 teachers across grade levels and subject areas, recruited through professional networks and selected for interview for having at least one year of BT experience. Because this study focuses on competency within online integration in secondary grades, we analyzed the subset of 24 transcripts from participants who taught secondary core subjects of English Language Arts, Math, Science, and Social Studies. The findings below reference pedagogical descriptions from six teachers in English Language Arts and Math, and 5 teachers in Science and Social Studies. For clarity, we refer to these teachers as ELA1-6, Math1-6, Science1-5, and SS1-5, respectively. The 24 participants had 3 to 10 years of teaching experience and represented school districts in Nevada, Virginia, Utah, and Georgia.

Data Collection

Selected teachers participated in approximately 90-minute interviews over zoom with a member of the research team. The interviews were conducted in a semi-structured format using a protocol centered around teacher experiences within K-12 BT competencies. The protocol included a section that specifically addressed online integration and asked teachers to describe their BT instruction, BT decision-making processes, and rationales for BT implementation.

Data Analysis

To uncover participants' online activities within BT, our first research question aimed to determine if these activities encompassed a range of in-

teraction types or predominantly focused on learner-content interaction. We categorized the mention of online activities using two frameworks, aligning with Wolcott's (1994) approach of linking researchers' work to prior research by turning to existing theory for qualitative interpretation. Moore's (1989) interaction framework was utilized to classify activities based on the types of learner interaction involved (learner-content, learner-learner, learner-instructor). Furthermore, the activities involving learner-content interaction were categorized as passive, interactive, or creative using the PICRAT framework (Kimmons et al., 2020).

To ensure reliability of analysis related to the first research question, a second coder independently applied codes from our codebook. Our coding categories demonstrated robustness, as we achieved an inter-rater agreement of 80% or greater across all categories. Additionally, we conducted a negative case analysis by examining the prevalence of participants supporting each theme, maintaining transparency when themes lacked evidence from certain participants. We also reviewed interviews of participants who did not explicitly support identified themes, looking for evidence of disagreement and documenting such instances in our findings.

The second research question aimed to uncover how teachers connect online and in-person aspects of their BT. Because there were not existing frameworks addressing this question, we used Braun and Clark's (2006) process for identifying emerging themes and patterns. Table 1 provides an overview of how our analysis proceeded, adapted from Braun and Clarke (2006, p. 87). Some steps were repeated and refined.

Table 1

Thematic Analysis Process

Step	Description
1	Familiarize oneself with the interviews, reading them several times and making annotations.
2	Generate initial codes and gather data that pertains to each code.
3	Organize and combine codes into initial themes and gather data that pertains to each theme.
4	Review themes with the original transcript to check for coherence to the whole of the data.
5	Define and name themes in a way that clearly presents the data and tells a compelling story in relation to existing research and theoretical frameworks.
6	Produce a report by selecting interview quotes that relate to the original research questions and prior research.

The lead researcher familiarized herself with the interviews, reading them several times and making annotations. She then analyzed the interviews and assigned initial codes to descriptions of BT practices using Quirkos. Practices were coded at the idea level, and ranged in length from

one sentence to a few sentences. The lead researcher then organized codes into themes. These themes were reviewed with the original transcript to check for coherence to the whole of the data. Themes and related interview excerpts were also reviewed by three additional BT researchers and refined based on their input. Next, the lead researcher defined themes and mapped the thematic network. Finally, she presented the themes, with quotes from the interviews and findings related to existing theoretical frameworks and the original research questions, in a report. Partial member checking (Lincoln & Guba, 1985) was achieved by asking 6 of the 24 participants to review findings in the final report. Participants agreed with the findings.

Limitations

This study attempted to understand online integration decisions and interviewees were asked to focus on pre-pandemic practices. However, many interviews occurred during the COVID-19 pandemic, so some responses may have reflected emergency remote teaching that occurred during that time rather than general BT practices. Also, our research team included members with extensive BT experience—both as researchers and practitioners. It is likely that they carried some BT biases, which we attempted to mitigate by including team members with diverse experiences.

Ethics

Research participants received a small stipend for their participation. Approval for this research was granted through the associated university's Institutional Review Board.

Findings

We found that blended teachers' online activities aligned with Moores' Three Types of Interaction (1989), with online activities including learner interactions with content, the instructor, and other learners. L-C interactions aligned with all PIC levels of the PICRAT framework (Kimmons et al., 2020). We further found that participants' strategies for connecting online and in-person spaces aligned with themes that we labeled Data, Relationships, and Preparation and Reinforcement. The first subsection below describes the three themes related to Moore's Three Types of Interaction (1989), and the second subsection describes the three themes related to strategies for connecting online and in-person activities.

Online Activities

Participants recounted their experiences moving their instruction to a blended modality. They often talked about specific activities or lessons created or repurposed for the online space. We identified 18 distinct activities (see Figure 2). On average, participants reported 10 activities in each inter-

view.

