

## BEYOND TRADITIONAL OBSERVATION: OBSERVING FORMATIVE ASSESSMENT THROUGH 360-DEGREE VIDEO IN TEACHER EDUCATION

Jessica Herring Watson, Kayla Waters, & Jason Trumble, *University of Central Arkansas*

This design case documents the development, implementation, and refinement of a structured 360-degree video observation activity for preservice teachers learning about formative assessment practices. The activity was designed and tested across two semesters in an undergraduate Classroom Assessment course with 53 total students. Through an iterative design process, we developed a scaffolded observation protocol that leveraged the unique affordances of 360-degree video technology. Student feedback revealed that the immersive format enhanced observation capabilities by providing comprehensive classroom views, multiple perspectives, student-centered observation opportunities, and greater autonomy in directing attention. Our design process highlighted important design decisions: the need for explicit technological modeling, structured guidance balanced with exploratory freedom, and the importance of high-quality recording.

**Jessica Herring Watson** is an Assistant Professor in the College of Education at the University of Central Arkansas. Her research interests include preservice teacher education, technology-enabled learning, and inclusive online learning design.

**Kayla Waters** is a Visiting Lecturer in the College of Education at the University of Central Arkansas. Her research focuses on preservice teacher support, the use of AI to ease K-12 teachers' workload, and mathematics education.

**Jason Trumble** is a faculty member and Associate Dean in the College of Education at the University of Central Arkansas. His research focuses on integrating content, pedagogy, and emerging technologies.

### THE DESIGN CONTEXT

Our design team designed, developed, and facilitated an immersive 360-degree video observation activity for undergraduate preservice teachers in a Classroom Assessment course. This design case documents two iterations of the activity, along with our design team's reflections on the failures and successes encountered throughout the design process. Boling (2025) has argued that a design can originate from a desire for an instructional experience that is better than our current or previous practice; it does not necessarily have to be a problem-solving process. In this case, the activity we designed was meant to improve upon the use of traditional, two-dimensional (2D) video as a tool for preservice teachers to "observe" and reflect on a K-12 teacher's formative assessment practices during a live lesson.

### Affordances of 360-Degree Video

Before examining our design decisions, it is essential to understand how 360-degree video's affordances created both opportunities and constraints as we worked with this new-to-us technology. 360-degree video captures everything around the camera in every direction simultaneously. The most transformative aspect of this video format, from an instructional perspective, is that it moves the viewer from passive to active. While viewing a 360-degree video, they can swipe from side to side with their finger to move around the viewing space, move their device around in



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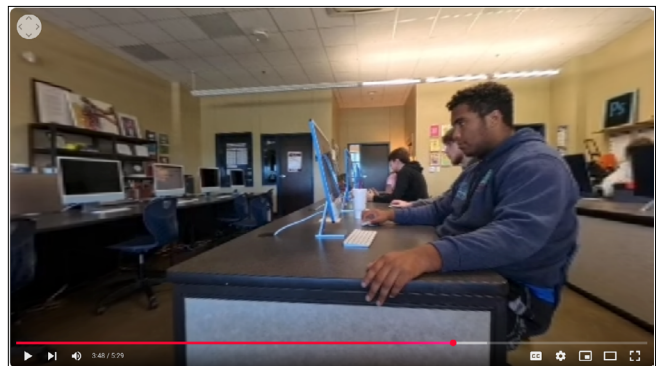
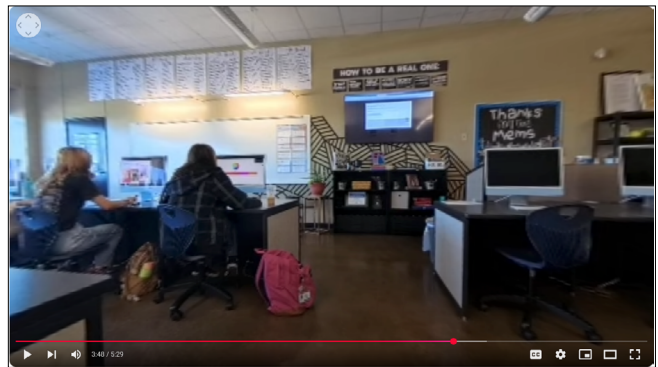
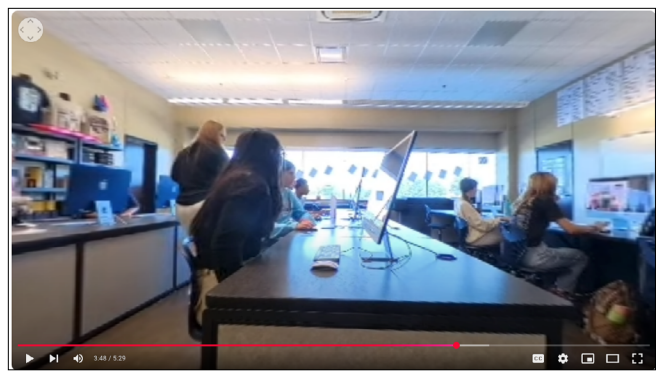
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physical space (if viewing on a mobile device), or simply turn their head up, down, or side to side (if viewing in a virtual reality headset) to explore the environment captured in the video. For instructional purposes, 360-degree video provides several affordances that cannot be matched by traditional, 2D video. First, 360-degree video provides complete context to the learner. The learner as viewer has the opportunity to experience the entire environment, not just one perspective or framing of the environment. Thus, this video format also allows for learner-directed exploration of the environment. Viewers can focus on what interests them most and are not limited to one perspective. However, 360-degree video's complete environmental context could either enhance or overwhelm novice observers, depending on how the experience is scaffolded. Finally, 360-degree video can enhance learner presence within the recorded environment. It creates a "being there" feeling within the learner/viewer that can increase engagement with the recorded environment. This immersive quality also raises questions about whether preservice teachers might be distracted by the novelty of the format, rather than focused on key elements of the classroom environment. Figure 1 shows three different perspectives of the same time stamp within a 360-degree video, illustrating how the viewer can choose where to focus their attention at any given time.

In the context of this design case, the use of 360-degree video overcomes certain limitations of both 2D video observations of K-12 classrooms and live, in-person observations in K-12 school sites. First, 360-degree video allows preservice teachers to see the whole classroom space and manipulate the environment they are observing to see, in many ways, more than the teacher in the recording can see while facilitating instruction. Viewing a 2D video of a lesson to observe the teacher constrains what the preservice teacher can observe because certain aspects of the classroom will be out of frame. Additionally, live, in-person observations can be difficult to schedule for all parties involved. For example:

- Preservice teachers need to observe K-12 classroom instruction but may have scheduling conflicts during K-12 school hours.
- University teacher preparation programs do not want to overburden their K-12 partner schools but need to provide substantial early field experiences (i.e., observations) for undergraduate preservice teachers.
- K-12 schools want to maintain continuity of instruction with minimal distractions.

