

Teachers Using Designerly Thinking in K-12 Online Course Design

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Teachers are typically abstracted from the design process and not referred to as instructional designers. However, they are constantly designing instruction or adapting instructional materials on a daily basis. Teachers provide a unique perspective as instructional designers: instructional design, content experts, and instruction delivery. Thus, describing their design process is important to help support teachers as they design online courses. This case study examined and described the design process of eleven high school teachers as they designed, developed, and implemented their first online courses. Findings from this study present the online course design processes of these high school teachers and highlight the resources perceived as valuable when embarking on their first online courses. Among the key findings are that teachers face constraints, use a variety of technological tools, and use a variety of pedagogical strategies. Belonging to a community of practice helps online teachers, who report valuing the support of an Online Learning Coordinator. Although given similar guides and resources, they make independent design decisions and rely on feedback from a variety of sources. Recommendations are made for K-12 online learning coordinators, school administrators, and for first-time online teachers/designers related to the processes involved in designing online courses.

INTRODUCTION

When it comes to discussion of instructional design practices of online K-12 courses, the teacher's role as a designer is often abstracted from the conversation, and the focus is placed on a prescriptive learning theory or process design model as directing the design of instruction. This may be due, in part, to the thought that the deliverer of the instruction (teacher) is not as important as the design product itself (Barbour, Adelstein, & Morrison, 2014; Cavanaugh & Clark, 2007; Laurillard, 2012).

However, unlike instructional designers in other contexts, in the K-12 environment, teachers are given the additional responsibility of designing instruction and incorporating engaging teaching methods, to target the needs of the 21st century student (Laurillard, 2012). Furthermore, it is believed that since teachers also implement the design, and are situated within the context on an everyday basis, they bring in a unique perspective and knowledge set to their instructional design processes (Ball & Cohen, 1996; Koehler & Mishra, 2005). Additionally, Schon (1987) and Marx et al. (1994) claim that designing is central to the teaching process because teachers are constantly creating, selecting, and sequencing instructional activities while taking the needs and constraints of their classrooms into account.

Designing Online Learning in K-12 Environments

In recent years, online learning has rapidly gained momentum in the K-12 context (Gemin et al., 2015; Picciano, Seaman, & Day, 2015). Project Tomorrow's most recent survey (2014) reported an increase from 24% of traditional students taking at least one online course in 2006 to 50% in 2013. Furthermore, the 2014 Keeping Pace policy report suggests that 30 states and Washington, D.C reported operating statewide fully online schools and five states make it a requirement for students to complete an online course before high school graduation (Watson et al., 2014). Students have reported taking online courses for several reasons including credit recovery and the opportunity to take courses not regularly offered in school (Gemin et al., 2015).

However, online learning environments require slightly different instructional design and teaching practices (Dick & Carey, 2005). In many instances, K-12 teachers are asked to use their situated K-12 knowledge (e.g., learner characteristics, curriculum requirements, standards, pedagogical practices, teaching strategies, etc.) to design and implement online learning experiences and courses (Barbour & Reeves, 2009; Dikkers, 2015). Although there are offerings by commercial companies to provide content and learning modules, many schools are unable to afford this path.

Therefore, states are exploring ways to certify and train existing teachers in how to design online learning experiences (Archambault, Debruler,

& Freidhoff, 2014). Although teachers may be comfortable and have experience in teaching the content and learners, some studies have found that teachers required additional support as they utilize their skills to design online instruction (Barbour, Adelstein, & Morrison, 2014; Cavanaugh & Clark, 2007).

As school districts have begun with the adoption and diffusion of online learning, they have found challenges with developing teacher professional development for online teaching, providing research-based design principles, and offering other adequate resources for teachers to design instruction for this new technologically-supported learning environment (Archambault & Crippen, 2009; Moon et al., 2014; Picciano & Seaman, 2008). Some scholars have indicated that there is a need for stakeholders to locate and/or develop guides and practices for overcoming these challenges (Barbour, & Clark, 2009; Cavanaugh, 2004; Dikkers, 2015), especially since researchers (Barbour & Reeves, 2009; Rice, 2006; Veletsianos, Doering, & Henrickson, 2012) have claimed that teachers typically lack knowledge on how to create effective online instruction.

Therefore, schools planning to launch online learning programs must address providing adequate professional development and support for teachers. This is especially true since researchers have indicated that designing instruction for online learning requires different skills and considerations as opposed to designing instruction for face-to-face classrooms (Rice, 2006).