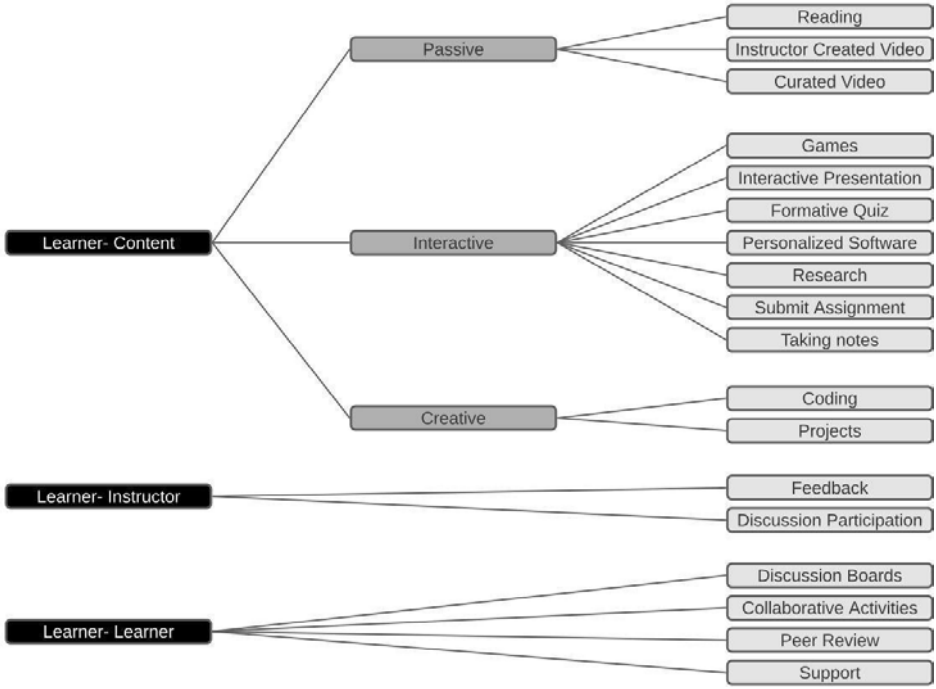

Figure 2. Thematic Map of Online Activities in BT Settings.

Note. The darkest left column aligns with Moore's (1989) framework and the darker middle column aligns with Kimmons et al.'s (2020) framework.

In answer to our first research question, we found evidence of L-C interactions and L-L interactions among 100% of teachers interviewed and evidence of L-I interactions among 83.3% of the teachers interviewed.

Theme 1: Learner-Content. All of our interviews showed evidence of L-C interactions, with this category including the largest variety of activities among the L-C, L-L, and L-I classifications. Evidence of passive L-C online activities occurred in 87.5% of our interviews. Suggesting that participants may have desired to move towards interactive learning activities, as the PICRAT framework recommends. Table 2 provides a collection of the passive L-C activities mentioned by participants.

Table 2
Examples of Passive L-C Online Activities

Passive L-C Activities	Examples From Interviews
Readings	• Instead of giving them one article that you're going to read, using a blended format, they could pick from five different options that they wanted that all connected back into the objective, but had a lot more options. (SS3)
	• With my Weebly, I started posting articles on there, particularly, if at the last minute I decided I wanted to use something with several pages and I didn't want to copy it. (ELA4)
Videos (Instructor Created)	• I could post recordings and show them exactly how to do it with my own voice or read them something in the tone that I wanted them to understand. (ELA3)
	• My team teacher and I, made our videos and then uploaded them to YouTube because YouTube imports closed captioning and for our ESL students the hearing and seeing the written word is better for them. (Science3)
Videos (Instructor Curated)	• One way that I've used blended learning is to have them watch videos on their own. I don't know if you're familiar with the TV series Band of Brothers, but there's a scene where they actually find a concentration camp and they liberate it. (SS1)
	• You can even go as far as using YouTube to really get kids to be inspired. You can show them a clip, a phenomenon, something that's going on and say "Why do you think this is happening?" (Science1)

Evidence of interactive L-C activities was present in 100% of transcripts. Participants often mentioned benefits from instant feedback, data collection, and personalization of pacing. Interactive L-C activities included games, choice boards, interactive presentations, formative quizzes, personalized software, simulations, research and exploration opportunities, assignments, and taking notes (Table 3).

Table 3

Examples of Interactive L-C Online Activities

Interactive L-C Activities	Examples From Interviews
Games	They go through these questions, but it's like a race and it's fun, because it's a game, right? They're all competitive. (Science2)
Choice Boards	I give them more information than they need in the playlist, and I put the most important one at the top. If they still can't figure it out there's more resources underneath and the objective is that they learn to self-select from that list. (Science4)
Interactive Presentations	I like to use Nearpod because it's an interactive experience for them. They draw what they remember seeing under the microscope or they take a quiz, or they do a poll and they engage. (Science2)
Formative Quizzes	I did regular assessing, like quizzes, and used data more often. And as a result, test scores skyrocketed. (SS2)
Personalized Software	It takes a few readings and quizzes for them to get a baseline but then gives them their read- ing level. And it also gives little indications for which skills they're doing great on and which skills they're struggling with. (ELA1)
Simulations	I will give them an online simulation, a lab, where they go through the mixed reactions and they can do 10, 20, 30 trials, which would take maybe two weeks if we did it hands on. They can do it in 20 minutes, see the data and then think, "why do you think those things hap-pened?" (Science1)
Research & Exploration	They had to tell me, in the end, how much it would cost to carpet their house, how much it would cost to paint the walls in their house using area and that stuff . . . They had to do the research. How much does paint cost? (Math1)
Assignments	I use Google Slides to do a lot of interactive assignments . . . I can create background images with instruction that the students can't mess up and there are interactive parts, click and drag this here, take your link and place it here. (ELA5)
Taking notes	I've copied and pasted it into a Google Doc. They can highlight, they can make notes that way. So, they're engaging with that. (ELA2)

Creative learner-content (L-C) activities were mentioned in 83.3% of transcripts. While some participants faced challenges and preferred in-person creative interactions, others found online creative L-C interactions beneficial for shorter feedback loops and innovative demonstrations of learning. Online creative L-C BT activities encompassed coding, essays, projects, posters, brochures, and art (Table 4).

