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A Case Study of Teachers' Experiences of Blended Teaching and Learning

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The purpose of this study was to explore how teachers experience blended teaching and learning. This article describes the interplay of beliefs and practices of four high school teachers, based on interview data, observation data, and artifact analysis. Results showed that the four teachers in the study enacted their beliefs in the blended context. Teachers' views centered on active and authentic learning for students. They saw their roles as facilitator, coach, guide and co-learner, placing their trust in different aspects of the teaching and learning process. Instructional strategies that supported their beliefs included the use of a variety of types of resources, flexing content from week to week, inclusion of student choice, especially within authentic tasks, and opportunities for student collaboration. All four teachers viewed assessment as learning and placed significant emphasis on formative assessment and feedback. The study suggests that further research into how teachers view and practice assessment in the blended context could benefit the field.

INTRODUCTION & LITERATURE REVIEW

The current state of education has brought great attention to online and blended learning models, as teachers everywhere have been forced to rethink how to enact their curriculum, instruction and assessment in online, blended, and hybrid contexts. While this study was conducted prior to the global pandemic, it adds to the current body of research related to teacher beliefs and learner-centered practices in online and blended contexts.

Prior to the current shift, K-12 schools and districts looked to the blended model as a means to a more student-centered approach to learning, one that could allow students to be active and to take ownership of their learning while working toward complex standards and competencies (Graham & Robinson, 2007; Horn, 2014; Palak, 2009; Picciano, Seaman & Allen, 2010; Yang, 2014.). Proponents of online and blended learning cite the potential to increase interaction, collaboration, and reflection—some of the hallmarks of a student-centered and active environment (Kehrwald, 2015; Means, Toyama, Murphy & Baki, 2013).

The research on K-12 blended learning also reveals that teaching effectively in a blended environment is not simply a matter of learning to use technology or changing the medium. Blended teaching requires that teachers not only understand the technology and its uses but also that they are able to think through the way in which technology can serve the learning. Furthermore, they need to be able to think about how the two modalities of face-to-face teaching and online facilitation blend and impact the teaching and learning relationship (Comas-Quinn, 2011; Kassner, 2013). Most importantly, they need to make a shift to more of a facilitation role and re-think what instruction looks like. While these findings highlight unique instructional demands, there is little mention of assessment practice in the blended environment in the research. This is a surprising gap, since faculty need to be able to use quality assessment practices to formatively assess understanding, skills, and abilities if they are to adjust instruction to respond to students – a significant aspect of the student-centered ideal.

Findings from K-12

Teacher practice in K-12 studies show little change. Across the K-12 studies related to blended learning, researchers reported very little change, overall, in teachers' practices. In their review of six years of data collected from national studies of both online and blended learning environments at the K-12 level and the post-secondary level in the United States, Picciano, Seaman, and Allen (2010) reported that it is unclear whether teacher practices are changing or whether they are simply transferring face-to-face practices to these environments. In other words, just adding the blend through technology does not seem to be changing pedagogy. Several other studies report that much of the blended learning is not changing pedagogical practices and that the blending that is occurring is not changing teaching or learning in any significant ways (Cherry, 2010; Cuban, Kirkpatrick, & Peck, 2001; Graham & Robinson 2007; Palak, 2009).

In a study of two technology-rich San Francisco high schools, researchers found that teachers used technology to support their existing practices rather than alter or integrate (Cuban, Kirkpatrick & Peck, 2001).

Bingham (2016), in a study of a charter high school, reported that some change did occur. But when tensions, frustrations, and contradictions arose, all teachers showed a return to pedagogical roles and practices with which they were most comfortable. The researchers cited lack of professional learning and lack of clarity around the teacher role as causes. Similarly, in a mixed-methods study of technology rich schools (not blended or online environments), Palak (2009) found that teachers used technology most frequently for preparation, management, communication, and administrative purposes and that the use of technology to support student-centered practices was rare. He also found that teachers continued to use technology in ways that supported their already existing teacher-centered instructional practices. Shifts in teacher practice did not occur even when attitudes were positive, support was provided, and teachers reported being comfortable. This researcher did not link findings to beliefs, stating that categorizing beliefs based on self-report data alone is too unreliable.

These studies suggest that blended learning, as a student-centered approach, is not yet realized. The reasons behind this have not been probed deeply — there is little mention of teacher beliefs related to the teaching and learning process (i.e. curriculum, instruction, and assessment), nor is there much about school culture, which encompasses beliefs. In a recent study focused on culture, published in the 2018 Handbook of K-12 Online and Blended Learning, Davis, Makay and Dabner examined behavior and structures in school culture, but did not examine teacher beliefs.

Some change toward student-centeredness. Several studies reveal that time, culture, and assessment may influence teacher practice in the blended context. In an ethnographic case study of three teachers' use of laptops over a two-and-a-half-year period, Windschitl and Sahl (2002) had mixed results. They witnessed significant shifts, moderate shifts, and no shifts in teacher practice among the three teachers studied and concluded that teachers' beliefs about responding to students and aligning to the school vision motivated teachers to adjust practice. This suggests that teacher beliefs and school context can merge and prompt teachers to respond differently.

In a second study, Borup, Graham, and Drysdale (2014) found that teacher practices led to improved student learning. Researchers attributed the success to the fact that teachers were able to design and modify curriculum and learning opportunities to foster community, nurture relationships, and promote discourse. Other factors described by the researchers included a collaborative culture and a collective effort among teachers and parents to be student-centered learning environment, including use of assessment data was a vehicle for meeting student needs. The third study, a comparative, mixed-methods study of six flipped classrooms and six traditional classrooms, revealed that teacher efficacy about teaching and technology,

comfort level with technology and attitudes toward technology contributed to willingness to use the flipped model (Unruh, Peters, & Willis, 2016). This study pointed to the need for teacher professional learning and the importance of teacher beliefs and efficacy in adopting new practices, lending further support for the need to examine teacher beliefs and practices.

