

UTILIZING CODESIGN TO CREATE K-12 ONLINE AND HYBRID LEARNING RESOURCES

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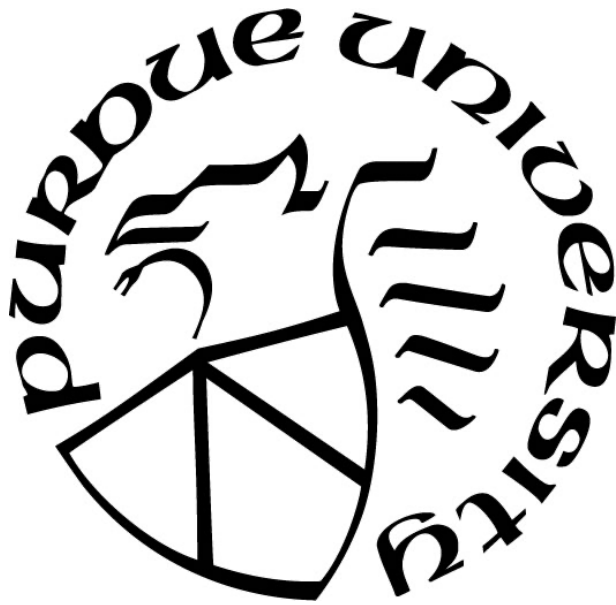
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*“Sometimes I think you believe in me more than I do,” said the boy.
“You’ll catch up,” said the horse.*

~ The Boy, the Mole, the Fox and the Horse, by Charlie Mackesy ~



For all the family, friends, and mentors who believed in me during this long, winding journey.

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GLOSSARY AND LIST OF ABBREVIATIONS

Instructional design: The design discipline concerned with the systematic process of creating effective learning experiences (Branch & Merrill, 2011).

Human-centered design (HCD): The term referring to the techniques, practices, and approaches used to create meaningful designs based on a deep understanding of user's needs and desires (Guacomín, 2014; Steen, 2012). In this study, HCD is used to describe a wide range of design activity.

Participatory design: A practice within human-centered design that involves users throughout the design process to enhance the alignment between the design and the user's needs (Sanders & Stappers, 2012). Historically, participatory design has been used to socially or politically empower individuals to effect change within their immediate environment (Bratteteig & Wagner, 2016).

Codesign: As a type of a participatory design practice (Kyza & Nicolaidou, 2017) within the human-centered design landscape, codesign is a multi-disciplinary design process where designers and non-designers collaborate to brainstorm ideas, prototype solutions, and evaluate prototypes based on identified needs (Penuel et al., 2007).

Participant Designers: In the current study, these are the practicing K-12 educators (e.g., teachers, digital coaches) who were recruited and engaged in the codesign phase of this research investigation.

ABSTRACT

Instructional design is commonly referred to as the systematic process of creating consistent and reliable learning experiences (Branch & Merrill, 2011). Built on a foundation of learning theory and instructional design theory, instructional design relies heavily on various process models to guide design practice (Stefaniak & Xu, 2020) and to manage and communicate the process of design (Branch & Dousay, 2015). Despite their use, scholars argue that these models do not accurately represent instructional design practice (Bichelmeyer et al., 2006; Rowland, 1992; Smith & Boling, 2009; Visscher-Voerman & Gustafson, 2004; Wedman & Tessmer, 1993) and remain too focused on high-level processes rather than discrete methods and actions (Gibbons et al., 2014). In recent years, human-centered design (HCD) methods have emerged within instructional design practice, providing more methodological guidance for instructional designers within an empathetic design perspective (Stefaniak & Xu, 2020). HCD includes codesign practices (Steen, 2012) that seek to involve users directly throughout the design process. The current study explores the design experiences of 12 participant designers (e.g., teachers, digital coaches) who were purposely selected to engage in a seven-week codesign experience. Tasked with providing direction on resources designed to support K-12 teachers with online and hybrid teaching, these participant designers worked together to share previous teaching experiences, analyze teacher data, and identify and develop learning prototypes. Interviews with eight participant designers following the codesign experience revealed that participants viewed the project as open and ill-defined, lacking in a clear outcome and identified roles and responsibilities. As the codesign continued, participants described impactful moments that clarified the design project and shifted the design process to a focus on details. While the end product of design was described by participants generally, participants viewed their experiences and perspectives as their major contributions to the design process. Results from this investigation reveal important implications for design practice, education, and research.

CHAPTER 1: INTRODUCTION

Instructional design is the systematic process of creating consistent and reliable learning experiences in pursuit of desirable learning outcomes (Branch & Merrill, 2011). Within complex and ill-structured design environments (Ge et al., 2005; Jonassen, 2000), instructional design has historically relied on models and frameworks to communicate design activity, manage the design process, and communicate design activity (Branch & Dousay, 2015). However, these models largely fail to describe what designers do in practice (Bichelmeyer et al., 2006; Rowland, 1992; Smith & Boling, 2009; Wedman & Tessmer, 1993). Noting the need for a clearer view of instructional design practice (Smith & Boling, 2009; Sugar & Luterbach, 2016; Tracey & Boling, 2014), design methods from other fields are emerging in instructional design (Stefaniak & Xu, 2020; Schmidt et al., 2020a). These methods include human-centered design (HCD) which involve users throughout the design process and enabling users to more completely articulate needs and assist in the development and evaluation of potential solutions (Steen, 2012).

While HCD approaches are beginning to emerge in instructional design (Schmidt et al., 2020b), research is noticeably lacking on how these methods can be supported (Gray, 2020). This study seeks to add to this small, yet emerging body of research by investigating the application of HCD practice in an instructional design context. Specifically, the purpose of this study explores how participant designers (i.e., K-12 teachers, digital coaches) experience codesign in an ill-structured, collaborative environment.

Background

As a field of research and practice, instructional design emerged in the years following World War II to advance science-based understanding of learning from military fields to education and workplace settings (Curry et al., 2020). Building off decades of learning theory research from behaviorist, cognitivist, and constructivist paradigms, instructional design became fixed on a theoretical foundation. Robert Mager's (1962) work in learning objectives focused learning on observable performance and established criteria for which behavior could be evaluated. Building off of previous work, Robert Gagné (1985) identified specific "events" needed for effective instruction and emphasized the importance of structuring the learning environment to enhance learning. Instructional design theory was also proposed to support the reliable creation of learning experiences.

Instructional design theory describes the presumptive relationship between a teacher's actions and an individual's learning (Landa, 1983). Instructional design theory, therefore, focuses on activity occurring outside of the learner and within control of the designer. The early scholarly work in learning and instructional design theory established instructional design as a field built on a theoretical foundation.

In addition to its theoretical foundation, instructional design is also viewed as a systematic process commonly represented by various design models and frameworks (Gibbons et al., 2014; Gibbons & Yanchar, 2010). Instructional design models continue to proliferate, but scholars argue that most models are simply a variation of the ADDIE model or other early models and frameworks (Branch & Dousay, 2015; Göksu et al., 2017). Despite their prevalence in instructional design education and training (Stefaniak & Xu, 2020), design models and frameworks largely fail to describe authentic design practice (Bichelmeyer et al., 2006; Smith & Boling, 2009). Instructional design practitioners do not follow the linear, regimented structure provided in instructional design models, often varying the order or repetition of design activities or omitting them altogether (Dicks & Ives, 2009; Visscher-Voerman & Gustafson, 2004; Wedman & Tessmer, 1993). As design practice does not always follow a predictable series of steps, rules, or logics, the designer himself becomes the central figure in “design work guided principally by humans for humans” (Yanchar, 2016 p. 17).

Emerging Practices in Instructional Design

Unlike other design disciplines that have begun to shift away from process models, scholars argue that the field of instructional design remains preoccupied with global design activities and processes that do not inform or describe design practice (Bichelmeyer et al., 2006; Gibbons et al., 2014). The shifted focus in other design fields includes a deeper consideration of design methods which describe the “techniques, tools, and processes that support design activity” (Gray, 2016a, p. 4044). In recent years, instructional design scholars and practitioners are beginning to explore design thinking and HCD methods from other design fields (Schmidt et al., 2020; Stefaniak & Xu, 2020). Emerging from ergonomics and computer science, HCD methods prescribe a deep understanding of the users and the use contexts as a prerequisite to design activity (Giacomin, 2014). While these methods are growing within instructional design, little is known regarding how HCD methods can be supported within instructional design practice (Gray, 2020).

HCD covers a broad scope of design practices in which designs are informed by knowledge gained from potential users (Steen, 2011). Sanders and Stappers (2008) described two major approaches within the landscape of HCD: user-centered design in which designers gain design knowledge by interviewing or observing users who remain indirectly connected to the design task, and participatory design which utilizes users as partners in design phases. Participatory design practices have become an increasingly prevalent methodology in recent years to increase the effectiveness and efficiency of the design process and the relevance of the design outcome (Bratteteig & Wagner, 2016; Könings et al., 2014). Early participatory design efforts aimed to democratize and empower individuals traditionally left out of the design process by engaging them directly in creating their world (Hansen et al., 2019). In more recent years, participatory design has been used pragmatically with users to enhance the chance of success for a developed product or service (Bratteteig & Wagner, 2016).

Within the area of participatory design, the practice of co-creation and codesign have expanded although these terms are often confused. According to Sanders and Stappers (2012), co-creation is defined as “any act of collective creativity that is shared by two or more people” (p. 6), including work outside of the process-driven activity representative in design fields. Similar to co-creation, codesign is the narrower term referring to the involvement of designers and non-trained individuals specifically within a design and development process (Sanders & Stappers, 2008). This study specifically addresses the practice of codesign, defined as a “highly facilitated, team-based process in which teachers, researchers, and developers work together in defined roles to design an educational innovation” (Penuel et al., 2007, p. 53). While codesign practices are becoming increasingly common in instructional design contexts (see Cavignaux-Bros & Cristol, 2020; Kyza & Nicolaidou, 2017; Severance et al., 2016 for examples), existing research is lacking regarding how they are experienced by participants.

Statement of the problem

As a field of a larger design discipline (Murphy, 1992; Parrish, 2009; Rowland, 1992, 1993), instructional design problems are often ill-structured (Ertmer et al., 2008; Jonassen, 1997), unsolvable by rote application of traditional problem solving or instructional design processes (Jonassen, 2008). In recent years, collaborative design approaches like codesign have emerged as methods to solve intractable problems, enabling designers to utilize users directly in the design process (Sanders &

Stappers, 2008). While codesign approaches are becoming increasingly common in general design practice, there is very little research regarding how these practices occur in instructional design settings. Therefore, the purpose of this study is to examine the experience and contributions of participant designers (i.e., teachers, digital coaches) through a codesign experience.

Research Questions

This inquiry is guided by the following research questions and sub-research questions:

1. How do participant designers experience codesign?
 - a. How do they describe the design task?
 - b. How do they describe the design process?
 - c. How do they evaluate their roles, contributions, and outcomes of the design process?

Research Design Overview

This investigation occurred within the context of a codesign experience with participant designers. In the summer of 2020, faculty members from the Learning Design and Technology program in Purdue's College of Education secured a federal grant supporting the creation of K-12 teacher professional development and learning resources for online and hybrid instruction. This grant was designed to support Indiana educators in developing the needed knowledge, skills, and attitudes to be successful in transitioning to remote instruction in response to the COVID-19 pandemic.

To answer the research questions, I conducted an explanatory embedded single case study, utilizing K-12 participant designers as research participants. Participant designers were invited to attend seven weekly codesign sessions held from February to April 2021. These meetings were held virtually (via Microsoft Teams) to avoid issues of travel and to align with COVID-19 safety guidelines. During codesign, participant designers engaged in a variety of HCD activities (Hanington & Martin, 2019) enabling them to interpret previously collected data, brainstorm design ideas, and create and evaluate prototypes. At the conclusion of their codesign experience, participant designers were invited to participate in an interview aimed at understanding their experience as codesign participants. While the codesign session transcripts and design artifacts created during codesign activities will be considered in this study, the primary data analyzed and reported here come from interviews with eight participant designers who agreed to participate in the research portion of this design project.

Significance

This investigation aims to enhance knowledge and understanding of participant designers' experience within a codesign process. Results from this study provide theoretical and practical contributions relevant for instructional designers, instructional design researchers, and for faculty and professionals responsible for educating and training instructional designers.

As designers do not routinely or predictably follow traditional instructional design process models in practice (Christensen & Osguthorpe, 2008; Rowland, 1992; Wedman & Tessmer, 1993), this study provides an authentic account of HCD practice. Instructional designers utilizing human-centered methods, or considering them in future work, will benefit from viewing how designers and participant designers work together in codesign, including the roles they assume and the unique contributions that each makes within a design process. Bringing together designers and participants in a shared design experience illuminates benefits and challenges of added perspective in design and development.

Researchers engaged in instructional design research can also benefit from this exploration of codesign. As a form of HCD practice, the experiences of codesigners and the nature of codesign practice is only emerging in instructional design research. While this study aims to shed additional understanding on codesign experiences, a significant vein of inquiry could expand on this analysis by examining factors and practices that enable or hinder participants from engaging in codesign experiences. How can roles and responsibilities of designers and participant designers be best established and negotiated within a codesign experience? What strategies, practices, and behaviors are most likely to improve codesign experiences? How can participant designers be empowered to make design decisions that have traditionally been reserved for trained designers, administrators, and other individuals within a design experience?

This study is also significant for those responsible for educating and training instructional designers. As HCD methods are becoming increasingly utilized in instructional design to realize significant design outcomes, this study provides greater understanding of how participant designers experience the design process. This understanding can support instructional designers in establishing expectations and procedures for codesign activity, anticipating opportunities and challenges, and understanding how to best provide support to participant designers throughout a codesign process.

CHAPTER 2: LITERATURE REVIEW

This review will begin with a short history, tracing the development of the field of instructional design and its underlying theoretical and historical foundation. Next, weaknesses and limitations of the traditional view of instructional design will be explored, opening up possibilities for emerging philosophies and practices from other design fields. Finally, this review will discuss emerging design practices, including codesign, which describes the direct involvement of users within a collaborative design experience.

The Field of Instructional Design

Instructional design is the systematic process of creating consistent and reliable learning experiences (Branch & Merrill, 2011). The systematic and outcome-focused characterization of contemporary instructional design can be traced back to its historic roots during World War II (Reiser, 2012). During this period, efforts were made to formalize the preparation of individuals for work in the military or wartime industries using the best available knowledge of instruction, assessment, and evaluation. In the years that followed World War II, scholars expanded their knowledge and practice into new areas, continuing to advance the systematic and science-based understanding of teaching and learning from military fields into education and workplace settings (Curry et al., 2020).

As systematic learning design continued to grow during the post-war period, advancements in learning theory added to the field's emerging theoretical foundation. B.F. Skinner, a preeminent educational psychologist whose work on operant conditioning heavily impacted the behaviorism movement, sought to improve the overburdened education system (McDonald et al., 2005). Built on a system of reinforcement and feedback, Skinner is credited for the development of programmed instruction which sought for efficient and personalized learning in self-paced instruction (Molenda, 2008). The “teaching machine” was the primary instrument of programmed instruction, providing learners with a prompt, immediate feedback, and a subsequent prompt dependent on a learner's correct or incorrect responses. Skinner (1958) noted that the effectiveness of this machine depended on the quality of the instructional material. The tasks used in these teaching machines were carefully crafted and predicted in advance; the teaching machine was particularly ill-suited for non-standard problems (McDonald et al., 2005).

Beginning in the late 1950s, learning theorists began to focus more on the cognitive processes rather than on the observable behavior emphasized in behaviorist thinking (Ertmer & Newby, 2013). While not diverging from the stimulus - response association of learning emphasized in the behavioral paradigm, cognitivism focused on the internal mental processes that lay between a stimulus and an individual's response (Driscoll, 2012). Shiffrin and Atkinson's (1969) model of human cognition gave scholars a new representation of human cognition that was largely ignored in previous behaviorist research. According to this model, information moves through three stages: sensory, short-term memory, and long-term memory. Learning, therefore, is concerned with the development of internal mental structures and can be supported by assisting learners to attend to, organize, store, and retrieve information (Ertmer & Newby, 2013).

By the 1990s, cognitivism was being increasingly challenged by constructivism, the philosophy of learning which emphasized the role of the individual in making meaning out of their lived experience (Jonassen, 1991). Constructivism shifted attention away from the formation and development of internal cognitive structures to focus on the situatedness of individuals in rich real-world contexts (Driscoll, 2012). Instructionally, constructivism promotes the creation and facilitation of "learner-centered, collaborative environments that support reflective and experiential processes" (Jonassen et al., 1995 p. 8). With the learner as the focus, constructivism suggests a shift in control as learners were asked to construct their own knowledge through active experiences (Ertmer & Newby, 2013; Wilson, 2012). Matthews and Yanchar (2018) argued that one's adherence to a philosophical paradigm (e.g., constructivism, cognitivism, behaviorism) stance has bearing on instructional practice. For example, a constructivist perspective encourages designers to work in cooperation with learners, while objectivist or instructivist perspectives lead designers to adopt more manipulative instructional approaches (see also Jonassen, 1991). Despite the influence of constructivism, instructional design models and practices are still largely based on the objectivist tradition which predetermines learning goals and minimizes the independence of the learner (Pieters, 2004).

Instructional design was also heavily influenced in this post-war period by scholars who sought to identify areas of learning and specify learning objectives within those areas. Notable among these scholars was Benjamin Bloom who created a taxonomy for learning and identified potential categories within the cognitive domain (Reiser, 2012). This taxonomy has been used heavily to show the diversity and representativeness of objectives within the learning experience (Krathwohl, 2002). In the 1960s, Robert Mager contributed to instructional design by instructing on how to write

instructional objectives (Reiser, 2012). Building on earlier work of scholars and researchers, Mager (1962) proposed that learning objectives should include observable performance, conditions that underlie the behavior, and criterion that can be used to assess the performance. Beyond mere identification of areas or forms of learning, these scholars sought to fix learning experiences on overt, observable behaviors in pursuit of desirable learning outcomes.

Working within a cognitivist perspective, Robert Gagné sought to identify the specific conditions that underlie effective learning (Gagné, 1985). He specified nine events of instruction and placed significant emphasis on the structuring of the learner's environment in order to enhance learning. Some scholars suggest that Gagné emphasis on the structuring of the learning environment provided an example or framework of the systematic process which characterizes much of current instructional design processes (Curry et al., 2020).

Guidance regarding the structuring of the learning environment continued to proliferate, resulting in expanded scholarship in instructional design theory. Unlike learning theory that is descriptive of the learning process, instructional design theory is probabilistic in describing how a learning outcome might be achieved (Reigeluth, 1999; Reigeluth & Carr-Chellman, 2009). Landa (1983) argued that while descriptive theories of learning proscribe a more causal link between a learner's actions and the associated psychological or behavioral experience, instructional design theory describes the presumptive relationship between a teacher's actions and the learner's subsequent response. Therefore, instructional design theory focuses on activity occurring outside of the learner and within control of the designer. Instructional design theory also provides guidance regarding the situations for effective practice (Reigeluth, 1999). Reigeluth and Carr-Chellman (2009) described instructional design theory as a set of component design theories that inform various design tasks, including the processes of collecting information about potential instruction, preparing for design implementation, and evaluating instruction. Various instructional design theories are more likely to be effective when certain situational factors are present.

Traditional View of Instructional Design

Emerging from this history, instructional design has become viewed as a theory-based field for systematically creating learning experiences resulting in desirable learning outcomes. As a theory-based, systematic process, instructional design practice has been commonly represented by numerous design models and frameworks. These models are used to guide instructional design practice

(Stefaniak & Xu, 2020) and to manage and communicate the process of design (Branch & Dousay, 2015). While the number of instructional design models has increased over the last decade (Branch & Dousay, 2015), some scholars suggest that new models vary little from earlier instructional design models (Branch & Dousay, 2015; Gibbons, et al., 2014; Stefaniak & Xu, 2020).

Utilizing theory within a systematic process, the field of contemporary instructional design continues to emphasize linear design processes to improve learning and performance (Merrill & Wilson, 2006). Labeled by some scholars as the “instrumental paradigm” (Visscher-Voerman & Gustafson, 2004), design continues to focus on the creation of learning objectives and achievement of learning outcomes. Designers working in this paradigm emphasize effectiveness and efficiency of learning rather than outcomes embedded in other paradigms, such as consensus, practicality, and usefulness (Visscher-Voerman & Gustafson, 2004). Since its inception in the wake of World War II, instructional design has emerged as a scientifically based, systematic practice dedicated to improving the efficiency of instruction in pursuit of desirable learning outcomes.

Limitations of traditional view

More recently, instructional design scholars have questioned traditional characterizations of instructional design practice which many believe is an overly simplistic view of design (Gibbons & Yanchar, 2010). A growing body of scholarship in instructional design practice suggests that design practice may be more complex and dynamic than previously understood. With regards to its reliance on theory, instructional designers do not always rely on instructional and learning theory, or use it as intended, when making design decisions (Christensen & Osguthorpe, 2008; Dicks & Ives, 2009; Yanchar et al., 2010). Instructional designers view their work as ill-structured, requiring the use of cognitive and social skills in balancing the needs and perceptions of learners and subject-matter experts (Dicks & Ives, 2009).

Scholars also argue that representations of instructional design practice, often in the form of models and frameworks, do not accurately represent authentic design practice (Bichelmeyer et al., 2006; Rowland, 1992; Smith & Boling, 2009; Visscher-Voerman & Gustafson, 2004; Wedman & Tessmer, 1993). In practice, instructional designers typically omit one or more design activities included in traditional design models (Dicks & Ives, 2009; Wedman & Tessmer, 1993), or vary the order and iteration of design stages (Visscher-Voerman & Gustafson, 2004). For example, Williams et al. (2011) found that instructional designers regularly engage in informal, developmental

evaluations to enhance the efficacy of their designs. In a systematic review of 48 studies applying design models, Stefaniak and Xu (2020) found that the majority of studies reported strict adherence to the design model, with no clear indication for how these models were used or applied in designing. Despite these concerns and criticisms, design models continue to significantly influence the instructional design field (Smith & Boling, 2009).

The continued use and proliferation of design models reveals a field heavily focused on “highest level processes” conceptualized through design models (Gibbons et al., 2014, p. 608). Almost 40 years ago, Kerr (1983) described the “black box” of design, the unidentified and unclear practice that occurs in design activity. Design is often represented as an algorithmic activity that merely serves to “outline the realm within which a designer’s actions take place” (Kerr, 1983, p. 47). In more recent years, Gibbons and Yanchar (2010) noted a similar problem, and conceptualized design as a “miracle box” that describes the outcome of an activity rather than how that activity was conducted. Design research focused on merely describing design processes is limited in informing and improving authentic design practice.