360-degree video has the potential to overcome these challenges by approximating the experience of an in-person observation and, in some ways, enhancing it. Preservice teachers have full access to the recorded learning environment in 360 degrees. When observing a lesson through 360-degree video, they can move around the classroom in a manner that would be distracting to everyone in



**FIGURE 1.** Three views from a single timestamp of a 360-degree video.

the learning environment if they were to observe a live, in-person lesson. Additionally, once the 360-degree video is recorded, university instructors can provide the video to a large number of preservice teachers at once, maximizing the use of the observation and minimizing the potential burden on K-12 school partners to have multiple preservice teachers observing in classrooms onsite, which could create distractions for K-12 learners and teachers.

These capabilities and constraints of 360-degree video were central to the design decisions we navigated throughout our process. While the technology itself has potential usefulness, it cannot fulfill its potential without appropriately designed instructional scaffolds. Therefore, our team designed a structured observation activity using this video format to help preservice teachers in an undergraduate Classroom

WHO	HOW
Jessica	Instructional designer and structured observation activity facilitator
Kayla and Jason	Course owners/instructors and collaborators in the design process
Preservice teachers	Undergraduate students enrolled in a Classroom Assessment course; participants in the structured observation activity during the Fall 2024 and Spring 2025 semesters
Graphic design teacher	The high school graphic design teacher in the 360-degree video recording used for the activity
Graphic design students	The high school students in the 360-degree video recording used for the activity

**TABLE 1.** Who is involved in the design.

Assessment course isolate formative assessment practices as the focus of a classroom observation.

### THE DESIGN TEAM AND LEARNERS

During the design process, Jessica was an Assistant Professor, Jason was an Associate Professor, and Kayla was a Visiting Lecturer in the College of Education, where the course is taught. Two of the authors (Kayla and Jason) co-taught Classroom Assessment in Fall 2024 and Spring 2025 (August-December 2024 and January-May 2025). This design process began when they expressed interest in developing an immersive observation activity to evaluate preservice teachers' understanding of formative assessment practices at the end of a course unit. Jessica has a background in instructional design and suggested working through a structured process to design and develop a 360-degree video activity so the team could more effectively evaluate the efficacy of using 360-degree video to meet their instructional goals. Given that this design case involves instructors and learners in multiple contexts (both in the case and in the 360-degree video observation), Table 1 presents key terms that identify the roles of everyone involved in the learning and design process.

### THE COURSE CONTEXT

This design process focused on a structured observation activity in an undergraduate Classroom Assessment course for preservice teachers. Classroom Assessment is taught as an in-person, 15-week course in the fall and spring semesters in the College of Education where all three authors are faculty members. The purpose of the Classroom Assessment course is to provide undergraduate preservice teachers with the knowledge, skills, and dispositions needed to design and implement formative and summative assessments that facilitate students' academic growth and increase their engagement. The course is typically taken by undergraduate juniors and seniors who are concurrently enrolled in a K-12 field placement course that requires them to be at their assigned K-12 school site, working with a mentor teacher and K-12 students for approximately nine hours each week.

However, there is no K-12 field placement tied specifically to the Classroom Assessment course.

As we stated above, our design team wanted to explore using 360-degree video observations to help preservice teachers isolate formative assessment practices as the focus of a classroom observation. Formative assessment practices are teachers' informal checks of students' progress and understanding. Some examples include the teacher listening to students' verbal responses during a think-pair-share or turn-and-talk activity where students discuss their learning. Another example of formative assessment in practice is using questioning techniques to gather information and guide student progress during a lesson. The activity we designed allowed the course owners/instructors (Kayla and Jason) to determine whether the preservice teachers in the course could apply their learning about formative assessment by identifying these practices in the 360-degree video observation.

### DESIGN BOUNDARIES

To begin the design process, we needed to address the complex student population within the class. In Fall 2024, 38 preservice teachers were enrolled in the course, and in the Spring 2025 semester, the class included 15 preservice teachers. In both semesters, students in the course represented a range of preservice teacher education degrees and licensure areas, including middle-level (i.e., grades 4-8) and secondary (i.e., grades 7-12) education certification. In this context, our middle-level preservice teachers were working toward certification in two disciplines, and the secondary preservice teachers focused on one discipline. The disciplines represented in the class across both semesters were English/Language Arts, Social Studies, Mathematics, Art, and Family and Consumer Sciences. Therefore, one of our design constraints was considering how to appeal to this broad range of disciplinary interests through a structured observation activity. We wanted to ensure that they could engage with the 360-degree video with an eye specifically for formative assessment practices without being distracted by the content of the lesson.

### Goals for the design:

1. Be able to recognize ~~formative~~ formal and informal assessments happening during instruction.
2. Be able to identify teacher decision-making moments during instruction.
3. Be able to recognize where assessment is missing and how it could be more integrated into instruction.

### Design questions:

1. How did experiencing 360 video inform your understanding of assessment's role in instruction?
2. How, if at all, did ~~Are~~ students leveraging ~~ing~~ the full capabilities of 360 video during the activity?

### InTASC Standards addressed:

#### Standard 6:

- 6(a) The teacher balances the use of formative and summative assessment as appropriate to support, verify, and document learning.
- 6(e) The teacher engages learners in multiple ways of demonstrating knowledge and skill as part of the assessment process.
- 6(f) The teacher models and structures processes that guide learners in examining their own thinking and learning as well as the performance of others.
- ~~6(j) The teacher understands the differences between formative and summative applications of assessment and knows how and when to use each.~~
- 6(l) The teacher knows how to analyze assessment data to understand patterns and gaps in learning, to guide planning and instruction, and to provide meaningful feedback to all learners.
- 6(t) The teacher is committed to using multiple types of assessment processes to support, verify, and document learning.

FIGURE 2. Goal refinement process.