Along with the massive expansion of online learning, there has also been an explosion of producing instructional design models and theories towards designing an effective, efficient, and enhanced online course. For example, Lee De Fink's model of integrated course design is a typical model that explicates the key components of a quality online course to comprise of the: learning goals, teaching and learning activities, and feedback and assessment (Fink, 2013). As Fink himself mentions, his model is similar to other ID process models (such as the ADDIE model, Morrison's ID model, etc.), wherein the focus is directed towards scientizing instruction (Merrill, Drake, Lacey & Pratt, 1996) that automatically limits the agency of the designer to determine the final outcome of the instructional product.

It is interesting to note that in the K-12 online learning literature, there is very little mention of using process models as directing the online course design process, perhaps because these models seem to act more as broad guidelines, as suggested by iNACOL (International Association for K-12 Online Learning, 2011), whose frameworks on K-12 online course design standards and rubrics are emphasized to be viewed as a guide, an "evolving" model that will constantly change based on the growing knowledge-base on K-12 online learning.

Whether or not ID process models are applied in K-12 online course design, these models fail to factor in the role of the designer in the design process and therefore limit our understanding of how designers design in a highly contextualized teaching and learning environment.

One way to approach this understanding is by conceptually examining teachers' design practice from a designerly thinking perspective. Designerly thinking is informed by a philosophical methodology that examines the process and methods used by designers through a human-centered lens, which approaches the process of problem solving through synthesis (Cross, 2001; Nelson & Stolterman, 2012).

Designerly thinking is critical to consider because design in the real world is ill structured and messy; one of the ways of uncovering the complex decisions is by delving deeper into how designers think and approach their design problems (Cross, 2011). Designerly thinking is based on the premise that design should not be viewed as a rule-based scientific activity that can be solved with a systematic process model or theory. It is rather approached from a human-centered perspective, which gives agency to the designer as making use of judgment that is informed from both theoretical knowledge and practical experiences, when directing the design process and final outcome of the design (Cross, 2011; Gibbons, Boling, & Smith, 2013; Korkmaz & Boling, 2013; Nelson & Stolterman, 2012; Rowland, 1992; Smith, 2008; Tracey & Boling, 2014; Yanchar & Gabbitas, 2011).

Therefore, by utilizing a designerly lens, this study seeks to describe the design process and characterize the decisions made by K-12 teachers while designing their first online course. This study intends to inform K-12 teachers, administrators, and online course coordinators, on how K-12 teachers engaged in the design of online instruction. The results of this study aim to provide implications for appropriate professional development and resources necessary to assist teachers in developing online courses.

The research questions for this study were as follows:

1. What is the design process of high school teachers when designing their first online courses?
2. What kind of input and resources do high school teachers perceive as valuable during the design process?

METHODS

This qualitative case study examined the processes of the teachers in one high school and the design process of their first online courses. All teachers were employed in the same high school; the high school was working on the initial implementation of online courses and provided a consistent support structure and resources to all teachers involved with designing their

online courses. The data sources included individual and focus group interviews with teachers, individual interviews with the online coordinator, online course reviews, online course evaluations, and online instructional materials.

Role of Researchers

As stated by Baxter and Jack (2008), prolonged exposure to the phenomenon within one particular context can strengthen the trustworthiness of the results. In this case, both researchers were involved as instructional design experts, providing course feedback to the teachers earlier on in the process of designing their courses. While this was voluntary, all teachers decided to attend different online consultation sessions with instructional design experts to review their courses and ask questions. The feedback was conducted as a service outreach activity before the research study began and was used to help inform the researchers' conception of the broader context. Based on the data, the teachers did not report this as an influential factor in their design considerations and mainly relied on feedback from their students' and the online learning coordinator.

Furthermore, the lead researcher is influenced by the broader field of design (Cross, 2011; Nelson & Stolterman, 2012), identifying and relating several designerly activities carried out by the teachers in the study to existing design literature. This method influenced the codes that were developed during the analysis phase of the study. However, all codes were also reviewed by the second researcher without knowledge of designerly activities to ensure that codes made sense and aligned with teachers' reports. For example, when teachers talked about activities such as engaging in a feedback process with their peers or students on the design of their course, the researcher associated this activity with the reflective activity that designers engage in to further critique and ideate their designs.

Context

The study was conducted during the 2013 spring and summer semesters at a Midwestern public high school in the United States. This high school had an enrollment of 2,366 students, of which most of the students were Caucasian (94%). Thirteen percent of the students participate in the free and reduced lunch program, and 74% of the graduating students attend college.