Emerging Practices in Instructional Design

In other design fields, the teaching and training of design based on models has been discarded in favor of focus on practice (Bichelmeyer et al., 2006). Gray (2020) specified that this shift in other design fields has resulted in a focus on design methods. Defined as the “techniques, tools, and processes that support design activity” (Gray, 2016a, p. 4044), design methods describe how designers act or function when engaged in design. Design methods provide more clear conceptions of what designers do, rather than the high-level process they follow. However, design scholars argue that design methods are still merely tools, subject to the judgment of the individual designer (Gray, 2016b; Nelson & Stolterman, 2012).

Without a deep understanding of design methods and practices, it is not surprising to see design methods from other disciplines emerging in instructional design. In particular, human-centered design (HCD) methods that emphasize empathetic design practices have taken root within instructional design (Stefaniak & Xu, 2020). These practices stem from the fields of ergonomics and computer science and requires a deep understanding of users and use contexts in order to produce effective design results (Giacomin, 2014). Contrasting HCD with traditional design which focuses on the object to be designed, Krippendorff (2004) suggested that traditional design focuses on ensuring

that users utilize designer products as intended while HCD enables the manifestation of user needs in their interactions with technology.

Designing With Others as an Emerging Practice

HCD covers a broad scope of design practices, including practices which directly involve users in the design process (Steen, 2012). Designing with users began with participatory design, a design practice beginning in Scandinavia in the 1970s (Sanders & Stappers, 2008). During this time, collaborative efforts between worker unions, researchers, industries, and governments were undertaken to mitigate the possible deleterious impact of technology on workers, working conditions, and the overall workplace setting (Kensing & Blomberg, 1998). From this beginning, participatory design emerged as a paradigm of social and political empowerment and emancipation (Hansen et al., 2019). In more recent years, the political aims of participatory design have not always been embraced, focusing more on the nature of participation than on political or social empowerment. This view of participatory design emphasizes the user's role throughout the design process and understanding how participation could be best configured (Hansen et al., 2019). While not inherently apolitical, this perspective suggests that active participation with end users can also be used to fulfill pragmatic ends, including ease of implementation (Bratteteig & Wagner, 2016), creating potential influencers for the designed product (Cavignaux-Bros & Cristol, 2020), envisioning the use of a design before actual use (Björgvinsson et al., 2012), and improving the overall design product (Könings et al., 2014).

Codesign

Within the conceptualization of participatory design, other terms have been used to describe collaborative activity with potential users. Sanders and Stappers (2008) broadly described co-creation as “any act of collective creativity that is shared by two or more people” (p. 6), including work outside of the process-driven activity representative in design fields. Similar to co-creation, codesign is the narrower term referring to the involvement of designers and non-trained individuals specifically within a design and development process (Sanders & Stappers, 2008). While not necessarily focused on individual empowerment or emancipation, codesign seeks continual engagement with stakeholders throughout the design process.

Within instructional design, codesign practice that utilize users directly in the design process are becoming increasingly common (see Barbera et al., 2020; Cavignaux-Bros & Cristol, 2020; Kyza

& Nicolaidou, 2017; Severance et al., 2016). In a multiple case study, Voogt et al. (2015) investigated the impact of collaborative design among teachers and researchers. The aim of this approach was to support teacher's development of knowledge and competencies related to teaching reform, including the use of technology-enhanced pedagogy and school and university partnerships. Penuel et al. (2007) utilized a codesign approach with teachers in the design of education innovation to support formative assessments in the classroom. As a group of practicing teachers and researchers, participants operated under clearly defined roles, to design, develop, and evaluate prototypes. While early participatory practices emphasize the democratic process of power sharing, Penuel et al. (2007) admitted that within his investigation of codesign, decision making remained under the direction of the project leaders although attempts were made to ensure that the emerging design was inclusive of all participant perspectives.

Within the current investigation, we implemented a codesign methodological approach with twelve practicing educators. Defined as a “highly facilitated, team-based process in which teachers, researchers, and developers work together in defined roles to design an educational innovation” (Penuel et al., 2007), p. 53), we explored the experiences of these untrained, participant designers within a codesign context. As a new and emerging practice in instructional design, understanding the experiences of participant designers is essential in identifying the skills, resources, and practices needed to support effective codesign experiences.

CHAPTER 3: METHODS

This explanatory qualitative case study investigated the experience of designing learning resources for practicing K-12 teachers regarding online and hybrid teaching practices. Specifically, this investigation examined how participant designers (i.e., teachers, digital coaches) experienced a codesign process within a seven-week codesign setting. Supported by codesign session observations and design artifacts, interviews were conducted to gain insight into the following research questions:

1. How do participant designers experience codesign?
 - a. How do they describe the design task?
 - b. How do they describe the design process?
 - c. How do they evaluate their roles, contributions, and outcomes of the design process?

Study Design

As the central focus of this research was to investigate participant designer's experience within an authentic design situation, a qualitative method was most appropriate. Stake (2010) suggested that qualitative research often exhibits four major characteristics, including 1) experiential; research occurs by exploring phenomena within natural and personally-meaningful contexts, 2) situational; inquiry occurs in unique, complex settings inclusive of objects and activities common in those settings, 3) personalistic; investigations seek to explore and understand perspectives from empathetic and emic vantages, and 4) interpretive; inquiry proceeds through acknowledged and subjective definitions and descriptions of the researcher.

Within the qualitative paradigm, this investigation adopted an explanatory embedded single case design in which a deeper understanding of design experience was sought (Yin, 2018). Defined as a method that investigates a phenomenon in depth within a clearly bounded context (Yin, 2018), case study was appropriate for the current study due to its epistemological and practical considerations. Capturing the experiences of multiple individuals through a variety of data sources aligns with a constructivism paradigm which assumes that individuals construct their own reality, and that research proceeds as a co-construction of perceived reality between researcher and participants. Case study methods embrace these multiple realities and call for the collection and subsequent analysis of multiple sources of data. Furthermore, case study methods examine phenomena within the complex,

real-world contexts (Yin, 2018). In this study, we acknowledge the potential impact of social and environmental factors impacting codesign and embrace case study to include these factors in the research.

Within our bounded case, this study includes several cases embedded within a single case study design (Yin, 2018). At the first level, the participants are examined independently as subunits of the study through analysis of the interview transcripts. Case descriptions were written for each participant before the analysis continued with the next participant. At the second level, this study explored the experience of the codesign group as a working whole. Codes from each participant were compared, looking for areas of agreement or disagreement leading to the themes presented in this investigation. Viewing codesign from two levels ensures that the investigation is representative of participants' experiences individually and collectively.

Research Setting

In summer August 2020, a group of faculty in the College of Education at Purdue University received a \$1.5 million Coronavirus Aid, Relief, and Economic Security (CARES) grant to provide practicing K-12 teachers with online and hybrid teaching resources. To support the grant and develop the content, a grant team was formed comprising faculty, graduate students in learning, design, and technology, and former K-12 teachers acting as project managers and school liaisons. The grant team was further organized into three major sub-groups to facilitate grant work (see figure 1). First, the *global team* was organized to include all faculty members, the K-12 teacher project manager and school liaison, and a graduate student. This group provided high-level guidance to the design process, discussed and made project decisions, and determined goals for weekly codesign sessions. Second, the *codesign team* included 12 practicing teachers and digital coaches (the research participants), the K-12 project manager and school liaison (also acting as session participants), and a faculty member and a graduate student as facilitators. This team met weekly with teachers to discuss issues related to remote teaching, analyze survey data collected earlier, and design potential prototypes. This codesign group would also be invited to evaluate the final resource. Finally, the *production team* consisted of a faculty member and nine graduate students from the learning design and technology program within the College of Education at Purdue University. This team was tasked with creating and developing content emerging from the weekly codesign sessions.

The research examined the experience of participant designers as they engaged in design and development activities across seven codesign sessions. Codesign sessions were 75 minutes and held weekly between February and March 2021. Given the safety COVID-19 protocols in place and to enable the participation of a demographically and geographically diverse group of participants, these codesign sessions were conducted virtually through the Microsoft Teams platform.

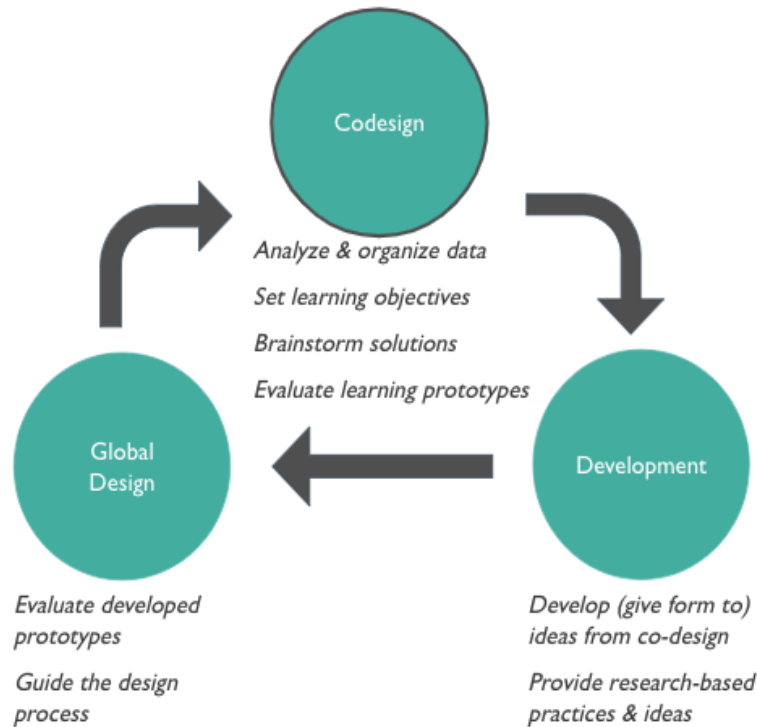


Figure 1. Organization of Groups Within the Grant Project

The figure depicted above shows the organization of groups within the grant project. While other groups also influenced the work of participant designers, this investigation explores participant’s experiences within the “Codesign” group.

The goals and outcomes of weekly codesign sessions were determined by the global design team during a weekly meeting. In those meetings, a report of the previous codesign session was presented and the next steps and outcomes for the subsequent codesign session was decided. Acting under the direction of the global design team, one faculty member and a graduate student designed and facilitated specific codesign activities to achieve the predetermined goals and objectives. Activities (see Table 1) were based on human-designed principles (LUMA Institute, 2012; Hanington & Martin, 2019; Tomitsch et al., 2018) and were intended to incorporate the end users (i.e., teachers,

digital coaches) into the design process. The format of the codesign sessions varied from week to week depending on the activity, but most sessions included whole group elements (e.g., session debrief, task instruction, discussion) and design tasks performed in smaller breakout groups.

Table 1. Codesign Session Topics and Activities

Session #	Design Topics	Design Activities
1: February 17th, 2021	Welcome & Introduction	Personal introductions Introduction to codesign process Remote teaching journey maps
2: February 24th, 2021	Exploring the Problem Space	Journey map synthesis Teacher survey card sort
3: March 3rd, 2021	Exploring the Problem Space	Card sort synthesis Tree diagramming
4: March 10th, 2021	Imagining the Opportunities	Professional development reflection Professional development brainstorm
5: March 17th, 2021	Imagining the Opportunities	Creative matrix of potential professional development “How might we...”
6: March 24th, 2021	Creating with Constraints	Consider current designs (All Aboard) Project wireframing
7: March 31st, 2021	Drilling Down on Delivery	Web features card sort “Top Five”

Note. Table 1 identifies the topics addressed and activities completed in each of the seven codesign sessions.

The codesign sessions involved 12 participant designers (e.g., teachers, digital coaches) (see Table 2) selected using a stratified purposeful sampling technique (Patton, 2002) based on participants’ levels of teaching experience, technology knowledge and confidence (e.g., high, medium, low), grade level (e.g., elementary, middle, high school), content area (e.g., science, math, languages), teaching roles (e.g., general education, special education, digital coaches), and school community (e.g., rural,

urban). Because constructing a codesign group with a broad and diverse set of experiences was essential to the study, participant designers were recruited from among personal contacts of faculty and staff in the College of Education at Purdue University. During the first three weeks, two participant designers withdrew from the codesign, and replacement individuals were recruited from a pool of potential participants.

For their involvement in the codesign, participant designers received \$40 for each codesign session attended at the conclusion of the codesign sessions (total of \$280 possible).

Table 2. Codesign Participant Designers

Name	Education Role	School level	Years of Teaching Experience
Catherine	Special education	Elementary	20+
Emily*	Teacher	Elementary	8
Jasmine*	ESL Teacher	High school	6
Joy	Teacher	High school	21
Kara*	Teacher	Elementary	4
Keith*	Digital coach	High school	19
Kimberly*	Special education	Elementary	14
Leslie	Special education	Middle	5
Malachi	ESL Teacher	High school	3
Sylvia*	Teacher	Middle	15
Vanessa*	Digital coach	Middle	14
Zayne*	Teacher	High school	19

Note. Table 2 shows the demographic information for each individual who participated in the codesign experience and subsequent research project. Individuals who opted to participate in interviews are denoted by an asterisk.

Research Participants

At the conclusion of the codesign experience, all participant designers were contacted and invited to participate in the research portion of this study. Of the 12 participant designers, eight agreed to participate and are included in the analysis. Individuals who engaged in the research portion of this project are hereafter referred to as “research participants” or as “participants” while all individuals who engaged in codesign are referred to as “design participants” or as “participant designers.”

Data Sources

This research and subsequent analysis will focus on participant interviews and supported by design artifacts and codesign session transcripts. Effective case studies incorporate multiple sources of data to ensure that the findings and conclusions are valid (Yin, 2018).

Semi-Structured Interview

Participants engaged in one semi-structured interview during May and June 2021. Interviews were designed to understand participant experiences with remote teaching, their ideas regarding valuable and needed professional development, and their experience with codesign (see interview protocol in Appendix A). Prior to interviews, two pilot test interviews were conducted, and adjustments were made to ensure protocol questions were relevant and meaningful. Interviews with participants were conducted virtually using Zoom and lasted between 60-75 minutes. The same graduate student who conducted the codesign sessions also conducted the research interviews. For their time, interview participants were compensated \$50.

Codesign Session Transcripts

The seven weekly codesign sessions previously described were held virtual via Microsoft Teams, recorded, and transcribed. While not considered a primary source of data, codesign session transcripts were used to inform specific questions for interviews for each participant and to find examples and negative cases of the findings.

Design Artifacts

In preparation for interviews, participants were given a copy of design artifacts completed during the codesign sessions (e.g., teacher journey maps, card sort, wireframes). These artifacts, while not analyzed directly, were used to inform the interview and to identify examples and experiences by the interview. During the data analysis process, these design artifacts documents were also used to write each case description and to identify examples and negative cases of the themes and sub-themes presented in the findings. Since codesign sessions were conducted virtually, these artifacts were in a digital format (e.g., Word documents, PowerPoint, images), and many were created in collaboration with other participants.

Data Analysis

This study utilized a two-cycle coding process described by Saldaña (2021) that provides a structure for general inductive inquiry while maintaining flexibility across various epistemological, ontological, and theoretical perspectives. First cycle coding focuses on deconstructing data and representing ideas and meanings implicit in text with a code, a word or pithy statement that represents the main idea or essence of a selected portion of data (Saldaña, 2021). In this study, first cycle coding began with holistic coding which categorizes data into larger ideas in preparation for more detailed coding processes. Holistic coding is especially helpful in studies with a large amount and a broad diversity of data. Within the resulting holistic coding categories, *in vivo* coding was applied as a second first cycle coding method to further refine the ideas described and experienced by research participants. With *in vivo* coding, codes are generated using the participants' words to ensure that codes and subsequent analysis remains embedded in the participants' experience. Following the coding of all interview data, the list of all codes was assembled, allowing researchers to check for duplicate codes and group similar codes into larger categories of codes.

Second cycle coding seeks to further the analysis by synthesizing the ideas from the first cycle coding. This step followed the pattern coding technique described by Saldaña (2021). In the current study, pattern coding occurred as codes and categories were grouped into smaller categories or concepts that held meaning for the research questions of this study. After coding three participant interview transcripts, second cycle coding was used to create a drafted codebook. This codebook was used to code the remaining five transcripts although adjustments to the codebook were made based on insights gained from subsequent analysis. The final codebook (see Appendix B) became the foundation for the remainder of the analysis process.

Once the codebook was developed through first and second cycle coding activities, two interview transcripts were independently re-coded by two researchers using the established codebook. During this process, five meetings were held between the two researchers to refine the codebook, ensure relevance of the codes, and determine inter-coder reliability. As a result of this process, the two independent researchers generated an unweighted Kappa inter-coder reliability statistic of 0.87 which is above the accepted level (Neuendorf, 2017). This revised codebook was then used to deductively re-code the remaining six interview transcripts. Coding during all analysis activities occurred at the sentence level using NVivo 12.

The themes reported in this study derived principally from the codes generated in the second cycle, pattern coding process. Data from each of the codes were analyzed and themes were developed that identified the meaning of the codes. While not the primary source of data in this study, the codesign session transcripts and artifacts were analyzed to find evidence in support of the themes or identify negative cases that needed to be addressed.

Trustworthiness

In qualitative research, the researchers are the instruments by which data is collected, analyzed, and reported. To minimize the negative impact of research bias and to enhance the trustworthiness of the research, I implemented strategies described by Lincoln and Guba (1985).

Credibility

The credibility of research suggests that the findings are believable across multiple realities (Lincoln & Guba, 1985). In considering the emic perspective of the participants through their words, actions, and artifacts during and after their involvement in the codesign experience, I sought to enhance research credibility through prolonged engagement with participants, data triangulation, peer debriefing, negative case analysis, and member checking. Interactions with the participants occurred through *prolonged engagement* with participants over the course of five months, enabling participants to trust one another and allowing me to become more familiar with each participant and sensitized to the research context. *Triangulation*, or the collection of different forms of data (e.g., observations, artifacts, interviews) from multiple participants over an extended period of time, was integrated to ensure that the multiple realities represented by participants was represented in the analysis. After the codebook was generated, I implemented a *peer debriefing* practice where a second researcher disconnected from the study was given access to my codebook and interview data. Using the developed codebook, we independently coded two interview transcripts, meeting together following each interview to check the validity and reliability of the coding process. This second researcher also asked probing questions requiring me to refine and adjust codes to more accurately distinguish codes to ensure greater credibility in the coding process. As a result of these discussions, our generated unweighted Kappa inter-coder reliability statistic was 0.87 which is above the accepted level (Neuendorf, 2017). During the analysis, as themes and patterns were developed, *negative case analysis* was utilized to ensure findings were represented by the data. When instances were found that

diverged from the overall findings, the findings were subsequently adjusted or properly highlighted and explained in the text. Finally, to ensure that the data records and analysis properly represents the participants' experiences, I used *member checking* with all participants. After a draft of the findings was completed, each participant was given the opportunity to review their participant narratives and findings and identify any incomplete or misrepresented ideas, or suggest any additions, clarifications, or modifications. Of the eight participants represented in this study, six provided feedback during this member checking process (see Appendix C).

Transferability

The trustworthiness criterion of transferability refers to how the findings presented in the research could be generalized to other research settings (Williams, 2018). While the purpose of this research is not to provide broad, generalizable statements regarding design judgments or codesign practice, I anticipate that this study will provide useful information that can be adapted and considered in other research and design contexts. In enhancing the transferability of the research, I provided a *thick description* of the research context, participants, and procedures that can assist other researchers in designing and facilitating similar lines of inquiry in their own setting.

Dependability and Confirmability

Dependability refers to the reliability and consistency of research across time, participants, and activities. Confirmability refers to the degree to which the research findings, conclusions, and suggestions can be supported by previous research and available data (Williams, 2018). Research that is confirmable makes an argument that is coherent and supported. The dependability and confirmability of this research is enhanced by an *audit* of my research journal, a document where I reported decisions in the design, facilitation, and reporting of this study. After a rough draft of the findings were completed, a draft of the analysis and an index of my research journal were given to an independent researcher to review and determine if the findings and interpretations of the study were coherent, logical, and supported by available data (see Appendix D). This external audit of my research journal by an independent researcher required me to address issues or problems that needed to be addressed in my research. The research audit feedback completed by the independent researcher's response can be found in Appendix E.

Researcher Positionality

As a researcher engaged in qualitative inquiry, I acknowledge the influence my knowledge, values, and experiences have on this investigation. My experience as a middle school teacher sensitized me to the challenges, opportunities, and limitations faced by many educators. It also introduced me to a strong and independent community of educators who are capable designers and problem-solvers and are diligent and helpful in assisting others in their shared work. Teaching also helped me develop a trust in the perspectives of other educators and a general ambivalence towards educational perspectives that were not rooted in practical knowledge and experience.

My early graduate studies deepened my knowledge of learning and instructional design theories and various process models. I quickly embraced a constructivist mindset that accepted and valued multiple realities and perspectives. I found common design process models to be unhelpful in describing the act of design. I began to view “design” as a sort of a “miracle box” (Gibbons & Yanchar, 2010), represented more by its outcomes and high-level processes than by identifiable, discrete tasks. I had very little understanding of what was meant by the act of designing, and I became skeptical regarding how instructional design could fulfil its potential in providing the learning experiences needed to produce real change within individuals and organizations.

Later graduate studies helped me to further explore my lack of knowledge related to the practice of design. As a way to understand design in practice, I became very interested in the individual designer, including the decisions, judgments, and evaluations made during the course of design. This focus on the designer helped me understand better what designers actually do when they design. However, I still viewed design as a systematic process, and I was unwilling to view design simply as a fully individualized task where designers act independent of any guidance or theory. I began to view design as creating learning experiences through the application of design methods or tools, inscribed by individual values and ethics, and applied uniquely to each context through the designer’s judgment. With this understanding, I sought to identify methods that instructional designers use when designing and found these methods hidden, obscured by design processes that have dominated instructional design research.

It is not surprising to me to see the adoption of human-centered design (HCD) methods and practices within instructional design contexts. Learning about HCD provided me with tangible methods I could use to design learning experiences and further elucidated the nebulous practice of design. HCD also aligned with my constructivist perspective and provided means to empathize and

value perspectives of learners that I felt were often neglected. Learning about codesign, with its involvement of users directly in the design process, provided additional methods that I could use to design relevant and meaningful learning experiences.