Factors influencing lack of change. Factors cited across the K-12 studies for the lack of change in teacher practice observed and reported include the following: teacher lack of technological skills, lack of professional learning for teachers, the challenge of adjusting to new roles required by blended environments, amount of time required to design and implement blended/online learning, inability to reconcile competing educational priorities (specifically, standardized testing with student-centered approaches), and traditional school structures that limit sharing across and learning across disciplines (Barbour et al., 2011; Bingham, 2016; Carter, 2014; Cherry, 2010; Cuban, Kirkpatrick, & Peck, 2001; Gerbic, 2011; Graham and Robinson, 2007; Greener, 2009; Kassner, 2013; Kerwald, 2015; Picciano, Seaman & Allen, 2010). While traditional school structures are mentioned, the absence of culture as a factor influencing lack of change is noteworthy. It raises questions about educator beliefs, which are a part of culture, as a factor in the success of blended learning models.

Findings from Post-Secondary Studies

In a meta-analysis of seven studies, Gerbic (2011) found that there was little about teacher views and beliefs about blended learning and much more about how technology is viewed. She did cite one study that revealed a range of views about blended learning that makes connections to pedagogy. Gonzalez (2009) studied 18 university instructors from 14 different disciplines and found that blended teaching among these instructors was seen in following three ways: 1) a dis-integrated way to transmit information, or a *supply channel*, 2) a dissonant blending of teacher-centered face-to-face work with student-centered online work, and 3) a blended and embedded way of supporting student learning. The author concluded that teachers' understanding of blended learning paralleled what they considered to be good teaching. Teachers who were more teacher-centered saw blended learning as an opportunity to transmit information while teachers who were more student-centered talked about blended learning as a way to foster communication and collaboration. He further suggested a student-centered view of learning is a prerequisite to using a blended model successfully.

Several cases described in the secondary literature do reveal that faculty who are successful and remain committed to blended learning have a desire

for more student-centered approaches to learning. In a study of ten faculty at three universities, Kaletta, Skibba, and Joosten (2007) found that teachers who had a desire to engage students more deeply were centered on the student experience and that they shifted from teacher to facilitator, serving as a guide. Similarly, in a case study of three teachers who were successful in using technology to teach, Steel (2009) found that all three teachers expressed and enacted learner-centered approaches to teaching and believed that the use of technology needs to come from an educational need and should not be driven by the technology itself. In other words, they viewed the technology as a tool to enact their pedagogy. Last, in a study of six language teachers, Yang (2014) found that the teachers also shifted roles from "dominators to facilitators" (p. 14) and that they provided scaffolds to meet student needs. These teachers employed extensive formative assessment (i.e. feedback), from student to teacher, teacher to student, and student to student, to become more student-centered. These three studies revealed that teacher views and beliefs are important. They also suggested that exploring and/or making beliefs explicit is essential to not only understanding the teacher experience of online and blended learning, but also necessary for supporting success of the model. Finally, they suggest that examining student-centeredness requires an examination of assessment practices.

CONCEPTUAL FRAMEWORK

Impact of Teacher Beliefs on Practices

In his thorough synthesis of the research on beliefs, Pajares (1992) states that there is strong relationship between teachers' educational beliefs and their decision-making regarding instruction and classroom practice. The implicit and explicit beliefs and theories (i.e. rationale) behind what teachers do and how they engage with students is one part of the puzzle that helps us to understand how to support professional growth — perhaps the most important part (Pajares, 1992; Steel, 2009).

Research on the correspondence between teachers' stated beliefs and practices is mixed. Basturkman's (2012) meta-analysis of 16 studies showed limited correspondence between teacher beliefs and teacher practices. Several of the studies they reviewed found that constraints or barriers got in the way of teachers' being able to put their beliefs into practice. They describe the following four different types of barriers that prevented teachers from realizing their beliefs in classroom practice 1) lack of experience, 2) time constraints, 3) administrative obstacles, and 4) lack of professional culture. Though teachers had strong beliefs about student-centered pedagogy, they reverted to more traditional assessments due to time limits, mandated cur-

riculum, and constraints imposed by standardized tests. Other studies described the relationship between beliefs and practices as changing and evolving as an explanation for the mismatch or gap. Since beliefs drive action, and experiences and reflection can change beliefs, the process itself can be a reason for the mismatch (Sato & Kleinsasser, 2004). It is possible, then, that beliefs and practices do not correspond because teachers are in a change process and their beliefs have changed prior to their practice. Finally, some studies showed strong matches between beliefs and practice. Several researchers (Brewer, 2002; Gaitas & Martins, 2014; She, 2000) found that beliefs and practice were aligned and attributed alignment to a common teacher preparation program and strong collaboration between teachers.

Beliefs About Knowledge Impact Practice

Understanding beliefs about the nature and acquisition of knowledge (i.e. epistemological views) is helpful to understanding classroom practice (Pajares, 1992; Schraw & Olafson, 2002) and provides insight into how teachers strive to be learner-centered as they design curriculum, instruction, and assessment. Schraw and Olafson (2002) described three views based on a systematic review of others' positions. The first, the realist view, assumes that there is a body of knowledge that is agreed upon by experts and that does not change much. This knowledge is best acquired through experts via transmission. Teachers who hold this view teach actively to students whom they view as passive recipients. They don't see peers as involved in the learning process, they believe that practice is important to developing core skills, and they tend to assess knowledge or discrete skills using tests.

