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Unleashing the Power of Video Cases: Enhancing Teachers' Ability to Engage Learners in Problem-Based Geographic Inquiry

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Inquiry-based learning is not common in secondary geography classrooms in the United States. The goal of this initial foray into design-based research was to maximize the potential of online video-case technology to disrupt this trend and support geography teachers in enacting high-quality problem-based geographic inquiry (PBGI). Informed by research on video and multimedia production for professional development, the authors worked with a team of social studies teachers in Mississippi to design PBGI curriculum materials and create a video case for use in future professional development with preservice and in-service geography teachers. This paper describes key features of the video case and presents findings on modifications to the video case that might improve its potential as a professional development tool.

The Bridging Divides Project is a research initiative designed to support geography teachers in adopting a model of inquiry-based instruction called problem-based geographic inquiry (PBGI). PBGI emphasizes the application of disciplinary knowledge and skills to problems that have relevance to democratic societies (Maddox et al., 2018; Saye & Brush, 2003). Inquiry-based instruction has long been advocated in social studies, and materials are increasingly available to help teachers improve their practice (for an example, see c3teachers.org and earlier materials provided by Social Studies in Action, <https://www.learner.org/series/social-studies-in-action-a-teaching-practices-library-k-12/>). However, challenges remain that make it difficult for teachers to implement inquiries effectively with their learners (for a review, see Saye, 2017). To address these challenges, we worked with a small group of teachers in Mississippi to design PBGI curriculum, video record implementations of that curriculum, and construct an accompanying video case for future professional development with in-service and preservice teachers.

The work reported in this paper builds from scaffolded lesson study interventions we previously led. These interventions were designed to support social studies teachers' pedagogical shifts toward greater use of inquiry-based instruction including problem-based geographic inquiry (Howell & Maddox, 2024). Lesson study is a professional development approach whereby teachers address a problem of practice by collaboratively designing, implementing, and revising lessons across multiple design cycles (Lewis et al., 2006). Our scaffolded version of lesson study guides teachers to make connections between research and practice as they focus instruction on a compelling geographic problem with civic implications.

The results of our previous work yielded positive changes in the ability of teachers to create curriculum consistent with the PBGI model. These findings were unsurprising given the highly scaffolded nature of the planning phase embedded in our lesson study model. However, teachers were less successful in implementing instructional strategies as intended, such that students engaged in deep inquiry and achieved designated learning goals. Recognizing that our lesson study teachers needed stronger models of the PBGI curriculum being implemented, we turned to the development of the PBGI video case discussed in this article. We have assembled an online video case featuring a field-tested lesson and are in the process of refining the case and related unit materials to maximize their effectiveness.

To scaffold teachers' ability to provide PBGI instruction more effectively, our video case addresses some of the challenges identified in our previous lesson study research (Howell & Maddox, 2024) and similar studies related to problem-based learning (Ertmer & Glazewski, 2015). The video case focuses on a *single focus lesson*, based on the assumption that video case users would learn more from bite-sized content modeling aspects of PBGI. However, there is some risk associated with this approach, since the power of our inquiry model stems from its coherent *unit* design. To mitigate this problem, we clearly depict how the focus lesson is situated within a larger inquiry unit and designed to support unit goals.

Case materials provide the user with access to the overall unit structure and all the lesson resources for the focus lesson. The materials/resources

area of the video case will eventually expand to include all resources needed to fully implement the unit, including the unit culminating activity. We readily acknowledge that a single video case cannot begin to fully model all aspects of problem-based geographic inquiry. Our goal is to build a suite of video cases that collectively empowers teachers to investigate aspects of the PBGI model related to their professional learning needs in ways that mirror other successful professional learning platforms (Annenberg Foundation, 2002; National Board for Professional Teaching Standards, 2024; Read.Inquire.Write. team at the University of Michigan, 2024). In future work, we intend to systematically evaluate the efficacy of our site in relation to its intended aims.