When our department secured a grant from the state of Indiana to develop resources to support K-12 teachers with online and blended learning, I immediately hoped that these HCD practices could be integrated into the design process. I believed in teachers, trusted their perspectives, and knew that their involvement in design was crucial in designing effective learning experiences. Working with faculty, staff, and graduate instructional design students, we developed a codesign experience and integrated various HCD methods throughout the anticipated 10-12 codesign sessions. My role in this experience was as the designer and facilitator of the weekly codesign sessions, and I also served on the global design team which largely informed and directed the codesign experience. Despite our intention to work closely with educators throughout the design process, I began to understand why Steen (2012) called HCD a “fragile encounter.” Rather than turning towards the other, our project moved “toward self and toward closure” (p. 79). As the codesign sessions continued, it became increasingly clear to me that impactful decisions were made outside of the recognized codesign group of participant designers. As described by Bratteteig and Wagner (2016), the codesign context was bound by “structured elements” (p. 455) which limited the possibilities that participant designers were empowered to make. Power-sharing in the form of decision-making was minimal and the participant designers were relegated to more of a consultation role (Arnstein, 1969). With this understanding, the anticipated 10-12 codesign sessions were reduced to seven sessions, and participant designers were released early from their commitment and involvement in design. Like the plethora of research conducted under the guise of participatory design (Bannon et al., 2018; Bødker & Kyng, 2018), our efforts focused almost entirely on collaboration with teachers, with little success in empowering educators and building their capacity within their respective positions (Bratteteig & Wagner, 2016).

As a participant in the codesign sessions, I am aware of the impact that myself and other faculty members and staff had on the participant designers’ experience and the resulting design. I also acknowledge that there may be other factors that contribute to this design process of which I am unaware. As a researcher, I acknowledge the limitations of my perspective and the influence my values and experiences have on this research investigation. While I have included numerous trustworthiness checks to minimize the bias in my research process and subsequent interpretations, in the end I understand that all research is unavoidably subjective.

Limitations

As in all research, the current investigation has limitations. I acknowledge that research is a subjective interpretation of real events and phenomena. As the instrument of this qualitative inquiry, I know that my interpretations impact my ability to perceive and interpret experiences. While not completely avoidable, I believe the trustworthiness checks included can minimize the negative impact of researcher subjectivity. Technology may also limit this research. By conducting these codesign activities at a distance, activities effectively promoting creativity and group cohesion in face-to-face settings may become impractical to adequately conduct in online settings. Technology also limits the ability to perceive individual experience, thereby, restricting the view of individuals as they engage in codesign practice. These technological limitations are certainly not desired but represent the current realities of the context. Finally, this study is not nor was intended to be completely generalizable to different research and practice contexts. Efforts will be taken to provide a thorough description of the research activities and context, and further research is encouraged.

CHAPTER 4: FINDINGS

As an embedded single-case study design, the data was considered from two levels. While this codesign experience represents a single case, these findings will also consider each participant as embedded within the single case. These findings will begin with a brief narrative of each participant (i.e., embedded level) and will continue with a discussion of themes that represent the case as a whole (i.e., single case level). The narratives provided here briefly describe each participant's previous teaching background, their experience teaching or coaching during the pandemic, and a brief description of codesign from their perspective. This narrative is intended to highlight the uniqueness of their experience that informed their ideas, thoughts, and experiences with the other participant designers.

Following the participant narratives, seven themes along with associated sub-themes are presented. These themes reflect participant experiences during the codesign and are presented in rough, chronological order from the beginning to the end of their codesign experience. Theme one ("Design Task Was Vague, Unclear, and Ill-Defined") describes the lack of clarity participants experienced during the initial weeks of codesign, including lack of clarity about the outcome and the participant's roles and potential contributions. Themes two and three ("Previous Experiences Were a Foundational Element of the Design Process" and "Participants Sought Commonality Through Shared Experience") describes the significance and outcomes of design conversations with participant designers, primarily during weeks one through four. Themes four and five ("Design Process Punctuated by Clear Moments of Insight" and "Design Process Shifted from General to Specific Over Time") describes impactful design moments, and the observed shift in the design product during codesign. Finally, themes six and seven ("Participants Describe a Solution That Is General and Undefined" and "Participants Contributed Through Their Unique Experience and Perspective") provides reflective comments by participants as they sought to describe the design outcome and identify their individual and collective contributions. While these themes represent patterns in participants' experience, negative cases or conflicting perspectives are provided when available.

Participant Narratives

Emily

During the 2019-2020 school year, Emily taught at a large, suburban school with an ethnically and economically diverse group of students. While she enjoyed her school and felt supported by her administration, the 30-minute commute each way was difficult with three little kids at home. When a teaching job opened up at a nearby school just two weeks prior to the start of the 2020-21 school year, she decided to make the change. Qualified as a Title 1 school, her current school served a rural community composed of a small, largely white, middle class student population. In this setting, Emily taught math, reading, science, and social studies as one of only two 3rd grade self-contained teachers in the school.

Teaching During the Pandemic. When COVID-19 forced schools to close during the spring of 2020, her school and district administration provided very little guidance beyond the simple directive to “maintain the level of education.” Emily was required to work from home, a situation compounded with three school-aged children and a husband whose work was also shifting to home. As the wife of a Methodist pastor, her bedroom became a “pastoral office on one side, and a classroom on the other.” She said, “It was pretty much like 8:00 to 6:00. One of us was upstairs with the door closed in the white noise, you know, like, while the other one was caring for kids and things like that.” Emily remembered feeling significant “relief” when the 2019-20 school year was over.

During the 2020-21 school year, her new school provided the community with a virtual school option, requiring classroom teachers to teach in-person classes while managing a proportion of the grade’s virtual students asynchronously. To meet her teaching responsibilities, Emily “clung” together with her grade-level colleague to develop content (e.g., assignments, videos) for both instructional modalities.

Through these experiences, Emily admitted, “The biggest chaos is that nobody knew best practices.” While her master’s degree in school leadership and administration introduced her to the importance of research-based practice, it was opinion-based practice that seemed to guide teachers during the pandemic “without research to fall back on to.” As a result of this lack of best practices, Emily noted, “you really had no idea if anything you were doing was beneficial...There were so many different opinions about what you should be doing.”

Codesign Experience. Emily joined the codesign group in week three after another participant designer withdrew. While Emily admitted that she initially joined the codesign group because of the monetary incentive, this original motivation was soon replaced by a genuine desire to engage. She described codesign as the “best thing I did for myself last year,” an experience that was “very therapeutic.” As a teacher at two schools during the pandemic, her perspective enabled her to see “what worked well here” and “what was a hot mess.”

Jasmine

Jasmine was a 7th and 8th grade English as a Second Language teacher at an urban middle school. Originally from Puerto Rico, Jasmine began teaching as an English/Spanish instructor while still an undergraduate, followed by a brief position creating lessons and content for dual-language programs. In 2015, she began her K-12 teaching career in Puerto Rico where she taught Conversational English at the middle and high school level. After three years in that setting, Jasmine moved to the mainland United States and began teaching at her current school where she has been employed since 2018. Her school included a predominantly Caucasian staff and served an economically and racially diverse student population.

Teaching Through the Pandemic. Jasmine found it challenging to teach virtually at the “flip of a coin” when her school shut down in the spring of 2020. All of her training up to that point had been “designed for in-person teaching” with perhaps some blended or flipped learning elements. Her school pivoted to a “hybrid” instructional model during the 2020-21 school year which required her to teach in-person and virtual students simultaneously. She admitted positive experiences teaching in both in-person and virtual settings but noted that teaching hybrid was something she would “definitely not do again.” It was challenging, Jasmine described, having to manage the physical in-person environment while simultaneously supporting a virtual student who needed additional help or was experiencing connectivity issues. Split between in-person and virtual teaching caused her to feel like she was “dropping the ball somewhere.”

Drawing a comparison between language and technology usage, Jasmine described that most students “know the social aspect of technology, but not the academic aspect or the productivity aspect.” Helping her students use technology for academic reasons was a persistent challenge. These challenges led to her “biggest storm cloud” which was simply knowing, “Was I being effective?” This question was particularly poignant for her language students who struggled to engage virtually.

Jasmine admitted that while she does not wish for another pandemic, “in the end, I have become a better teacher for all of this.”

Codesign Experience. With her diverse teaching background in limited experience teaching in the United States, Jasmine admitted feeling a “little nervous” to participate in codesign. As codesign continued, however, Jasmine realized the value of being able to look at the situation “from a newer, fresh pair of eyes.” Jasmine’s experience as a Latina and a language specialist provides a unique perspective of how virtual teaching and the codesign process impacts teachers from different cultures and disciplines.

Kara

Kara was a music teacher within a rural, “blue collar” school corporation. As one of only two music specialists in her school corporation, her teaching responsibilities required her to work with students across grade levels at two different elementary schools. Even before the COVID-19 pandemic, Kara noted the difficulty of finding educators to collaborate with due to the limited number of music specialists in her corporation.

Teaching Through the Pandemic. When COVID-19 first forced the shutdown of her school, she was left with little support and help for her unique teaching context. She noted, “college did not teach me how to teach in a pandemic, virtual and in-person kids at the same time.” Opportunities for professional development during COVID-19 were either irrelevant or not feasible, and school and corporation guidance on remote learning during the 2019-20 school year was limited to simplifying doing “the best you can.” Expectations heightened during the 2020-21 school year, and her school corporation provided a virtual option for students who did not wish to attend school face-to-face. During both the 2019-20 and 2020-21 school years, the administration required her content to be asynchronous and “self-guided,” and synchronous learning via Zoom was reserved for general education teachers.

While many teachers in her schools had only a small number of virtual students, if any, Kara reported having up to 83 virtual students while also teaching a regular load of in-person students. Managing students in quarantine was challenging; students were continually going “in and out” due to the school’s quarantine procedures, and privacy requirements prevented her from knowing if a student was actually sick or out due to contact tracing. Kara wanted to differentiate between students who were sick and needed simply to “just get better” and students who were contact traced and were

capable of doing work. Additionally, the large, multi-family housing complexes that fed into her schools often meant that some students were missing “a lot of school” due to contact tracing, resulting in “total gap” due to the students’ lack of “internet capabilities or the ability to do virtual.” As a result of student quarantine, grading “evenly” and equitably was difficult.

Codesign Experience. Kara began codesign during week four as a replacement for a participant designer who was unable to continue. As a specialist with little collaboration opportunities in her district, Kara reflected that working with other participant designers to “create something that was mutually beneficial for all of us genuinely, was amazing and really nice.” Previous to her arrival, codesign sessions had focused on learning about the participant designers’ experience teaching through COVID-19 and had explored how different problems and issues were related. Kara’s perspective is unique not only in her position as a specialist in two schools, but also in when she started the codesign process.

Keith

After teaching secondary mathematics for 13 years, Keith began working in positions centering around curriculum development and technology inclusion beginning in 2015. During the 2019-20 school year, Keith worked as a mathematics and technology integration specialist after which he left and assumed his current role as Coordinator of Digital Learning for a small, rural school corporation. In this current role, he worked with over 160 teachers and administrative staff members across five different schools, supporting remote teaching efforts and guiding strategic technology implementation throughout the corporation.

Coaching Through the Pandemic. When COVID-19 began to impact the schools in the spring of 2020, Keith noted that COVID-19 spurred within teachers an initial interest in professional development and personal coaching resulting in a sense of “validation” for his position. However, Keith observed that teacher apathy soon set in near the end of the 2019-20 school year as the “double duty” demands of teaching and the teacher’s home life led many teachers to feel “done” with remote learning. As a self-proclaimed “people person,” Keith found it difficult when meeting face-to-face with teachers was no longer possible although he continued to work virtually with teachers.

Keith’s new position during the 2020-21 school year required him to assume new roles and responsibilities typical of starting a new job, including “getting to know the teachers, getting to know the schools, what are their needs, what can we do?” Prior to the new school year, his district conducted

surveys with students and families to understand what they could learn “to be a little more consistent and respond to our stakeholders in a better light.” Keith worked to understand how experiences learned through remote learning could improve technology-enhanced learning in face-to-face environments. Still, the continuance of COVID-19 dramatically shaped his work with teachers. Keith tried to provide teachers with the “peace of mind” by providing needed help and support.

Codesign Experience. Keith’s experience observing and working with numerous teachers helped him to appreciate the diversity of experience and perspectives within the codesign group. As an educator with significant teaching and technology coaching experience, Keith brought expectations for the process that were not initially met. At the beginning of the codesign process, Keith admitted to an early desire to “hop right in” with designing and felt that the initial information gathering activities forced him to “slow down.” Additionally, Keith felt some discomfort in not understanding the end goal from the beginning and felt like he was “kept in the dark for such a long time.” Keith represents a unique position as an experienced teacher and technology specialist who worked with two different school corporations during COVID-19.

Kimberly

During the 2019-20 and 2020-21 school years, Kimberly worked as a Title 1 administrator and reading interventionist where she monitored the school’s Title 1 program and provided interventions for K-3 students not performing at grade level. She described her school as a “struggling” suburban school that served a majority African American and Latino student population. As an interventionist, Kimberly was no longer a “classroom teacher” but worked strategically with small groups of students and in support roles with other teachers. In addition to having a bachelor’s degree in speech and hearing sciences, Kimberly has a master’s degree in elementary education and was in her third year of a virtual PhD program in curriculum and instruction where she specialized in educational technology.

Teaching Through the Pandemic. Kimberly’s teaching responsibilities shifted to virtual when COVID-19 forced her school to close during the spring of 2020. Despite having a disposition toward challenge and technology, Kimberly described this time as “a hodgepodge of a mess.” She acknowledged a lack of clear expectations and poor planning in execution led to significant challenges but noted that this was often due to the administration not completely understanding “what they were

up against.” Her school established a one-hour window where she could contact students, but this hour of “sacred time” was insufficient to meet with her 200 students.

During the 2020-21 school year, her school started a virtual school and informed teachers that they would also be teaching virtually. Kimberly continued working as a K-2 interventionist but was also asked to teach a virtual 6th grade computer science class. Her school maintained the hour of contacting time with virtual students, but again this time was insufficient. It was challenging having to simultaneously manage the in-person and virtual students. Despite her knowledge and experience with technology, Kimberly sought “best practices” for virtual teaching during the COVID-19 pandemic, however she did not know where to find or if best practices even existed. As a result, she admitted that much of her work was performed through “a lot of trial and error.”

Codesign Experience. Having experienced similar opportunities in the past, Kimberly approached codesign with some initial skepticism. Without a clear goal at the beginning, Kimberly wondered, “Is this one of these things where, you know, you're just talking to me, but it's going to end up in a hole of data where it just sits, and nobody uses it?” These initial worries were soon assuaged, and she began to “look forward” to the meetings where the teachers’ voice could be heard. With significant teaching and technology experience, Kimberly’s role as an interventionist working with under-performing students is unique among participants in this study.

Sylvia

Sylvia was currently an assistant principal, a position she accepted shortly before the interview. Prior to her current assignment, she was working as a middle school English teacher within an urban school. This school primarily served students from an ethnically diverse, low socioeconomic background. In addition to having her teaching credential, Sylvia has received a master’s degree in educational psychology and a master’s degree in educational administration and supervision. During the 2019-20 school year, Sylvia worked as an 8th grade English and English Language Acquisition teacher. She shifted her role within the same school during the 2020-21 school year to become a full-time virtual teacher for all 8th graders across all subject areas (e.g., math, science, history, English, Spanish, FACS).

Teaching Through the Pandemic. When the COVID-19 pandemic shut down the schools in March 2020, Sylvia observed that the shift to remote instruction “wasn’t a big deal” because of her existing relationships with students and the flipped classroom model that she had already established

in her classroom. Students already knew “where to go, they knew how to contact me, they knew which peers to contact if they're confused,” so the experience “wasn’t that bad.” Additionally, at that point in the year, students were focused on applying previously learned content and she was simply helping students put “stuff into that long-term memory.”

As the 2020-21 school year approached, Sylvia’s school created a virtual school for students and families who felt insecure about in-person instruction. Due to having a child with asthma and her firm belief that “every kid matters” and deserved a committed teacher, Sylvia volunteered to be the 8th grade virtual teacher. This shift required her to teach all 150 8th grade virtual students in her school across core and elective subjects. Immediately, she began to think about “different perspectives.” When considering these students, she questioned, “‘What's gonna influence this kid whether to succeed or not?’”

To support virtual instruction, Sylvia’s school purchased a curriculum designed for credit recovery. The curriculum was meant to be “supplemental” for high school students, Sylvia noted, but the school was using it as their foundational curriculum for 8th grade students. To build students’ foundational knowledge, Sylvia held synchronous Zoom classes and made supplemental materials, a challenge due to the wide variety of courses she was tasked with teaching. Additionally, the absence of clear expectations caused many students to revert back to the previous year and the inconsistent expectations that each teacher set for their own classroom. She worked to create an expectation of regular school hours with students and parents, emphasizing that “the reality of it is, I’m a human being. I have a family just like you have a family.”

Codesign Experience. When early meetings focused on understanding the participant designers’ experiences with teaching and coaching during the pandemic, Sylvia admitted that she was “already at the finish line” and was ready to “go to step five.” She soon learned that she needed to “trust the process,” suggesting later that the value of early codesign activities was to understand the “why” or the “big picture.” Sylvia represents a unique perspective in the codesign as the only full-time, virtual-only teacher among all participants.

Vanessa

Vanessa was a middle school instructional coach with 14 years of K-12 experience. After working as a part-time teacher and part-time instructional coach, Vanessa began working as a full-time 8th grade Language Arts teacher in a new district during the 2019-20 school year, just prior to

the COVID-19 outbreak. Vanessa returned to her former district for the 2020-21 school year as a full-time instructional coach with the lead on technology inclusion. As an instructional coach, Vanessa took the lead on the integration of a new learning management system (LMS) which required her to provide professional development to schools throughout the district. As a teacher and coach, both school districts served a rural community with a largely Caucasian student population, about 30% of whom are considered economically disadvantaged.

Teaching and Coaching Through the Pandemic. Vanessa was working as an 8th grade Language Arts teacher when COVID-19 first hit in March of 2020. At the time, she was partnered with a social studies teacher to promote cross-curricular learning. When learning went online, they shifted instruction to be more skill-based to accommodate students who were suddenly thrust into caregiver roles. When a return to school was no longer a possibility, Vanessa separated from her co-teacher as she followed her own “pathway.” She worried about student engagement, noting that students were simply “missing in action,” isolated, and lost.

As a new full-time instructional technology coach during the 2020-21 school year, Vanessa described a “flurry” of questions as the district prepared for a new year during the continued pandemic. Vanessa admitted that much of her work in the first few months of the 2020-21 school year was spent “putting out fires” with the new LMS. Teachers, especially those not as “tech savvy,” experienced a significant learning curve until about October when they got “really fluent” on the new LMS. During this time, COVID-19 went through her school, requiring her to substitute for teachers who were sick or in quarantine. As a coach, she struggled to do the professional development she was hired to do and to help the teachers who were working through the “trauma” of teaching through COVID-19. Vanessa observed that there were “More tears this year, than I’ve ever seen. People definitely questioning their job when they would have never questioned it before.”

Codesign Experience. Vanessa observed the codesign process progressing from “personal to more broad” and described it as “helpful.” Vanessa also referenced her experience as a technology coach as she described her codesign experience, noting the value of objectives and demonstrations as contributing to the overall experience. With significant teaching and technology experience, she admitted to feeling “a little nervous” when the end goal was unknown, but also described a “freeing” feeling by not having something forced upon her. Vanessa’s perspective is especially valuable to this case because of her experience as a teacher and as an instructional coach at different schools and corporations during the COVID-19 pandemic.

Zayne

Zayne was a math teacher with 19 years of teaching experience, most of it at a high school level. While Zayne had taught multiple math subjects ranging from remedial to upper-level dual credit college math courses, he described his "gift" in working with "lower-level" students. His school is based in the oldest part of town, an urban setting with significant levels of economic need. As the community spread outward and into the surrounding suburban areas, Zayne described the people who were left were those who were too poor to move into new neighborhoods and into the newer schools. The remaining population fed into his school, students who largely came from homes where parents and guardians were focused primarily on providing the basic comforts.

Teaching Through the Pandemic. During the 2019-20 and 2020-21 school years, Zayne described his teaching as "up and down." When COVID-19 first hit and forced his school to go online, Zayne admitted that the situation was "so far out of our hands and there was nothing we could do." His students struggled without the needed structure of a traditional school and compensating impact of a supportive home environment. Despite the challenges, he noted that spring 2020 was a "good learning experience."

The "helpless" feeling caused by the 2019-20 school year led him to be prepared for the 2020-21 school year knowing that the same closures could happen again. For the first time in his career, he was able to provide students with "opportunities that they wouldn't have had otherwise," including opportunities to learn through recorded videos and online materials that were easily accessible at home. At one point, he described the 2020-21 school year as his favorite year of teaching. Despite these successes, Zayne admitted to significant challenges, particularly with student accountability. When a student, especially a "low-level kid," was quarantined, they would often stop doing the work and return to school "in a totally different area" and "lost." After growing accustomed to not doing much work while in quarantine, students grew "tired" of the work upon their return to school. The "tricks" he had developed over his teaching career failed to motivate or engage students and frustration soon set in for Zayne. For the students, Zayne observed more "gaps this year than I've ever had, with kids being able to do certain things, certain skills, even certain routines."

Codesign Experience. Zayne was quick to identify significant differences between himself and the other participant designers which impacted the way he experienced codesign. In the early weeks of design, he observed the participant designers' conversations about "being stressed and needing their mental health." He admitted that he felt he had a "really good system" during the

pandemic, and that others were “concerned in a different area” than he was. When thoughts and ideas began to emerge during the codesign process that did not align to his unique set of needs, he felt content to simply “stay back” without feeling compelled to say anything unless he had something important to say. As a classroom teacher with almost 20 years of teaching experience, Zayne’s perspective was unique among designers as a teacher who experienced significant successes and positive outcomes while teaching during the pandemic.

Themes

This inquiry sought to understand how participants experience design within a codesign context (RQ1). To more fully define “experience” in this research question, the three sub-questions were used to guide these findings. The results will be presented by sub-question after which a summary will be provided.

RQ1a: How do participant designers describe the design task?

The themes and sub-themes presented here focus on the design task, including participants’ perceptions of the scope or purpose of the design project, anticipated goals and outcomes of the project, and their given or assumed roles.

Theme 1: Design Task Was Vague, Unclear, and Ill-Defined

As participants began their codesign experience, they described the purpose of the design project generally as making a positive impact on education, especially as it related to online or remote instruction. For some participants, this impact meant supporting teachers through the current pandemic. As a teacher who consistently lacked school or district sponsored support, Kara observed that “Teachers currently have way too much to do, and not enough help to do it, and not really anything that could teach them how to do it.” Similarly, Vanessa noted that teachers lacked “tools in their toolbox to be able to be both reactive to what's happening in their virtual classrooms at the time.” She continued, “I think the major goal was to help teachers in the state with this new remote learning situation.” Other participants viewed the codesign task as a way to prepare for the future. Emily described codesign as a “way to prevent the chaos from happening again.” Hypothesizing on a potential “next time,” Kimberly observed a need for “better education models” because “current

models, again, in curriculum instruction, I don't think it's always working.” She added that the purpose of codesign was “to help educators be better at what they do virtually.”