This school was well prepared to be supportive as they launched their first online courses. In the summer of 2013, the school launched its first online courses via a district-wide online initiative. Equipped with funding, the high school hired an online learning coordinator and launched the online courses for high school students. According to the school's online learning mission, the courses were designed to "emphasize real-world relevance, provide meaningful relations, and to remove barriers to learning."

The next step for the online learning district initiative was to start recruiting teachers to design the courses. The teachers were incentivized with \$1000 to design the course. They would be paid \$250 to conceptualize the course and would be paid the remaining \$750 after the course was designed. Initially, twenty-one teachers agreed to participate during the initial launch, however, according to the online coordinator, due to the time and stress it placed on the teachers, ten teachers dropped out; the remaining eleven teachers were all invited to participate in the study. All eleven teachers (Table 1) including the online learning coordinator agreed to participate in the study. The eleven teachers were designing their first online courses using the Canvas Learning Management System. The online coordinator was responsible for organizing the district-wide online learning initiative, as well as providing resources and support for teachers designing their first online courses.

Table 1
Participant Information

Teachers	Online Course	Individual Interviews	Focus Group Interviews
Mary	Statistics	Yes	Yes
Beth	Senior Composition	Yes	No
Ana	Health	Yes	Yes
Denise	Visual Communications	Yes	No
Garth	U.S. Government	Yes	No
Patrick	Economics	Yes	No
Kate	Information and Communications Technology	Yes	No
Tanya	Astronomy	Yes	No
Elizabeth	Creative Writing	Yes	Yes
Peter	Biology	No	Yes
Angelica	Health	Yes	Yes

Procedure

The researchers began the study by reviewing the district's online course initiative website and informally communicating with the online coordinator. The coordinator asked both researchers to provide instructional design feedback on courses the teachers were in the process of designing. In the spring semester, the researchers provided online course review feedback,

reviewed course evaluations, and online instructional materials. Although the researchers played an instrumental role in providing course design feedback, the teachers were not obliged to change online courses.

Based on the online course reviews, evaluations, and instructional materials, the researchers established a semi-structured protocol to conduct individual interviews with eleven teachers and the online coordinator. The semi-structured interview protocol for the teachers was designed to describe the overall journey the teachers went through when designing their first online course and to understand some of the key elements that the teachers reported as valuable in their course design process. The semi-structured interview protocol for the online learning coordinator was designed to understand the background of the high school's online learning initiative and to understand the role the online learning coordinator played throughout the teachers' course design process. Throughout the process, the researchers reviewed the data sources and made notes (Merriam, 1998) of themes (Table 2) that were identified from influential elements related to the teachers' design processes and their perceptions of online course design.

Using the noted themes, the researchers developed initial assertions (Erikson, 1986) that described teachers' design processes and their perceptions of valuable support related to designing online courses. The researchers conducted a focus group interview with five teachers and the online coordinator to examine the validity of each assertion. During the focus group interview, the participants confirmed all seven assertions and provided additional evidence and examples. To establish the evidentiary warrant of these seven assertions and to triangulate by utilizing multiple data sources as evidence, the researchers utilized a systematic process of reviewing the entire data corpus comprised of interview transcripts, focus group interview transcripts, and the online course review, online course evaluations, and online instructional materials.

ANALYSIS

The online coordinator's interview, individual teachers' interviews, and focus group interview were transcribed and organized into an electronic database system. All data were analyzed using *ATLAS.ti* qualitative data analysis software.

Stake's (1995) methods of direct interpretation and categorical aggregation were used as the means of analyzing the data. These two strategies enabled researchers to examine a single instance and formulate an interpretation of the observed phenomenon. The coding process began with the lead researcher using direct interpretation to read through individual interview transcripts and interpret the design process of each high school teacher.

For example, Garth reported noticing some of his students were struggling to understand the requirements of the assignment, so he went into his course during the post-design phase and created a video to clarify the assignment. The researcher interpreted that this was an example of Garth relying on *student feedback* to inform the design of his course. The researcher proceeded to look for the emergence of this interpretation in multiple instances (both in additional participants and data sources) to establish themes for teachers' design processes and their perceptions of valuable support related to designing online courses (Table 2).

The interpreted themes were sorted using categorical aggregation (Stake, 1995). In this phase, emerging themes and subthemes (e.g., Theme = Feedback | Subthemes = Student feedback, coordinator feedback, peer teacher feedback, external feedback) were identified. All data were reviewed for these initial themes, actively looking for supporting and contradictory evidence. Once themes were established, the researchers discussed the coding schema and categorization (Table 2). They collectively looked at each transcript and discussed the coded themes that were appended to each excerpt from the transcripts (interviews, focus group interview). The researchers met several times during the analysis phase to review the transcripts together and came to a consensus on the coding scheme. The interviews, course observations, and focus group interviews were reviewed and coded.