The focus lesson of the video case models several techniques or “teacher moves” common to PBGI, such as how to orient instruction around a hierarchy of questions tied to a social problem, implement a lesson grabber, and promote effective group collaboration. The featured instructional strategy is a geographic investigation designed to promote both geographic and civic learning goals. Subsequent cases will feature additional instructional strategies that should enable the user to (a) learn from skilled teachers and (b) better envision how strategies can be intentionally stacked (within lessons and across the unit) to achieve unit goals.

The specific curriculum materials featured in the video case focus on human migration and address policy questions associated with so-called “brain drain” in Mississippi. The curriculum featured in the case has been implemented in several high school settings, but the online video case described in this paper has not been used for professional development purposes.

The present study sought to contribute to the body of literature on the potential of video case-based professional development to promote teacher change (Brunvand, 2010; Major & Watson, 2018; Marsh & Mitchell, 2014; Shin et al., 2019). More specifically, we are interested in designing a multimedia, video case resource that could provide geography-specific “professional development that focuses on teachers’ content knowledge and pedagogical content knowledge,” a key goal from *A Road Map for 21st Century Geography Education* (Schell et al., 2013, p. 35).

Our research question was as follows: How can a video case be designed to most effectively address known barriers to the adoption of PBGI? Data used to evaluate this research question included focus group interviews with students who experienced the curriculum featured in the video case, interviews with participating teachers, and expert reviews of the online video case by the project geographer and two external researchers. These data provided insights into the quality of the curriculum materials featured in the video case and improvements to it that might enhance its potential to overcome barriers to the adoption of PBGI.

Video Cases to Support Shifts in Practice

Several challenges or barriers exist that make it difficult for social studies teachers to adopt inquiry-based forms of pedagogy and, more specifically, problem-based learning. In this section, we summarize some of these

barriers as context for subsequent discussion of how video cases might support meaningful shifts in practice.

The first challenge pertains to the content knowledge required to successfully enact problem-based inquiries. Virtually all novice social studies teachers must work to build adequate content knowledge, but geography teachers are particularly at a disadvantage. Geography teachers often complete minimal university coursework in their discipline during their educator preparation programs (Brysch, 2014; see also, U.S. Government Accountability Office, 2015, p. 17). Additionally, social studies teachers often must split their time between teaching geography and courses in other disciplines. Opportunities to build content knowledge on the job may be uncommon, with limited professional development resources directed toward disciplines that receive greater priority in the curriculum (e.g., history). Successful implementation of PBGI requires mastery of geographic content (the “facts”) *and* the ability to understand how geographers solve problems using geographic practices (Bednarz, 2016, p. 46). Professional development must prioritize providing support in both areas.

In addition to a possible lack of content knowledge, geography teachers must work to build pedagogical content knowledge related to the PBGI model. A barrier we have identified involves the novelty of some of the instructional strategies commonly used during PBGI instruction (Howell & Maddox, 2024). Some student-centered instructional strategies may be entirely unfamiliar to novice geography teachers, or the teachers might have seen the strategies applied only in other disciplines. Additionally, geography teachers may need to reconsider their use of more common instructional strategies (e.g., lecture) to maximize the effectiveness of these strategies within an inquiry.

Successfully enacting PBGI requires teachers to be able to navigate complexity as they scaffold learners’ understanding of disciplinary content and ability to engage in civic/ethical reasoning related to a central question/problem. Novice teachers may rely on habits they have developed when confronted with this complexity; other times, novice teachers do not notice some of the intricate details involved with implementing inquiry-based instruction.

For example, PBGI lessons routinely feature an introduction, where the teacher guides learners to revisit larger unit questions to promote coherence and retain a connection to big ideas embedded in the unit. Teachers new to PBGI, however, often skip this element in favor of a more streamlined, efficient approach to starting the lesson. For instance, they may launch into content delivery to start a lesson because this approach is more consistent with their existing practice. Teachers may also provide insufficient time and support for higher order thinking. The scaffolding conceptualized during planning phases can easily be overlooked or discarded during the complex and sometimes messy implementation of problem-based inquiry. These choices ultimately undermine the thinking students can demonstrate during the lesson and may impact teachers’ perceptions of the effectiveness of the model.