Without limiting the task to remote learning or predicting future pandemic-like situations, other participants suggested that the purpose of codesign was to improve the effectiveness of technology integration. Some participants theorized that COVID-19 had likely introduced permanent changes to teaching and learning, and that codesign could in some way help to prepare for those changes. Observing a “new world of teaching,” Zayne described codesign as a group tasked with identifying “an idea for something that is going to make this world that we're living in now with the technology of school better.” As a technology coach, Vanessa likewise saw the possible changes to the classroom. Among the “changes that we experienced this year” was the “inclusion of technology in classrooms that had never had it.” As these participants described, the design task assumed by the participant designers was to assist in navigating the long-term changes brought by the COVID-19 pandemic.

While participants offered slightly different perspectives of the potential design task, each participant held a general and broadly defined perspective of the purpose and scope of the codesign project.

Sub-theme 1: Participants were unclear about design outcome. With a vague sense of the design task, participants also described a lack of clarity about the design outcome. In most cases, participants simply described the outcome as a “thing,” “resource,” or an “end product.” Vanessa admitted that she held “no preconceived notion of what this thing was going to be,” knowing only that the eventual outcome was intended to apply broadly to schools throughout the state. Kara reflected, “from the beginning it was very big, of like, we're going to make a resource, period, no idea what it is or how it's going to work.” During this initial time when the design outcome was undefined, Jasmine asked, “what kind of resource were we going for?” She continued, “We use the word ‘resource,’ we throw it everywhere, and a resource could be a document, a resource could be a whole website like we were talking about.”

In some cases, participants began the codesign with some ideas of what the end product may look like, although some of these initial impressions never materialized in the final design. Emily described, “I initially thought it would be more like a hub of lessons.... like, ‘Here's the lesson the teacher did. I can plug and play it. I can watch it. It's good.’” Similarly, Jasmine believed it would have included lessons or even a sort of “roadmap on steps to take to prepare your classroom to create

a remote environment.” Keith admitted he originally thought it would be a sort of “resource hub,” but he did not understand “what it was going to look like, and I didn't know how it was going to be created.” Zayne guessed that the final outcome would be a “place that people could go and get resources or a place where we were giving out things and sending it out to people where it might be a professional development that will go into schools later.” These initial ideas, while providing some participants with a conceptual starting place, still provided a generic view of the design outcome.

The lack of clarity produced different responses from participants. As an experienced technology coach, Keith admitted it was a “little difficult for me not knowing what it was” until later in the codesign experience. Jasmine viewed this uncertainty as necessary, saying “And I knew that part of [codesign] included coming up with what it is that we want to design, what is this master resource that we want to create.” The participants had a general belief that the idea for an outcome would emerge as part of codesign. Keith described identifying the end product as “the whole idea” for codesign. Zayne felt “okay” with not understanding the end goal, suggesting that during the codesign “people are going to throw out their voices and concerns and maybe then, something will come to light that we need to do.”

Sub-theme 2: Participants were unclear about codesign. As participants grappled with a lack of clarity with the end product, they also experienced uncertainty regarding the design process, their role, and their individual or collective contributions. Emily admitted, “I honestly didn't understand, like, ‘Co-design.’ What is that? I don't know.” Sylvia described similar questions, saying “‘Okay, wait, man, what are you asking me to do?’...It's like, what kind of design? So when you hear ‘codesign,’ it's like your brain is trying to process, like, ‘what type of design are we speaking of, right?’” Vanessa understood that collaboration would be involved, but she failed to understand “what codesign was,” or “what the process would look like.”

For some participants, understanding their role or their potential contribution was not immediately clear. Emily initially viewed her role simply as a source of information for others: “I genuinely did not understand what we were doing...I thought it was more of, like, just an information collecting, like, and less opinions of, like, ‘Let's do this.’ The codesign is what I didn't, like, really understand.” She did not understand that her experience would be as formative in the creation of the final product. In contrast, Keith initially thought that the participant designers would have a more direct involvement in the design process. He said, “I thought our group was actually building what your team built from the responses of the codesign team. And so, initially, I thought that we were the

ones that were going to be building the website, you know, putting these other resources in.” Jasmine identified “a little bit of unknowns” at the beginning of the experience, including “figuring out what was my place and the place of the group.”

Participants also described uncertainty regarding the potential value of their efforts. Kimberly described similar experiences in the past, wondering “Is this one of these things where, you know, you're just talking to me, but it's going to end up in a hole of data where it just sits, and nobody uses it?” Without a clear purpose and end goal in mind, Keith wondered if his years of teaching and coaching experience would even be helpful. He questioned, “is my feedback going to be necessary if I don't know, you know, what the end result is going to be?” For Jasmine, the question of value and personal contribution was much more personal. Noting her limited experience in the American education system, she wondered, ““is my input even going to be...useful in this case because I just got here?’ So I'm learning as I'm going. I'm still adapting and figuring out ways to be an effective teacher in this kind of environment.”

Participants experienced initial uncertainty as they considered the goals, potential outcomes, and subsequent design process involved with codesign. With preconceived notions or without, all participants experienced a design experience with an initial ill-defined process and outcomes.

RQ1b: How do participant designers describe the design process?

The themes and sub-themes presented here describe the design process itself, including how the process was initiated and how it progressed, resulting in the creation of a final design solution.

Theme 2: Previous Experiences Were a Foundational Element of the Design Process

During weeks one through four of codesign, participants described a personal beginning where participant designers shared and learned from each other's experiences. While these experiences provided a foundational element that guided the design process, some participants struggled to see this value in these initial activities. Keith described these first weeks as “trying to get that background experience...from the teachers.” Due to his experience and “love for technology,” Keith remembered, “I was ready to just jump right in and start talking about, ‘Okay, what are some resources we could do?’” Sylvia also noted the urge to skip these early background activities and progress to the designing. She was confident in her understanding of the pressing issues that should be considered. In reflecting on these early weeks, she said,

I was like, “Okay, we know that though, ...I'm already at the finish line.” So if I'm already in the experience part, it's almost like, “Okay, I already know that” ... We don't have to go through and say, “This is why it is. We know exactly what it is. So can we go ahead and go to step five, and then step six?” You know, “Can we skip that part?” Not to say it's a waste of time, but it's almost like we're beating a dead horse, right? So, you've got this group of people who've done the virtual stuff, who, you know, understand the experience stuff. So, let's go ahead and get this ball rolling. Like, there's no need to say, “Oh, what are the issues? Oh, we know.” So, here's the solution part, right?

Sylvia's impatience to progress to the design was due to the “situation I was in.” Later, she reported that it “makes sense” why these early sharing experiences were needed. She said, “everybody had different experiences when they came to the virtual stuff. It's always like, okay, so that makes sense to try to figure out a commonality. What's the common issue or the common thing that we need to do to make it better?” Despite this understanding, she continually reminded herself to “trust the process.” She related the process to “strategic doing,” a conceptual leadership framework which encourages understanding of the purpose behind the actions. She described, “And then with strategic doing is like you understand the people that you're working with, right? So, you understand their strengths, you understand their weaknesses, you understand what they bring to the table.” For Sylvia, these initial weeks were key to understanding the “why's” behind participant designer experiences.

By the end of the codesign experience, the foundational nature of these introductory sessions became apparent as they enabled participants to find commonality as a group.

Theme 3. Participants Sought Commonality Through Shared Experience

Participants described actively trying to learn from conversations with one another as a way to establish commonality with one another. As previously described, the codesign group was created by purposely selecting a group of educators that represented a wide range of grade levels, years of teaching experience, technology confidence, and specialties. Beyond simply sharing perspectives, the participants described an effort to reach a common level of understanding among all participant designers. Describing this effort as the “most difficult thing,” Emily remembered, “we weren't trying to just rely on one person's experience, that we were trying to bring it together.” Jasmine spoke of this effort as establishing a “starting point that would work for us.” As a group, she explained the task as “coming up with a common ground, that we had to find something in common and then work from there to see where we struggled or where we saw opportunities differently and how to approach them.”

Part of reaching a level of consensus required participant designers to consider differences in experiences. Keith observed, “it’s really important for educators to understand that there are issues beyond the four walls of your classroom, and before the four walls of your building or your corporation.” Sylvia remembered, participant designers could be “selfish” when focused only on their own situation, and times when “we had to be selfless and take a collective way.” At times, disagreements arose in pursuing consensus. Kara noted that the purpose of codesign was not to “pat people on the back or throw people under the bus.” For her, without honest communication, “we’re not going to make a thing that’s useful.” Emily reflected that “if they disagreed, they disagreed from, like, their own set of schema” based on their unique experiences. Sharing perspectives, especially during moments of disagreement, sometimes caused participants to shift their understanding of the context. Emily described that

So, things that I thought were, you know, like, the end-all-be-all once you heard what their end-all-be-all was and why. Some you still were like, “Nope. Mine is still more important.” And then others you were like, “Oh, yeah.” I mean, you feel like, “Let me go change my thing because I see that now.”

As participants understood one another’s experience, they sought to design a resource that would be representative of all teachers. With a beginning that felt very personal as participant designers shared their experiences, Vanessa noted that “I think that helped understand each other, but also helped us center our focus, that it doesn’t have to just help me. I think teachers kind of get blinders on for their own situation.” Sylvia understood that the purpose of codesign was to determine something “checks every box for everybody, not just teachers, not just students, not just admin, community members, you name it, all your stakeholders.” Or, as Emily noted, “you don’t need something that just works for a low poverty white rural school, because that’s not reflective of Indiana.”

Theme 4: Design Process was Punctuated by Clear Moments of Insight

While participants described initial vagueness at the beginning of the design experience, participants identified later moments of insight when their understanding of the design task and possible solution became clear. Emily reflected that the outcome “became clear quickly.” Speaking of the codesign process itself, Sylvia remembered that “as time progressed, it was like, ‘Oh, it makes sense...We’re trying to figure out all the unnecessary stuff, and not unnecessary, but the things we

can't control.'" This separation of ideas was echoed by Kimberly: "there was no longer that, again, the cloud of other stuff around because it was funneled into a way that I could then understand it better." As Sylvia described, these moments of insight caused the process to become "more of a reality versus a theory" and appeared significant in moving the design process forward.

Perhaps no participant described the experience of insight as well as Kimberly. As an experienced teacher with formal graduate training in instructional design, Kimberly held concerns regarding the project and the potential value of the outcome. She described her experience as a "discovery," a process of increased understanding that occurred through the ongoing conversations and shared experiences. In the first codesign session, she asked, "do you have any idea what the final products look like, or will that come together over time?" Her uncertainty and the associated discomfort were tied to previous experiences. She said, "And unfortunately attaching it to past experiences where teachers have been talked to, or I've been a part of something like, 'okay, so, now again, what are you gonna do with this?'" As a result of early conversations, Kimberly admitted that "I was able to kind of put the pieces together and see the goal that you were trying to achieve, like, I had a part to play in it." As early as the first meeting, she became someone who "was looking forward to coming to the meetings, just to see what was gonna happen...and I can kind of see the footprints in the sand." For Kimberly, these early moments of insight seemed directly connected to her willingness to engage in subsequent codesign activities.

Sub-theme 1: Brainstorming with Others Provided Design Insight. Beginning in week five of the codesign experience, conversations and design activities began to shift from interrogating experiences of the past to considering possibilities for the future. During week five, participant designers brainstormed ideas for a potential design using a creative matrix (see figure 2), an online whiteboard tool that aligned various types of support resources (e.g., professional development, social media, digital collections) with previously described desirable characteristics of effective learning (e.g., applicable, self-direction, just-in-time, goal-oriented). Kara observed that the process "blew up from there, because it allowed everyone to just write down whatever the heck was on their brain." Like Kara, Zayne saw this activity as the moment when "it came clear to me what people wanted." He described,

You had the big, wide, I mean, full screen there and people were throwing things in certain areas. And then somebody threw that out there...I just started to see other people jump on and then throw another idea right out there right next to it that was

very similar. And then to me, they seemed to pile up and have three, four, or five of those ideas all right there together, that maybe people were having individually, but then realized that "Oh, wait, yeah, that goes with this one. Oh, and that would help this idea." And "Oh, mine goes in with that also." And it just seemed to keep building in that way. Whereas all of the other ideas on the screen seemed very kind of segmented or off on their own and not really linked. Or the ones that were linked were things that, again, were maybe already in place, and already existed, and so then we know the need for them, but I don't know how beneficial they would be moving forward. And I think people just thought this, like, that hub idea was new and something that they wanted to be able to explore a little deeper.

The accumulation of related ideas signaled to Zayne the mindsets of the other participant designers and their thoughts regarding a profitable direction forward. Ideas that seemed isolated from other ideas naturally fell out of the scope of design possibilities. While not endorsing this idea as he understood it, he described a "shift" in this moment when "five or six people, maybe even more, that seemed to have already been honed in on that."



Figure 2. The creative matrix was conducted using MURAL, an online tool that allows users to work synchronously together in a shared space. Each colored note on the matrix above acts like a digital “sticky note,” enabling users to create new notes, move or edit existing notes, and create links and connections between notes. During the activity described in the text, the size, shapes, and color of the individual notes were insignificant and determined by the individual.

The creative matrix brainstorming activity informed a small group breakout discussion where groups were asked to further explore potential solutions. Using the ideas from the matrix, participant designers began to align problems discussed during the early weeks of codesign with potential solutions. While the matrix enabled participant designers to get their ideas out, Kara described that it was in the following breakout session “where it got real for me.” Kara’s conversation with Jasmine, Zayne, and two other participant designers described the moment when they fixated on an idea for a “hub” of resources:

Leslie: Honestly, we need like a hub with all these amazing teacher resources in one spot and organized, and very detailed organized, like here is multiplication and then break it down into all the little parts of multiplication. That's what I need. Okay. Let's go... and make it free.

Jasmine: Or have it be tied to the standards. This is what you would use to teach the standard. "Hey, you're in a rush. You need to come up with a lesson in five minutes or less. Here we go."

Zayne: I feel like you're just describing a free version of Teachers Pay Teachers.

Leslie: I know, but then you still have to sort through all of that. It's not in an organized hub.

Savannah: Are you needing teaching materials? Or are you needing technology support? Are you needing... what would you want in that hub? Because I'm hearing searchable and materials, but what... I'm just trying to make sure that we can put it down on the sticky note to mean what you were saying.

Leslie: I think a lot of teachers have in-person materials, and that's super easy to do because we just have it already, it's part of our curriculum. But those online materials, we've had to go back and recreate everything that's in-person and put it in online. I don't know-

Savannah: So already created materials.

Following the breakout session, groups were asked to present their ideas with the other groups. For Vanessa, this larger group conversation was impactful. Noting the similarities between the groups, Vanessa noted, “I think that was neat, because we were coming from all over the state with a variety of different backgrounds. We all kind of had the same issues, came up with similar things to keep in mind.” The consistency between groups gave added clarity to the direction of the design process.

Sub-theme 2: The Power of Example in Solidifying Ideas. During week six, the codesign group was shown an example website and asked to evaluate it. This website (All Aboard, n.d.) was identified by the global design team (composed of faculty and staff) and was given to provide guidance to the participant designers. This website (see figure 3) covered a variety of online teaching and learning topics visually represented by a train or subway metaphor. With its multiple modes of learning and customizable learning paths, this website was meant to approximate the ideas identified in the previous codesign session. Several participants noted that seeing this example was a significant moment in the design process. For Emily, seeing this example website created the “biggest shift” and observed that the process suddenly became “very obvious.” The website also had an impact on how she understood the scope of the project. She said, “I think that's when I realized, like, the scope of what we were trying to do...That it was something actually really big or at least somebody was trying to make it something really big.”



Figure 3. Screenshot of the All Aboard Website Used as an Example

This is a screenshot of the example website shown to codesign participants during week 6. Created to immediate a city subway system, each colored line represents a category of ideas or concepts related to online teaching (e.g., “Tools & Technologies,” “Identity and Well-being,” “Create and Innovate”). Each dot on the map represents a station, a stop on an individual learning journey and the main learning unit on this resource (e.g., “Assessment,” “Digital Copyright,” “Collaboration Tools”) (All Aboard, n.d.).

Some participants viewed the website as a springboard that could be adapted or built upon for the current design project. Jasmine reflected, “I was like, ‘This is cool, but it's a lot. We need something a little bit more trimmed down. This looks for college level. We're looking for something a lot more streamlined.’” For Jasmine, the subway metaphor continued to be useful in understanding how to make sense of a complex and vague design task: “So at least let's have one roadmap, and then we'll decide where we stop for the tourist traps.” Building off of commonalities identified in brainstorming activities, seeing the example website provided Vanessa with a model that could be used to assist in the process. She said, “we came out with that looking at that final website that we were kind of like, ‘okay, here's a model of something that you're talking about, let's pick it apart.’ And then design, kind of, brainstorm our own.”

Vanessa admitted that the previous conversations and activities led to a “push” towards the website idea but seeing the example website “definitely helped solidify that idea.” When asked if the example website had constrained the design process and skewed it away from the participant’s authentic experiences, Vanessa said,

I think it was important. I think, for me, it wasn't limiting. Because everything we were talking about with video or having strategies that teachers could get that were short, that they could use right away, could be embedded in that. We didn't have a good concept.

Vanessa’s comment is insightful. With the focus on enabling and empowering individuals in the design process, guidance and structure can artificially constrain the design process and lead the project in a direction that fails to represent the needs of the participant designers. According to Vanessa, the example website acted to solidify a direction that the design participants were already pursuing and provided a model that could be used as a starting point for subsequent design activity.

Theme 5: Design Process Shifted from General to Specific Over Time.

As a result of these impactful design experiences, participants began to describe the end product as a “hub,” a web-based collection of resources that teachers could access in real-time according to their individual and immediate needs. The identification of the product as a hub caused the design experience to shift away from the vagueness described earlier to greater specificity. Kara stated, “it started vague, and that got really, really specific, and then we got to make something out of that.” Compared to when she began the codesign in week three, the scope had become “way more tangible.” Jasmine also observed this shift in scope, explaining that it went from a “super broad category...and the scope of taking educators and professionals from different parts of Indiana, rural, urban, and putting together all that putting together all that expertise and funneling it into a resource.” As an English teacher, she drew from her knowledge of the writing process to describe her experience with codesign to following these impactful design moments:

It changed it from that brainstorming phase into drafting, like in the writing process. You first start with your topic. And then we were brainstorming and throwing things, let's see what sticks. And then finally, "Hey, we got something here," this whole mishmash of things, and we got something going here. And then once we have our

hearts set on something, we're working towards that. That's that transition from brainstorm to draft.

Once she saw “what sticks,” Jasmine was able to shift into drafting mode which provided the foundation for all subsequent design activity. No longer was the task at hand vague and ill-defined, but clear enough to work with.

This shift in design took time, which some participants admitted was difficult to bear. Sylvia mentioned, “I had to be patient because I knew where we were going. And I was like, ‘Oh, we getting it. There's that box.’ You know, it's almost like dangling a carrot, right? ... Like, ‘We're almost there.’” Describing the end product optimistically as a “magical unicorn fairy of PD,” Kara realized that designing was “going to take time and it's going to take conversation.” She realized that the “magical unicorn fairy” was not “going to be born on week two.” Vanessa noted that the progression of design “was not a straight line, but it was easy to see that, ‘okay, this is where we started in naturally, here's where we are and planted a seed of something that's gonna come to fruition in the future.’” While many participants described a shift in the design process, this shift took time and did not always result in the most direct pathway to the solution.

Sub-theme 1: Participants Detected Shift in Design Product. Before the idea for the hub was identified, participants considered different potential ideas for the solution. For some, early ideas included tools and resources they were most familiar with, including those they turned to while teaching and coaching during the COVID-19 pandemic. Emily remembered, “I think a lot of us talked a lot about how we'd use social media and kind of assume, I think, that it plays in somewhere just because it's 2021.” Other participants mentioned professional development, which is often formal, in-person training for an entire or select portion of a school faculty. Jasmine explained, “I think the concept of professional development was coming up because that's what we go to. We need to train other professionals so they can train other professionals, so they continue to grow.” However, these ideas were eventually dismissed out of feasibility. Emily noted that social media “needs more supervision” than what the grant would be able to provide over an extended period of time. Jasmine connected the idea of professional development with the “telephone game,” suggesting the challenge in clearly communicating important knowledge and skills from the source to the teachers and their classrooms. Additionally, Kara admitted that even if a formal professional development opportunity was provided, she didn't have the “bandwidth to absorb it, the time.” Her attitude towards professional development was likely influenced by her experiences teaching during the pandemic. With teaching

that spanned multiple schools and grade levels and the unpredictability of online teaching, formal professional development seemed unfeasible. “How do I write sub plans? How do I get that far ahead on virtual work for virtual kids?” And the possibility that professional development “couldn’t relate” to her unique teaching specialist position likely influenced her attitudes towards professional development.

As the idea for the end product shifted away from these common resources and coalesced around the idea of a web-based hub of resources, the design participants began focusing on the feature-level details and their associated design principles. Kara described, “It started very, very vague, like a searchable document. And then it got pretty specific with, like, wanting a search box, wanting a back-to-top button, wanting it to be timely but, like, also adjustable.” As participants described a feature of the hub, they often described it in connection with a principle valued by teachers. For example, Kimberly suggested implementing a rating system for included videos to identify “authentic teacher videos.” She said, “Authentic to one person might be not authentic because I’ve seen a number of videos like, ‘Well, why would you ever show that?’” The suggested rating system was merely a means of providing teachers with authenticity. Teacher choice or autonomy was also valued by participant designers. Vanessa observed, “I think teacher choice was the other big one. We wanted to make sure that in whatever we created, teachers were not streamlined into a single path, but could pick whatever they needed at the time.”

The principle of time was manifested in several features discussed during codesign, including Teachers-Pay-Teachers links where the content is “already done for you” (Kara) and having video markers that would allow teachers to “skip to a certain part” that was more relevant (Vanessa). During the pandemic, Keith noted teacher’s need for time and focused his efforts on showing teachers “how to maximize their time.” With that identified need, Keith’s experience informed his design suggestions. He said, “we don’t want it to be just like a hub of resources, but we want it to have specific purposes behind those, you know, what’s the reasoning?” Keith noted that “Anybody can just go to Google and look at...anything.” The hub needed to be vetted to ensure that the materials provided would be worth their investment in time. As Vanessa described, “making things brief, short, bite-sized was really, really important to us because we knew that teachers were overwhelmed to begin with.”