Another boundary of the design was alignment to course goals and state teacher competencies for formative assessment training. The course goals for this class align with the Interstate Teacher Assessment and Support Consortium (InTASC) Standards (Council of Chief State School Officers [CCSSO], 2013), which are replicated as requirements from the state department of education where the college of education is located. Classroom Assessment focuses on InTASC Standard 6: "The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making" (CCSSO, 2013, p. 9). This standard has three categories: Performance, Essential knowledge, and Critical dispositions. For this design case, we reviewed each category and identified the indicators that focused on formative assessment. Our design team also spent time discussing the deficits the course instructors had historically noticed in preservice teachers' understanding of these concepts in previous semesters of teaching the course. Then, we aligned the 360-degree video observation activity to the State Teaching Standards (Division of Elementary and Secondary Education [DESE], 2012). Figure 2 shows the process of refining our goals for the activity and the InTASC standards to which the activity is aligned.

## DESIGN TIMELINE

With these boundaries in mind, we began weekly meetings in August 2024 to tackle the practical challenges of designing our 360-degree video activity. (see Table 2). The team kept a design journal (i.e., a Google document) to document and reflect on our design decisions and their rationale. Screenshots of the design journal are included in Figures 2, 3, 4, 5, and 9. When we met weekly, we referred to the journal to discuss how the design had evolved since our last meeting and to talk out any questions or challenges we faced in designing and developing the 360-degree video activity. We also used Otter.AI to record, transcribe, and summarize our weekly meetings. This allowed us to reference our meeting transcripts and summaries to review design decisions and write about the design process.

We met one week before the start of the Fall 2024 semester to discuss the general direction for the 360-degree video activity design. During that meeting, we decided to use Qualtrics for students to document their thinking during the activity because of the ability to build blocks of questions that scaffolded students' progress through the activity. We also weighed the pros and cons of recording a 360-degree video of a veteran classroom teacher versus a novice teacher (see Figure 2).

EACH COLOR REPRESENTS AN ELEMENT OF THE DESIGN PROCESS.	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR
Design Discussions	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
360-Degree Video Recording		Red							
Initial Design	Blue	Blue							
Fall 2024 (1st iteration of the activity highlighted in green)		Orange	Green	Orange	Orange				
Spring 2025 (2nd iteration of the activity highlighted in green)						Purple	Purple	Green	Purple

**TABLE 2.** Design timeline.

<p>We discussed how to procure authentic 360 video clips. We could use interns.</p> <p>Pros:</p> <ul style="list-style-type: none"> <li>• Their students have already signed video consent forms.</li> <li>• It would be easy to recruit them.</li> </ul> <p>Cons:</p> <ul style="list-style-type: none"> <li>• Hard to get targeted footage of exactly what we need.</li> <li>• Wait time while the semester gets started and observations are being scheduled.</li> <li>• Reliance on internship supervisors to record quality video.</li> </ul> <p>We also considered using a practicing classroom teacher in a nearby school district who has a relationship with the university (former student).</p> <p>Pros:</p> <ul style="list-style-type: none"> <li>• We know we would get high quality instruction that would align with the purpose of this activity (formative assessment noticing).</li> <li>• We know we could collaborate with this teacher to record both a strong case and a failure case to remove any issues of potential bias toward the teacher in the video because the same teacher appears in both cases.</li> <li>• More control of the situation in general than if we chose to work with an intern(s).</li> <li>• The teacher is in a secondary setting (high school), which aligns with the programs of study of the majority of students in the undergrad assessment course.</li> </ul> <p>Cons:</p> <ul style="list-style-type: none"> <li>• May be challenging to get district permission to record students in the classroom</li> </ul>
<p>Resolution (for now):</p> <ul style="list-style-type: none"> <li>• We will work with Gary (field coordinator) to contact local SD about recording in the practicing teacher's classroom.</li> <li>• Gary can help broker consent from the district.</li> </ul>

**FIGURE 3.** 360-video recording decision.

In subsequent meetings, we identified key assessment standards for the Classroom Assessment course that aligned with the activity, developed an activity structure and materials, and created a feedback mechanism (i.e., Qualtrics survey) for preservice teachers to describe their experience during the activity. Jessica recorded a 360-degree video in a high school graphic design classroom in early September 2024. The graphic design lesson we recorded introduced new content and followed a direct instruction approach, followed by an opportunity for a gallery walk in which students provided peer feedback on one another's evolving design portfolios. We facilitated the first iteration of the activity, in which preservice teachers interacted with the 360-degree video recording, for 38 preservice teachers in October 2024 in a large classroom in the college of education building. Following

the first iteration of the activity, we met to debrief, discuss design failures and successes, and adjust the activity for the Spring 2025 semester. The second iteration of the activity was facilitated with a new group of 15 preservice teachers in March 2025 in a smaller classroom space in the college of education building. Both classroom spaces used for the activity featured modular furniture (e.g., chairs and tables with wheels and whiteboard surfaces) that allowed preservice teachers to manipulate their physical environment and move around to interact with the 360-degree video, which they viewed individually on iPads during the activity. We also allowed students to leave the classroom space and use nearby hallways to view and interact with the 360-degree video if they did not bring headphones for the activity. We met in the weeks following the second iteration of the activity to review student feedback from the fall and spring and reflect

on the effectiveness of the design.

### INITIAL DESIGN PROCESS

The first step in our design process was capturing a 360-degree video to use for the activity. We collaborated with a practicing high school graphic design teacher to record a full 60-minute lesson in 5–7 minute segments using a 360-degree camera. We limited the length of the video segments to make them easier to edit to a manageable length for student viewing during the activity and to accommodate the large file size associated with 360-degree video files.

Jessica recorded four separate videos of varying lengths in the high school graphic design classroom. During the

recording, Jessica was present in the classroom but sat quietly in the back of the room so she didn't distract from the natural rhythm of teaching and learning. After recording the lesson, Jessica returned the camera, and Jason, one of the course instructors, reviewed and edited each recording to eliminate unnecessary segments (e.g., when students were entering or leaving the room between periods). This gave us three options to evaluate that ranged from 5 to 7 minutes long. We reviewed each video to collectively decide which 360-degree video provided the most examples and non-examples of formative assessments. All three designers discussed each video segment and agreed on the most appropriate video (i.e., the video segment with the most evident examples of formative assessment in practice), and Jason uploaded the video to YouTube as an unlisted link ([link to video](#)), accessible to the preservice teachers in the course.