Table 4
Examples of Creative L-C Online Activities

Creative L-C Activities	Examples From Interviews
Coding	Some students might like Minecraft, Scratch. (Math3)
Essays	I've had a student revise a paper several times over and over and keep sending it back and I'd say the same thing. Here's what you've done well. Here's one thing I would con- sider revising . . . She had turned this thing in I don't even know how many times. (ELA5)
Collaborative Projects	In addition to collaborating with their international peers, students collaborated with their classmates. One example is where a class collaborated on a school-wide Peace Week project. Students were divided into subgroups based on whatever topic they were most passionate about. (SS2)
Posters & Brochures	We made travel guides and they got to pick. Quarter two was all about urban legends. And so they pick an urban legend out of any of the ones that we went over and had to create a brochure. (ELA2)
Art	They're creating an original work based on an assigned mathematical equation . . .where they can use a number of different platforms like maybe they create a PowerPoint or maybe they make a video. (Math2)

Theme 2: Learner-Instructor. Learner-instructor (L-I) online activities were also found in 83.3% of interviews. While some participants preferred in-person L-I interactions and mostly used the online space for learner-content interactions, others valued the timeliness of online communication and the opportunity to build stronger teacher-student relationships across modalities. Online L-I activities included feedback and participation in online discussions (Table 5).

Table 5
Examples of L-I Online Activities

L-I Activities	Examples From Interviews
Feedback	• It's easier for me to give almost immediate personal feedback to students while they're working, as opposed to a few weeks down the road. (ELA1)
	• I've been able to go in their assignments, to the suggestions, and so they can see if I have issues there or I can add my own comment they like, "This was plagiarized, not okay." (ELA2)
Participation in Discussions	• Every week, we'd have a discussion prompt that had nothing to do with math. And they could respond and say whatever they wanted . . . I would contribute to the discussion too. (Math2)
	• On the discussion prompts that we've had, I can read through each one and I can be like, "Oh, this one's a little off," and "Think about this," or I can be like, "Yeah, great thinking." Being able to give that response to them individually has been really fun. (Math4)

Theme 3: Learner-Learner. Learner-learner (L-L) online activities were found in all interviews. Participants reported that students had a natural inclination towards these interactions, which resemble social media and text communication. These activities fostered classroom culture, relationships, and extended learning beyond the classroom. Online L-L activities included discussions, collaborative activities, peer review, and peer support (Table 6).

Table 6
Examples of L-L Online Activities

L-L Activities	Examples From Interviews
Discussions	We use a lot of discussions . . .We would have our pairs record conversations and put them up on a discussion in Canvas. (Science5)
Collaborative Activities	You can make a keynote with four different colored squares . . . and you put a vocabulary word in the middle and you rotate. You can use it in a sentence, or model, and then you rotate the color squares on the next vocabulary word. (Math1)
Peer Review	If there's any sort of writing project or creative project where they're producing something that should have an audience, in my opinion, I put it in a discussion and I make them do a peer review. (Science5)
Peer Support	Our platform, if they do well on a focus area, it'll say, "Are you available for help?" And they can say, "Yeah, I'll help somebody." So then a kid can say "Oh Hey [student], I saw that you will help me with this." (SS5)

Connecting Online Activities to In-Person Learning

After classifying participants' online activities, we looked to understand how participants connected online activities to in-person learning. Such understanding is important because the connection between online and in-person learning creates BT. Participants connected online activities to in-person activities in several ways. We classified these as Data, Relationships, and Preparation and Reinforcement.

Theme 4: Data. Participants primarily connected online and in-person learning through data-driven learning adaptations. Technology facilitated the collection and analysis of student data, enabling teachers to promptly adjust instruction. Activities were tailored for the entire class, small groups, and individual students based on data, encompassing remediation, extension, and individual conferences. Instructors also utilized data to inform in-person groupings. Only one participant, ELA4, expressed a preference for using anecdotal in-person data to inform instruction.

As instructors reviewed data, they better understood learners' needs and met those needs in the in-person space. SS3 often waited to plan her in-person activities until after consulting data:

> I have to be comfortable and patient - maybe not even knowing what's happening tomorrow . . . Because I'm getting so much more information and data quickly, I have to wait until I get it to know where we're going the next day. I might have some ideas, but I might totally veer off in a different direction.

Math5 determined how long to teach a topic by analyzing student progress data from personalized learning software:

> It'll tell me only 12% know this already and that really helps me to know what kind of pace I set because if 80% already know it, then it just needs to be maybe a 10-minute mini lesson. But if only 15% know it, then maybe it's a two- or three-day thing that I need to cover to make sure they really get it.