As the design moved to greater specificity, participants drew upon their experience by suggesting ideas that were responsive to their observed needs and the needs of their colleagues.

Sub-theme 2: Participants Described Change in the Content to be Included. While the deep conversations in the first four weeks caused many teachers to fixate on specific challenges associated with teaching and coaching during the pandemic, designing a potential solution caused many to reevaluate these issues and reconsider their role in the design moving forward. Noting the improvement in contacting families at her school, Jasmine admitted, “there were still areas of opportunity that they didn't really affect us, or we had gotten better at.” Kimberly observed that as design progressed, “the more important pieces were starting to emerge.” Sylvia noted a change in attitude and mood towards virtual learning:

Like at the beginning, it was, "Yeah, we know that. Yes. This was a strain. Yeah, we know. Yeah. It's not here. It's not there. So what? So, what are we doing?" So, then it was almost like it shifts from our attitude about virtual learning to "Wait, what is keeping us from being our best?" ... Because I felt like, as we were going through, you [inaudible] our shift in our thinking changed, right? Our shift in our mood changed, because at the beginning, it was like, "Oh, you have no idea...duh, duh, duh, duh, duh, duh." And then it was, "Okay. Now let's figure out who plays the role and what so that we can move forward."

Out of all the participants, Emily spoke most consistently about the evolution of her perceived problems. With reference to issues related to technology, she admitted being “stuck in like the 2019/2020-year mindset.” Through conversations with others, she realized, “that's not even like a thing anymore because our kids are so technologically literate...that's really second nature to our kids, at least this group right here, right now.” Codesign helped her see how her problems had changed “because I think, like, you kind of get stuck in thinking what your problems are, and then you don't really realize how they've evolved and changed for better and worse.” As her perception of problems evolved, Emily observed a shift in the problems considered within the potential solution. She said, “I think I saw it shifting... into an overall, like, growth experience for teachers and students.” She began asking questions such as, “How do we prepare these kids for state assessments? What's the best manner for delivering instruction?”

Similar to Emily, other teachers observed this shift towards effective pedagogical practice, often due to the resistibility of some problems to change or their lack of knowledge or expertise on the topic. For example, Kara noted the different rules for the physical instructional space during COVID-19, suggesting that “no one can change it to an extent ... And there's not like an article that's going to fix that, it's just, kind of, what we were stuck with.” Kimberly admitted that “there's only so

much you can do with the whole relationship communication community part” which she observed fell outside “the whole beast” of the design. Vanessa reflected her group’s early fixation on social emotional learning (SEL) before eventually shifting towards pedagogy. She said:

It seems like for a while we were down a track of supporting parents, supporting SEL for kids. Like, that was our big focus for a long conversation of it. And then we took a turn and started talking more about, like pedagogy, like, what are good teaching strategies that would help us with this. So, kind of working through all that, and then figuring out where's the biggest bang for your buck, right? You only get to put this kind of energy into one project, you can't solve all the problems.

When asked about the reason for this “turn,” Vanessa said, “I think it came probably because we didn't have the answer,” at least not to inform a “one-size-fits-all solution” for the wide diversity of schools and teachers. Vanessa believed that “it was probably easier to go the route of instruction” because of their expertise in that area. Similarly, Zayne suggested that while the design “covered a lot of what I'm thinking” he admitted that “teacher burnout, the teacher mental health piece, the teacher feeling of helplessness and hopelessness” was a concept that “fell out” of the final design.

In all, participants generally believed that the hub was successful in including most concepts and ideas brought up in earlier codesign sessions. Unsure of any topics or ideas that were missing from the final design, Keith admitted, “So, I don't feel like there was ever anything that was left out maliciously or anything that just really stuck out to me.” Jasmine suggested that the idea of a resource hub enabled a resource that could be developed “over time,” keeping the scope wide with regards to the possible topics or ideas included.

RQ1c: How do participant designers describe and evaluate the outcomes of the design process and their individual and collection contributions?

The themes presented here include participant perceptions of the outcomes of the design process, their assessment of the final solution, and ideas related to participants’ perceived contributions to the design process of the final design solution.

Theme 6: Participants Describe a Solution That Is General and Undefined

The codesign experience ended after week seven while participant designers were refining details and ideas for a hub and before creating any early prototypes. By the end of codesign, participants had difficulty describing the final design beyond simple descriptions as a collection of resources or colloquially as a “hub.” Keith described it simply as a “one-stop shop for any educator” that included a “nice group of resources to help educators.” Vanessa explained the hub as a “database” where “teachers could go and receive quick PD support with clear objectives and clear end goals of that PD.” Similarly, Zayne described it as a tool similar to Teachers-Pay-Teachers where teachers could go to “look for resources.” Noting the need for teachers who are on “that struggle bus” with remote learning, Jasmine explained that the hub would provide a “roadmap” with “resources ready to help those teachers transition.”

By the end of the codesign experience, participants held different understandings regarding how the final design would look, function, or be implemented. Jasmine described her hope that the hub would provide teachers with “the same skeleton and then they can flesh it out from there.” Vanessa added that the resource would have a strategy, short video, and provide an information sheet that could be printed. In describing the hub as a “magical unicorn fairy,” Kara explained a resource with a social component included. She said,

If you have a problem, you can find something that will help you and/or someone . . . because we also talked about being able to like communicate in it, and/or someone that can help you get there. So, I might not have the answer to a problem, I might not find the answer to my problem, but I could find something that gets me to another music teacher somewhere else that's like, "Oh, I have the answer to this problem. Let me help you.”

Some participants identified lingering questions and uncertainties they had regarding the final design which they were unable to answer. Zayne questioned, “I don't even know if the idea of the hub is for the teacher or for the student, you know, because I think it could go either way.” In terms of what the final resource looks like, he expressed: “I don't know what those resources would exactly be, and so that's where I say, I don't know if it's like the LMS resource idea, if it's the curriculum resource, or if it's a straight-up technology, I don't know where that resource goes.” Vanessa wondered whether the hub would be static or continually evolving. She asked, “Is it something that's going to be continuously evolving? Like, is there gonna be a section where teachers could submit, ‘hey, I need help with XYZ.’ And then something could be created for that.” She added, “how are we getting this

into the hands of teachers in a way that does not feel like we're pushing something down their throat but giving them the opportunity?" When asked to describe the final solution, Emily simply said, "I don't know what the end product looks like."

As participants described the final product, they evaluated how effectively the design met the needs of teachers. Noting that some issues are more resistant to change, Kara observed that "in terms of what could be helped with professional development, we did pretty good." Kimberly, Vanessa, and Keith each identified that the design represented the needs they brought with them to codesign, or the needs of teachers generally. Keith noted the diversity in the codesign group and suggested that "we wouldn't have created anything that was irrelevant." Still, others were more unsure or even skeptical of the value of the identified design. Sylvia stated, "I'm hoping, once I see what you guys come up with, it matches that reality that I had in my mind." She added:

Based off of experience, I will say 92% that I feel like stuff has been...you know what I mean? Because, like, if my other 8% is coming from credibility. Right? I have to see it. I have to play with it. I have to make sure that what I had in my mind and things that I experienced, definitely checked off. So, just being honest, I will say 92%, based off this theory, right, theory into reality. Oh, the other 8% will be, "Here it is." "Play around with it."

Sylvia's quantitative evaluation of the end product may seem arbitrary, but it reflects her firm commitment to application, a principle she spoke of frequently. Whether referring to her students' need to apply principles in the classroom, or describing the teacher's need for relevant professional development, Sylvia could not completely endorse an idea without the opportunity for application.

Unlike other participants, Zayne was more critical of the outcome. He said,

Well, my immediate reaction is, "I don't think I'll ever use that." So, it was one of those where we talk about, you know, that I have kind of a different perspective than some people. And maybe I'm missing out, maybe I would be, you know, 10 times the teacher that I am right now if I were to go looking for resources. But honestly, just with my experience of what I've done, I don't feel like I need resources.

He admitted that his involvement in codesign would likely persuade him to look at the resources when they were completed but questioned whether he would ever "lean into it much." Even so, he

admitted that his final assessment would likely come later after he had an opportunity to see the final product.

Theme 7: Participants Contributed Through Their Unique Experience and Perspective

While participants were initially unsure of their roles in the codesign experience, their roles were clarified by the end of codesign. Initially, Keith believed that they would be tasked with designing and building the end resource. As the codesign progressed, he began to understand the role of participant designers as “being the experts in the trenches.” Some participants viewed their input and experience as prerequisite, even essential knowledge to subsequent design activity. Kimberly described that her role “was to share my experience so that experience could be evaluated, and then maybe somehow used to shape next steps.” Emily acknowledged that others would be building the actual resource and viewed her role as “giving information to people who are building something that we couldn't build.” Initial confusion regarding the design task was unavoidable “because the people making whatever we were gonna make didn't know what we knew and ... we had to get that information to them before they could make something.” Kara hypothesized that if a design was made without teacher input, “the help might just be on the, like, surface level of our job.” As an educator who was actively vocal about the need to put “all stakeholders at the forefront,” Sylvia explained her understanding this way:

So, it was more so of us being that expertise part. So, we're bringing in all these different perspectives of, you know, for expertise on what needs to be done. So, my mindset was, "Okay, so I'm an expert in this, so they need my, or our, you know, perception or perspective, on how to create something, like we finally understood that we can't do anything without getting our teachers involved." ...I think that's the issue, too, with a lot of things, like when you try to create educational resources, but you don't have educators as a part of your team. So, I felt like that's what my role was, as an educator, you know, let me go ahead and put in as much information as I can so they understand from our perspective.

Sharing expertise became the primary way that participants evaluated their individual and collective contributions at the conclusion of codesign. Kara and Kimberly both described that their roles as specialists provided them with unique perspectives among other participant designers. As a technology coach with responsibility for 160 educators, Keith acknowledged that his unique

perspective was informed by the teachers he had worked with. His thoughts returned to these teachers during codesign:

So, as things are getting designed, I feel like that was a big contribution that I had, is just kind of filtering all these thoughts from people that I've talked to, that were not on the panel and trying to filter all those into, "Okay, what would benefit those teachers I've talked with, that really need a certain resource, or would benefit," I should say, "from a certain resource?"

Having this wider perspective formed outside of a single classroom was also described by Vanessa who remembered, "that perspective, I think, was helpful because I think a lot of people in my group had a niche that their mind was on the whole time."

Unlike the other participants, Zayne was unsure of his individual contribution. Zayne approached his role in codesign as a "spoiler," or a "devil's advocate," an individual who saw the situation differently than the other participant designers. He tended to view his experience in teaching during the pandemic more positively than his peers and was predisposed to first understand "what we do well" than describe the challenge. He was prepared to assume an active role in codesign if he felt like he could contribute, or "stay out of it" if he felt his contributions were not needed. As the idea of an online resource was being developed, he remembered thinking, "I'm not sure I did anything here." The idea for a hub seemed "so far from where I was thinking at the time." Still, Zayne acknowledged potential unseen contributions he may have made:

And it makes me wonder, too, of how many times in our other conversations, if I speak for me specifically, was something that I said that maybe either removed a block from somebody that they were focused there, and they're like, "Okay, yep. Now let me change my mindset here." Or that puts me in somebody's way that they went, "Oh, yeah." So, I guess based off of that, that means this and so maybe I had...personally, I had something, I don't feel like I did much in that sense with that point, that idea. But it's very possible that little things that I said indeed led to it.

While not clearly identifying a specific contribution, Zayne was careful not to entirely dismiss his potential contributions.

As individuals contributed their individual perspectives to the codesign, a collective perspective merged that participants valued. In describing the group contribution, Sylvia noted that

the “biggest contribution” was “knowing what works and what doesn't work. Knowing what sets us back when we're trying to move forward.” As breakout groups shared their ideas with the entire codesign session, Vanessa observed “that every group kind of came to the same sort of conclusions.” The consistency in their ideas that validated their direction and gave them “power in that seeing like, ‘okay, this is what we all built.’”

While not responsible for the creation of the resource, participants largely identified their important individual and collection contributions. Their role and most significant contribution were to provide others with information born of experience that was necessary for the design and development of an effective resource.

Summary

The themes and sub-themes presented here explore participant descriptions of their experience in codesign and their evaluation of the end result and their individual and collection contributions. While each participant brought with them a diversity of experiences, general patterns of thought and could be seen across design participants. In general participants began codesign with a vague understanding of the design task, the eventual outcome, and what their role and potential contribution would be. Participants observed an initial phase of codesign that felt very personal as the similarities and differences in experience between the participants were shared. This sharing of experiences and perspectives, although not always appreciated by all participants, played a foundational role as participant designers created a commonality that could be used to inform subsequent design. As the codesign shifted from exploring and examining past experiences to considering future possibilities, participants noted significant moments in the design experience that impacted the way they understood the design task and possible outcomes. Over time, the design experience changed from general to specific as the end goal became increasingly clear. By the end of the codesign experience, participants described an end product that was still fairly general and somewhat ambiguous, with lingering questions and uncertainties. Despite these unknowns, participants largely approved of the final design which they felt represented a diversity of teacher needs. While the codesign ended without participant designers developing a working prototype, participants suggested that their main role and contribution was providing expertise and understanding that would inform the development of the final design.

CHAPTER 5: DISCUSSION AND CONCLUSIONS

This investigation sought to understand participant designers' experience within a codesign process. This chapter begins with a discussion of findings where results from this investigation are examined within the larger research landscape. Next, implications for practice, education, and research are proposed. Finally, a discussion of research limitations is provided.

Discussion

Using insights gained from this investigation and existing research, this discussion follows a rough chronology of codesign from the unclear and uncertain beginnings, the impactful design moments during codesign, and participant reflective comments regarding the outcomes and their contributions.

Design as an Ill-Structured Activity

The findings presented here suggest that participant designers experienced considerable uncertainty regarding the design task, the final design outcome, and the codesign process. While much of this uncertainty began to dissipate during brainstorming and design activity beginning in week four, participants universally experienced initial uncertainty which caused some discomfort and hesitation.

Design generally is viewed as a field that engages with open, ill-defined problems. Goel and Priollo (1992) described design problems as lacking in defined goals, problems, and characteristics. Ge et al. (2005) referred to instructional design as an ill-structured domain, lacking in a clear and direct relationship between the knowledge base and its application. While different types of problems exist within instructional design, with differing levels of complexity, Jonassen (2000) argued that design problems with all of their ill-structuredness may be the “most important type of problem to investigate” (p. 80). Within the current investigation, the participant designers were tasked with creating a resource to support teachers facing unprecedented issues, including issues related to school infrastructure (e.g., technology, health and safety protocols), student, family, and teacher social and emotional well-being (e.g., mental health, social emotional learning), and pedagogical best practices (e.g., hybrid and remote learning, student equity, professional development). These issues manifested

themselves unevenly across various teachers, schools, and districts, further complicating the design experience and preventing the adoption of simple solutions.

Solving ill-structured problems requires designers to explore the design space to better understand the problem and potential underlying factors. Existing research suggests that novice designers tend to quickly focus on design solutions while expert designers tend to focus more on understanding important contextual factors before considering potential solutions (Ge & Land, 2004; Le Maistre, 1998; Perez & Emery, 1995). Novice designers also tend to focus on surface level features while expert designers interpret problems according to underlying principles (Ertmer & Stepich, 2005). Ignorant of many of these underlying factors, novice designers may even fail to recognize the ill-structured nature of the design problem (Ertmer et al., 2009; Rowland, 1992).

During the first four weeks of codesign, participant designers engaged in various activities aimed at reflecting and examining their previous experiences with teaching and professional development. These activities were intentionally designed to help participant designers explore the ill-structured problem space before designing a potential solution. Unlike the other designers, Keith and Sylvia expressed a desire to begin designing during the initial weeks of codesign rather than continuing to explore participant designers' experiences. While this response appears to align with novice designer behavior, this assessment is likely inadequate, particularly for Keith. As an instructional coach during the COVID-19 pandemic, Keith's position required him to deeply understand this problem space as he considered how to best support the over 160 teachers within his responsibility. While he appeared to try and skip the analysis process, it may be more likely that he had been exploring this problem space well before codesign began. As he noted, experiences of teachers he had coached filtered through his perspective, giving experience and knowledge that extended beyond a single classroom. Interestingly, when the final outcome was determined, it aligned closely, although imperfectly, to his original ideas for a potential solution.

Design Consensus

In the first codesign sessions, participant designers were notified that they had been recruited purposely for their unique position and experience. Participants suggested that one of the implicit goals of codesign was to build a sense of commonality among the diverse selection of design participants that could be used to inform an eventual design. Historically, however, collaborative design practices like codesign are inherently adversarial activities (Buur & Larson, 2010). With such

a diversity of perspectives, conflicts are often unavoidable and may even be necessary elements of change (Bødker & Kyng, 2018; Keshavararz & Maze, 2013).

As a practice within participatory design (Sanders & Stappers, 2008), codesign practice may be negatively affected by the emphasis on consensus (Buur & Larson, 2010). In summarizing significant issues within participatory design research, Bødker and Kyng (2018) argued that the avoidance of conflict in contemporary participatory design limits designer's ability to engage in potentially significant design areas. More than change and empowerment, they suggested that the collaborative nature of participatory design has become the ultimate outcome. Keshavararz and Maze (2013) suggested dissensus could be intentionally staged within a design process to achieve more democratized outcomes. As an activity fraught with controversy, these researchers concluded that in designing for issues of consequence, it is neither possible nor advisable to avoid conflict. As a practice that utilizes users as partners in a design experience, codesign practice may be similarly limited if devoid of conflict that could potentially encourage greater design creativity.

However, effective design results in a tangible outcome, and conflict and disagreements must eventually give way. In the current investigation, the first several weeks were dedicated to understanding the perspectives and experiences of the participant designers. While participants observed differences in perspectives, these differences did not commonly result in disagreements between participant designers. Zayne was the participant most opposed to the final solution and the underlying issues upon which it was designed. Rather than dissuade the collective group from what he felt was an ill-advised idea, Zayne largely withdrew his perspective, and this tension was never fully explored. McDonnell (2012) observed the use of tentativeness in accommodating disagreement in software design. While designers in her study proposed different ideas, they each manifested a lack of firm commitment to their proposals that kept the issue open and enabled them to progress beyond potential obstacles. This strategy highlights points of disagreement while deferring final decisions and potential conflicts to a later time. In the current study, disagreements in the abbreviated design experience were rare. The lack of final and consequential decisions and prototypes made during the abbreviated codesign may have kept the design process in a tentative state, enabling participant designers to avoid possible disagreements and providing the consensus state with which participants seemed personally inclined.

Impactful Design Moments

Beginning in week five, participants described significant design moments which enabled them to shift the design process from abstract generalities to concrete realities. As a result of the creative matrix brainstorming activity and exploring an example website, participant designers began to speak of the final product as a “hub.” The concept of a hub became the perspective, or metaphor, by which subsequent design activity was managed. An adopted view or perspective of a design problem which sets a specific course through the problem space and formulates the specific design tasks is commonly referred to as a problem frame (Dorst, 2015; Patron & Dorst, 2011). Research on problems frames suggest that designers’ frames are held through the perspective of the designer (Dorst, 2004) and are influenced by experiences, cultures, and values of the designer (Hey et al., 2007; Patron & Dorst, 2011). These frames become “internal mechanisms for understanding reality” (Kolko et al., 2010, p. 5), the lens by which the designer makes sense of the design problem and design situation. When designing within a collaborative setting, however, establishing a common frame can be challenging due to the differences in perceptions and experiences (Hey et al., 2007). Participants described the challenging nature of bringing together the diverse experiences of all the participant designer’s. The significant issues for one participant were unobserved for another participant. For example, Kimberly and Emily both stated that concerns with parent communication was not high for them but observed this concern with other design participants.

Within ill-structured contexts, problem frames impose structure and boundaries within an open space (Stumpf & McDonnell, 2002) by “suspending” certain issues within the design context (Lawson & Dorst, 2009). Once framed, details that were once a part of the design space become irrelevant, thereby creating a more defined, immediate problem space within which the design proceeds (Dorst, 2004). As participant designer’s adopted the “hub” as a potential frame, issues and problems previously described seemed to fall out of the problem space. Poignant issues such as the teacher’s mental health, technology access, and social emotional learning gave way to a focus on effective pedagogical practices. Similarly, solutions involving social media platforms and formal professional development largely lost traction within the hub concept. Design scholars have noted this relationship between frame and solution generation, with frames acting as a sort of conceptual “bridge” between design problems and solutions (Dorst & Cross, 2001). Dorst (2004; 2015) suggested that design problems and solutions co-evolve together; to frame the design problem simultaneously

gives rise to the associated solution. Framing a problem in a certain way immediately rules out design actions while making other actions relevant and meaningful.

With a frame identified, practitioners work reflexively as they engage in design work within the problem space. Problem frames are dynamic and fluid (Patron & Dorst, 2011); expert designers experiment with different frames to better understand the design problem and desired outcomes (Dorst, 2015). Described by Schön and Wiggins (1992) as “seeing-moving-seeing,” (p. 140), designers experiment on a design based on what they perceive to be most effective in a given design situation. With the hub identified, participant designers worked within this narrowed frame to determine more finite details of the design. During codesign week seven, participant designers worked in their groups to create a potential layout of a single page of the hub, including all the elements they believed were important to teachers. The shift was apparent; designing the details became the new focus of their efforts.

Participant Designer Contributions

Initial plans for the current study included involving participant designers as creators of learning prototypes. However, unforeseen changes forced the codesign process to end abruptly, thereby significantly altering the nature of their participation in design. As a result, participants described knowledge and experience sharing as their major contributions to codesign and the eventual outcome. Despite this change in types of participation, participants had a positive view of the potential outcomes and their individual and collective contributions to the product.

Design scholars have sought to understand the nature of participation within collaborative design practices. Arnstein (1969) defined citizen participation by describing a “ladder of participation,” a representation that breaks participation down into eight types ranging from non-participation to complete participation. At the bottom of the ladder is manipulation and therapy and are defined as “non-participation” because they are constructed to educate or correct participants. In the middle of the ladder is “informing,” “consultation,” and “placation,” and are described as types of “token” participation since there is no requirement or indication that individuals in power will listen or agree to the information provided by participants. The top of the ladder represents “degrees of citizen power” (p. 217) and includes partnership, delegated power, and citizen control. While participatory design practices may call for the idealize complete user participation, Bratteteig and Wagner (2016) suggested that other forms of participation may be beneficial within participatory design. They

acknowledged that design occurs within a context that both constrains and provides opportunities for design activity.