Next, we designed an activity structure to scaffold preservice teachers' experience with the 360-degree video. There were several decisions to be made in this process. We knew we wanted preservice teachers to watch the video at least twice, once with a focus on formative assessment and an additional time with a focus on the affordances of the 360-degree video format. One of the design decisions we debated was whether to begin with an initial viewing of the video that did not have a specific focus. We worried that, because 360-degree video may be new to some preservice teachers, viewers would be distracted by the format and unable to focus on the formative assessment aspects of the lesson. Additionally, 360-degree video provides different options for exploration and navigation than 2D video, and we did not want navigation issues to be a distraction from the goals of the activity. These concerns led us to think we would need to begin the activity with an opportunity for open exploration of the video. Conversely, we were also concerned that three separate viewings of the video with different instructions might lead to student fatigue or distracted viewing behavior by the end of the activity. We ultimately decided to include three viewings in the initial activity structure (see Figure 4). As a group, we determined that student feedback regarding this aspect of the activity could guide our design revisions for Spring 2025.

**Activity Design:**

1. Watch video once to "preview" with no expectation
2. View Assessment questions ONLY on slide. Take 2 minutes to just look at questions
3. Rewatch video with Assessment questions in mind.
  - o Complete Assessment questions in Qualtrics survey
4. View 360 video questions ONLY on slide. Take 2 minutes to just look at questions
5. Rewatch video with 360 video questions in mind.
  - o Complete Assessment questions in Qualtrics survey
6. Advance to Qualtrics page w/ demographic Qs:
  - o Age range
  - o Gender identity
  - o Undergraduate classification
  - o Major/Discipline - two different Qs?
  - o Currently in field?
    - If in field, would you classify your placement district as urban, rural, or suburban?

FIGURE 4. Initial activity design.

**Activity Design:**

1. Watch video once to "preview" with no expectation
  - o Answer single open-ended question.
2. View Assessment questions ONLY on slide. Take 2 minutes to just look at questions
3. Rewatch video with Assessment questions in mind.
  - o Complete Assessment questions in Qualtrics survey
4. View 360 video questions ONLY on slide. Take 2 minutes to just look at questions
5. Rewatch video with 360 video questions in mind.
  - o Complete Assessment questions in Qualtrics survey
6. Advance to Qualtrics page w/ demographic Qs:
  - o Age range
  - o Gender identity
  - o Undergraduate classification
  - o Major/Discipline - two different Qs?
  - o Currently in field?
    - If in field, would you classify your placement district as urban, rural, or suburban?

FIGURE 5. Revised activity design.

In our initial structure, we planned to provide no guidance for the initial viewing. After further discussion, we revised the activity structure to include a single guiding question to focus preservice teachers on their ability to interact with a 360-degree video (i.e., move around the video, rather than only maintaining one perspective). The revised activity structure is in Figure 5. We created Google Slides (see Figure 6) to scaffold preservice teachers' progress through each step of the activity.

Finally, we needed to identify the best way to document preservice teachers' understanding of formative assessment and perceptions of the activity. We decided to create a Qualtrics survey for preservice teachers to document the formative assessments they noticed in the video and provide their feedback on the activity design. As our meetings continued, we built our Qualtrics survey around our 360-degree video design goals and the Classroom Assessment course objectives and ensured alignment with InTASC Standards. We decided to use the Aspiring TESS Rubric, which is used to score preservice teachers during university supervisor-observed lessons in their K-12 field placements, for the formative assessment section of the survey. The preservice teachers' familiarity with the rubric made it a good way to determine

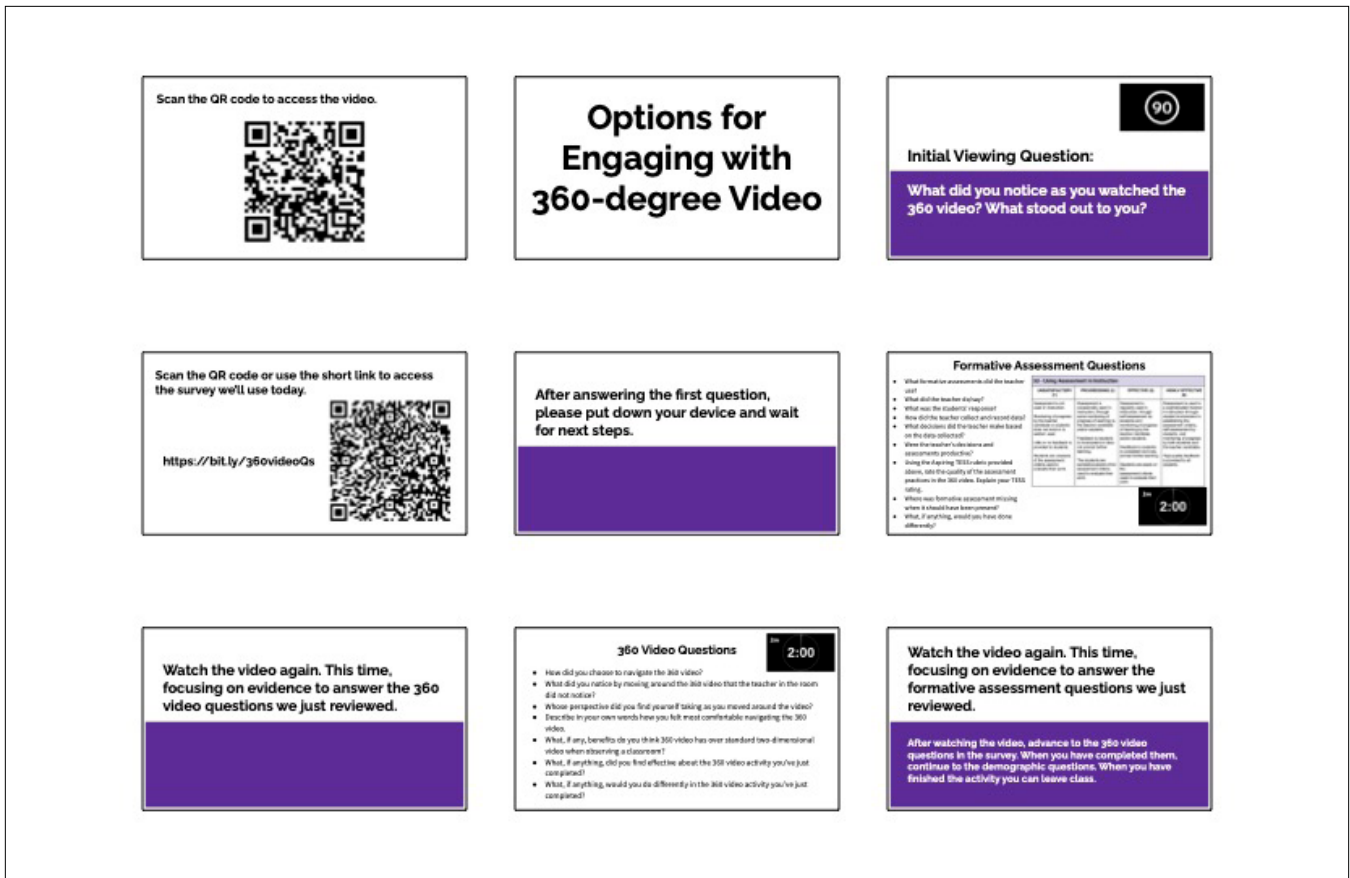


FIGURE 6. First iteration of activity slides.