Several instructors mentioned being surprised that online formative data suggested that students did not understand course content as well as the students thought, leading instructors to revisit topics in person. ELA3 related, "Wow, my entire class bombed this quiz. Okay, we need to go back and talk about this . . . And use that to drive us. Do some review. Ask them different pointed questions." ELA2 likewise shared:

> I ask them to thumbs up, sideways, thumbs down and they're like, "I've got it." Whereas, when I finally get that data, I'm like, oh you didn't get this, or some of you did. Let's revisit it. It's nice to be able to go back and get that information that same day in a very meaningful, quick way. I mean, I could still get that information by going through worksheets or going through the assignments that same day and not sleep, or I can let a computer solve that for me.

For the most part, participants suggested that instructors were able to plan powerful in-person learning activities after consulting online data.

Instructors were also able to identify and meet students' remediation needs by consulting data. Math2 described this practice as revolutionary:

> One of the biggest life-changers in my career was actually looking at data and then targeting kids who couldn't do it. You sort them really quickly. We have a flex intervention time at my school. And pulling them in—it's magical.

SS5 explained how online-platform data personalized and benefitted her in-person workshops:

> I think it's allowed us to really focus on what they needed. For example, if I have kids who, in the previous project, scored really low on say, argumentative claim, then I can do a workshop on argumentative claim and the whole class isn't going to come to that because most of them did okay. I'm just going to work with the kids who need it. Blended learning allows you to really personalize based on the data.

Online data became a powerful resource to help meet students' remedial needs.

Instructors also used online data to inform in-person conferences. Math4 described this relationship:

> When I see a student and they're just not getting it, I know who to reach out to. I know how to help them. I know what they know, and a quick five- or 10-minute conference identifies the error and fixes it, and they're able to move forward.

ELA2 similarly explained:

> We'll go through all of that data and see where they are. And then we'll meet again mid-year and say, "This is where you were, these are the activities that we can work on in order to help improve this so that by the end of the year, you're either higher than this or you are on the same track as you already were."

As instructors consulted student data, they created informed student conferences, to meet students' needs better.

Lastly, instructors used data to inform student groupings. Math4 described creating heterogeneous groups to support those who are struggling:

> We get back our results and I know the kids who are really struggling with this concept . . . So, I rearranged the seating chart several times, so I have a couple strong and a couple weaker [students] at the table together to kind of help support.

Science4 described creating homogeneous groups to target specific learning needs during station rotations:

> I do checkpoints leading into the final completion of a project. I can take all my students who turned in a checkpoint and didn't do a very good job in a group. I can take all my students who didn't turn in anything at all into a group, and then take all my students who turned it in and nailed it into a group. Then I can decide how I want to use those three groups to push education the next day . . . A typical way I'll do this is set up a station rotation. The ones that have done a good job—I'll sit down with them for 10 minutes while the other two groups have specific assignments they're working on and kind of work with them and then I'll shift between the groups over the course of the day and have a personalized lesson for each category of students according to what they need.

Math6 constantly changed grouping strategies based on data: "Those groups change based on the results of the tests. So, it's not like my groups are the same all the time. They are constantly changing based on understanding the data and what the data is saying."

Participants agreed that data-informed student groupings allowed students to receive targeted instruction.

Theme 5: Relationships. All participants except one utilized both online and in-person activities to foster student relationships. Instructors engaged with individual students while others participated in online activities,

leveraging the online space to cultivate opportunities for in-person connections. ELA5 cautioned that maintaining classroom culture during BT is crucial to preserving relationships. He advised providing team building, collaboration, and celebration opportunities during in-person learning. He further emphasized, “It’s important to not lose the pulse of the relationships in the classroom and as a community.”

Several instructors shared the positive impact of individual interactions allowed by engaging students in online activities. Math5 felt that her relationship with her students was better as she got to know them individually:

> I really feel like I have better relationships through blended learning because I have time to really sit down with kids on an individual basis, so I'm getting to know them and getting to know what they're able to do better . . . I can work with them, and really get to hear their concerns, their misunderstandings, and that brings me closer to the student, not just where math is concerned, but also personally because I really connect more with them.

Science4 described an experience where she was able to connect with a student who was normally unengaged:

> There is a student who never turned in any of her assignments, ever. But when we started working through some of this stuff, I could walk around the classroom. I would see she wasn't engaged. I would sit down and ask her why, and that gave an opportunity for her to talk about some of her challenges.

She went on to recommend that instructors use the opportunity that BT provides to build relationships with students:

> My biggest [BT] tip would be to stand up, walk around and interrupt students as they're doing stuff, and ask them what they're doing and why they care. Engage them in conversation about what they're doing . . . Everything hinges around your relationship with a student and you should use [BT] as a tool to find more time to encourage those relationships between you and the students.

Math6 shared how important it is to connect with students individually:

> [BT] has given me more time to get to know them, working more one-on-one or in small groups. I think that's massive. The students really see that I'm a teacher who is passionate about their growth. We are getting that more intimate setting to sit there and talk.

Participants used opportunities created by BT to connect individually with their students.