While the current study on codesign practice falls short of the power-sharing and emancipatory aims embedded in participatory design, the question remains regarding the value for participant designers in a codesign experience. Research in instructional and curricular settings have revealed that codesign with teachers have been effectively used as an approach to professional development to enhance teacher's subject-matter, pedagogical, and technological knowledge (Kyza & Nicolaidou, 2017; Penuel et al., 2007; Voogt et al., 2016). While participants in the current study admitted to fulfilling more of the "informing" or "consulting" roles described by Arnstein (1969), many of the participants felt satisfied with their participation and contributions. As participant designers discussed their experiences with teaching and coaching during COVID-19, many felt a sense of relief and understanding that had positive emotional benefits. Additionally, some participants observed that discussions with other participant designers helped them understand the nature of their problems, and in some cases, how their problems have changed or improved. These benefits, while different from the emancipatory aims of participatory design, were realized within the current study.

Contributions of this Study

This investigation explored the experiences of participant designers within a codesign experience. As a largely unexplored area of research within instructional design contexts, this study makes several key contributions to the field of instructional design. First, this study illustrates the ill-structured nature of many instructional design problems. In design practice, designers often must select among a number of problems that can be addressed in the ultimate solution. Second, this study demonstrates the need for designers to be open to the perspectives of multiple stakeholders and a commitment to rely on the expertise of practitioners. While a formal evaluation of the design was not included in this study, the experience presented here demonstrates that codesign can be an effective approach to create learning experiences that are meaningful and relevant to the ultimate users. Lastly, this study shows the challenge of integrating new design processes within a design field entrenched by its own practices and processes. As codesign unfolded in the current study, the urgency to develop a design prototype increased. Codesign is a philosophy that does not always align to design traditions that value efficiency over other outcomes like practicality and usefulness (Visscher-Voerman &

Gustafson, 2004). In order to more fully implement codesign in instructional design contexts, designers must revisit their values and desired outcomes.

In addition to its contributions to instructional design, this study also contributes to the codesign literature. This study provides an authentic account of how participant designers experience codesign, including how they perceive the design task, how they observed the design process, and how they evaluated their individual and collective contributions. As a design task conceived as a vague an ill-defined process, this study illuminates areas of challenge where appropriate scaffolding may be helpful. In the current study, weeks one through three were particularly problematic for participants as they grappled with a lack of expectations regarding the design task and their specific roles in the design process. Additionally, after two weeks of brainstorming potential ideas, seeing a website seemed to provide the support needed to move the design forward. By illuminating areas of difficulty experienced by design participants, this study identifies areas that can be effectively explored in future codesign research. This study also emphasizes the felt benefit of participation even when full design participation is not possible. While this study began with the intention of empowering participant designers in developing design prototypes, external factors required this plan to shift. Even when limited to providing experience, participant designers observed significant benefits through their participation. Finally, this study presents a case study on the impact external factors have on codesign practice. Even with clear expectations, a defined design task, and effective design activities, codesign practice is still influenced by external factors. Future research could consider these external factors and how their impact could be mitigated.

Implications

While the use of codesign is common in design fields, greater understanding is needed to properly inform its effective application in instructional design. The current study represents one attempt to fill this knowledge-practice gap, and provides implications for instructional design practice, education, and research.

Within instructional design practice, scholars have argued that design is not a linear process (Smith & Boling, 2009; Stefaniak & Xu, 2020) and is not well-represented by existing instructional design models (Bichelmeyer et al., 2006). Involving users throughout the design process further complicates the design process by introducing new perspectives and requiring negotiation of new roles and responsibilities between users and designers. Existing models and processes may be ill-

equipped to navigate these new realities, requiring the development of entirely new models and frameworks or significant revisions to existing models to properly account for users in the design process. New roles for users include completing design tasks traditionally performed by designers. In this setting, users may be unfamiliar with or unconfident, requiring designers to appropriately scaffold design activity to ensure effective user participation. Designers must also adjust for these new roles, including assuming a facilitator role by empowering users to explore a phenomenon and ideate, prototype, and evaluate potential solutions. Shifts in design roles requires designers to value user expertise and negotiate power and decision-making ability to design stakeholders. In a design process that is sometimes characterized as “fuzzy” (Ylirisku et al., 2009), designers must be comfortable with uncertainty but understand when uncertainty is productive and when support is needed to promote design progress.

The increased use of codesign practices in instructional design requires training programs to explore design models and philosophies outside of traditional instructional design. Within instructional design programs, designers should understand the value of stakeholder perspectives and cultivate a willingness to include these perspectives throughout a design process. Novice designers should be taught how to flexibly adapt existing design models and frameworks to situations involving users at various points in the design process, including multiple opportunities for user prototyping and evaluation.

While research has shown the benefits of these complex design arrangements, it is still unclear how these design situations should occur (Könings et al., 2017). It is unlikely that all instructional design contexts are well-suited to codesign and other HCD methods. Future research could consider contexts and problems for which these design methodologies are most useful. In the course of a design experience, research could also explore what aspects or stages of a design experience is best for involving participants, and how participants can be best supported within these stages and throughout the design process (Könings et al., 2014). The current investigation utilized participant designers largely as informants who contributed ideas of design possibilities. Future research could consider the experience of participants as they participate in other design activities, including prototyping, developing, and evaluating designs. Future research could also investigate how the roles of designers and participants can be negotiated and how power can be shared more democratically between all design participants.

Limitations

This inquiry represents an investigation of non-trained designers as they engaged in a codesign process. Like all research, this study includes several limitations. First, following a seven-week codesign experience, all K-12 participant designers were invited to participate in subsequent interviews. However, out of the 12 participant designers, four participant designers elected not to be interviewed and their experience is not reflected in this analysis. While a complete picture of experience was unavailable, this study sought to triangulate findings by collecting data from multiple participants. The participants included in this study were also given an opportunity to provide feedback on the analysis through member checking, enabling participants to provide correction or validation on this inquiry. Second, the interviews were conducted by the same researcher who facilitated the codesign experience. This familiarity between researcher and research participant may cause some participants to provide biased or favorable responses to interview questions. However, the open and transparent culture established for both the codesign experience, and the interviews supported honest dialogue. Additionally, familiarity with the participant enables a greater emic perspective which is desirable within qualitative research (Williams, 2018). Third, research participants were asked to engage in an interview prior to seeing the development of the final product. Participant's perspectives, especially as it relates to their description and assessment of the final solution, and their personal and collective contribution, may be influenced by the perceived outcome. However, given the realities of the grant project, the codesign process ended early and participants were unable to see the final product prior to the interview. Finally, while codesign is a design methodology that empowers individuals in creating their own realities, this study was also influenced by decisions made outside of the codesign experience. To overcome this potential limitation, this study includes a thick description of the codesign context and the potential impact of this context on the participant's experiences.

Conclusion

This investigation explored the experiences of teachers as they engaged in a codesign experience composed of 12 participant designers (i.e., teachers, digital coaches). While the original plan called for 10-12 sessions with participant designers, external constraints required adjustments to the plan and limited the codesign experience to only seven weeks. As a result, participant designers were utilized primarily as sources of information and initial design directions with limited

opportunities to develop or evaluate design prototypes. Despite these shifts, this study revealed significant insight that can inform the design and implementation of future codesign opportunities. As participant designers met together at the beginning of a seven-week codesign process, they observed a design task that was open and ill-structured. Their participation began with extensive opportunities to listen and learn from the perspectives and experiences of other participant designers, a task that was regarded generally as significant to the design process. Through various impactful design moments, the open and ill-structured design task became clarified, and design progressed from general and vague to detailed and specific. Participants viewed their individual and collective contribution as essential to the design process.

APPENDIX A. INTERVIEW PROTOCOL

Directions: Thank you for being willing to participate in this interview. It's anticipated that this interview will last about 60-75 minutes. We will also be recording this conversation so that I can better understand your thoughts and experiences. Do you have any questions?

A. Background

- a. Please share with me your background in education
 - i. Prompts: education degrees; teaching experience; purpose in teaching
- b. What are your current educational roles and responsibilities?
 - i. Prompts: content/grade level; administrative duties
- c. How would you describe your school community?
 - i. Prompts: teacher demographics; student demographics; rural/urban; socioeconomic status

B. Experiences with Virtual/Remote/Online Teaching (use the term teachers are most familiar with)

- a. Describe for me your experience in teaching at a distance (or coaching), including your experience during COVID-19.
- b. From your perspective, what was the remote teaching/learning experience like for others, including students, parents, and other teachers/coaches?

C. Design framing

- a. Describe the impactful problems and issues regarding remote teaching you observed when you began the codesign experience.
 - i. How was your perspective similar or different from other teachers in the codesign group?
- b. Describe the scope of the project at the beginning of the codesign.
 - i. How was this scope formed or how did it emerge?
 - ii. What was the problem or problems that the group was trying to address?
 - iii. How well did these problems represent the realities you experienced while remote teaching?
- c. Describe the ideas for solutions that emerged during the codesign sessions.
 - i. How did these ideas develop during the codesign sessions?
 - ii. How did you and other teachers contribute to the development of these ideas?
 - iii. How were these solutions changed or modified during codesign?
- d. Describe how the scope of the project changed during the codesign
 - i. How was this scope the same or different than the problems at the end of the codesign?
 - ii. What factors impacted the potential change in scope?
 - iii. How did the emergence of potential solutions impact the codesign experience?
 - iv. How did you and other teachers contribute to these changes?

- e. Describe the solution(s) that emerged by the end of the codesign
 - i. How effective did the scope and potential solutions align with your perceived challenges of remote learning?
 - ii. How do you view the adopted solutions and the set of problems they aim to address?

D. Working in Co-Design

- a. Describe your experience in working in a co-design experience
 - i. What was your role in the codesign experience? What was the role of others?
 - ii. What was your understanding of the job or the task you were trying to complete in the codesign?
 - iii. What do you feel like you were able to contribute through this experience? What did you gain?
 - iv. What factors helped or hindered the codesign experience?

E. Final thoughts

- a. Is there anything else with regard to your experiences with remote teaching or your experiences with co-design that you wish to share?
- b. Would you be willing to answer any follow up questions later?

APPENDIX B. CODEBOOK

Category	Sub-Category	Definition	Examples
10. Participant	10.1. Individual detail (listed by individual)	Details and information about the participant, including past or current teaching experience, teaching roles and duties, school information, and personal life.	“It was very difficult because we were home with three kids. We were both working full-time or as full-time as we could.” “I’m a little less experienced teaching in the U.S., because teaching in the U.S. and teaching in Puerto Rico.” “It was a little more difficult because I’m a real people person, where I like to meet face-to-face with the teachers that I’m working with, and with the educators that I work with, it’s not just teachers, I work with peer professionals and administrative staff as well.”
	10.2. Perspective	Descriptions of the participants’ unique or shared point of view based on experience, job position, or other factors.	“And I realized later, I’m like, ‘I’m pretty sure that this is helpful for me because it’s coming in from the newer, fresh pair of eyes on this,’ looking at it from the point of view of like, ‘I’m not sure what’s going on, but this is what I’m observing,’ and it’s a fresh look on stuff, or at least a fresher look on stuff.” “I think me specifically, like you said, brought in like a point of view that’s not as typical. I’m like a high school teacher in that I teach every...you know, like hundreds of kids. But I’m, like, I am an elementary teacher in that I teach little kids, and like fine motor, gross motor, like developmental skills, not like

			you have to teach in 12th grade, but at a larger scale. And it's just different.”
20. Pandemic Teaching	20.1. Teaching description	Description of pandemic teaching experiences, including teacher or coach roles and responsibilities, and teaching arrangement. Could also include a general assessment or summary of the experience.	“But what we did was all of our material was... Okay. I have to get the word right. Asynchronous, like, I did not live teach unless we were all virtual. So, that meant that on my preps and after school and things like that, I was recording videos and also using resources like from Edpuzzle and things that teachers had recorded.” “I think in the end, I have become a better teacher for all of this. I mean, I would definitely do not wish another pandemic. And I wish I could have learned all of this on a more positive note.”
	20.2. Observed challenges	Descriptions of problems, issues, or challenges experienced while teaching or coaching during the COVID-19 pandemic. Also includes prioritized problems participants described as having “brought” with them to codesign.	“And so, I think the biggest chaos was, there were no best practices. There was no research to fall back on to.” “Oh, I think the biggest question was, ‘Was I being effective?’ I know it's very broad because at that moment in time when we started that process of building tools together and forming this brainstorm, I think the biggest thing in my head was like, ‘Am I being an effective teacher?’”
	20.3. Observed successes	Descriptions of highlights or successes while teaching during the pandemic. Information must go beyond simply the absence of problems but indicate something	“The best, the upside of it that I guess I would say, is for the first time ever, I recorded my lessons, and I was able to put them into Canvas, and I have videos for every single lesson.”

		that went well while teaching during the pandemic.	“I haven't seen my iLearn scores, but we had all of my kids pass iRead including virtual.”
	20.4. Similarities and differences in challenges	Descriptions of similarities and differences between the codesign teachers or teachers generally. Includes similarities and differences regarding perspectives, characteristics, observed problems, and the significance of problems.	“And so, I had just such a totally different set of problems. My problems weren't emergencies. My children were learning and being fed and had consistent care. And so, my needs look different from other people's. And it's easy to lose sight of that.” “Similar, and that I think we all had to have the willingness, well, maybe, I think we all had to get in there and just do the best we can, best we could do to meet the needs of kids and their families. That's the one thing I think we all probably shared.”
30. Design Process	30.1. Initial understanding	Description of participant's initial understanding of the problem, the codesign purpose or process, their personal contribution, or potential end product and value.	“So, I didn't quite know what co-design was, I knew it was collaboration toward a common goal at the end, but I didn't know what that process would look like.” “But from the beginning it was very big, of like, we're going to make a resource, period, no idea what it is or how it's going to work.” “Initially, I did not understand that what you all were doing was going to have such a strong impact on, I would say, education moving forward. That, I wasn't quite sure about.”
	30.2. Enhanced understanding	Descriptions of changes in understanding of the problem, their role,	“So, I think that's when I realized, like, the scope of what we were trying to do, that it

		perspective, or potential solutions and their value. May also include descriptions of moments or events that resulted in increased understanding.	wasn't just, like, a Pinterest board. Do you know what I mean? That it was something actually really big or at least somebody was trying to make it something really big.” “Once we got to talk to him, a little bit more, and everybody got a little bit more acclimated, I was able to kind of put the pieces together and see the goal that you were trying to achieve, like, I had a part to play in it.” “So yeah, I feel like it was around like the week five, around there, where I think we started kind of really pushing what would engage our learners, and really having a good idea of what was going to be the product, you know, what was going to be the end result.”
	30.3. Anticipated outcome (goals)	Descriptions of what the solution of codesign would be or achieve, or goals of the eventual design. Includes comments at any point in the design process.	“Yeah, like a roadmap to help teachers that are still kind of on that struggle bus to get remote learning path to go a little bit smoother, to have resources ready to help those teachers transition.” “I felt like it had a bigger purpose, like, that someone was actually trying to, I think they said, stop the chaos and provide something more uniform.”
	30.4. Solution ideas	Descriptions of potential alternative solutions proposed during codesign, including evaluative comments on the advantages and disadvantages of solutions. Ideas described	“There was a lot of talk about, like, social media being a good outlet, but that has to have someone who will keep it going. I mean, so do websites, but I feel like social media needs more supervision.”

		here may or may not be included in the final design.	“We talked about how we definitely prefer in-person PD, but that wasn't really like a viable option to mass produce, because it does make it less accessible with having to do some plans or whatever, and also, COVID.”
	30.5. Process	Description of how codesigners worked together in a complex and open design space to sort through various problems and potential solutions to determine a way through. Also includes specific moments or events that were significant in the process.	“I could probably think of it as like, almost funneling. And as we got to talk about it, the more important pieces were starting to emerge, at least that was my perspective. And I even, as we got a little further along, maybe fourth week, I could see the more... What's a good word? It was more obvious, the direction where we were going. So, it's almost like we had to kind of start off kind of cloudy, and then talk through it and funnel it down to the most important aspects.” “But as a couple of things were said here and there, I just started to see other people jump on and then throw another idea right out there right next to it that was very similar.”
	30.6. Solution description	Descriptions of the final solution developed through codesign, including what it is and what it's like. Also includes content that is or is not included in the current solution or what they don't know about the final design.	“But the idea being that it was a one-stop shop for you to get some ideas, something you would pin to your bookmarks, or put on your bookmarks so that you're struggling, click on that, see if there's a strategy that's gonna help you and then watch a quick five-minute video, get the information sheet if you need it.” “But I think for the most part, if we were thinking about

			instructional resources and how to be better, in learning and instruction, I believe we wrapped our arms around it.”
	30.7. Solution assessment	Descriptions of the personal assessment or evaluation of the final product or solution.	“And so, I felt like, yeah, my individual world was represented with the end product.” “So, I looked at that hub idea and I'm like, ‘All right, cool. You know, if that's what a lot of people want to do, great. I don't think I'll ever access it.’”
40. Codesign Experience	40.1 Codesign description	Description of codesign experience, including what it felt like and summative comments about the experience or how they benefited.	“And so, once I got in, honestly, it was the best thing I did for myself last year was doing the Co-design meeting because getting to... Honestly, don't tell 'em this. But I would have done it for free after the first session because it was so good because the teachers that were there cared so much and they also totally understood what you were saying.” “So, it wasn't like they... There was no judgment. You never felt like anybody was judging you or judging any issues that you had or were, like, you know, rolling their eyes like, “Well, why is that a problem?” There's none of that.”
	40.2 Codesign challenges	Descriptions of problems, challenges, or factors that negatively affected their ability to work in codesign.	“I think timing of the day. And I don't know if there's any answer to it, but just that we're worn out, we're tired, I think at least I was. And life, in general, getting in the way, was probably the biggest hindrance.”

			“And we were in such a time-constraint, you know, an hour and fifteen minutes once a week to meet and it's just going to be so difficult to get through, you know, everything.”
	40.3 Codesign helpful factors	Descriptions of successes or positive factors associated with codesign.	“I think that the breakout rooms helped it tremendously. Without those breakout rooms, I would have not felt, one, the accountability to contribute my voice. Because we broke into, you know, three and four people. And so, now all of a sudden, I can't sit there and be quiet. So, I think that that was one thing that helped it tremendously.” “I think the whole group process and then breaking it up into small groups was very helpful.”
	40.4. Roles	Descriptions of a job or responsibility given or assumed during the codesign sessions. These descriptions could include jobs or responsibilities of codesign participants or others on the project.	“I felt like we were giving information to people who are building something that we couldn't build, like, information that they couldn't gain themselves because they hadn't experienced it to people building something that we couldn't build.” “It changed. I thought our group was actually building what your team built from the responses of the co-design team. And so, initially, I thought that we were the ones that were going to be building the website, you know, putting these other resources in”
	40.5. Contribution	Descriptions of something given or provided during the	“I feel like that was a big contribution that I had, is just kind of filtering all these

		codesign sessions. May also include uncertainty about one's contribution.	thoughts from people that I've talked to, that were not on the panel and trying to filter all those into, 'Okay, what would benefit those teachers I've talked with, that really need a certain resource, or would benefit,' I should say, 'from a certain resource?'" "That I remember that meeting sitting back going, 'I'm not sure I did anything here.' So, when it got to that side of it, I don't know that I threw a lot in"
50. Quotes	50. Quotes	Direct quotes from participants that highlight particularly interesting or relevant concepts or ideas.	"I felt like I was actually a part of something that would last, because once we got to codesign number five, it became more of a reality versus a theory." "Creating a collaborative resource for all educators across the spectrum, to benefit us in, honestly, like a time of desperation."
60. Other	50. Other	Codes not found in other categories or sub-categories.	

APPENDIX C. PARTICIPANT MEMBER CHECKING

Hi [participant]!

How are you doing? Is school going okay for you? We each know how much can change in a short period of time, but I hope the time that has passed since our last conversation has only brought good things!

I'm sorry if it feels like I just keep coming back again and again asking for more help, but I wanted to give you one final invitation. Please note that this is optional and unfortunately no incentive will be provided. However, if you some time available, your help would be greatly appreciated!

Since our conversation in the summer, I have documented research findings to represent your individual and collective experience with the codesign. Additionally, my findings include an individual narrative of each participant, a 1-page document that summarizes your teaching background, experience with teaching or coaching during the pandemic, and a brief description of your codesign experience. If possible, would you be willing to review these findings (especially your personal narratives which are highlighted in the attached document) and provide any necessary corrections, highlights, or clarifications? If so, you can make corrections in a Word document, an email, or any other form you would find helpful.

As a researcher, it's important to me to represent your experience accurately and fairly. I do not wish to make any claims or statements that do not represent you or that distort you or your experience. Additionally, I have also sought to protect your identity by replacing your name with a pseudonym. The pseudonym I have chosen for you is [pseudonym]. This name is meant to represent you wherever it occurs in the document.

If you choose to participate, please respond with your comments by Monday, November 1st. If you have any questions or concerns, please don't hesitate to reach out!

Thanks for your time!

Tadd Farmer
Doctoral Candidate
Learning Design and Technology
Purdue University

Participant Responses

Kara

I read the narrative and it looks great! I'll skim through the rest through today but the summary of me looks great!

Eva

I think what you have is fine.

Vanessa

I found one area of my section that could use some minor tweaking. I've indicated changes in red and with a strikethrough in the paragraph copied from the attachment (see below).

“Teaching and Coaching Through the Pandemic. Vanessa was working as an 8th grade Language Arts teacher when COVID-19 first hit in March of 2020. At the time, she was partnered with a social studies teacher to promote cross-curricular learning. When learning went online, they shifted instruction to be more skill-based to accommodate students who were suddenly thrust into caregiver roles. ~~would not require significant quiet time for those students who were thrust into caregiver roles.~~ When a return to school was no longer a possibility, Vanessa separated from her co-teacher as she followed her own “pathway.” She worried about student engagement, noting that students were simply “missing in action,” isolated, and lost.”

Keith

I read through the document. I feel you represented my comments very well. I appreciate you summarizing in such a way.

Zayne

You are welcome to email me anytime you need something for this project. I read through the narrative and I think it was accurate and well written to represent me.

Kimberly

I reviewed the findings in the document and the only change I have is the following: I worked with K - 3 during the 2020-2021 school year. This year we have added fourth grade.

APPENDIX D. RESEARCH JOURNAL INDEX

Graduate studies in instructional design led me through various theories and perspectives related to the practice of online learning, including cognitive load, self-efficacy, and self-determination. Near the beginning of my third year in my PhD program, I took a design theory course that was taught from a human-computer interaction (HCI) perspective. This course introduced me to design theory and practice from an interdisciplinary design perspective. I began developing interests in ideas and topics that I felt were missing or ill-developed within instructional design. Near this time, I also began researching learning experience design and human-centered design (HCD) principles which emphasized the role of the designer and the user within a design system. For me, traditional instructional design had become too highly focused on process models, the use of educational technology, and the development of instructional artifacts, and had not adequately considered the important role that designers and learners play in a design context. More importantly, the practice of design that had been vague and elusive to me in earlier years was becoming clearer to me through an interdisciplinary design perspective.