### Formative Assessment Questions

- What formative assessments did the teacher use?
- What did the teacher do/say?
- What was the students' response?
- How did the teacher collect and record data?
- What decisions did the teacher make based on the data collected?
- Were the teacher's decisions and assessments productive?
- Using the Aspiring TESS rubric provided above, rate the quality of the assessment practices in the 360 video. Explain your TESS rating.
- Where was formative assessment missing when it should have been present?
- What, if anything, would you have done differently?

3d - Using Assessment in Instruction			
UNSATISFACTORY (1)	PROGRESSING (2)	EFFECTIVE (3)	HIGHLY EFFECTIVE (4)
<p>Assessment is not used in instruction.</p> <p>Monitoring of progress by the teacher candidate or students does not exist or is seldom used.</p> <p>Little or no feedback is provided to students.</p> <p>Students are unaware of the assessment criteria used to evaluate their work.</p>	<p>Assessment is occasionally used in instruction, through some monitoring of progress of learning by the teacher candidate and/or students.</p> <p>Feedback to students is inconsistent or does not prompt further learning.</p> <p>The students are somewhat aware of the assessment criteria used to evaluate their work.</p>	<p>Assessment is regularly used in instruction, through self-assessment by students and monitoring of progress of learning by the teacher candidate and/or students.</p> <p>Feedback to students is consistent and may prompt further learning.</p> <p>Students are aware of the assessment criteria used to evaluate their work.</p>	<p>Assessment is used in a sophisticated manner in instruction through student involvement in establishing the assessment criteria, self-assessment by students, and monitoring of progress by both students and the teacher candidate.</p> <p>High-quality feedback is provided to all students.</p>

2:00

FIGURE 7. Formative assessment questions for preservice teachers.


## FIRST ITERATION OF THE ACTIVITY

Having made these initial design decisions, we were ready to test our assumptions about scaffolding, navigation, and viewing structure with our first group of preservice teachers. When preservice teachers walked into the college of education classroom on the day of the activity, we had the tables pushed off to the sides of the room to create space for preservice teachers to interact with the 360-degree video by standing up and moving around as they viewed the video individually on iPads. They all sat down in their chairs in a circle to wait for instructions.

We had the 360-degree camera set up in the middle of the room on top of a table to capture preservice teachers' involvement in the activity to support our own design reflections. Kayla and Jason were set up on the side to observe the activity, give guidance as necessary, and take observation notes, while Jessica was positioned at the front of the room to facilitate the structured 360-degree

their ability to identify examples of formative assessments in the 360-degree video. The formative assessment survey questions we created, along with the TESS rubric, are in Figure 7. The questions we posed about the 360-degree video activity are in Figure 8.

## 360 Video Questions



- How did you choose to navigate the 360 video?
- What did you notice by moving around the 360 video that the teacher in the room did not notice?
- Whose perspective did you find yourself taking as you moved around the video?
- Describe in your own words how you felt most comfortable navigating the 360 video.
- What, if any, benefits do you think 360 video has over standard two-dimensional video when observing a classroom?
- What, if anything, did you find effective about the 360 video activity you've just completed?
- What, if anything, would you do differently in the 360 video activity you've just completed?

**FIGURE 8.** 360-degree video questions for preservice teachers.

9:42 - Move into the Formative Assessments Questions Slide

- "Now we want to be more evaluative in our noticing" Starts 2 minute timer for students to just read over the questions
  - All students seem to be reading, except 1
- "You have the video pulled up. We're going to do the second viewing. You don't have to use the same viewing strategy as last time. Feel free to stand up. Try a different strategy and see if it changes the way you manipulate the video"
  - Around 8 students went outside the classroom
  - 2 are standing up inside the classroom
  - Around 6 are standing up and walking around outside the classroom
  - About half of the class are just using their finger
  - One student has her eyes closed and I asked what was wrong. She said she has an auditory processing disorder and was struggling to hear what the teacher is saying. Might be a good idea to clean up the transcript and remind students that they can turn on Closed Captioning.
  - I've had to tell 3 students so far that they need to download the YouTube App in order to have the video move around with them. Might want to put this on one of the beginning slides next time.

9:51 - Transition to the second section of survey questions

- Most students are typing on their phones.

**FIGURE 9.** Example notes from activity iteration #1.

video observation activity. During our design discussions, we deliberated on who should facilitate the activity. We decided that preservice teachers might provide more honest answers to the Qualtrics survey questions if they had an outside facilitator who was not a course instructor. During the activity, preservice teachers worked through the structured protocol provided on the Google Slides (see Figures 6, 7, and 8) with facilitator guidance. Figure 9 is a snapshot of Kayla's notes during the activity. We were careful to catch as many details as possible, so we could reflect on them and improve the activity design in its second iteration.

### First Iteration: Preservice Teachers' Feedback

Overall, feedback from the preservice teachers who participated in the first iteration of the activity was positive, with only 4 out of 38 preservice teachers finding it unhelpful to their learning. Preservice teachers were able to correctly identify multiple formative assessments in the video, with Turn and Talks (e.g., students turning and discussing a

teacher-provided prompt with a partner) being the most common. While many preservice teachers were able to spot formative assessments in the 360-degree video lesson, some noted, "They [the graphic design teacher in the video] needed more structure to have effective assessments." The TESS ratings indicated that the preservice teachers rated the graphic design teacher in the 360-degree video as generally effective, but they also mentioned that she leaned heavily (sometimes too heavily) on informally assessing through observation. Table 3 provides an overview of preservice teachers' formative assessment noticing with example quotes. ChatGPT and Claude.AI were used to cross-check the authors' insights into preservice teachers' responses to the Qualtrics survey questions about formative assessment and the 360-degree video format after both iterations of the activity.

In their feedback about the 360-degree video format, preservice teachers highlighted the unique affordances of 360-degree videos, such as capturing multiple conversations and interactions across the classroom, which traditional 2D video cannot achieve. One preservice teacher reported, "The ability to look around the [graphic design]

classroom in the 360-degree video helped me focus on both the teacher and the students." Table 4 provides an overview of preservice teachers' feedback about the use of 360-degree video for observing formative assessment practices.