Finally, teacher beliefs and dispositions also constitute a barrier to successful adoption of the PBGI model. Research has documented how

some teachers believe only Advanced Placement or honors students are capable of demonstrating the higher order learning outcomes that are the focus of instruction (Kohlmeier et.al, 2020; Onosko, 1991; Rossi, 1998). Teachers who hold this belief may narrow the curriculum by focusing attention on the acquisition of lower order, factual geographic content and skills.

In addition to beliefs about students, some teachers may hold a view of teaching and learning that is inconsistent with the constructivist theories that underpin the PBGI model. They envision the primary role of teachers as being transmitters of knowledge and may be uncomfortable with the idea of relinquishing control to implement student-centered instruction. Consequently, teachers' epistemological assumptions, or what is viewed as "legitimate teaching and learning" in a discipline may conflict with our model (Saye & Brush, 2006, p. 189). Teachers holding absolutist beliefs about geography (e.g., mastery of geographic facts and skills is a straightforward process that requires little to no interpretation), for instance, may not agree to having learners grapple with ill-structured problems.

This summary of barriers, while not exhaustive, serves to underscore why we decided to explore the potential of video cases to enhance the professional learning of geography teachers. Video is used in multiple ways, for varying purposes, as part of professional development for teachers (Marsh & Mitchell, 2014). Discussion of video in this study focused on the use of videos as models of exemplary practice that may feature unknown teachers (as opposed to analysis of videos from a teacher's classroom instruction as a form of self-reflection). Our work builds most directly from the Persistent Issues in History Laboratory for Virtual Field Experience (PIH-LVFE) research that explored the effectiveness of a database of video cases designed to promote shifts in practice toward problem-based historical inquiry (Brush et al., 2009; Shin et al., 2019). The PIH-LVFE cases include authentic classroom video combined with online technology tools and elements intentionally designed to achieve instructional purposes.

Continued research and development related to video cases is warranted for several reasons. Videos used during professional development seem to be effective in promoting changes in teacher cognition (Major & Watson, 2018). Video-based professional development is effective in challenging teacher's beliefs by "positively disrupting views of practice" and has been helpful in "developing pedagogical content knowledge" (p. 63). Research specifically on the PIH-LVFE cases has also revealed promising outcomes with preservice teachers (Brush et al., 2009; Shin et al., 2019).

To take advantage of the learning potential of video cases, we consulted Brunvand's (2010) synthesis of best practices in producing video content and Mayer's (2017) work defining 12 research-based principles for using multimedia for e-learning. Mayer's principles for designing multimedia instruction are grounded in the cognitive theory of multimedia learning and meant to support active processing of information by the learner. To reduce the cognitive load, Mayer advocated using techniques such as "signaling" to visually direct the learner to examine key information (e.g., through arrows; p. 406).

A second set of principles focused on managing essential processing and included practices such as providing information to users in small segments that can be viewed in a self-paced manner. Finally, Mayer (2017) acknowledged the importance of learner motivation in a set of principles designed to promote “generative processing” (p. 413). Techniques advocated in this area include personalizing content and engaging learners with a human voice.

Brunvand’s (2010) research on best practices for designing professional development videos placed similar emphasis on managing the cognitive load by guiding learners to “notice relevant content” in the video materials (p. 250). These two sources provide a relatively thorough synthesis of the research base for designing high-quality video for professional development.

Research Method

Our prior scaffolded lesson study work resulted in teachers designing curriculum consistent with our PBGI model, but teachers were not as successful implementing instructional strategies as intended, and their students struggled at times to engage in rigorous PBGI. Following the conclusion of our scaffolded lesson study DBR project, we theorized that a video case might jumpstart the teacher change process and enhance teachers’ ability to implement PBGI instructional strategies such that deep PBGI could occur among students. Consequently, we turned to the development of the PBGI video case discussed in this article, which we will integrate into future PBGI professional development activities.