Table 2
High School Teachers' Online Course Design Process

Design Process							
Participant	Constraints	Technology Tools	Pedagogical Resources	Community of Practice	OL Coordinator Support	Feedback	Design Decisions
Mary	6	11	16	2	7	6	27
Beth	12	10	12	2	8	8	16
Ana	4	7	11	1	5	6	13
Denise	4	4	4	2	2	3	2
Garth	9	8	15	5	8	8	15
Patrick	6	2	11	0	6	4	6
Kate	6	7	8	9	11	9	12
Tanya	7	5	8	1	6	7	6

Note. Each time a teacher mentioned one of these design elements, they were coded. This table represents the number of times each teacher mentioned that code during his/her individual interview.

Three techniques were used to increase the trustworthiness of the results during the data collection and analysis process. First, a form of peer debriefing was utilized among the two researchers who went through the interview transcripts together to check for any discrepancies and restate some of the emerging themes that could be addressed for validation in the focus group interview. Secondly, member-checking procedures were used; all participants were emailed copies of their individual interviews and emerging themes asking for confirmation or changes (Lincoln & Guba, 1985). Any misinterpretations or mistakes were clarified and corrected. The focus group interview was also an opportunity to review the emerging themes and reach consensus as a group. In addition, multiple data sources were used to provide additional evidentiary support for emerging themes (Denzin, 1970).

INITIAL ASSERTIONS

Based on the observation of the teachers' online courses, the individual interviews (with the teachers and the online coordinator) and confirmed in the focus group interview, these initial assertions were developed:

1. Teachers face many constraints (e.g., managing time, communicating online, combatting cheating, conceptualizing the design process, lacking or possessing limited knowledge of online learning, translating face-to-face content to online, and creating relevant content) when designing an online course for the first time.
2. Teachers make use of a number of technological tools (e.g., collaboration and engagement tools).
3. Teachers make use of a number of pedagogical resources (e.g., learning by design, chunking process, project based learning).
4. Teachers indicate that belonging to a community of practice helps build online courses.
5. Teachers report valuing an online learning coordinator to provide support to the teachers throughout their design process.
6. Although teachers are given similar guides and resources (e.g., chunking process, learning by design models), teachers still make independent design decisions during their online course design process.
7. Teachers rely on feedback from a variety of sources (e.g., students, peer-teachers, online learning coordinator) to make their design decisions.

ASSERTIONS

The following sections discuss some of the major assertions that were established from analysis of all data (i.e., individual and focus group interview transcripts, online course observations, researcher notes). Glaser and Strauss’s (1967) method of back grounding and foregrounding data helped the researchers illuminate the dimensions of data and qualify the numerical values in the analysis (Table 2). Depending on the number of times each interviewee mentioned a particular theme, the researchers were able to identify stronger patterns and find consistent themes in the interviews of the influential design elements (Figure 1) that were a part of their course design processes.

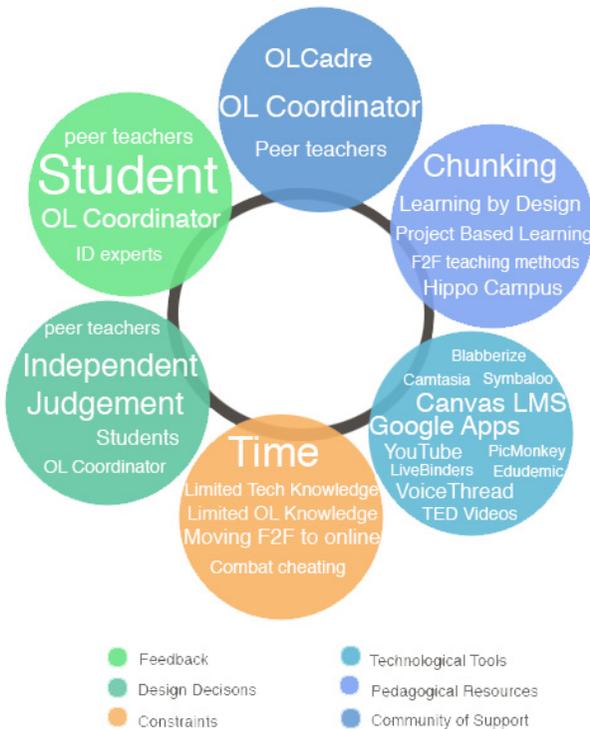


Figure 1. Influential Elements within the High School Teachers’ Online Course Design Process. (Note. The larger words in the figure are prevalent themes with the online course design process.)