### First Iteration: Design Team Reflection & Design Decisions

The first iteration of the 360-degree video activity provided valuable insights that informed design decisions for the second iteration. Our design team feedback is organized by design decision.

#### *Design Decision #1: Determining the Number of Video Viewings*

During the first iteration, preservice teachers watched the 360-degree video three times: the first viewing was unguided, the second included questions on formative assessment, and the third involved evaluating the 360-degree video

CATEGORY	EXAMPLE QUOTES
Formative Assessments Used	<p>"The teacher used Think, Pair, Share, and Question and Answer formative assessments. The focal point of these was to listen to their discussion and collaboration."</p> <p>"Using proximity throughout the entire classroom while making notes, asking/answering students questions within their pair groups."</p>
Suggestions for Improvement	<p>"She should have had an entry ticket to see if students had completed their worksheet."</p> <p>"She should have given clear directions and clear criteria to be included on the formative assessment to limit student confusion. She should have talked about the criteria and posted a rubric to help students understand."</p>
Assessment Tracking	<p>"They were working on an assignment so she can collect and record data from that. She also was collecting data by listening to conversations and recorded it in her brain."</p> <p>"The teacher used her listening and observing skills to see how the students were responding. She used her findings to see who understood, needed extra help, and made sure to listen to every group."</p>
TESS Ratings	<p>"2 - Progressing: I don't think they had a very effective formative assessment because she didn't take up anything. However, she was able to assess by walking around making sure students were on their task at hand."</p> <p>"3 - Effective: The teacher is doing a great job at walking around and informally assessing and then adjusting based on what she heard from students. Despite this, there could be better ways to give the instructions and collect the data."</p>
What Would You Do Differently?	<p>"I would have had more concrete questions, made them share out loud, or answered on a piece of paper. That way the data is accurate and efficient."</p> <p>"I would have had a whole group discussion before putting them in turn and talk. This would have made sure everyone already had their brainstorming papers and sketches ready to use. The students then would have known the expectations of the conversation."</p>

**TABLE 3.** Formative Assessment Noticing.

experience. However, 15 of 38 preservice teachers (approximately 40%) felt that watching the video three times was excessive, and many reported disengagement during the third round. We also observed visible fatigue among preservice teachers during the final viewing. Therefore, we decided to remove the unguided first viewing. This decision is supported by previous design precedent that suggests unguided exploration of 360-degree video often does not yield meaningful learning, especially for novice teachers or when learning complex skills (Barnhart & van Es, 2015; Luna & Sherin, 2017).

Additionally, Kayla and Jason reflected that the lag time between students viewing the video (e.g., students moving at slightly different paces through each stage of the activity) may have caused distractions and reduced focus among preservice teachers. We decided this could be addressed by introducing more structured protocols into the activity, such as using timers and limiting the number of preservice teachers leaving the classroom to interact with the video in quieter spaces like empty hallways. As a result, we decided to adjust the activity to eliminate the first unguided viewing, integrate timers into the activity structure, and remove some

of the Google Slides because they were not used when Jessica facilitated the activity.

#### *Design Decision #2: Mitigating Technical Challenges and Encouraging Multiple 360-Degree Viewing Strategies*

The second design decision we faced regarded how to help preservice teachers become more comfortable with viewing 360-degree video (e.g., navigating to the video via YouTube, using headphones, and moving to interact with the video). We recognized that intentional modeling of the navigation features could address these challenges. In the second iteration, we decided not to introduce separate training or pre-teaching sessions and instead incorporate these elements directly into the structured observation activity during class time. Because we eliminated the first unguided viewing of the video, we created time within the activity structure for Jessica to explicitly model with her own iPad the variety of viewing strategies that preservice teachers could employ throughout the activity.

The first iteration of the activity also highlighted the importance of ensuring that preservice teachers come to the activity prepared with earbuds, iPads, and the YouTube app

CATEGORY	EXAMPLE QUOTES
Navigation Methods	"I felt most comfortable viewing the video sitting down but if I was by myself or in a smaller classroom environment, I would have moved around more. It felt weird being one of the only people to move." "Using an iPad, and whirling around in my chair was my favorite way to view it. Like a VR experience."
360 Positives	"You can see more perspectives from the 360 camera than you would as a teacher simply standing or walking around to observe students." "It makes it better to observe overall student behavior in the classroom as it lets you zoom in on individual student conversation and interactions throughout the room. This will help you realize that you need to make sure you're spending more time around certain parts of the classroom to ensure student participation and make sure there is no confusion."
Engagement with 360 Tool	"I felt like I was in the room with the students and instructor." "I found it effective for being able to see what assessment looks like in action and how real students respond to assessment." "Each time I watched it, I noticed something different and gained a deeper understanding."
Noticing Student Engagement Issues the Graphic Design Teacher Missed	"I noticed certain students who were off task, got off topic, or were not engaged. It gave me the chance to be a fly on the wall at certain moments and see how productive and thoughtful the students were." "The teacher was not able to notice who I was paying attention to."
Suggestions for Activity Improvement	"I would utilize more cameras if possible or a different positioning to view more students' computers." "It was very repetitive, so maybe try and find a way to make it less repetitive." "I would make sure my iPad actually charged the night before."
Technical Challenges	"I did not feel comfortable, it made me feel car sick." "I would prefer a 2D video."

**TABLE 4.** 360-degree video activity feedback.

downloaded. We decided this could be achieved with reminder announcements in the course learning management system (LMS) prior to the activity date.

Also related to this decision was our consideration of improvements, such as recording a new observation video from a higher angle to enhance video quality, since a few preservice teachers mentioned video quality as an issue during the activity. That discussion also relates to Design Decision #3.

#### *Design Decision #3: Determining Whether to Record a New Video*

Both Classroom Assessment course instructors confirmed that the activity objectives relative to formative assessment were met, but they highlighted areas for improvement. One key observation was that the chosen video focused more on informal formative assessment than explicit, structured methods that would better suit novice teachers who are just learning to identify and use formative assessment during instruction. This brought us back to the design decision of

whether to record a new 360-degree video of a lesson that would provide more explicit examples of formal formative assessment to better align with the lesson's goals. After discussing the options for recording a new 360-degree video, the design team decided to use the same video for the second iteration of the activity, given that the graphic design teachers' use of formative assessment, while subtle, represented authentic K-12 classroom formative assessment practices and presented opportunities for preservice teachers to note not only when formative assessment was present but also where it could be improved.

Each of these decision tensions and design decisions is summarized in Table 5.