While we consider the development of the video case discussed in this paper to be the first steps in a second iteration of design-based research (DBR; Barab, 2022), the method employed for this study was far simpler. Here, we offer an initial evaluation of the video case development, interface, and structure and describe its potential for overcoming known barriers to the adoption of PBGI.

Video Case Context

Six social studies teachers, from three different school districts in Mississippi, participated in the development of the curriculum featured in the video case. From these six teachers, two teachers from Two Rivers School District [pseudonym] were selected as video case teachers. At the time of the recording in 2022-2023, Two Rivers was an “A-rated” district (62.9% of students were proficient in English, 86.9% of students were proficient in U.S. History, and 72.4% of students went on to a postsecondary institution in Mississippi). Regarding teachers, 72.5% were experienced (defined as teaching 4 or more years) and 98.1% were teaching in an area for which they held a valid teaching certificate (Mississippi Succeeds Report Card, 2024).

Mrs. Cielo [pseudonym], one of two video case teachers, was an award-winning history teacher. A 14-year veteran, Mrs. Cielo’s goal for her social studies teaching was “education for citizenship.” Mr. Abbot [pseudonym], the second video case teacher, was an award-winning geography teacher. A 9-year veteran, Mr. Abbot’s goal for his social studies teaching was the

development of “life-long learning skills essential [for students] to thrive as responsible citizens.” Both teachers, therefore, considered preparation for citizenship to be central to their teaching mission.

Developing the Video Case

To build a video case that included research-based design elements that had the potential for helping teachers overcome barriers to the adoption of PBGI, we engaged in the following steps:

1. With project teachers and the project geographer, we cocreated the curriculum featured in the video case.
2. We observed six teachers implementing the curriculum but video recorded two video case teachers using two cameras from two angles: Mrs. Cielo and Mr. Abbot. For each recording session, we focused one camera on the teacher, who wore an omnidirectional mic, and a second camera on student groups, with a second omnidirectional mic located at their table
3. From all six teachers, we collected all student work associated with the video case curriculum.
4. We interviewed all six teachers who implemented the curriculum to obtain data on their experiences with the curriculum.
5. We conducted three focus groups with three groups of students from the video case classrooms to understand their experiences — one group from Mr. Abbot’s implementations and two groups from Mrs. Cielo’s.
6. We selected Mrs. Cielo’s second implementation for initial development of the video case. While we intend to fully develop Mr. Abbot’s implementation into a separate video case featuring the same curriculum, time constraints required that we choose one.
7. We selected seven video segments from Mrs. Cielo’s video footage and cut these segments into clips. Clips showcasing elements of the PBGI model as well as moments of geographic thinking about human migration in Mississippi were selected.
8. We asked Mrs. Cielo to view the seven clips in our presence. As Mrs. Cielo watched the video wearing headphones, she provided teacher commentary about what she saw in the clips, providing audio that we recorded for use in the video case.
9. We built the online video case platform and constructed the online case materials.
10. We provided access to the online video case to three expert reviewers qualified to consider the geography content contained within the case as well as its potential as a pedagogical and professional development tool. We asked for reviewers’ critical

feedback via a structured review protocol. Reviewer 1 was our project geographer; his review focused primarily on how geography content was featured within the case. Reviewer 2 was a social studies teacher educator who had extensive experience with problem-based inquiry in other social studies subject areas. Reviewer 3 was a veteran social studies teacher educator, with degrees in geography, who had substantial experience leading geography professional development.

In subsequent DBR research efforts, we will use a refined version of the video case as an intervention and examine how it might assist social studies teachers to achieve professional learning goals tied to problem-based learning and pedagogical content knowledge in geography. While we focus largely on the technical elements of the emerging video case in this paper, we recognize that additional improvements to the curriculum itself will simultaneously enhance the video case.