Near the time when HCD was becoming the focus of my consciousness, I learned that my graduate school program was awarded a grant from the state of Indiana. This grant was intended to provide support for teachers who were struggling to meet the demands suddenly forced on them with the emergence of the COVID-19 pandemic. Because of my experience as a K-12 teacher and my obsession with having impact and making meaning for others, I encouraged the faculty on the project to consider codesign as a design methodology for creating learning experiences for teachers. My encouragement was based on several key assumptions:

1. All people are creative
2. Teachers are the experts of their own experience and are the most qualified
3. Actively involving those we intend to serve will increase the possibility that the learning experience we design will be meaningful and useful
4. To facilitate effective design, the roles in the design process change:
 1. User (teacher) – the “experts” of their own experience
 2. Researcher – provides tools (e.g., theories, process knowledge) and facilitates ideation and creation processes
 3. Designer – gives form and expression to ideas (e.g., storyboards, prototypes)

Informed by recent design theories and my belief in practitioner expertise, I worked with the faculty to incorporate HCD principles into the design project. Specifically, we worked to design a design collaboration in which inservice K-12 teachers and technology coaches would work together with instructional designers and higher education faculty members to design an intervention that would support K-12 teachers in their online teaching responsibilities.

My interest in this topic was not a linear process. I explored many topics related to design theory and HCD, until I finally landed on my current area of research. The entries in this section highlight some of the impactful explorations and decisions related to my dissertation research.

October 2nd, 2020 - Looking into the Literature

I'm going to be looking into the literature a bit to see how learners are included/excluded in traditional instructional design models and frameworks.

- What is interaction with the learners first initiated? At what point in the process does this occur?
- At what point in the process do designers interact with learners/users?
- What implicit or explicit assumptions do authors make about the learners/users?
- What responsibilities do learners have in the design and development process?
- What roles do learners have in the design and development process?

One thing that is important to note, research has shown that practicing designers do not use these models and frameworks prescriptively. Rather, they make adjustments as needed in the situation. This means that in practice, learners/users may be much more involved in the process. However, if this is the case, shouldn't we develop models and frameworks that are more reflective of contemporary and effective design practice?

As I learned more about HCD, I began to compare it with the traditional instructional design models and frameworks that I was used to.

October 29th, 2020

This new research agenda is getting to be pretty overwhelming to me so I thought I'd take some time and think this through a little more. My initial feeling about human-centered design is that it is new and largely unexplored in instructional design. It's true that it's still not common practice in ID, but to say that it's new is false. The challenge is that it sometimes goes by other names, including participatory design, co-design, co-creation among other things. For decades, educational researchers and designers have explored how involving students and teachers in instructional design could impact learning outcomes and experiences.

Because I'm a little overwhelmed by the amount of content I'm running into, I thought I'd take a step back and try and operationalize some terms. In particular, I'm hoping to have a "research question" for my research today, hoping that by breaking this topic down into a bite sized piece I may avoid feeling too overwhelmed. Here's my research questions for today:

- What terms are used to describe the involvement of end users in the design and development process?
- How are these terms operationalized?
- How can these terms be differentiated by
 - History
 - Epistemologies and ontologies
 - Desired outcomes or benefits
 - Processes

Co-Design

Like I mentioned, I've run into a lot of educational research that I didn't know existed. Much of this research seems to stem more from outside of ID (perhaps curriculum education or general educational research) and much of it references Penuel et al (2007). In defining co-design, he describes as "a highly-facilitated, team-based process in which teachers, researchers, and developers work together in defined roles to design an educational innovation, realize the design in one or more prototypes, and evaluate each prototype's significance for addressing a concrete educational need." This sounds similar to other

research, but one thing that stands out to me is the “defined roles” part. In these articles, researchers are also quite clear in emphasizing that this is not a completely democratized approach to design where every participant has an equal voice. Rather, each perspective is heard but ultimately the principle researcher is accountable for the design decisions and the quality of the product.

Participatory Design

Participatory design is also mentioned in educational and instructional design research. In a lot of ways, participatory design is viewed as a perspective-taking exercise where teachers engage with students during design as a way to understand their perspective to better plan and design curriculum that will meet their needs.

Knowing that the grant project would enable us to involve educators in the design and development of the professional development, I began to hone in on this larger idea of participatory design. I also believed that a study simply on participatory design was likely too broad for my inquiry and would need to another idea to provide a tighter analytic lens. My thoughts began to turn to impactful ideas and conversations from the past as I considered potential ideas.

November 20th, 2020 -

I'm still having a really hard time trying to figure out how to work these different pieces together in my proposal. I usually try and outline my papers and then write from that outline, but I'm having a hard time putting the pieces together. So, I thought what I'd do is try to write out a narrative of what I'm trying to do and then reverse-engineer from that narrative my outline. Here goes.

One of my fundamental assumptions (consistent) is that we really don't talk much about the actual act of designing. From the time I was in Dr. Gibbons class, I've always viewed design as a sort of "black box"; no one really knows what goes on inside of it. All we know is that we tend to do some kind of analysis or data gathering activity (e.g., survey, literature review, user analysis) and then from there we "design" which results in more or less a finished artifact. However, what we do between the analysis and development phase is really unclear (at least to me and I believe is unclear from the literature). Our best attempts at describing design (which we usually refer to design as the process we engage in from analysis to implementation rather than the specific activity within that process) is some kind of process model. However, these models fail to adequately capture and communicate authentic design practice. Without an adequate method to describe design activity, we (as a field) will continue to struggle in pushing forth our best work and educating effective designers. That's the challenge.

I do not believe that our inability to describe our authentic design activity can be easily solved by a single study or even a single research agenda. What I hope to do is foreground the importance of the individual designer within a design context. The designer brings a lot into the design context he or she designs in. What I'm most interested in is understanding how the designer decides what information to foreground and what information can be deemphasized or even removed entirely from a design. I couch this discussion around the concept of judgment, and describe judgment as the knowledge

I began to consider more seriously the idea of appreciative judgments as a lens for my inquiry. My knowledge on this topic was fairly limited, and I struggled to try and make sense of this abstract concept.

November 26th, 2020 - While I Couldn't Sleep

The link between co-design and appreciative judgment is really not that tenuous; these concepts can be easily related. Considering judgments as “mental activity” (Vickers), we view appreciative judgments as having the main components: reality judgments which are judgments regarding what exists within a context, value judgments which are more subjective judgments regarding what matters and needs attention, and instrumental (or action) judgments which suggests the solutions that exist to a particular problem (note that these judgments each proceed any actual decision although from a management and policy perspective, Vickers is concerned with the judgments that ultimately result in decisions although judgments are not synonymous with decision). According to Nelson and Stolterman, judgments are a function of our personal experiences and the uniqueness of the design context. Both are brought together in an “inquiry” which gives shape to our design through subsequent design actions. When operating as a lone designer, our perceptions of reality (reality judgments) are limited to our personal experiences and our valuation of design elements (e.g., design processes, content) is based on our personal convictions. As is common in instructional design, subject-matter experts are often utilized to both provide help in gaining a clearer perspective of reality and understanding what elements of the situation should be prioritized. However, the perspective of SMEs is still limited in both reality and value judgments. Like the designer activity on his own, this perspective from an SME is still a judgment. When working in a co-design situation with end users you aim to serve, participant designers can dramatically impact reality judgments by more completely providing industry into what is real within the context of design. Additionally, their experience can assist designers in valuing (value judgments) of what is most important to be considered in a design. These two judgments working together can also inform instrumental judgments as appropriate solutions to the perceived problems are generated and ultimately adopted. Therefore, a co-design approach in design can significantly impact the appreciative judgment making process of instructional designers, thereby increasing the ability to exercise wise design action.

The implications of this for designers and design education are significant. If designers are agentive beings and are not merely following routinely the design process models we commonly espouse, then the intentionality of the designer becomes a significant factor in the design experience leading to either good design or bad design. This intentionality, precipitated by judgments previously described, also carries import within instructional design research. Understanding how these judgments are forged, including how these judgments can be informed by professional development and educational practices, can have direct bearing on the act of designing. In particular, how can a designer be better attuned to the complexities and peculiarities of an authentic design context? What strategies, practices, and behaviors are most likely to improve his or her judgments of reality? Furthermore, within a real design context, how does a designer value different elements of a design experience? What tools are adopted to assist the designer in valuing these different elements, including the priority of these different elements, within the context of their discerned reality? How can designers be assisted in their valuing process?

A couple of helpful tools are beginning to emerge in instructional design that can help to shed proper attention on the mental activities that characterize authentic design activity. First, studio work is becoming more common in instructional design problems. Through authentic activity within a conversationally-rich environment, designers judgments can be enhanced. Second, the use of design cases and design precedent (common in other design forks), can attune designers to the mental processes (including judgments making) that are implicit in design activity.

With these ideas in mind, I wrote my dissertation proposal about the idea of appreciative judgments in a codesign context. I passed my defense but received a lot of great feedback on the topic, especially from Dr. Colin Gray who is attuned to the complexities of design judgment.

Tuesday, February 23rd, 2021 - Dissertation Proposal Defense

- Questions from Dr. Gray
 - What is the role of co-design in your proposed study? Could co-design be replaced by “consulting” with any change in meaning or impact on the proposed workshops?
 - What knowledge and experiences do each group of designers bring? What are the differences between the knowledge set, toolset, mindset, and skillset of “participant designers” and “graduate instructional designers”?
 - How much data in total do you expect to analyze, and how do you plan to move from “raw” data to assertions about the appreciative judgments that are used to shape the design situation?
 - What connections are you prepared to make between appreciative judgments and other forms of design judgment that you included in your proposal?
 - e.g., framing and reality judgments seem to go hand-in-hand; core judgments influence what someone might perceive and value
 - How appreciative judgments form OR what appreciative judgments form?
 - Focus on perception and understanding OR focus on languaging that then relates to these constructs?
 - Language focus? Artifact focus? Interactional focus of language with artifact?
 - What is the role of interviews in unpacking the appreciative judgments that have been observed and evaluated?
 - What is the role of researcher reflexivity in working with abductive engagement as it is performed by co-design participants?

This dissertation defense gave me confidence to move forward with appreciative judgment, but it also sowed some seeds of concern that impacted my later work. In particular, there were concerns about the role and nature of “codesign” in my work that did not accurately reflect the reality in the codesign in my study. This concern came to a head following the sixth week of codesign.

Wednesday, March 24th, 2021 - Afterthoughts about Co-Design 6

One thing I've thought a bit about is the concept of power in this experience. From the beginning we've referred to this experience as "co-design." In recent weeks, it's been clear to me that we have been engaged in co-design in name only. I understand from the research that co-design is all about emancipation and empowerment, giving power and voice to those traditionally left out of the experience. Even in my dissertation, I noted that I was doing codesign, but that I wasn't really interested in the piece about power. I wasn't trying to empower people as much as I wanted to give them voice. However, as we've made some design decisions in our global meetings, I have realized that you cannot do co-design without re-negotiating power relationships. As soon as we make a design decision without the teachers, we are changing the conversation and dialogue, shifting the design frame in a direction that may or may not align with the desires of the teachers. At best, we're probably doing collaborative design or "designing for people" rather than co-design which is what I had originally intended. Another interesting point about power is if co-design in our situation was even possible to begin with. As previously mentioned, co-design requires the sharing of power, but in our case, we weren't really positioned to share power with the teachers. To some degree, power is found in relationships and the relationships we have with teachers is not distinguished by power. The power is in the relationships teachers have with school and district admin. To conduct real co-design, we'd have to share power that we already had access to.

Wednesday, March 31st, 2021 - Co-Design thoughts

I wanted to go back to some of the thoughts I had from last Wednesday (March 24th) about co-design and power. Like I said, I don't think we're doing co-design but rather "collaborative design" which focuses more on getting user perspective rather than dealing with issues of power. If we were honest with ourselves at the beginning of this whole grant, and if we were clear and transparent about our expectations, we would've realized that the power that is manifested through decision making was never really negotiable. Those of us in the grant administration never intended for the teachers in the co-design to actually make the decisions, but to merely inform these decisions. Teachers would never

have the last word and since power is manifest in decision-making, power was never in the equation. So the principle that I learned is that to find out who holds the power in the situation, you need to ask, “who’s making the decisions?” Find the decision makers and you’ve found the power. Does the power you can provide empower them in the situations and realms that are meaningful to them?

On April 5th, the global design team decided to discontinue the codesign activity following the 7th week of codesign. This was in part informed by me as I realized that the participants were not really empowered to design as the way codesign was intended. I began to consider shifts in my research as described in an email to Dr. Richardson.

Monday, April 5th, 2021 - Email to Dr. Richardson

Like I warned you about in our global meeting today, I think I need to have a chat with you to consider my steps moving forward with the dissertation. We took a pretty sharp turn in this co-design experience that shifted things and I need to figure out how to get my bearings. I realized early on that we're really not doing co-design as is explained in the literature. That's on me for not understanding and communicating very well. I figured I'd just drop co-design from the dissertation but now I'm growing a little concerned that design judgment really won't be present either given the lack of design activity we've done with the teachers.

Anyways, I'm trying to figure out the best steps moving forward and I'd like your thoughts.

Here are some possibilities I'm thinking about:

- Look at what we've done so far with the teachers and see if I can see evidence of appreciative judgment or design judgment...not sure if there's enough there to write about
- Go with a three-paper dissertation on design judgment. One chapter a converted literature review based on chapter 2, one chapter my prelim with Adrie, and one chapter TBD
- Write about how not to do a co-design (I could write a whopper on that)
- Try something new

Once we concluded codesign, I needed to figure out how to pivot with my dissertation. Dr. Richardson suggested that although the codesign didn't work the way I had envisioned, there was still some value in telling about the experience of codesign. With this potential shift in mind, I emailed Dr. Gray and asked for any suggestions. My email to him describes why this shift was needed.

April 9, 2021 – Email to Dr. Gray

I just wanted to reach out and give you a quick update on my dissertation and get some advice. Since the last time we spoke, the grant administrators have decided to stop the co-design sessions after only 7 weeks (rather than the 10-12 we anticipated). Beginning in week 3 or 4, the co-design really shifted from having teachers co-design to giving teachers stuff made by others (graduate students on the grant) and have them evaluate. Our last meeting with the teachers was last week and we don't plan to reach out to them again until we have a workable prototype for them to evaluate (likely 5-6 weeks).

This is an unfortunate turn for me and my work. My next task is to figure out where to go from here in my research. After talking to Dr. Richardson yesterday, she suggested I find a way to tell the story of our co-design experience. She mentioned (and I agree) that even though this did not happen the way we had envisioned, there's still a lot to learn about what we tried to do and why it didn't work. We also talked about the possibility of design judgments (especially appreciative judgments) but I don't really see a strong element of judgment in our experience.

With that being said, I'm wondering if you had some insights in terms of potential methodology in examining our co-design experience. It does feel like a type of ethnography may be useful since I'll be looking at an experience that I was very involved in. I may also need to include individuals I did not previously consider including, such as grant faculty and staff. What role the teachers play, if any, is unknown to me. Do you have any thoughts or examples of things I may be able to look at to get ideas?

Dr. Gray suggested that although the participants weren't fully empowered in the way codesign is described in the literature, there still may be some lurking judgments. He suggested

looking more into framing judgments as a way to tell the story of codesign experience. I explored that idea in more detail, but felt unprepared to pull out evidence of framing judgment from existing codesign transcripts. In meeting with Dr. Richardson, we discussed this challenge of finding evidence and decided to conduct interviews with participants to get their perception on how the design experience was framed.

Thursday, April 22nd, 2021 - Meeting with Jennifer

My meeting with Jennifer went pretty well. We talked about a lot of things but ultimately we talked about an idea that I think can get some traction. One of my big concerns was trying to weed through the design meeting transcripts looking for evidence of framing or appreciative judgments. I have no doubts that I think there's something there but I don't feel myself (as the research instrument) that I am properly attuned to the subtle nuances enough to be able to recognize them in practice. If I was able to sit with these ideas for several years, that may be another story. So, as appealing as it may be to be done with the data collection at this point, I don't think that's the best way forward. I think a better way is to conduct the participant interviews so that I can be in control of the data that I collect and can ask the questions that I know will get at the concepts I'm hoping to address.

At this point, my approach is going to be to interview teachers and ask them their perspective of the frames we generated during this co-design experience. How do these frames relate to their experiences and challenges during remote instruction? How did these frames relate to the conversations we had as individuals and groups during our co-design? What contributions do they perceive in the frames of our design? Once these sorts of questions are answered, I can go through a fairly typical analysis process, utilizing co-design transcripts and design artifacts to triangulate what they told me.

Significant time passed as I submitted addendums for the IRB and began conducting interviews with participants. When the interviews were completed and transcribed, the research entered into the analysis phase. In this phase, I did a lot of "learning by doing." In the following example, I was considering different coding methods and wanted to record thoughts that would help me identify the best way forward.

Friday, July 23rd, 2021 - Notes about coding

- This first process with Kimberly has been slow and challenging. It's always like this when you're starting a new project and figuring out the best way to do something. In my dissertation proposal, I determined to use two methods for first cycle coding. First, holistic coding which basically attached broad, general codes over large segments of text as a way to break up the data. The second coding is In Vivo coding which is an inductive coding method which uses the participants' own words as codes. These codes can then be arranged, rearranged, and combined using a second cycle coding method.
- As I was working on this first text, I struggled a bit using both holistic and in vivo coding methods. The holistic coding methods seemed to create certain "boxes" that the in vivo coding method seemed to want to "break" out of. At best, I felt like this initial holistic coding method was simply unnecessary; at worst I felt like it constrained and even colored my analysis.
- As a result of this experience, I feel like simply moving forward with an in vivo coding method. However, since the interview really covered two main experiences (teaching through the pandemic and codesign), it may still be advantageous to maintain holistic "boxes" for these two different experiences. I plan to finish my analysis of Kimberly today and pass this idea on to Dr. Richardson to get her feedback.

This early coding work helped to inform a later conversation with Dr. Richardson which focused on coding methods, particularly creating a codebook and how to progress through the process.

Wednesday, July 28th, 2021 - Meeting with Jennifer

My meeting with Jennifer was really helpful. I walked her through my process and showed her what I have been doing in Nvivo. She gave me some great advice. Rather than coding each individual and then generating a codebook and subsequent analysis, she suggested that I code 3 participants together and then derive a codebook based on that analysis. She recommended a choose 3 individuals who vary in their understanding of the process. After that codebook is created, I can code the remaining participants through a deductive and inductive process. I think this is a really great recommendation. I have really struggled with Kimberly and I've found myself hyper focused on just her experience. Adding two (or three) other individuals to the process I think will help me get a more generalizable idea of what the participant's experience really is like.

After analyzing these first 3-4 participants, I can revisit the RQs and see if any of them need to be changed.

Once the codebook has been created and all the participants have been analyzed, I'll be able to go back through the transcripts and recode those (along with the meeting transcripts). At that point, I'll also be able to determine if I want to stay with the embedded case study design or shift to a single case study design. If I go the embedded route, I would use the codebook and analyze the participants according to the codebook and report on them individually. If I go the single case study way, I'll be able to simply report on the participants based on the codebook.

I feel much better about this plan.

My codebook was originally created by analyzing three participants who were unique in their experience: Kimberly, Zayne, and Eva. The remaining transcripts were coded deductively using this codebook while also maintaining an openness to new codes. I recorded some difficulties I had in developing my codebook.

Monday, August 9th, 2021 - Developing a codebook

- I spent most of Friday trying to generate a codebook composed of the three interviews I've already coded. I made very little progress so I took a break over the weekend and I'm trying to get at it again today. I wanted to record a few thoughts regarding my difficulties and then describe what I'm going to do and why I plan to do it.
- In addition to the complex and abstract nature of the content, I think my main difficulty in creating a codebook is that I'm using it to try to form an argument. For example, in trying to form categories and subcategories of codes, I'm trying to figure out if this concept belongs to one category or another. This may seem like a simple exercise but it can be more complex when the distinction between those categories is complex and not entirely clear. Certainly my analysis will make some kind of argument, but that's not the role of the codebook. The codebook is really meant to help me understand what the data is about and to create a tool to help me analyze the data more accurately and consistently. Once the data has been analyzed, I will be able to use the data and the codes to form a cogent argument. But I don't need to make that argument now.
- As a result of these challenges, I'm going to forgo making any analytic arguments in the codebook and create code categories and subcategories that are more descriptive of the data rather than interpretative (making an argument). For example, my early thinking here suggests that the concept of understanding mediates to some degree the problem finding and problem generating elements of design. However, rather than trying to determine if understanding is a sub-category of problems or solutions, I'm simply going to keep it as its own categories. As I code the remaining interviews with this codebook, the codebook will continue to be refined. Even in the end, the exact relationship between the codes and categories of codes will not be determined until I write the findings. So, as a result, I'm going to create a codebook that is simply more descriptive about what the data is showing and leave the arguments for down the road.

Once I had created a final codebook, I considered revisions to my research questions and recorded some initial thoughts.

Tuesday, August 24th, 2021 - Reconsidering RQs

I knew that my original RQs would likely need to be changed (they almost always are). I was always worried that the presence of design framing may not be as readily clear and apparent as I hoped it would be. To some extent, I was correct even though there is evidence that some design framing occurred. So how do I feel about my ability to answer these questions based on the data I've received? Again, I don't know how well I can answer these questions. I'll record some thoughts below:

1. How did participant designers contribute to the framing of instructional problems?
 1. Participant designers were very quick to admit to some contributions to the design process (not necessarily design framing). The contributions came mostly in the form of providing perspective and expertise on the issues at hand and workable solutions that could be used to address the issues.
2. How did participant designers' frames develop through a codesign experience?
 1. It's hard to say. Certainly the design space was framed, and that the end frame of the space was much more refined and identified at the end than it was at the beginning. But that whole process of how they were formed is still not easily apparent.
 2. It's hard to identify how it occurred. Here are some examples.
 3. It all about what they perceive and what they believe. My argument can come out in the discussion
3. How did participant designers evaluate the frames adopted during a codesign experience?
 1. Most of them evaluated them pretty positively. This isn't a really interesting RQ.
4. How did they feel about codesign?
5. How did teachers experience a collaborative design process?

In exploring these options with Dr. Richardson, she suggested making them more general about the codesign experience. Therefore, the analytic lens on design framing was largely dropped from the study because I still didn't feel like there was good evidence that framing had occurred.