## **SECOND ITERATION OF THE ACTIVITY**

After making each of the adjustments detailed above, we facilitated the second iteration of the 360-degree video activity in March 2025 with 15 preservice teachers who documented their observations in the Qualtrics survey throughout the activity. While Jessica facilitated the activity, Kayla took notes

DESIGN TENSIONS	DESIGN DECISIONS
Should we have two or three structured 360-degree video viewings within the observation activity?	We decided to remove the unguided first viewing of the video because we observed visible fatigue among preservice teachers during the final viewing. Although the initial viewing was intended to reduce the cognitive load, we saw the opposite effect.
How can we help preservice teachers become more comfortable with viewing 360-degree video (e.g., navigating to the video via YouTube, using headphones, and moving to interact with the video)?	Use more structured protocols in the activity, such as timers for discussion between viewings and limiting the number of preservice teachers leaving the classroom to interact with the video in quieter spaces.  Post reminder announcements in the course learning management system (LMS) prior to the activity date.
Given preservice teachers' feedback, should we record a new video for observation in activity iteration #2?	Given the challenges of gaining administrative permission to record students in a K-12 setting, we decided not to try to capture new video before the second iteration.

**TABLE 5.** Design revisions based on first iteration.

and highlighted moments that were important and/or were different from the first iteration.

The first difference Kayla noted was Jessica's use of the first few minutes of class. While preservice teachers were not prompted with any pre-activity work in the first iteration, those who participated in the second iteration were prompted with the following warm-up as they entered the classroom: "List all formative assessments you might use. Categorize them by "I" for Informal and "SB" for Summative Based." After they were given time to write down their thoughts, Jessica then facilitated a discussion about formative assessment as an introduction to the 360-degree video activity.

A second difference between the first and second iterations was the removal of the initial independent viewing of the video. Rather than allowing preservice teachers to explore the 360-degree format on their own, Jessica guided them through the experience, modeling how to interact with the video on her own iPad and providing instructions on how they might choose to interact with the video. Jessica also encouraged active engagement, stating, "The best way to engage with 360-degree video is to get out of your seat."

A third difference that Kayla highlighted was the introduction to each section of the Qualtrics survey (see Figure 8). In the first iteration, preservice teachers were asked to sit silently and read the slides on their own. In the second iteration, however, Jessica provided scaffolding by reading the slides and instructions aloud. Throughout the second iteration of the activity, the preservice teachers appeared more engaged, as many got up and moved around, and some even took notes on paper or on their whiteboard desks. These real-time observations of the activity, coupled with preservice teachers' feedback in the Qualtrics survey, informed our design reflection on the second iteration of the activity and our design decisions and process as a whole.

### Second Iteration: Preservice Teachers' Feedback

The second iteration of the 360-degree video activity in Spring 2025 yielded predominantly positive feedback from preservice teachers. With a smaller class size (15 preservice teachers compared to 38 in the fall), we were able to gather more focused data on the effectiveness of our design changes. Preservice teachers in the spring semester identified multiple formative assessment techniques in the video, with Turn and Talk/Think-Pair-Share and Walking Around/Monitoring being the most commonly recognized. This suggests that the removal of the initial unguided viewing and the addition of more structured modeling at the beginning helped preservice teachers focus more precisely on formative assessment practices. The TESS ratings showed that most preservice teachers (77%) rated the teacher in the video as "Effective," with the remaining 23% rating the graphic design teacher as "Progressing." This distribution suggests that preservice teachers were able to critically evaluate the assessment practices they observed, recognizing both strengths and areas for improvement in the teachers' strategy use.

Navigation methods for the 360-degree video showed significant improvement compared to the fall semester. While most fall preservice teachers defaulted to the simplest navigation method (sitting and swiping), 62% of spring preservice teachers reported trying multiple approaches to navigation. This experimentation aligns with our design change of explicitly modeling different navigation methods at the beginning of the activity, encouraging preservice teachers to explore the full capabilities of the 360-degree format.

Preservice teachers' perceptions of the benefits of 360-degree video were notably positive, and they identified several advantages over traditional 2D video. Example feedback quotes from Spring 2025 preservice teachers are provided in Table 6.

Overall effectiveness was rated positively by 85% of preservice teachers, with only 13% of preservice teachers expressing neutral or negative sentiments about the activity.

BENEFITS OF 360-VIDEO OBSERVATIONS	EXAMPLE STUDENT FEEDBACK QUOTE
Comprehensive View/Immersion	<p>“You can see everything going on, all at once.”</p> <p>“You can feel like you were actually there.”</p>
Multiple Perspectives	<p>“It allows more perspective of the classroom.”</p> <p>“I think it was neat to see a different perspective on observing. I think I was able to get a feel like I was in the classroom instead of just watching from the outside.”</p>
Student-centered Observation	<p>“It was great being like a student observing because sometimes [K-12] students tense up when the teacher comes around.”</p> <p>“I was able to watch every student. I was able to see some screens she [the teacher] was not always able to see. I heard some people asking their neighbors questions that she might have missed while working with other groups.”</p>
Autonomy in Observation	<p>“It grants more control over what I witness in the classroom.”</p> <p>“Something I found effective was being able to feel like if I was actually there. It made it easier to navigate and see around the classroom and students.”</p>

**TABLE 6.** Preservice teacher-identified benefits of 360-degree observations.



**FIGURE 10.** Video quality issues.

Preservice teachers who participated in the second iteration of the activity valued the immersive experience, the observer perspective, the insights into teacher challenges, and the increased engagement afforded by the 360-degree video format. One student noted, “Understanding that as a teacher you are not going to capture everything,” highlighting how the activity provided insight into the complexities of classroom monitoring and formative assessment.

Despite the improvements to the activity in the second iteration, video quality remained a concern for some preservice teachers. One student commented: “Maybe if the video was clearer and I could see what they were doing on their computers, I would find it more beneficial.” This persistent technical limitation (see Figure 10) suggests a continued design challenge that will need to be addressed in future iterations of the activity.

### Second Iteration: Design Team Reflection

Our design team’s reflections aligned closely with the student feedback. We observed significant improvements in the second iteration, noting that preservice teachers appeared more engaged, technologically adept, and thoughtful in their analysis of the formative assessment they observed in the 360-degree video.