Assertion 1: Teachers face many constraints when designing an online course for the first time.

Based on all the data sources, teachers seemed to face a variety of constraints in their design process while designing online courses for the first time. Identifying constraints experienced during a design process is an essential principle in designerly thinking as it enables the designer to transfer prior knowledge into new contexts (Rittel & Weber, 1973). Some of the most common constraints encountered were as follows: conceptualizing the design process; redesigning existing face-to-face content for the new online format; time management associated with designing an online course; insufficient knowledge of communication tools used to engage their online students; combating cheating; and lacking or having limited knowledge of the concept of online teaching and learning. For example, Beth, a senior composition teacher, faced difficulty with designing a reasonable time for her students to spend online, she assumed that since the class was online, “they would be online all the time.” However, after receiving feedback from her students during the first week of classes, she was able to overcome the time design constraint.

Meanwhile, Kate, an information and communications technology teacher, had some prior experience with designing and teaching courses in a blended format using the Epsilon learning management system. However, Kate faced issues with translating her face-to-face content to a fully online format. She stated, “I had to really think more about what I wanted the students to get out of the project or the assignment, and how I can get them to that point without me being right there.” One of the most common constraints reported by all eight teachers was their limited knowledge of which online technologies could be used to design engaging and collaborative experiences for online students.

Assertion 2: Teachers make use of many different technological tools.

All eight teachers reported using a variety of technology tools beyond the tools included within the Canvas Learning Management system. Some of these tools included the following: Blabberize, Explorerlearning, Google Docs, Google Forms, Google Sites, Google Presenter, VoiceThread, Symbaloo, YouTube Videos, Glogster, VoiceThread, LiveBinders, SpringPad, Camtasia, Videolicious, Edudemic, Picmonkey, and TED Videos. Most teachers indicated that they discovered these tools through the recommendations of others (e.g., the online learning coordinator, the cadre group, teacher conferences), as well as by randomly searching for tools via Google. Once they decided on a tool, all teachers indicated that they learned to use the tools on their own by studying online tutorials or through trial and error.

When asked about the choice of technology tools, all teachers claimed that due to limited social interaction evidently present in online learning, they wanted to create as much social engagement and collaboration as possible for their students. For example, Kate stated, “In GoogleDocs the students can collaborate and share so I wanted them to do some collaborative project like work on a presentation where they could all add to the presentation. That’s why I wanted them to use GoogleDocs and GooglePresentation.”

In all the interviews, the teachers stated that the online learning coordinator played an active role in introducing them to certain online engagement and collaboration tools but also encouraged them to search for tools on their own using Google. Recommendations for tools also came from their small community of practice, the cadre group of online teachers at the school. Garth, a U.S. Government teacher, stated the cadre group of teachers was a useful resource for sharing online resources and tools: “I found something that could take your PDFs and make it into word documents, so I sent that out to people, and another person would say, here I am using Voicethreads and I am finding success and here is why.”

Assertion 3: Teachers make use of many different pedagogical resources.

In their interviews, and through the course observations, teachers seemed to use a range of pedagogical resources: design by learning, chunking, and project-based learning. The majority of teachers stated that their design process began by figuring out how to chunk their online courses and work with the affordances of an online environment. According to the online learning coordinator, “[the process] was design based. There were logistic pieces in there: Do you have your syllabus? Do you have your criteria on how you want your kids to participate? A lot of it was based on rubric for quality courses which was from a K12 organization.” In all interviews, teachers and the online coordinator stated that once they familiarized themselves with the basic tools of Canvas, they started analyzing their face-to-face classes and then began dividing the course into “chunks.” Multiple participants stated that this “chunking process” was modeled by the online learning coordinator in their first cadre meeting, and the online coordinator met with each teacher individually to help establish the “chunks” of each course. A chunk seemed to be defined as smaller units that could be assessed as students mastered elements of the course in a planned progression.

During this process, all eleven teachers stated that they took out elements from their face-to-face material that were perceived as not being relevant for an online environment. For example, Mary (who taught statistics) stated:

I had to combat cheating quite a bit and these are harder to grade obviously but I had a lot of old madlib things you did as a kid where it says put a verb here, put a noun here. I would say put a number between one and three here, put a number between fifty and seventy here so they would have different numbers than everybody else in the class. They would have different numbers because of cheating. I'd have a graph with a number of questions and I would have a set of questions where they would have to find graph on the Internet, and make a screenshot and answer the questions depending on what graph they chose.