Instructors also connected online and in-person spaces to build relationships with their students. This led SS4 to connect with his students better than he has before: "They're more likely to share stuff via a Canvas thing than to write you a letter. So now I know them better than I probably ever would have known them 15 years ago." Several instructors, including ELA6, shared experiences of online communication alerting her to students' need for professional help:

> I flipped writing online this year. I hadn't done that before and they opened up in a way that I've never seen them open up before. They were willing to tell me stuff that I don't think they would have written on a piece of paper, sitting next to somebody. And some of it just broke my heart. And it's stuff I didn't know, that I felt it made me a better teacher knowing what was going on in their lives. I was able to get a couple kids some help and I don't even think I would have been aware of what was going on in their lives otherwise.

ELA6 went on to share this experience:

> I had one young lady whose mom had died a couple years before. And she had a stepmother now and a new baby. She would just write about her frustrations and her feelings that her dad wasn't really caring about her anymore because now he had this new family and everything and all this, just a lot of emotion and stuff. I don't know why but when they're typing it into an online platform, they seem to feel more free. I think it's because they're tweeting and they're texting and all these things and they're used to being more free . . . That transference of some of that openness is there. She's a really super quiet kid, never talks in class. I would have never known any of this stuff was going on. It just let me say, "Well, did you get some sleep last night? How's the baby thing?" Just little things to connect with her from the things that she shared that I don't think I would have gotten without it.

The online space of BT provides an additional platform for instructors to build relationships, and participants found opportunities for improving relationships with their students by leveraging this space.

Using both modalities allowed teachers to better support students' social and emotional wellness, addressing a growing concern in K-12 education. A more subtle connection between online and in-person activities that strengthened student-teacher relationships was that digital activities allowed

teachers to increase the number of one-on-one and small group interactions they had with students. These activities improved relationships regardless of the interaction's topic.

Theme 6: Preparation and Reinforcement. We found that all participants used the online space to reinforce in-person learning and 83% of our participants also used the online space to prepare students for in-person learning. This was usually a fluid process with the instructor choosing which platform best suited targeted learning goals, and students moving back and forth between modalities.

Participants explained how they used the online space for both preparation and reinforcement. Science4 explained, "It's really hard to separate what is online or not because it's kind of a constant flow between online and what we're doing together." SS3 shared:

> We might do something online and then come back together in a face-to-face activity, or discussion, or assessment, or something like that, and then vice versa. We might do something in class, an activity or lesson, and then go to an online forum, maybe a canvas discussion board.

This fluid use of the online space was common among participants.

Participants also used the online space to prepare students for class by introducing a topic; sharing work in-class students previously submitted online; and preparing for in-class discussions, presentations, deeper learning activities, and assessments. Science1 described introducing a topic in the online space:

> I will only use [the online space] for the engagement piece, to kind of pique their interest. Maybe it's not so much like they will start using the terminology, but the next day I will be the one to fill in the blanks . . . what I like to do for that engagement piece is find an online simulation or an activity.

ELA2 explained how sharing examples of students' online work can support in-person learning: "I can pull up an example that has no identifying information and ask what we can do to this paragraph to improve it?" ELA3 described asking his students to explore a topic online and then bring back questions and ideas for an in-class discussion:

> I know you have questions; here's your task list – I want you to find some answers. But I want you to come back with those questions. So they're each bringing their pockets of knowledge from where they've come from on the internet or whatever resource that I've given them . . . and then we spread and share knowledge in small and then larger group discussions.

Science2 asked students to prepare a presentation online and then present it in-class: “They each get assigned one of the seven [organ systems] to learn and they start on Canvas. I tell them that they have to present it to their group. They're required to teach their group about their organ system.” Instructors described students preparing for deeper, project-based activities in the online space. ELA6 explained, “The only way you can really have time to do project-based learning is if you're front loading it with something, if you have a blended learning activity of some kind.” Science3 was one of several teachers who encouraged students to prepare for assessments through online activities: “My homework was designed so that you could take them over and over again to get a perfect score . . . The students learn the information so they can pass a test in the end.” These examples provide insight into how participants used the online space to prepare their students for in-person learning.

Some of the ways that instructors used the online space to reinforce in-person learning included revisiting or researching topics introduced in person, extension or remediation opportunities, and providing real-time feedback. ELA5 described adding content to the online space to address ideas brought up by multiple students during class:

> I'll have a conversation with a student independently. And then I'll move to another student. Similar ideas will come up from several students – things that they're thinking about. What I can [then] do with blended learning is I can go back into the content that I've left them online and I can add links to it.

SS3’s students researched a topic that they first learned about in person:

> We did a couple of in-class lectures and activities. We defined resilience. We did a whiteboard activity. We did a little bit of face-to-face instruction about why I like history, or different things that we were going to study. And then in an online format students did some more research.

Math5 described how providing the option to extend learning to future topics allowed a student to learn much more than he would otherwise: “He went through all of the sixth grade accelerated topics, all the seventh grade accelerated topics, all the pre-algebra topics, all the algebra topics, and was over 80% finished with the geometry topics before the end of the year.” ELA1 used the online space to provide remediation activities for his students: “I would create Canvas courses for remediation and then I could determine who I would invite to that course.” SS1 described using the online space to support students who were working in person in real time: “You are on the document the same time they are . . . You can leave a comment right there so they can get support and know somebody is paying attention

to them." These practices represent a few of many examples of using the online space to reinforce in-person learning.