A teacher who holds a contextualist worldview believes that students construct a shared understanding in collaborative contexts and that knowledge changes over time. These teachers see their role as facilitator and are not only concerned with types of knowledge, but also with the process by which students learn and the authentic application of that knowledge in day-to-day life. These teachers promote peer support and embed authentic experiences and cooperative learning activities in their instruction and are more likely to use authentic assessments aligned to cooperative activities (Schraw & Olafson, 2002).

Teachers who have a relativistic worldview believe that knowledge is subjective and that each learner constructs a unique knowledge base that is different but equal to that of others. Teachers with this view do not hold their own knowledge as more important, rather they strive to create an environment where students learn to think independently. They serve as facilitators, not experts. These teachers will tailor assessments to student needs and embed self-assessment and self-feedback opportunities. These three views can be considered a continuum, but may be better used together, as it is en-

tirely possible that teachers' views live in all three places.

In addition to framing views of knowledge in these ways, Schraw and Olafson's (2002) survey of research identified five assumptions made by curriculum theorists and educational philosophers that lend support for an examination of teacher beliefs. The first assumption is that teachers are consistent in their beliefs. The second is that teachers' views are consistent across different domains. That is, they are domain general rather than domain specific. The third assumption is that teachers' views may be explicit or implied and that as educators make them more explicit, they are better able to reflect on them and make changes. Fourth, different views lead to different teaching styles and fifth, views develop slowly and late. This last assumption, directly contradicts Pajares' (1992) finding that views develop early and raises questions about how each defines views.

These findings and assumptions, taken together, support a need to understand teachers' views about knowledge as part of the process of preparing them to teach in a blended model, as beliefs and views will impact the degree to which teachers enact learner-centered practices.

Learner-Centered Practices

The third part of the conceptual frame driving this study was learner-centered practices, with an emphasis on an assessment-centered approach (Bransford, Brown, and Cocking, 2000). To place the learner at the heart, teachers must take into account student interests, strengths, challenges, and lived experiences. Educators who are learner-centered are also assessment-centered. They use formative assessment effectively, provide regular feedback in the course of learning, and embed opportunities for self-assessment. A teacher who is assessment-centered will use formal and informal formative measures to check for understanding and make decisions about what to re-teach and who to support with different scaffolds. These checks for understanding are done by examining student products, observing student performances, or listening to student conversations during classroom dialogue (Brookhart, 2008; Fischer & Frey 2007; Popham, 2008). In a blended environment, teachers need to be able to design formative assessment tasks for online portions of learning since the immediate feedback that occurs in face-to-face learning is not present. This requires the use of product submissions and online discussion to assess student understanding, adjust course, and tailor the work in response to what the formative assessment reveals.

The use of formative assessments also allows the teacher to provide specific feedback to students while they are still learning. Students then benefit from formative measures because feedback comes when they can use it to revise and improve upon their work. Recent research, summarized by Brookhart (2008) recognized that timing, quality, and mode influence

whether students are able to use feedback in the learning process. This area of assessment also connects to the research on self-regulation and supports students' ability to set goals, monitor their learning and work both independently and with others. Asking students to self-assess for quality, accuracy and use of processes is also in line with the research on feedback and self-regulation (Brookhart, 2008; Popham, 2008). It is this aspect of feedback that could perhaps be most important for blended learning. Since the model can give students more control and ownership over how to learn, it requires that they become better at monitoring and assessing their own learning and progress.

METHODOLOGY

Research Questions

The overarching research question addressed in this study was *How do teachers experience blended teaching and learning in OC21?* Sub questions included the following:

1. *How do teachers practice in a blended model?*
2. *What are teacher beliefs about teaching, learning and assessment in a blended model?*
3. *What, if any, is the connection between beliefs and practices in a blended model?*

Research Site, Participants and Questions

This article describes a case study of four teachers at OC21 (Online Courses for the 21st Century), a virtual high school that has served as many as fifteen school districts in New York State over the last ten years. Supported by the Putnam/Northern Westchester County BOCES, the participating districts act as a consortium, making program decisions collaboratively and sending both faculty and students to the high school to learn, across districts, together. OC21 has offered a variety of courses such as anthropology, coding, architecture, the adolescent brain, media and presidential elections, writing a novella and environmental engineering. The school offers between 8 to 12 elective courses, serving between 120 – 200 students, each year.

The consortium provides intensive professional learning for every teacher who designs and facilitates a course. The year-long experience is co-facilitated by a curriculum specialist and an instructional technology specialist. It focuses first on quality curriculum and assessment design, to include identification of essential questions, student outcomes, curation of content, and the design of authentic performance tasks. Teachers create a curriculum

blueprint for the course that informs course building during a two-week, summer institute focused on the effective use of instructional technology and the learning management system (LMS). The blended model adopted by the consortium follows Horn and Staker's (2015) three-part definition of blended learning. The first part is "any formal education program in which a student learns at least in part through online learning, with some element of control over time, place, path or pace", the second part is that "the student learns at least in part in a supervised brick and mortar location away from home" and the third part is that "the modalities are connected to provide an integrated learning experience" (p. 53). This definition reflects the intent of the high school to support teachers in the design of curriculum and instruction that effectively integrates the two modalities while providing students with some choice and control. Teachers can determine the balance between face-to-face, synchronous instruction, and online instruction, but the consortium asks that at least one third of instruction be synchronous, even if remote.