On the other hand, Beth (senior composition) reported using most of her face-to-face material in her online course, but she researched innovative methods for engaging her students online. She stated, "I really used some of the same things I used in my face-to-face class and looked for ways to adapt that to those online tools. So peer editing showed up in my online course in the form of a discussion format where a student could share something they had written and others could give feedback." Additionally, all eleven teachers reported using the online course coordinator and Google to identify new pedagogical resources and approaches. In designing Garth's Government class, he described modeling many of his resources from Hippocampus, while Patrick (biology) described deciding to design a project-based course using examples from the Buck Institute.

With regards to using online content provided in existing resources (e.g., YouTube videos), most teachers indicated that resources and instructional materials found through Google searches were not always exactly what they needed (e.g., incorrect grade level, different terms utilized, inappropriate advertising material). Therefore, teachers reported using these examples to help them design their own learning resources. For example, Mary described her Google search experience: "I had a specific way of teaching a concept so I had to read through a bunch of stuff and watch lots of videos and go 'that was good except this' or 'that was too detailed for what I need to do.' I am teaching a bunch of high school kids, not graduate level students." Mary went on to indicate that she used the videos to help her plan her own delivery of videos, creating and uploading her own screencasts later.

Assertion 4: Teachers indicate that belonging to a community of practice can help build online courses.

Throughout the interviews, both the teachers and the online coordinator stated how they worked together as a cadre of teachers to exchange ideas and provide support to one another. The online coordinator stated the

importance of this community of practice explaining that she tried using it as a space for teachers to develop trust in her as a capable leader who valued and acknowledged the strengths and weaknesses they brought into their design processes.

In their interviews and focus group interviews, seven teachers reported that the cadre of teachers provided moral support and a community of like-minded designers that could email each other which technologies were successful for their online courses. For example, Peter stated that the teachers "...all collaborated even if we are not in the same content area. Despite the different content areas, we worked very well together." Denise also confirmed this, reporting that "We also emailed a lot. We had a group. If somebody found an article that was really good or something on the Canvas management system was really good, or a program that was working well, they would share that out with everybody." Another teacher, Ana, described the camaraderie: "This group of online teachers, this cadre, we were famous in the spring for sending out a group email 'I need a tool' and you would get five or six responses. It helps when other teachers have experience using something. I would use Glogster Edu and had fun with it and someone would say 'oh my god! Avoid this.' So those conversations helped a lot."

However, four teachers indicated that the community of practice was not regarded as a highly influential element in their design process, due to time constraints and the different courses they were designing. Instead, those teachers stated valuing other elements such as the online learning coordinator and feedback from students.

Assertion 5: Teachers report that an Online Learning Coordinator provides support throughout the design process.

Throughout the design process, all teachers stated that the online coordinator took on a mentorship role. They indicated that the online coordinator assisted the teachers in reinforcing the vision of the schools' online learning initiative and guided them by modeling their first learning units. They also stated that in her role, she would facilitate the community of practice, provide group and individual feedback on their courses, and design quality measures for the teachers to receive feedback. Feedback measures included the following: 1) usability tests for students, 2) peer-reviews based on a combination of Quality Matters, iNACOL's rubric, and Chico State's rubric, 3) partnership with the local university's instructional design graduate students that provided additional feedback, and 4) mid-term/post-course student evaluations. According to most teachers in their interviews, the online learning coordinator was described as helpful in assisting them with conceptualizing the online course design process (e.g., guides for how

to chunk) and referred them to design techniques (e.g., backwards design process). Most teachers stated that the online learning coordinator let them explore the technological and pedagogical practices rather than limit their creativity to following a set model of online course design.

Assertion 6: Although teachers are given similar guides and resources (e.g., chunking process, learning by design models), teachers still make independent design decisions during their online course design process.

In their interviews, all eleven teachers stated a variety of design decisions they made relating to the technological and pedagogical tools for their courses. Although three teachers indicated that the online learning coordinator influenced their design decisions, eight teachers reported making these decisions based on their previous experiences with designing face-to-face instruction and from conducting independent research about online learning through Google searches. For example, Tanya was designing her first astronomy course. It was a new course that she had not yet designed for a face-to-face setting. Tanya stated that since she was designing her content from scratch, she was open to peer reviews and guides from the online learning coordinator. However, Tanya stated that her main design choices were influenced by consistently reflecting on her main focus: “Will my students be comfortable with this?” In another example, Mary was designing a statistics course that she had previously taught face-to-face. Mary stated that trial-and-error, coupled with student feedback, was the focus of her design process: “I am a teacher that tries something and asks the kids what they thought about it. I think student feedback was more important to me than anything else so I was up to try it and see the response I got back from the students.” Therefore, it seems that although teachers were given similar guides and resources (e.g., chunking process, learning by design models), they made diverse design decisions during their online course design process depending on their own design choices.