Participants also reported a cycle where students and instructors benefit from feedback, with students able to quickly retry learning opportunities and educators quickly able to iterate on learning activities. This feedback made students more confident going into assessments, discussions, and deep-learning activities. Some participants also connected online and in-person learning by offering remediation activities to students who did not demonstrate mastery and extension activities to students who mastered standards more quickly than their peers. This differentiation allowed learning beyond class time and location. Students could build on class instruction by acting on feedback, continuing to practice, and learning or researching beyond the constraints of the classroom.

Discussion

Below, we recommend strategies from our findings as important topics for PD. We also connect current research to our themes of data, relationships, and learner preparation and reinforcement.

Professional Development Structure

To support BT implementation, PD should align with participants' desired teaching strategies (The New Teacher Project, 2015; Philipsen et al., 2019). Educators should assess their strengths, weaknesses, and problems of practice, considering the uniqueness of their content area pedagogies and technologies (Cox & Graham, 2009). We recommend organizations offer a range of PD structures, including in-person, online, and blended formats, allowing participants to select relevant opportunities. Additionally, content-specific groupings and individual/small group coaching can be beneficial. It is important to acknowledge the diverse implementation practices among participants, highlighting the need for tailored PD approaches. Our study identified 18 online activities for BT (Figure 2, and Tables 2-6) and three strategies to connect online and in-person learning. Given the varied potential of BT, educators and PD planners should approach BT cautiously, gradually implementing a few strategies at a time. Among the 18 different activities mentioned, our experienced BT participants, on average, only implemented 10 strategies each.

Data

The field of education has recently emphasized data collection and utilization to direct learning (Fisher & Frey, 2018). Participants employed data to bridge online and in-person learning, consistent with findings from other BT studies (Short, Graham, & Sabey, 2021; Short & Hanny et al., 2021). Data-informed decisions enabled improved learning experiences, remediation, conferences, and groupings. As highlighted by our participants,

technology is essential for efficient data evaluation. Therefore, we recommend that BT PD programs incorporate training on accessing, evaluating, and utilizing student performance data.

Relationships

Educational organizations are increasingly concerned about educators' and students' social-emotional well-being (Korpershoek et al., 2020; Milatz et al., 2015). Research indicates that students' sense of school belonging is connected to positive social-emotional outcomes (Korpershoek et al., 2020) and that complex relationships with teachers and peers are important in a BT format (Castañón et al., 2023). Additionally, positive relationships between educators and students contribute to the social-emotional wellness of educators, reducing teacher burnout (Milatz et al., 2015). The Learning Policy Institute emphasized the importance of school support for social-emotional learning and recommended designing school structures that foster strong relationships (Darling-Hammond et al., 2020). Contrary to the belief that technology may create distance between students and teachers (Gerbic, 2011), many participants found that technology improved student-teacher relationships. Therefore, educational leaders should challenge this misconception and promote BT strategies that enhance student-teacher relationships, such as online discussions and feedback. Because 87.5% of L-C interactions were passive, PD supporting BT should support instructors in creating blended activities that go beyond moving content online. Additionally, given that BT activities involving learner-instructor interactions were slightly less common in our study, aligning with Short and Hanny et al. (2021), PD supporting BT should provide guidance, encouragement, and support for implementing such activities.

Preparation and Reinforcement

Initially, we intended to present separate sections for preparation and reinforcement findings. However, we observed that few teachers exclusively used the online space for either preparation or reinforcement. Instead, most participants seamlessly transitioned between these strategies, resulting in a form of self-directed learning where students took charge of their own learning and shared it with others online. Morris and Rohs (2021) highlighted the importance of self-directed learning in preparing learners for an unpredictable world. They also emphasized the need for educator support and feedback within technology-assisted, self-directed K-12 learning environments. The fluid use of online activities for preparation and reinforcement, as described by participants, aligns with these findings. We recommend that BT PD programs incorporate strategies to foster learning environments that empower students to be successful in technology-assisted, self-directed learning.

Conclusion

Graham, Borup, Short, and Archambault (2019) identified four blended teaching (BT) competencies: online integration, data practices, personalization, and online interaction. This study aimed to understand the range of online integration practices among teachers but did not examine frequency or grade-level/subject-area variations. Future research could explore teacher experiences with data practices and online interaction to deepen our understanding of these competencies across subject areas, or investigate patterns in activity selection and implementation. It would also be valuable to explore how ongoing institutional support and educators' beliefs about BT's impact on student learning and well-being shape instructional decisions. Examining the underlying reasons behind educators' BT choices could provide insights into effective implementation strategies.

As technology-enhanced learning becomes more prevalent, it is important to understand the online activities experienced blended teachers assign and how these activities connect with in-person learning. Our participants shared their experiences with various online activities, fostering passive, interactive, and creative interactions with content and peers. They also emphasized the need to teach across modalities, using data to inform in-person activities, nurture student-teacher relationships, and prepare and reinforce in-person instruction. These findings aligned with Moore's (1989) categorization of online activities and provide guidance for PD supporting BT.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work the authors used Chat GPT 3 to make some sections of the text more concise. After using this tool/service, the authors reviewed and edited the content as needed and the authors take full responsibility for the content of the publication. Generative AI was not used for any of the research methods, nor was it used in relation to participants' quotes or interview responses.