During the year of this study, OC21 had seven participating districts, seven faculty, eight courses offered, and approximately 225 students. A purposeful sampling method was used to select the teachers for the case study in an attempt to maximize diversity. Criteria included 1) length of tenure at OC21, 2) amount of face-to-face time built into the curriculum, 3) current role in home school, 4) sex and 5) overall years as an educator. After selection, one teacher had to be replaced because she would not be teaching. This replacement reduced diversity in terms of subject area and gender. Teachers studied were (pseudonyms):

John – 2 years, social studies teacher, male, late career (more than 20 years), frequent, synchronous, face-to-face time

Trevor – 3 years, social studies teacher, male, mid-career (between 10-20 years), minimum face-to-face time

Anne – 4 years, social studies teacher, female, late career (more than 20 years), moderate face-to-face time

Nate – 6 years, educator for engineering firm, male, late career (retired from classroom teaching), frequent synchronous, face-to-face time

Data Collection

From September of 2016 through February 2017, three formal methods of data collection were used to capture teacher beliefs and actions. This provided a rich body of data and guarded against bias and limitation of any one data source. Data sources included interviews, observations, and documents.

Interviews. Each teacher participated in a face-to-face interview in December 2016 or January of 2017. The interview process was drawn from the work of Mishler (2009) and Seidman (2006), drawing most heavily from Siedman's approach, which aligned to the conceptual framework of the study. Interviews were recorded and transcribed so that verbatim responses could be captured. The interview protocol allowed for a "joint construction of meaning" (Mishler, 2009, p. 52). Each interview did not proceed in the exact same fashion and interviews became a dialogue. The researcher piloted and refined the protocol in two pilot interviews. The "past, present, and belief" protocol (Seidman, 2006) worked well in these pilots and revealed that the professional history (past) is quite important to expression of beliefs and should not be minimized. The protocol worked well across all four interviews — answers to the questions often emerged without the researcher having to ask some of the questions (see Appendix A).

Observations. Observations included: 1) face-to-face instruction in brick-and-mortar classrooms, 2) synchronous instruction in virtual classrooms, and 3) online instruction (i.e. asynchronous) in the LMS.

Face-to-face instruction, in brick-and-mortar classrooms. The researcher took notes during these sessions using a low-inference approach, capturing as much of what each teacher said and did as possible. Exact quotes were captured and a recorder was used to fill in gaps. This data collection happened at three school-wide days during the year and allowed the researcher to observe faculty and students working together in the same physical space. These occurred in September, January, and February.

Synchronous instruction, in virtual classrooms. Three of the four teachers held synchronous meetings in their virtual classrooms. The researcher attended between four and six of these for each teacher, depending on availability. Again, low-inference observation notes were taken and audio recordings captured exactly what was said.

Asynchronous instruction, online. To observe online instruction, the researcher observed three participants teaching for the same two weeks in the Fall semester and one participant for two weeks in the Spring semester. The research examined resources for the week, assignments, and interactions between the teacher and students as it happened inside of forums, announcement spaces, and e-mail exchanges. Screenshots captured images of the actual work.

Documents. The first documents collected came with the interview, when teachers identified specific examples from their practice within their courses. These concrete, tangible artifacts provided rich description and served as

confirmatory data. The second type emerged as important as the researcher began to analyze data and noticed one teacher's extensive use of emails to communicate with students. This prompted an additional collection of all emails sent by teachers to the entire class. All group emails for two teachers were collected in the Fall semester and all for two teachers in the Spring Semester.

Data Analysis

Interviews were scheduled close together, with no in-depth analysis between them. The researcher listened to each interview once a few days after completion, and waited to analyze so as not to impose meaning from one teacher to the next (Seidman, 2006). This allowed for the possibility of examining the data as a single case and as a set of cases.

Detailed analysis began with the interviews since that is where the teachers expressed beliefs about their experiences. Each teacher interview was treated as a single case. After the third interview, the researcher began to also look at the larger, school case. These analysis methods align with Creswell's (2014) qualitative approaches. The researcher collected multiple sources of data in the natural setting, used both inductive and deductive analysis, and focused on participants' meanings. The data was analyzed as follows:

1. Each recorded interview was listened to while waiting for the transcripts. This allowed the researcher to get a sense of the whole interview.
2. During the first read, the researcher highlighted passages/phrases of interest, noting meaningful chunks and crossed out interruptions (i.e. pauses to take calls, get water, or use the restroom).
3. During a second read, the researcher noted themes and created labels (words and phrases) for those themes.
4. During third and fourth reads, the researcher jotted the themes next to every passage and refined the themes as they became clearer and the connections between them emerged.
5. After four readings, the researcher created a theme chart that listed the themes, and identified the interview chunks that revealed them.
6. Themes were re-ordered based on weight, meaning the number of interview segments that seemed to be connected or illustrative of the theme.
7. Themes were placed in a chart so that the other data sources could be used to confirm or refute the themes. The columns in this chart included a) theme, b) interview transcript segments, c) supporting observation data, d) supporting artifacts and e) contradicting data.

8. Notes from face-to-face observations, online observations, artifacts (previously collected) and e-mails, were added to the chart, using these data sources as confirmatory and dis-confirmatory.
9. After three interviews were analyzed, themes across experiences emerged and the chart was refined. After the fourth interview, the theme chart captured each individual case and themes for the overall OC21.
10. It is important to note that patterns from the first three interviews influenced how the researcher analyzed the fourth interview—more comparison happened during analysis.
11. The researcher deliberately looked for contradictory evidence, for each teacher case, by re-reading all data sets on a separate day, usually a week or more later.
12. Key word searches were used to:
    a) Test themes (for each individual case) to see if the weight would be supported by the frequency of use of certain words related to them.
    b) Look for similarities and differences across the four cases by searching for the same words to see how frequencies were different. This further confirmed some observations and teased out a few differences.