Assertion 7: Teachers rely on feedback from a variety of sources, which influence a part of their design decisions.

All eight teachers reported that feedback from their students was an essential element in their design processes. In their interviews, teachers indicated that this feedback usually occurred in the post-design phase. However, six teachers decided to embed the feedback in each learning unit, to make ongoing changes to their courses. For example, Tanya stated how she used student feedback to make changes to her course:

The feedback from [my students] was really important. As I found tools, and I thought it would maybe pique their interest, because for me its really big about making sure they are interested in the assessment they are doing to make it seem less tedious for them, make it seem more exciting for them to complete. I was very open with them. Every time I wanted to try out something new, I asked them to give me feedback on did it work, did it not work, what did you like about it and do you never want me to assign something like that and why, so that I could learn from them the tools I was using and worked well for them.

Mary incorporated opportunities for student feedback after each lesson, and this design decision helped her reflect and improve on the design for the next learning unit (or chunk). Teachers emphasized the importance of asking for student feedback on both the learning activities (e.g., “Did you like the Discussion Forums?”) and the technologies used (e.g., “Did you like the Google Forms?”). They also received feedback on their courses from local instructional design experts, as well as from the online coordinator during the initial design process (formative feedback). When teachers were asked about which forms of feedback were most effective in the focus group interview, teachers indicated that student feedback was most critically important, followed by the online coordinator, other teachers, and lastly, the instructional design experts.

DISCUSSION

When hoping to help teachers with their design processes, it is important to look at designerly approaches (Cross, 2011) to designing instruction rather than primarily relying on a process model or prescriptive instructional theory to direct and support teachers’ design. Design is a complex and messy activity that cannot be solved by relying on process model or theory but is rather contextualized and is solved through the designerly skills set (e.g., identifying constraints, collaboration, prototyping, design judgments, reflection, practical knowledge, and vicarious experiences) (Cross, 2011; Rittel & Webber, 1973).

In other words, each teacher approaches design differently because his or her courses are contextualized. They teach in different subject areas, encounter different students, need to accommodate for a wide range of learning strategies and approaches, and this can change from year to year depending on the new students that enter their classroom. It is unrealistic to expect that one rigid approach would help all high school teachers as they

design their first online courses. With the increased offerings in online K-12 courses, more teachers are being asked to create their own online courses. Therefore, this study examined the design processes of high school teachers in one district with the same resources as they designed their first online courses.

In this study, it was evident that the high school teachers made a variety of design decisions that were informed by judgment that was built from their own practical experiences and skillsets they developed as a teacher. In fact, this study found that although teachers were given similar guides and resources (e.g., chunking process, learning by design model), they still made independent design decisions during their online course design process. Dunne (1997) calls for the value of *phronesis*, or practical knowledge for designers, as designers continue to build their own practices, identity, and philosophy of design. Nelson and Stolterman (2012) asserted that quality design is often attributed to the character of a designer, which is based on the development of a design judgment exercised when doing design. They argue that it is important to develop a deeper understanding of design judgment in order to improve the design ability and processes of designers.

Although there was a certain technical process that was followed by the teachers in their design processes, the majority of these teachers strayed away from what Schön (1983) refers to as technical rationality, or primarily relying on scientific methods of inquiry. Instead, teachers seemed to rely on their vicarious experiences and judgments when making design decisions. For example, Ana brought in her teacher skills by ensuring she followed the right teaching standards before she decided to use certain readings or online resources. Her teaching experience also brought to the foreground her design decisions in terms of keeping in mind the learner, thereby designing content that was relevant to their age level and learning style. These findings are counter to Johnson's (2007) prerequisites for K-12 teachers' online design processes, which she claims that by coupling technology to a particular learning theory, any K-12 teacher can develop an effective and efficient online instruction.

Reflection is a key component for a designer to develop designerly skills (Cross, 2011). Schön's (1983) theory of reflection-in-action and reflection-on-action illustrates how a designer can develop good design judgments in their design practices. This is done by making well-reasoned and purposeful design decisions through a process of active reflection during the process of designing and reflecting again on the process after the design is produced. In this study, all eleven teachers reported valuing feedback on their course from their peer teachers, online learning coordinator, and students. This feedback highly influenced their design process, as they were making well-reasoned and purposeful design decisions when redesigning their courses.