ADDITIONAL DECLARATIONS

The authors declare no conflicts of interest.
The authors declare no funding associated with this study.
The authors declare that permission to collect data for this study was granted by the ethics board of Brigham Young University, USA.

References

Akarawang, C., Kidrakran, P., & Nuangchalerm, P. (2015). Enhancing ICT competency for teachers in the Thailand basic education system. *International Education Studies, 8*(6), 1–8. https://doi.org/10.5539/ies.v8n6p1

An, Y. (2021). A response to an article entitled "Improving teacher professional development for online and blended learning: A systematic meta-aggregative review." *Educational Technology Research and Development, 69*(1), 39–42. https://doi.org/10.1007/s11423-020-09844-8

Archibald, D. E., Graham, C. R., & Larsen, R. (2021). Validating a blended teaching readiness instrument for primary/secondary preservice teachers. *British Journal of Educational Technology, 52*(2), 536–551. https://doi.org/10.1111/bjet.13060

Arnett, T. (2014) *Does blended learning work?* Christensen Institute. https://www.christenseninstitute.org/blog/does-blended-learning-work/

Barbour, M. (2017). The state of K-12 online learning. In J. G. Cibulka & B. S. Cooper (Eds.), *Technology in the classroom: Can it improve teaching and student learning in American schools?*, (pp. 37-51). Rowman and Littlefield Education.

Beatty, B. J. (2019). *Hybrid-flexible course design*. EdTech Books.https://edtechbooks.org/hyflex

Bjekic, D., Krneta, R., & Milosevic, D. (2010). Teacher education from e-learner to e-teacher: Master curriculum. *Turkish Online Journal of Educational Technology, 9*(1), 202–212.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Castañón, M., Rice, M., Filiss, T. (2023). Emergent themes from a study of a highly flexible hybrid learning program. *Online Learning, 27*(4), 220-243. https://doi.org/10.24059/olj.v27i4.4020

Cox, S., & Graham, C. R. (2009). Diagramming TPACK in practice: Using an elaborated model of the TPACK framework to analyze and depict teacher knowledge. *TechTrends, 53*(5), Article 60. https://doi.org/10.1007/s11528-009-0327-1

Darling-Hammond, L., Schachner, A., & Edgerton, A. K. (2020). *Restarting and reinventing school: Learning in the time of COVID and beyond*. Learning Policy Institute. https://restart-reinvent.learningpolicyinstitute.org/

Fisher, D., & Frey, N. (2018). The long view of visible learning's impact. *Education Sciences, 8*(4). https://doi.org/10.3390/educsci8040174

Gerbic, P. (2011). Teaching using a blended approach–What does the literature tell us? *Educational Media International, 48*(3), 221-234. https://doi.org/10.1080/09523987.2011.615159

Graham, C. R. (2019). Current research in blended learning. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (4th ed., pp. 173–188). Routledge. https://doi.org/10.4324/9781315296135-15

Graham, C. R., Borup, J., Pulham, E., & Larsen, R. (2019). K–12 blended teaching readiness: Model and instrument development. *Journal of Research on Technology in Education, 51*(3), 239-258. https://doi.org/10.1080/15391523.2019.1586601

Graham, C. R., Borup, J., Short, C. R., & Archambault, L. (2019). K-12 blended teaching (Vol. 1). EdTech books. https://edtechbooks.org/k12blended

Graham, C. R. (2021). Exploring definitions, models, frameworks, and theory for blended learning research. In A. G. Picciano, C. D. Dziuban, C. R. Graham & P. D. Moskal (Eds.), *Blended learning: Research perspectives* (Vol. 3, pp. 10-29). Routledge. https://doi.org/10.4324/9781003037736-3

Hanny, C. N., Arnesen, K. T., Guo, Q., Hansen, J., & Graham, C. R. (2021). Barriers and enablers to k-12 blended teaching. *Journal of Research on Technology in Education.* 1-22. https://doi.org/10.1080/15391523.2021.1991865

Hodges, C. B., Moore, S., Lockee, B. B., Trust, T., & Bond, M. A. (2020, March 27). *The difference between emergency remote teaching and online learning.* Educause. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Horn, M. B., Staker, H., & Christensen, C. M. (2014). *Blended: Using disruptive innovation to improve schools.* Jossey-Bass.

Kaleta, R., Skibba, K., & Joosten, T. (2007). Discovering, designing, and delivering hybrid courses. In A. G. Picciano & C. D. Dziuban (Eds.), *Blended Learning: Research Perspectives* (pp. 111–143). The Sloan Consortium.