Memos. The researcher wrote a total of seven memos during the study. The first three were during the interviewing process and focused more on learning related to the interview process than on the teachers' experiences. Four more memos captured a) methods of analysis (especially adjustments to process), b) themes in the data, c) connections between data sources, d) tentative theories and e) questions or wonderings. These memos allowed the researcher to keep track of this rather complex process, served as a synthesis method and allowed for reflection and discussion with a mentor.

FINDINGS

The theoretical framework and the literature review both informed and grounded the findings. Table 1 below summarizes findings related to participants' beliefs and practices.

Table 1
Summary of Teacher Beliefs and Practices Across Variables

Variable	Nate	Anne	Trevor	John
Years teaching blended	6 years	4 years	3 years	2 years
Belief formation	early career	early career	mid-career; shifting	late-career; shifting
Influences on beliefs	student teaching mentor	constructivist teachers and schools	non-traditional school	action research experience
Beliefs about teaching and learning	contextualist: emphasis on practical application and procedural knowledge	contextualist: emphasis on exploration and meaning -making	contextualist and relativist: emphasis on active learning and ownership	shifting from relativist to contextualist: emphasis on active learning
	values authenticity and collaboration	values courage and risk-taking	values self-regulation	values personal connection
	places trust in self to keep students engaged	places trust in relationships	places trust in i ntrinsic motivation	places trust in clear expectations
Alignment between expressed beliefs and practice	alignment	alignment	strong alignment	moderate alignment
View of role	facilitator	learner, then facilitator	coach	guide
Strategies to support learner-centeredness	checking in with every student	relationship building	student ownership and control	standards-based grading approach
Assessment practice	use of performance tasks; emphasis on formative assessment; vague feedback provided	use of performance tasks; emphasis on formative assess-ment; specific, descriptive feed-back provided	use of performance tasks; emphasis on formative assess-ment; specific, descriptive feed-back provided with use of rubrics	use of performance tasks; use of diagnostic assess-ment; emphasis on formative assess-ment; specific, descriptive feed-back provided

Beliefs

Belief formation. Each teacher's narrative contained a teaching or professional experience that shaped the teacher's beliefs and approach in the blended model. For Nate and Anne, the influential experiences came early in their careers. In Trevor's case, beliefs developed mid-career. In John's case, beliefs shifted much later in his career, prior to entering this

high school, and were still shifting at the time of the study. Nate was highly influenced by his student teaching mentor, Anne by positions in private, constructivist schools with constructivist mentors, Trevor by a position in a non-traditional school where performance-based approaches were the norm (i.e. non-public), and John by a quality, in-depth experience of action research that allowed him to safely experiment to make changes to his practice. These experiences shaped core beliefs and were all in place *prior* to entry into OC21, but, as each teacher expressed, were reinforced during their tenure at the blended HS.

Beliefs aligned to school vision for students and teachers. In all four cases, teachers' expressed beliefs fit inside two world views—the contextualist view and the relativist view. Nate, Anne, John, and Trevor all believed in the importance of authentic learning experiences, active learning, and collaboration. This excerpt from Nate's interview reveals his belief about authentic learning:

> I show you a photograph [artifact] from my field trip because I think that's at the center of how I'm able to link my in-class learning with real-world learning. It's great when the kids get to see structural steel. They get to see concrete. They get to have conversations with engineers that are looking at the questions that we deal with in and out of the classroom every day. They see how that practical knowledge comes into play. I think it's important that they're learning about things, not in isolation but because this knowledge is totally applicable and relevant. It's important because it's emblematic of something I really believe in.

His beliefs were also revealed in his instruction. In the 10/17/16 virtual class meeting, Nate explained:

> This week we've opened a unit engineering drawing using visual tools. I want you to become familiar with sharing a graphic file, because that is the true life of an engineer. They're constantly sharing 3D concepts from one engineer to another engineer, modifying and sending it back. This is the language and communication of the engineer and I want you to have some experience of that.

While all teachers placed a high premium on the application of knowledge in the context of authentic experience, Trevor's interview and practice also revealed that he was working to promote even more independent thinking

opportunities for students. He designed his course and instruction to promote self-regulation. Trevor's interview artifacts were two students' samples from his campaign design project. As Trevor described why he chose his artifacts, his intent to support student independence and ownership was clear:

> I said, "Here are the outlines here of what I'd like to see. I want you to go and look at these models, and then I want you to create something on your own. If you need to learn how to do something, I'd like you to figure that out." I was really proud that they were able to learn on their own. They learned it. They created it.

Trevor continued by describing his deliberate approach to leave assignments open enough to require students to take ownership and to "do it on their own":

> Many of the students jumped right into it. They would ask a question every once in a while, but for the most part, they did it on their own. A few students needed more direction, so instead of saying, "Okay, here's a tutorial that I made for you," I said, "Why don't you take a look at this website and see what this person's done?"

Analysis revealed that all four teachers chose to enter a HS whose vision was aligned with their beliefs. Their experiences of blended learning were also supported by the vision, design, and assumptions underpinning the *teacher professional experience*. From its inception, OC21 had a clear vision of the teacher as curriculum designer. Driving assumptions included the following:

- teacher ownership and engagement contribute to success for students,
- teachers are better able to bring a rich curriculum to life if they have designed it themselves, and
- teachers need to be passionate about what they are teaching as they enter the blended context, which would be different and challenging.

Each of these teachers in this study was able to choose a course connected to an interest or passion, and in three cases connected to their identity. Anne chose anthropology, Trevor chose presidential elections, John chose sustainability, and Nate chose engineering. Their aligned beliefs about teaching and learning, their self-efficacy, and their passion impacted the ways in which they experienced blended teaching and the satisfaction they expressed in interviews.