Thursday, August 26th, 2021 - Codebook work

This also precipitates a revision of my RQs. I'm considering changing RQs to more broadly consider the codesign experience and the design process more broadly rather than hyper focusing to the problem framing experience which wasn't quite clearly seen. Potential research questions could be:

- How did participant designers experience the design process?
- How did participant designers experience codesign?
- How did participant designers evaluate their roles and contributions to the design process?
- How did participant designers experience design within a collaborative setting?
 - How did they perceive the design process?
 - How did they understand and evaluate their roles and contributions to the design process?

I determined to reexamine all available data using the new codebook. Dr. Richardson suggested that I involve a second coder to help with the data analysis. I described my original plan for a second coder in an email:

Tuesday, August 31st, 2021 - Preparing for Shams

As I've mentioned, the primary data for this research will come from 8 interviews with my research participants. I've already read and coded these to create a codebook. Now that the codebook has been created, our task is to use the codebook to code them again. To make sure we're on the same page, we'll code the first 1-2 participant interviews and then we will divide up the remaining interviews. After we code the first interview, we'll meet together and see how closely our codes align. This process is simply to see if we're looking at things similarly so we can have confidence that the remaining transcripts will be analyzed as consistently as possible.

Here's a breakdown of how I see these initial tasks occurring but please let me know if you have any challenges or concerns:

- Together: Emily, Zayne (if needed)
- Shams: Sylvia, Jasmine, Kara
- Tadd: Kimberly, Keith, Vanessa

I also have transcripts of 7 codesign sessions that are used as secondary data sources. We'll code these transcripts after we're done with the interview transcripts using the same codebook as the interviews. However, this coding will be lighter in that we're really looking for examples of the codes. Additionally, there's a lot more "other" stuff in these transcripts that can be skipped in our coding. Since coding these transcripts will be a little different than coding the transcripts, we'll again code 2 transcripts together before dividing the remaining transcripts. Here is how I can see how this task can be broken down:

- Together: Codesign 1, 2
- Shams: Codesign 3, 4
- Tadd: Codesign: 5, 6, 7

While the coding was going on, I was also trying to decide how to structure the narratives. I collected a significant amount of information on each participant and their experience teaching or coaching through the pandemic. I didn't want to simply omit this data from the research, but I also didn't want to devote an entire research question to it either. I decided that much of this information would be included in the participant narratives which would be presented before the themes about codesign experience.

Wednesday, September 8th, 2021 - Plan for Narratives

(Participant name)

Personal information (teaching experience, background, personal life): under the participant name and not as a separate heading

Teaching Through the Pandemic. Includes the codes teaching description, observed challenges, observed successes. This section name could be retitled to follow the words of the participant.

Codesign Experience. Includes codes codesign experience, factors, and roles. Ends with the contribution that the individual made to the codesign experience. This section name could be retitled to follow the words of the participant.

My first meeting with the second coder resulted in significant revealed differences in our coding.

Tuesday, September 14th, 2021 - Reviewing Meeting with Shams

The meeting with Shams went pretty well, especially considering our different backgrounds and experiences. I merged together the files and then ran a coding comparison. The resulting query generated a .50 Kappa score which is considered moderate. After we ran the query, we went through our comparison code-by-code (excepting the codesign experience codes) so we could make sure we were on the same page as to the meaning of these codes. After spending over two hours, we left agreeing to re-code the same transcript again with our enhanced understanding and meet again on Friday to run the query again and look at our comparisons.

As the dual-coding progressed, I began to look for standards for this aspect of the research. I found several good resources and ultimately decided to aim for 0.8 kappa score.

Friday, September 17th, 2021 - Intercode Reliability Sources

Because I know I will be asked to report this, I decided to do a little research on criteria for success intercode rating. Here's what I found:

- O'Connor, C., & Joffe, H. (2020). Intercode reliability in qualitative research: debates and practical guidelines. *International Journal of Qualitative Methods*, 19, 1609406919899220. - Good resource for the discussion about intercode reliability and some good references. Also suggests that the Kappa score is more appropriate because it includes calculations of probability.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage. - use percentage agreements and sets standards about these, but percentage agreements are largely rejected because it doesn't consider coding consistency that could simply occur by chance.
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *biometrics*, 159-174. - Suggests a breakdown of Kappa scores as follows: < 0.00 = poor; 0.00-0.20 = slight; 0.21-0.40 = fair; 0.41-0.60 = moderate; 0.61-0.80 = substantial; 0.81-1.0 = almost perfect.
- Neuendorf, K. A. (2017). *The content analysis guidebook* (2nd edition.). SAGE Publications, Inc. - Presents some various statistics and sources for reliability but concludes: "It's clear from a review of the work on reliability that agreement reliability coefficients that account for chance (e.g., Cohen's *kappa*) of .80 or greater would be acceptable to all, .60 or greater would be acceptable in most situations, and below that, there exists disagreement."

As a result of this research, I think I can shoot for over .80 kappa score.

Several subsequent sessions with the second coder followed, each one resulted in changes to the codebook. These changes helped to clarify the codebook and ensure that each code represented a distinct idea. However, our alignment was still not getting better.

Monday, September 20th, 2021 - Meeting with Shams

I ran the reports on our coding reliability and we scored .56 kappa. To be honest, I'm a little frustrated. When we met together, I felt like we are still too uncomfortably far from each other. We spent about 90 minutes reviewing our codes but only got 1/3 of the way through it. When we set up a new time to meet, he offered to meet on Friday, almost 5 days later. I don't know if this is going to work out.

In a meeting with Dr. Richardson, we decided to halt the dual-coding process and proceed with me coding the remaining transcripts. This effort was not wasted, however. I'm convinced that this double coding made all subsequent coding better. After my final meeting with the second coder, we found that we reached a .71 kappa.

Once all of the data had been re-coded, I began to put the themes together. Prior to doing this, I revisited the research questions to see if they needed any changes.

Friday, October 8th, 2021 - Putting together the themes

Today is really the big day when the magic begins to happen. I've finished coding the transcripts, and I've read through the codes looking for anything that stands out to me. Now is the day when I return to the research questions and see how well I can answer them according to the data I've collected. Here we go!

Here are my research questions:

1. How do participant designers experience collaborative design?
 - a. How do they describe the design task?
 - b. How do they describe the design process?
 - c. How do they evaluate their roles, contributions, and outcomes of the design process?

This is also a time when I need to revisit these questions to make any potential changes. Let me start there:

RQ 1: How do participant designers experience collaborative design?

A couple of thoughts. First, I don't really know HOW they experienced it, but I know how they described it. I may even be able to argue how they perceived collaborative design because I know there were more elements of their experience than what they were able to identify and describe (so much of our experience is only experienced unconsciously or on the border of consciousness and unconsciousness). However, without getting into new methodology (like phenomenology), I don't think this is a distinction that I need to make here as long as I clarify what I mean by other sub-questions.

This question is still very general which is why having the sub-questions is important to the study. By having the sub-questions present, I'm trying to define what is meant by "experience." According to the sub-questions, I'm defining experience in collaborative design as the perceived tasks, process, and roles, contributions and outcomes of design.

Some thoughts about initial responses to the question:

- Participants described a helpful experience, one that was positive and uplifting during a time of challenge in their careers. They described positive interactions with other teachers, and process that seemed meaningful (at least at times), and one that had personal benefit.

- Slightly different from their emotional experience in codesign, they also described a design process that was similar to other types of ill-structured design problems. While not stages in a linear sense, participants experienced early stages of vagueness, uncertainty, and even doubt, followed by a moment (or moments) of clarity, and resulting in a product and experience that had perceived value.

If I needed to, I think I could answer this question. However, when the results are written, I believe I will answer this question by answering the sub-questions.

RQ1a: How do they describe the design task? (associated with the codes, anticipated outcomes, initial understanding, enhanced understanding...possibly roles too)

- The task (or purpose) was vague, unclear, and ill-defined. General idea of improving education and making a resource.
- Wasn't sure about codesign, or what they would be doing or building.
- Shift in scope

RQ1b: How do they describe the design process? (associated with the codes, design process, solution ideas)

Began as a conversation, seeking understanding and common ground among participants.

- Brainstorming, gathering ideas, funneling ideas
- Moments of insight that caused things to shift or change
- Shift in process, similar to a shift from brainstorming to drafting
- Discussion of ideas, or organizing ideas
- Move from vague to specific, theory to reality, brainstorm to drafting

RQ1c: How do they evaluate their roles, contributions, and outcomes of the design process? (includes associated codes of contributions, anticipated outcomes, solution description, solution assessment, perspective)

Introduction of participant criteria

- Description of a hub, including lingering questions without answers
- Content included in the final hub, and content excluded
- Personal assessment of the hub
- Individual and collective contribution

The analysis continued as I began to put my themes together.

Monday, October 11th, 2021 - Themes iteration

This inquiry sought to understand how participant designers experience design within a codesign context. To more fully define “experience” in this research question, three sub-questions have been developed and used to guide this inquiry. The results will be presented by sub-question after which a summary will be provided.

RQ1a: How do participant designers describe the design task?

The themes and sub-themes presented here focus on the design task, including participant designers’ perceptions of the scope or purpose of the design project, anticipated goals and outcomes of the project, and their given or assumed roles.

- *Theme 1: Design task was vague, unclear, and ill-defined* (anticipated outcomes)
 - Participants described a general purpose of making a positive impact on education, especially as it relates to online or remote instruction.
 - Sub-theme 1: Participant designers were unclear about design outcome. (value, scope, end product)
 - With a vague sense of the purpose of codesign, participant designers also described a lack of clarity about the end result or product of the codesign efforts.
 - Sub-theme 2: Participant designers were unclear about codesign. (potential contribution, roles, process)
 - Like the end product itself, participant designers were uncertain about the design process, their role, and even their individual or collective contributions.

RQ1b: How do participant designers describe the design process?

The themes and sub-themes presented here describe the design process itself, including how the process was initiated and progressed resulting in the creation of a final design solution.

- Theme 2: Previous experiences were a foundational element of the design process
 - *Sub-theme 1: Sharing experiences was essential to the design process.*
 - *Sub-theme 2: Participants sought consensus through conversation.*
- Theme 3: Design process punctuated by specific, impactful design moments
- Theme 4: Design process shifted from general to specific over time.
 - *Sub-theme 1: Shift impacted design product and content to be included.*
 - *Sub-theme 2:*

RQ1c: How do participant designers describe and evaluate the outcomes of the design process and their individual and collection contributions?

The themes and sub-themes presented here include participant perceptions of the outcomes of the design process and their assessment of the solution. These themes will also address ideas related to participants' perceived contributions to the design process of the final design solution.

- *Theme 5: Participant designers describe a solution that is large and undefined.*
- *Theme 6: Participant designers contributed through their unique experience and perspective*

APPENDIX E. JOURNAL AUDIT FEEDBACK

Hi Tadd,

Reading your journal gave me moments when I could picture how you approached every aspect of the dissertation throughout the process. The detailed notes unfolded the iterative process you took from framing the study to presenting the findings. The journal not only justified how things came together but also improved the trustworthiness of your inquiry. Below are some of my thoughts while going through your journal and dissertation.

- You embarked on this project with lingering questions about the less uncovered role of learners (participants) in the instructional design process. It naturally led to the problem and central question stated in the dissertation. It is clear to see how your initial interests were triggered and how & why a concept from a different but relevant discipline was brought into this manuscript. The major concepts/ideas that emerged from exploring the literature and interacting with experts were covered and explained (e.g., appreciative judgments, etc.). These concepts were nicely interwoven together in the introduction section in laying the foundation of the research design.
- Initial RQs in your journal emerged from and aligned well with the problems and understandings of the main concepts. The literature review was also guided by the major questions you wanted and needed to answer. The problem statement in your dissertation aligned well with the questions that drove you in reviewing the literature and designing the study.
- I also really liked that, through connecting with early experience & challenge, you constantly reflected on the underlying questions of conducting the study: Why does it matter? What is the contribution of this manuscript to understanding the "black box" of design? This iterative reflection process helped to narrow the scope of the manuscript and bring the pieces together.
- The journal gave me an idea of how your integrated feedback from committee members in strengthening the manuscript in multiple ways, from framing the study, analyzing collected data, to presenting findings. For example, bringing in a second coder could significantly improve the credibility as you interpret the collected data in answering the RQs.
- I realized the research design was interrupted with a sharp turn that was beyond your control. This explained the shift caused by the interruption and how you started to explore framing judgment in telling the codesign experience story.
- Research questions were modified several times to align the shifts and the analysis to make sure the findings and research design were coherent. This is quite common in qualitative research due to the nature of the collected data and how it is analyzed.

- In your journal, you reflected on the process of interpreting the data and putting the themes together. The way you coded the data collaborating with another coder (e.g., cycles of coding, codebook, and achieving a high Kappa value, etc.) ensured data was interpreted with personal biases minimized. During this process, you also constantly revisited the research questions. This helps how to structure and present your findings logically.
- With several attempts to structure the answers to the research questions according to your journal, you presented the themes in a logical order to answer the questions, which made it very easy to follow.

The notes were kept current and reflected the complete journey of how this dissertation came into being. As an auditor, I was able to see your major actions in making each decision or dealing with each concern. It provided a complete image of how the study was conducted and conclusions were reached. The journal notes throughout the dissertation process informed the design and formation of the dissertation manuscript. For instance, what concepts need to be clarified to pave the road for the research design. Qualitative inquiry has been deemed as a relatively subjective approach, which further causes questions on trustworthiness. Keeping journals is one of the approaches in responding to such concerns. On the one hand, it makes the process transparent. Every question asked, and every step taken has a specific purpose in exploring participants' stories to provide a thick description. The story itself conveys its own opinions. On the other hand, it informs the design, structures the design of the study in a logical way, and provides opportunities for ideas to emerge throughout the process.

All in all, I believe your journal provided you the opportunity of having a conversation with yourself from the beginning to the end. It confirmed that each section aligned well with the others. The collected data supported your findings, which in turn answered your research questions coherently and logically.

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VITA

EDUCATION

Purdue University, West Lafayette, IN

Ph.D., Learning, Design, and Technology – *Expected graduation 2022*

- Research interests: online learning and teaching, digital badges, instructional design and learning theories

Brigham Young University, Provo, UT

M.S., Instructional Psychology and Technology – *August 2017*

- Research interests: K-12 online learning, digital open badges, teacher development
- Thesis: Exploring Concerns of K-12 Online Teachers
- GPA 3.94

Brigham Young University, Provo, UT

B.S., Social Science Teaching – *April 2010*

- Credentials: State of Utah teaching license (active), Teaching English to Students of Other Languages (TESOL) certificate
- GPA 3.67

LICENSES AND CERTIFICATES

- Independent Applying the Quality Matters Rubric (5th Edition) – May 2018
- Foundations of College Teaching Certificate, Purdue University – *November 2019*
- Indiana K-12 Teaching License, Historical Perspectives, Grades 5-12 – *Exp. March, 2024*
- Utah K-12 Teaching License, Social Studies, Grades 7-12 – *Exp. June, 2024*

PROFESSIONAL EXPERIENCE

Design

Instructional Designer, Seagage Online Training Solutions – *January 2021 – current*

- Developed video-based online learning modules on sales and marketing best practices
- Managed a quality assurance process to ensure market readiness of learning modules
- Created a design principles guide to promote effective and consistent design practice

Codesign Facilitator, Purdue University – *January 2021 – May 2021*

- Designed and facilitated weekly online co-design sessions using human-centered design methods
- Managed relationships with multiple stakeholders to ensure quality, scope, and direction of prototypes

Instructional Designer, “Paraimpact Project,” Purdue University – *February 2019 – current*

- Co-designed development process for team of designers and subject-matter experts
- Collaboratively reviewed and evaluated content storyboards for instructional modules
- Developed nine multimedia-rich modules using Articulate Storyline
- Installed and integrated LMS within WordPress platform to host Storyline modules

Instructional Designer, “Preparing, Designing, and Facilitating e-Learning in K-12 Education,”

Purdue University – *February 2020 – June 2020*

- Interviewed teachers and analyzed results to determine relevant content
- Collaboratively designed and developed instructional objectives and content
- Migrated instructional content from content storyboard to institution’s LMS

Instructional Designer, “The PoRTAL Project: ‘Getting Started’,” Purdue University – January

2019 – April 2019

- Synthesized online teaching resources regarding foundational principles of online teaching
- Developed an interactive instructional module using Articulate Storyline

Teaching

Lead Teaching Assistant, Learning Design and Technology, Purdue University – *January*

2020 – May 2021

- Redesigned course assignments, rubrics, and activities aimed to simplify and enhance the student learning experience
- Organized teaching and tutoring schedules for eight graduate teaching assistants
- Co-led weekly teaching assistant meetings designed to resolve student and course-related issues

Teaching Assistant, Learning Design and Technology, Purdue University – *August 2018 –*

May 2021

- Facilitated a digital badge-based technology integration course to prospective teachers
- Assessed student learning and communicated student progress through personalized feedback

Graduate Instructor, Instructional Psychology & Technology Department, BYU – *August 2015 – December 2016*

- Designed and taught multiple blended and online sections of an educational technology integration course
- Collaboratively designed course goals, content, and assessments for a new online course

Social Studies Teacher, South Jordan Middle School, South Jordan, UT – *August 2011 – August 2015*

- Rebuilt traditional and honors geography curriculum to implement best teaching practices
- Collaboratively developed district-wide common assessments according to rigorous learning objectives
- Achieved an 82% student passing rate on the national AP Human Geography exam

Research

Graduate Research Assistant, Learning, Design, and Technology Program, Purdue University– *August 2017 – current*

- Created a literature review on developing self-efficacy in online learning environments
- Co-designed a study investigating the impact of self-efficacy strategies in online settings

Graduate Research Assistant, Center for Teaching and Learning, BYU – *April 2016 – August 2017*

- Researched peer review of teaching literature to inform university policies
- Co-designed a study on the impact of team-based learning on student learning outcomes
- Evaluated the effectiveness of a faculty development retreat for new faculty members

AWARDS AND HONORS

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- Outstanding Division-Sponsored Accepted Student Proposal Award (AECT) –
 - Online Teaching and Learning SIG (AERA) Best Paper – *2019*
 - Frederick N. Andrews Fellowship, Purdue University – *2017 to 2021*
 - Outstanding Teaching Award, Instructional Psychology & Technology Department, Brigham Young University – *2016*

Journal Articles

- Caskurlu, S., Richardson, J. C., Alamri, H. A., Chartier, K., **Farmer, T.**, Janakiraman, S., Strait, M., & Yang, M. (2021). Cognitive load and online course quality: Insights from instructional designers in a higher education context. *British Journal of Educational Technology*, 52(2), 584-605.
- Yang, M., Ashby, I., McCord, B., **Farmer, T.**, Sarwar, U., & Exter, M. (2020). Educational software design in practice: Understanding the power of intersecting disciplines on design process. In B. Hokanson, M. Exter, M. Grincewicz, A. Schmidt, & A. A. Tawfik (Eds.), *Intersections across disciplines: Interdisciplinarity and learning* (pp. 109-122). Springer
- Koehler, A. A., & **Farmer, T.** (2020). Preparing for eLearning using digital learning plans. In R. E. Ferdig, E. Baumgartner, R. Hartshorne, R. Kaplan-Rakowski, & C. Mouza (Eds.), *Teaching, technology, and teacher education during the COVID-19 pandemic: Stories from the field* (pp. 47-53). Association for the Advancement of Computing in Education. Retrieved from <https://www.learntechlib.org/p/216903/>
- Randall, D., **Farmer, T.**, & West, R. (2019). Effectiveness of undergraduate instructional design assistants in scaling a teacher education badge system. *Contemporary Issues in Technology and Teacher Education*, 19(4), 825-849.
- Swan, K., Richardson, J. R., & **Farmer, T.** (2019). Introduction to special issue: Highlighting the best papers from the OTL SIG AERA 2019. *Online Learning Journal*, 23(4), 1-5.
- Farmer, T.** & West, R. E. (2019). Exploring the concerns of online K-12 teachers. *Journal of Online Learning Research*, 5(1), 97-118.
- Farmer, T.**, Richardson, J. R., & Swan, K. (2018). Introduction to special issue: Highlighting the best papers from the OTL SIG AERA 2018. *Online Learning Journal*, 22(4), 1-5.
- Farmer, T.**, & West, R. E. (2016). Opportunities and challenges with digital open badges. *Educational Technology*, 56(5), 45-48.

Presentations

- Lowell, V., **Farmer, T.**, Yang, M., & Long, Y. (2019, October 21-25). *Creating accessibility modules for instructional designers* [Conference session]. Association for Educational Communications and Technology, Las Vegas, NV, United States.
- Lowell, V., **Farmer, T.**, Yang, M., & Long, Y. (2019, October 21-25). *Designing for online learning accessibility: An instructional design project* [Poster presentation]. Association for Educational Communications and Technology, Las Vegas, NV.
- Farmer, T.**, & Lowell, V. (2019, April 5-9). *Enhancing academic self-efficacy in online settings: A systematic review* [Conference session]. American Educational Research Association, Toronto, CA.
- Farmer, T.** (2017, November 7-11). *Working through challenges: The concerns of online K-12 teachers* [Conference session]. Association for Educational Communications and Technology, Jacksonville, FL, United States.
- Johnson, M., **Farmer, T.**, & Davidson, L. (2017, March). *Exploring a modification to the readiness assurance test in team-based learning* [Conference session]. Intermountain Consortium for Faculty Development, Orem, UT, United States.
- Farmer, T.** (2016, October 17-21). *Opportunities and challenges with digital badges* [Paper presentation]. Association for Educational Communication and Technology, Las Vegas, NV, United States.
- Farmer, T.**, & Pulham, E. (2016, October 17-21). *The benefits and challenges of using Facebook to mediate online class discussions in a blended classroom setting* [Conference session]. Association for Educational Communications and Technology, Las Vegas, NV, United States.
- Farmer, T.**, & Pulham, E. (2016, March). *Opportunities and challenges with digital badges: New opportunities in professional development* [Conference session]. Utah Coalition for Educational Technology, Salt Lake City, UT, United States.

SERVICE AND MEMBERSHIP

- Online Learning Journal (OLJ), special issue co-editor, *May 2018 - December 2018; May 2019 - December 2019*
- Purdue Association for Learning Design and Technology (PALDT), president, *2018 – 2019*
- Association for Education and Communication Technology (AECT), member, *2016 – current*
- American Educational Research Association (AERA), member, *2017-2018*

TECHNOLOGY COMPETENCIES

- Research tools: Mendeley, NVivo, SPSS
- Design tools: Articulate Storyline
- Media production tools: iMovie, Powtoon
- Learning Management Systems (LMS): Brightspace (D2L), Blackboard, Canvas, LearnDash (WordPress)
- Web development tools: WordPress, HTML (basic), CSS (basic)
- Office tools: Word, PowerPoint, Excel, Outlook, G Suite