Kimmons, R., Draper, D., & Backman, J. (2022). PICRAT: The PICRAT technology integration model. EdTechnica: The Open Encyclopedia of Educational Technology. https://edtechbooks.org/encyclopedia/picrat

Kimmons, R., Graham, C. R., & West, R. E. (2020). The PICRAT model for technology integration in teacher preparation. *Contemporary Issues in Technology and Teacher Education, 20*(1). https://citejournal.org/volume-20/issue-1-20/general/the-picrat-model-for-technology-integration-in-teacher-preparation

Korpershoek, H., Canrinus, E. T., Fokkens-Bruinsma, M., & de Boer, H. (2020). The relationships between school belonging and students' motivational, social-emotional, behavioural, and academic outcomes in secondary education: A meta-analytic review. *Research Papers in Education, 35*(6), 641–680. https://doi.org/10.1080/02671522.2019.1615116

Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.

Milatz, A., Lüftenegger, M., & Schober, B. (2015). Teachers' relationship closeness with students as a resource for teacher wellbeing: A response surface analytical approach. *Frontiers in Psychology, 6*. https://doi.org/10.3389/fpsyg.2015.01949

Moore, M. (1989). Three types of interaction. *American Journal of Distance Education, 3*(2), 1–7. https://doi.org/10.1080/08923648909526659

Moore, M., Robinson, H. A., Sheffield, A., & Phillips, A. S. (2017). Mastering the blend: A professional development program for K-12 teachers. *Journal of Online Learning Research 3*(2), 145–173.

Morris, T. H., & Rohs, M. (2021). The potential for digital technology to support self-directed learning in formal education of children: A scoping review. *Interactive Learning Environments*, 1–14. https://doi.org/10.1080/10494820.2020.1870501

The New Teacher Project. (2015). T*he mirage: Confronting the hard truth about teacher development*. https://tntp.org/assets/documents/TNTP-Mirage_2015.pdf

Philipsen, B., Tondeur, J., Pareja Roblin, N., Vanslambrouck, S., & Zhu, C. (2019). Improving teacher professional development for online and blended learning: A systematic meta-aggregative review. *Educational Technology Research and Development, 67*(5), 1145–1174. https://doi.org/10.1007/s11423-019-09645-8

Pulham, E., & Graham, C. R. (2018). Comparing K-12 online and blended teaching competencies: A literature review. *Distance Education, 39*(3), 411–432. https://doi.org/10.1080/01587919.2018.1476840

Pulham, E. B., Graham, C. R., & Short, C. R. (2018). Generic vs. modality-specific competencies for K-12 online and blended teaching. Jo*urnal of Online Learning Research, 4*(1), 33–52.

Rieckhoff, B. S., Farwick Owens, R., & Kraber, B. (2018). Teaching in the 21st Century: Perspectives from a Catholic university partnership. *Journal of Catholic Education, 21*(2), 182–203. https://doi.org/10.15365/joce.2102082018

Schwirzke, K., Vashaw, L., & Watson, J. (2018). A history of k-12 online and blended instruction in the United States. In K. Kennedy & R. E. Ferdig (Eds.), *Handbook of research on k-12 online and blended learning* (2nd ed., pp. 7–20). Carnegie Mellon University: ETC Press.

Short, C. R. (2024). Preparing P-12 educators for providing technology-mediated personalized instruction. In Blankenship, R. J., & Cherner, R. (Eds.), *Research Highlights in Technology & Teacher Education 2024 35th Anniversary Edition,* (Vol. 2, pp. 281-299). Association for the Advancement of Computing in Education. https://www.learntechlib.org/primary/p/224717/

Short, C. R., Hanny, C., Jensen, M., Arnesen, K. T., & Graham, C. R. (2021a). Competencies and practices for guiding k-12 blended teacher readiness. In A. G. Picciano, C. D. Dziuban, C. R. Graham & P. D. Moskal (Eds.), B*lended learning: Research perspectives,* (Vol. 3, pp. 193-213). Routledge. https://doi.org/10.4324/9781003037736-17

Short, C. R., Graham, C. R., & Sabey, E. (2021). K-12 blended teaching skills and abilities: An a priori analysis of blended teaching artifacts. *Journal of Online Learning Research, 7*(1), 5-33. https://www.learntechlib.org/primary/p/217689/

Short, C. R., Graham, C. R., Holmes, T., Oviatt, L., & Bateman, H. (2021b). Preparing teachers to teach in k-12 blended environments: A systematic mapping review of research trends, impact, and themes. *TechTrends, 65*(6), 993-1009. https://doi.org/10.1007/s11528-021-00626-4

Short, C. R., Graham, C. R. (in review). Blending and personalizing: A cross-disciplinary analysis of k-12 blended teaching practices for personalization.

Stevens, M., Borup, J., & Barbour, M. K. (2018). Preparing social studies teachers and librarians for blended teaching. *Contemporary Issues in Technology and Teacher Education, 18*(4), 648–669.

Trust, T., & Whalen, J. (2020). Should teachers be trained in emergency remote teaching? Lessons learned from the covid-19 pandemic. *Journal of Technology and Teacher Education, 28*(2), 189–199. https://www.learntechlib.org/primary/p/215995/

Wolcott, H. F. (1994). Transforming Qualitative Data: Description, Analysis, and Interpretation. SAGE.

Yang, S., Carter, R. A., Zhang, L., & Hunt, T. (2021). Emanant themes of blended learning in K-12 educational environments: Lessons from the Every Student Succeeds Act. *Computers & Education, 16*3. https://doi.org/10.1016/j.compedu.2020.104116