Teachers report consistent beliefs across domains. When asked about whether beliefs were different for blended teaching and brick-and-mortar teaching, all four teachers described their beliefs as the same in both contexts. Additionally, their beliefs, which were shaped outside of the blended context, were the same inside of the blended context. In analysis, it became clear that this was also the belief of the high school. OC21 described a vision for student learning that was student centered and that matched the vision for students in the home high schools of the consortium.

Technology was not a barrier. When asked what it was like to teach in a blended way, teachers did not speak about the technology. Two reasons surfaced in the interviews that could explain this finding. First, teacher professional experiences prior to entering made a difference. Three of the four came into the school having at least one role or significant experience with technology, and the fourth, Nate, is an engineer, used to using technical tools and software. Anne managed websites and John served as an instructional technology coach. Only Trevor mentioned technology when he described his decision to come to the school. He explained his decision in this way: "I said, 'This sounds like something I'd like to try out. If nothing else, I'll gain some technical skill.' I think, as a teacher, I do like to take risks. I like to do something new."

Second, in addition to structured professional learning focused on navigating and building in the learning management system, teachers have more ongoing, informal contact with the technology staff developer than they have with the curriculum specialist. Their initial comfort, the targeted professional learning and ongoing coaching have allowed them to manage the technology so that it is not a barrier.

High stakes test perceived as a barrier to enacting beliefs. While Nate, Anne, Trevor, and John showed more consistency than inconsistency between their beliefs and their practice in the blended environment, one barrier did arise in the findings, though it is not a barrier for their blended practice because the courses in OC21 are all elective courses. Each teacher who taught courses connected to high stakes tests in their home high schools (Anne, Trevor, and John) described being more challenged to enact their beliefs completely under those circumstances. The burden of content (i.e. knowledge outcomes) and testing made the use of student-centered approaches more difficult, in their view, though all were working toward it in some way. In this segment of her interview, Anne revealed the pressure she felt to help students pass the state test required for graduation:

> Clearly, this class is not a high-stakes class at all, so it's not like teaching Global 1 or 2 or U.S. History where you've got the state test waiting at the end. In Anthropology, I don't have to worry if they're retaining content. They don't have to know that Margaret Mead went to Samoa in 1923, but they do need to know that World War I started in 1914 for the state test. They need to pass the state test.

When I asked Trevor about his practice in OC21 vis-a-vis his brick-and-mortar teaching, he revealed that the content in his required courses burdened him and that he could not take as many risks with his practice, saying "I have an AP course where I feel I can't take as many risks because the—I feel bound by the tests." He did describe, however, that he was using new strategies and embedding more active learning experiences into those courses. He explained, "Those are some of the risks I like to take. I don't see them as risks. I see them more as opportunities." Finally, while John did not speak about tests, he did speak about the burden of knowledge outcomes in those courses as impacting his practice.

Practice

Three of four teachers used unsolicited metaphors to describe their beliefs and their role as they practice in the blended experience. Anne used the metaphor of a journey by boat, where she and her students were sailing together. Trevor used the metaphor of tightrope walker (student) and safety net (teacher) and John used the metaphor of a pathway. Each metaphor aligned with expressed beliefs and practices within their narratives and so became effective in describing their role in the teaching process. Taken together, the metaphors show the four teachers (even though one did not have a metaphor) on a continuum as it related to their role, to their ability to be learner-centered and to what they trusted would engage and support students.

Table 2

Summary of teacher beliefs (expressed in metaphor) about role

	communication-centered	curriculum-centered	community-centered	learner-centered
teacher	John	Nate	Anne	Trevor
metaphor used	pathway	--	shared journey	safety net
role emphasized	designer of clear pathways	designer of experiences	co-learner; caretaker	coach; feedback provider
placement of trust	clear expectations and communication	engaging and active learning experiences; teacher as monitor	relationships	students

Trevor's metaphor emerged as he described differences in blended and brick-and- mortar teaching. In addition to revealing his role, the metaphor reveals that he trusts students to rise to his expectations:

> In the classroom there's more coddling because there's less physical space. When I'm physically near kids, I get to know them better, and that's great. I can help them along, but then the opposite side of that is that I am helping them [laughter] along probably a little too much, right? That safety net is way close to that rope they're walking across as opposed to the blended course where they can drop a long way. That can be good because maybe they can do some amazing things up on that rope. It's a much more amazing show to see somebody with a net that's so far underneath them.

John used the metaphor of a pathway that could also be seen in his practice:

> Basically I'm creating a pathway, a learning path I like to say. It's easy to throw things up on a website. It's a lot harder to organize it so that there's a clear flow. That's what I really want. I give students the opportunity to move in different directions if they want to or need to, but most will follow the path I weave with content, reflection and assessment.

This idea of creating a pathway and keeping the student perspective in mind can be seen in the online segments of John's course and in his e-mail communications. He is careful to hyperlink within text for assignments and for communicating his expectations so that students have a clear path through the course resources. He places trust in clear expectations.

Anita's journey metaphor captured her view of learning as exploratory and her role as co-learner as did her assignments that placed students immediately in the role of anthropologist. She explained "we are getting in a boat and we are all in it together and will all get to the other shore" as she encouraged students to ask for help when they needed it and not to give up, even if they fell behind in the work. This metaphor captures Anne's theories about teaching and learning as a collaborative exploration:

> I think that teaching and learning is really learning and learning, and what I've loved about the blended class is that every semester I've taught it, I've learned so much. To me, an important word in teaching is connection and that feeling that you've said something that's made somebody think in a different way. My students do that for me too. They make me think in a different way.