This form of transformative reflection allowed for teachers to improve on their design practices. Therefore, when helping teachers design online courses for the first time, resources should be provided to support them in eliciting feedback from students and incorporating this into their designs.

The current literature suggests that thinking about design through a designerly lens is still new in the field of instructional design (Boling, 2008; Korkmaz & Boling, 2012; Yanchar & Gabbitas, 2012). The findings from this study suggest that future studies should investigate the role of teachers as designers and engage in a deeper understanding of their design practices. By better understanding teachers' design practices, we will be better able to support them in making strong pedagogical and technological choices, especially since more K-12 teachers are being asked to design online courses due to demand and lack of funding for purchasing (Archambault et al., 2014; Thomas, 2002).

In this study, it was evident that teachers made very different design decisions for their first online courses, even when provided with similar resources and constraints (similar students, technology, district vision, etc.). According to the teachers in this study, providing teachers with guides and resources seems to be important, but even more so was encouraging student feedback and providing them with opportunities to try out the various pedagogical and technological tools. In this case, districts should provide teachers with extra time to test out and prepare new online courses, as well as provide training on how to collect feedback for course design and evaluation.

LIMITATIONS

The results in this study are bounded by the specific context of the school. Therefore, the suggestions and implications made are not meant to be generalizations made across all K-12 teachers online course design process, but are rather contextual findings, providing examples of how teachers may approach designing online courses with similar levels of support and background. The school in this study provided high levels of support, as the lead organization had a specific vision for online education, which other schools may or may not have in place. These teachers' approaches were most likely influenced by these contextual supports and other teachers without those resources may not be able to implement the same design processes or choices. In addition, these teachers volunteered to teach online courses. In previous research, studies have shown that teachers who volunteer to engage in new innovations (e.g., Zhao & Cziko, 2001) tend to have a willingness to experiment and try new ideas. This may have also influenced their design approaches, and teachers that do not volunteer to participate in such initiatives, or who are mandated to teach/design online courses may have a different design process.

Moreover, it would have been beneficial to conduct the interviews with the participants during the course of their design phase, as the experience would be recent and the questions could have triggered more detailed responses. Since the participants were interviewed at the end of their design process, there is a possibility that participants may have forgotten to recall and report certain experiences that would have led to a more nuanced understanding of their online course design process. Other limitations of this study include the implications of the researcher etic perspective and the external validity, or generalizability of the study. Researcher's etic perspective could influence the responses received from the participants in the study and influence the development of codes in the thematic analysis (Lett, 1990).

CONCLUSION

The findings from this study illuminate in detail the design practice of eleven high school teachers and highlight some of the key elements of their design process of their first online course: (a) face constraints, (b) use a number of technological tools, (c) use a number of pedagogical strategies, (d) are helped by belonging to a community of practice, (e) report valuing Online Learning Coordinator's support, (f), make independent design decisions despite being given similar guides and resources, and (g) rely on feedback from a variety of sources.

In reviewing the assertions made from this case study, it is evident that K-12 teachers are highly embedded in the online course design process. Davis claims that this unique responsibility has placed the teacher in a position where they not only have control over the aesthetics and functionality of the course, but also bring in an interesting perspective over the delivery of the course content (as cited in Barbour, Adelstein, & Morrison, 2014, p. 21).

Furthermore, these K-12 teachers take agency as designers and like most designers, they are aware of the intentionality of their design, and report designerly skills such as, being reflective practitioners by relying on peer and student feedback in improving the design of their course. In addition, they also tend to make use of their practical knowledge to solve messy design situations such as tackling the many constraints they faced as first time online course designers. Although they design learning experiences in a highly constrained environment (e.g., technology fluency, online course design conceptualization, time management, etc.), they are key agents in making the design decisions in their courses, and these decisions come from judgment that is informed by the vicarious skill sets and experience they bring in as teachers.

The findings from this study suggest that more work should be done to investigate the role of teachers as designers. The current literature about ap-

proaching design through a designerly lens is emergent in the field of instructional design where the focus has mainly been placed on generating prescriptive theories and process models rather than giving the agency of designing to the designer (Korkmaz & Boling, 2012; Smith, 2008; Yanchar & Gabbitas, 2011). Therefore, a deeper understanding of the design practice of teachers engaged in online course design is precedent, especially for other school districts who intend to start similar programs like the district wide online program of the high school.

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