Removing the initial viewing seemed to increase preservice teachers’ engagement throughout the activity. Additionally, preservice teachers who participated in the second iteration of the activity adopted a variety of proactive viewing strategies, such as taking notes on paper or whiteboard tables and using split-screen to simultaneously navigate the video and take notes. We did not observe the use of these strategies during the first iteration of the activity and attribute these behaviors to the changes in how Jessica facilitated the introduction to the activity, previewing the questions about formative assessment and 360-degree video both verbally and visually. Preservice teachers were also able to name more formative assessment strategies in the whole group discussion during the activity and were more positive about the 360-degree video activity overall.

Kayla, who observed the second iteration of the activity and took notes throughout, observed that preservice teachers in Spring 2025 seemed more technologically fluent, as they used split screens, had no issues with the video, and even filled out the surveys more quickly. She attributed this improvement partly to the intentional walk-through at the beginning of class instead of just having them go into the first video viewing blindly.

Overall, we felt that preservice teachers engaged more deeply with the content in the second iteration of the activity. Scaffolding the process, including reading the questions aloud, prompted preservice teachers to think about the

elements more than before when they just read them and had time to reflect silently and individually.

The design changes implemented after the first iteration (i.e., removing the initial unguided viewing, providing explicit modeling of navigation methods, streamlining the slides, and adding timers for discussions) all appeared to contribute to the improved experience. The team's decision to maintain the same video despite quality concerns was justified by the overall positive engagement and learning outcomes, although we hope to find solutions to improve upon the 360-degree video quality in future iterations of the activity.

## OVERALL DESIGN REFLECTION

### Positive Outcomes

The iterative design process yielded several positive outcomes that demonstrate the effectiveness of our structured 360-degree video observation activity. Preservice teachers in both iterations successfully identified multiple formative assessment strategies, with the spring cohort (2nd iteration) demonstrating more focused and nuanced understanding as a result of the more streamlined activity design. The explicit modeling of navigation methods in the second iteration led to more varied and intentional use of the 360-degree format, with preservice teachers developing personalized strategies for interacting with the video that improved their learning experience.

Preservice teachers reported valuable insights from adopting different perspectives in the 360-degree environment, particularly appreciating the ability to notice student behaviors and interactions that would be difficult to observe in traditional 2D video or live, in-person observations. The activity prompted thoughtful reflection on teaching practices, with preservice teachers critically analyzing formative assessment approaches and suggesting specific improvements, indicating that the activity successfully developed their evaluative abilities.

In the second iteration of the activity, we observed preservice teachers independently develop strategies to enhance their experience, such as using split-screen functionality and taking notes on paper or whiteboards. This adaptability suggests that the activity design encouraged active problem-solving. The streamlined two-viewing approach in the second iteration maintained student engagement while still accomplishing the learning objectives, demonstrating that more structured guidance can lead to more efficient learning. Finally, preservice teachers made connections between the observed teaching practices and their own potential future practices, evidenced by their detailed suggestions for alternative assessment approaches.

### Areas for Growth

Despite the overall success of the second iteration of the activity, our design process revealed several design challenges and areas for continued refinement. First, both iterations highlighted concerns about video quality. Future implementations of this activity will prioritize higher-resolution recording, potentially from multiple angles or heights to improve the visibility of student work and facial expressions. Additionally, some preservice teachers experienced technical difficulties that could be further mitigated by clearer pre-session requirements and setup instructions. Ensuring all preservice teachers have appropriate devices, headphones, and knowledge of required apps would improve the activity experience overall. Furthermore, some preservice teachers appeared hesitant to move around the classroom while viewing the 360-degree video to take full advantage of the affordances of this more interactive format. Future designs of this activity will include more explicit encouragement or designated movement spaces to facilitate full immersion in the 360-degree video experience.

From an instructional perspective, we (the course instructors and designer) noted that the 360-degree video recording used for this activity contained more informal than formal assessment examples. While the formative assessment in the video represented the subtleties of how assessment often looks in K-12 classrooms, more obvious, pre-planned examples of a range of formative assessment techniques might be helpful, given that the viewers/activity participants are preservice teachers who are just learning to recognize and apply formative assessment strategies during instruction. In future iterations of this activity, we plan to use 360-degree video observations that demonstrate a wider range of assessment techniques, particularly more structured approaches to assessment.

Finally, accessibility is a key consideration as we determine how to continue developing this design. One student's auditory processing difficulties highlighted the need for more robust accessibility features, such as clearer audio, available transcripts, or closed captioning options. As we continue to refine this activity in future semesters, we will fully address all accessibility concerns so as to mitigate any barriers preservice teachers might encounter during the activity.

### Instructor Experience

From our perspective as designers and instructors, the activity design evolved over two semesters in response to direct observations of the 360-degree video activity and student feedback. Several key insights emerged.

First, the importance of structured guidance became evident. During the second iteration of the activity, scaffolding the process, including reading the questions on the activity slides aloud, prompted preservice teachers to think about

the elements more than when they were silently reading the guiding questions in the first iteration of the activity, enhancing student engagement and learning outcomes. The balance of structure and freedom proved critical for preservice teachers who are still developing their observation skills.

Additionally, the course instructors observed that modeling navigation options explicitly, rather than allowing completely free exploration, yielded better results in terms of preservice teachers' exploration of the 360-degree video format and identification of formative assessment strategies within the video. This design insight aligns with previous findings that, when working with preservice teachers, allowing complete viewer freedom within immersive platforms may, in some cases, actually be a disadvantage (Barnhart & van Es, 2015; Luna & Sherin, 2017).

In reflecting on both iterations of the activity, we felt that the smaller class size in the spring semester may have contributed to the improved learner experience, suggesting that the activity might work best with smaller groups or with additional facilitators for larger groups. We all noticed that the preservice teachers who participated in the second iteration of the activity seemed to engage with more thoughtful ideas about formative assessment in action and about the value and limitations of 360-degree video for video-based observations of K-12 classrooms.

Finally, we appreciated the activity's ability to meet the intended learning objectives while also actively engaging preservice teachers. Intentionally reflecting on our design failures in the first iteration of the activity led to a second iteration of the activity that felt more positive, engaging, streamlined, and effective to the design team and the preservice teachers who participated in the activity.

## CONCLUSION

This design case documented our development of a 360-degree video observation activity for preservice

teachers learning formative assessment practices. Through two iterations, we refined our approach based on student feedback and the instructors' observations and reflections. Our design decisions revealed that 360-degree video's immersive qualities enhanced these preservice teachers' ability to notice classroom dynamics that traditional 2D video or live, in-person observations might have missed. We found success required clear technological guidance and prerequisites, accessible design features, explicit modeling before independent exploration, and focused viewing experiences with dedicated reflection time. Future iterations of the activity might incorporate higher-quality recording and multiple camera angles.

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