Finally, Nate, while he did not use a metaphor, did reveal a belief about his role that was strongly supported in observations and artifacts. Nate held himself accountable to every student, and every student accountable to the work. It was key to how he saw his role, both in his brick-and-mortar practice and in his blended teaching practice:

> My college supervisor observed me every week, for 20 weeks. Imagine? He was there regularly. A regular presence. Feedback constantly. Detailed feedback. When he observed, he made a diagram of my classroom. At the end of the lesson, he'd say, "This kid over here? He's not paying attention because you didn't ask him enough questions. You only asked him one. He didn't know it, and you didn't come back to him. What's his name?" I said, "Tony." He said, "You make sure that Tony stays with you." Over the next 40 years, I've been looking for Tony [laughter]. Who's that kid who's not with me? He made me feel that my lesson was not successful unless it was successful for every kid in my classroom.

Relationship building was more challenging. Several studies from the body of secondary research on blended teaching and learning revealed that teachers perceive that building relationships, making connections and fostering community is an important part of the work of blended teaching (Carter et al., 2014; Greener, 2009; Kaleta, 2006; Brunner, 2007). This was also the case for teachers at OC21. While it did not emerge in the narratives as a dominant theme, all four teachers discussed the importance of relationships and believed that it was a greater challenge to establish relationships and connect to students in this environment. Nate, Anne, and John "mourned" the loss of more intimate connection in this environment, with the exception of Trevor who was ambivalent, as he was trying to find a balance that allowed him to build relationships and provide independence. All three of the teachers who used weekly synchronous meetings with students, stated that these meetings supported relationship building. They described them as tremendously helpful for keeping students engaged and for allowing them to tailor or adjust for students. Anne, who did not use the virtual classroom, built relationships primarily through her written group emails, individual written communications and by offering to meet with students after school or on weekends if they needed support.

When I asked Anne "What's it like to teach in OC21?" she spoke immediately about the challenge of developing relationships and revealed her belief about the importance of building relationships with students as part of keeping students engaged:

> Relationships are key. If I am able to build a relationship early on, it'll hold, and it'll give me the ability to rope them in and keep them heading towards a goal…help them achieve a positive finish to the class. If that relationship isn't there, then they will fail, fade.

Learner-Centered Practices

Online resources were varied. The online segments were rarely mentioned by the teachers in the interviews, but were observed for all four teachers' classes. There were some consistent practices and some variations within those practices evidenced. Each week, in each course, there was an overview for students that contained guiding questions. These questions came from the curriculum design approach used in professional learning, but the degree to which each week is described varied. In addition to this summary, each week contained a variety of content resources. These include short articles, links to websites, short video clips made by teachers, or links to videos. The amount of content varied from week to week and from teacher to teacher. The resources support learner-centeredness in that they allow students to access content individually, with some choice about which resources to access and use, in what order and at what pace. Clearly, there was flexibility for students and the inclusion of different types of entry points to content.

Teacher flexing for students. Because the platform allowed teachers to "hide" and "reveal" segments, there was evidence that teachers adjusted content as they opened each new week, holding back some content or moving pieces to the next week. This suggested that these teachers took a flexible approach and modified their curriculum. It was not clear, in the observation periods, what is informing their decisions, however. Only Anne mentioned flexibility in the interview and she felt that she could be more flexible in a brick-and-mortar course. She explained:

> First of all, the online course is slightly less flexible in that it's all set up and the curriculum's established, the assignments are built. I do, as you know, rearrange weeks, drop an assignment, tweak or change parts, but basically, the course it set.

Her explanation suggested that the timing of making change in the blended environment was different, as it could only be made prior to opening a new week of content and assignments. This context, in Anne's view, didn't

allow for the daily change that was possible in the brick-and-mortar classroom when she could adjust course in the moment based on student understanding, skill, or engagement.

Assessments provided choice. For all four teachers, the assessments provided the greatest evidence of student centeredness. Students across all four courses had choice. Sometimes choice was about content, such as Anne's students who choose a culture to study and sometimes choice was about how to demonstrate learning. For example, Nate asked students to demonstrate understanding of an architectural principle using one of several visual tools. In all cases, the choice supported student-centered learning, but the choice was also not unique to a blended context. In other words, these choices can also be provided in a brick-and-mortar classroom just as easily, as they come from the design of the task itself.

Collaboration, assignments and forums. Collaboration within assignments appeared in Nate's, Trevor's, and John's courses. That is, assignments were designed so that students must work with each other, indicating the teachers' intent is to build collaboration skills. The ways in which the teachers used forums, and the degree to which students collaborated within them, varied across classrooms. However, they appeared in all classrooms during the weeks observed. There was evidence that Nate was not maximizing the use of forums to foster collaboration, suggesting that he may not have known how to use the tools effectively since he repeatedly expresses a belief in collaboration.

Assessment Practice

All four teachers used a variety of assessment types – products and performances that asked students to put knowledge and skills to use. Most of these were formative assignments built to larger, summative tasks that were eventually summative, graded assessments. For three of the four teachers, assessment was seen as part of the learning and was not described as separate from the learning and the teaching. Nate, Anne, and Trevor spoke of assessment related ideas and practices, but did not refer to them as "assessment", a sign that they saw the assessment and the learning as one and the same. In addition, all four teachers described the importance of authentic, real, or personal tasks that provided opportunities for students to apply learning but didn't call these tasks "assessments." When asked, "How do you know your students are learning?", each teacher answered, every time, "The students work", in a way that almost said, "Well, obviously."

Formative assessment valued. Formative assessment and feedback were mentioned by all teachers as important and was the strongest pattern in

assessment practice across the teachers' experiences. The word feedback appeared twice as often in the interviews as assessment and grading, revealing that this faculty understood the value of feedback for learning and saw the difference between feedback and grading. All four believed in the value of feedback and described providing feedback while students were working. John stated:

> Every major assignment is a draft, and I let them redo and redo. I use Google apps so they share their work with me from when they start…That way it was always shared with me and I could see their progress and comment on it and give them suggestions and warm and cool feedback as they worked.

Anne said:

> It's that whole formative assessment piece that you taught us, that students learn best when they get to work on something and make it better and better and incorporate feedback. That certainly happened…it was rewarding in that sense, because I feel, as a teacher, that I'm making a difference to a student's level of learning.

Trevor, explicitly attributed his work on feedback to the school, the professional learning and to teaching these blended courses:

> I also think our talk about giving them feedback that's actionable has also helped in this course. That's one thing that I'm really proud of this year - that ability to write a full-on note to a kid and say, "Okay, this is where you're doin' a great job. It's because you're doing this, this, and this." And, "This is what you're doing well and what you're not," and then, "This is where we can see some improvement, and this is how you can do it." That's really big.

Evidence of feedback. Evidence of feedback in process was seen in practice more strongly for three of the four teachers and was found inside of the online segments, in virtual meetings, in group e-mail messages and in individual messages. Anne and John provided specific, descriptive feedback in written communications and Trevor was observed helping students to provide feedback with a rubric at symposium of the Fall semester. Verbatim notes included several quotes from Trevor showing that he used the rubric for feedback purposes. For example, "I'd like you to have the best project

you can have…so I brought the rubric" and "Show your website – introduce your candidate – show things you've included – take a critical eye – take a look at the rubric." Anne evidenced more specific feedback to individuals inside of her group emails, and John used the comment feature in Google Docs extensively. Nate, however, offered more vague feedback without specific, actionable support. The inconsistent use of rubrics among these four teachers and the varying degrees of quality of the feedback suggested that the school had more work to do in this area.

DISCUSSION

This study adds to the research reviewed about the connections between beliefs and practices in several ways. First, the research on when beliefs form is mixed and, in this study, we see that for three teachers, beliefs developed early in their careers and were influenced by mentors and school culture. For one teacher, beliefs shifted late in his career as the result of an in-depth action research experience in a collaborative community. Second, teacher views were tightly aligned in this study, which supports Pajares's (1992) research that stated there is a strong relationship between teachers' educational beliefs and their decision-making regarding instruction and classroom practice. The teachers in this study were able to enact their beliefs about curriculum, instruction, and assessment. These teachers chose to enter a HS whose expressed mission aligned to their beliefs, unlike other studies where strong matches between beliefs and practices were attributed to a common teacher preparation program and strong collaboration between teachers (Brewer, 2002; Gaitas & Martins, 2014; She, 2000). Third, the research reviewed described barriers that prevented teachers from realizing their beliefs in classroom practice. These included lack of experience, time constraints, administrative obstacles, lack of professional culture, mandated curriculum, and constraints imposed by standardized tests. The teachers in this study did not experience these barriers and pointed only to standardized tests. However, when they spoke about these tests, it was in relation to their practice in courses outside of their blended courses, which were not electives. It suggests that the elective nature of the courses in OC21 supported these teachers' ability to enact their beliefs more so than the fact that the courses were blended. The research reviewed supported this finding that revealed that a testing culture prevented teachers from enacting their beliefs (Zhang, 2014).

This study adds to understanding of the teacher role as it relates to being learner-centered. Taken together, the metaphors teachers reveal multiple ways to be learner-centered. Teacher beliefs about their role determined how they designed their courses. However, the strongest contribution of the study

is related to the research on assessment-centered practices. These teachers revealed the degree to which they were assessment centered through beliefs about assessment as well as their assessment practice. They viewed assessment and learning as integrated. They did not view assessment as something that happens after learning, rather as an integral part of the learning process, supporting the research by Bransford, Brown, and Cocking (2000). This was evidenced by the types of assessments they embedded in their courses and by their reliance on formative assessment. The teachers embedded formative assessment tasks and authentic performance tasks through product submissions and online discussion. These types of assessments allowed them to assess student understanding, adjust course, and provide feedback to move learning forward. Their emphasis on feedback was the strongest connection to student centeredness in the study.

Limitations and Directions for Future Research

This small case study does not allow for generalizations to larger populations. It was narrowly focused on four teachers who were successful in the blended context, but could be replicated to examine teacher beliefs and practices across multiple populations and various learning communities. Because beliefs and culture are connected, an examination of beliefs, culture and practice in a single district or school may provide more insight into these connections. We can also glean possible next steps for research related to assessment. A study of teachers' beliefs about assessment and of their assessment practices in the blended and online context would greatly benefit the field, especially since we know that assessment is one key to being learner-centered. The quality of teacher feedback was not carefully examined in this study and it is not clear how the context influences how students receive and make sense of feedback when it is provided.

APPENDIX A
INTERVIEW GUIDE/QUESTIONS

Prior to the interview, each teacher was asked to send an artifact (or a link) from their work that they were proud of. The artifact was used as a starting point for part 2 and 3 of the interview.

Part 1: How did you come to be a teacher? Sub questions may include:

- Tell me about your professional/teaching history.
- Why did you choose the profession?
- Why did you choose to apply to OC21?

Part 2: What is it like to be a teacher in this blended HS? Sub questions may include:

- Tell me about the artifact you chose. Why did you choose it?
- What does it capture about your teaching?
- What is it like to teach in a blended environment?
- How is it similar to and different from the teaching you did before and do in your home school?
- What is it like to assess student learning in a blended environment?

Part 3: What are your beliefs about teaching and learning in a blended environment? Sub questions may include:

- What are some of your personal theories (or beliefs) about teaching and learning in a blended model?
- In what ways does your work in a blended environment extend or contradict your beliefs about teaching and learning in general?
- How has this work impacted your beliefs, if at all?

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