Video Case Feedback and Analysis

In initially evaluating the potential of our video case to help overcome barriers to the adoption of PBGI, we relied on the following sources of feedback:

- products needed for the human migration video case (e.g., lesson materials, curriculum design scaffolds, and video of instruction);
- transcribed video case teacher commentary and reflection about the curriculum and the video that made up the case;
- transcribed student focus group feedback about the curriculum and student work samples that are part of the case; and
- expert reviews of the video case, completed via online survey, by the project geographer and two researchers familiar with the PBGI model.

From these sources of feedback, we extracted anything relevant to the construction of the video case, its usefulness, or ways to improve it. We compared the feedback to literature on video case development and to known barriers to the adoption of PBGI. We then used the combined feedback to produce the detailed description of the human migration video case discussed below and to identify areas for improvement.

Findings

In the section that follows, we detail results from our initial analysis of the video case, with a focus on its usability and potential for overcoming barriers to the adoption of PBGI. In our findings, we focus primarily on the video case itself, not on the curriculum being implemented. As we describe elements of the video case, noted by various screenshots, we overlay data from student focus groups, teacher interviews, and expert reviews that speak to elements featured in the video case. We use student and teacher feedback to highlight the quality of the video case and to

identify opportunities for improvements. While we use expert reviewer data to do the same, we also use this data to identify technical improvements that might enhance the useability of the video case as a professional development tool. Finally, whenever possible, we consider ways that the video case, along with suggested improvements, might be leveraged to overcome known obstacles to PBGI. Our findings are incomplete, however, because no implementation of the video case in a professional development context has occurred. Consequently, our findings should be viewed as an initial evaluation.

Overview of Curriculum

As context for the discussion of findings that follows, Table 1 provides an overview of the curriculum featured in the video case. Following the table is a brief explanation of the unit sequence noted in the table.

Table 1
Human Migration “Brain Drain” Unit Overview

Persistent Issue: What actions are justified in the interest of the well-being of the state?

Central Question: Why does Mississippi have a brain drain and what should be done about it?

Topic	Instructional Strategy
Lesson 1: Unit Grabber & Introduction	Experiential Activity
Lesson 2: Human Migration - The Mississippi Context	Interactive Slide Lecture
Lesson 3: Investigating Mississippi’s Brain Drain [a]	Geographic Investigation
Lesson 4: Brain Drain Policy Options	Think Aloud
Lesson 5: Culminating Activity Preparation	
Lesson 6: Culminating Activity	Storytelling Video
[a] Lesson 3 was the focus lesson for all video recordings featured in the video case.	

Lesson 1, the unit grabber and introduction was conceptualized, but not fully developed, as an experiential activity that confronted students with various push/pull factors and asked students to make decisions about their personal migration. Lesson 2 focused on human migration in Mississippi using an Interactive Slide Lecture. The lecture explored historical push/pull factors in Mississippi as experienced by various groups – Mississippians of Vietnamese, Jewish, African American, Chinese, and Hispanic origins, along with members of the Creative Class.

Lesson 3, the focus lesson, was a geographic investigation of the Mississippi brain drain problem. Students encountered three scaffolded data sets addressing three geographic questions adapted from work by Gritzner (2002): Where is the brain drain? Why is the brain drain problem

there? Why care about the brain drain? At the end of the lesson, students wrote a brief narrative addressing the following prompt: What is the story of the Mississippi brain drain?

Lesson 4, as conceptualized, was a Think Aloud through which students explored diverse and opposing perspectives on what, if anything, should be done about Mississippi's brain drain. The lesson would begin with students reading an interior monologue written from the perspective of Mississippi's governor as he considers what to do about brain drain.

Lessons 5 and 6, as conceptualized, were the unit culminating activity. Student teams would be assigned a Mississippi occupation severely impacted by brain drain and would be tasked with creating an emotionally engaging storytelling video as a medium to communicate their position on what should be done about the brain drain problem. These teams would conduct an interview with a community member while also researching possible policy solutions. They would use interview and geographic data to convince the audience to care about brain drain as a problem and then they would use their research on policy options to argue for specific actions to combat it. The proposed storytelling approach was intended to apply online professional development from "Why, How, and When: Introduction to Storytelling" (updated resources: <https://www.nationalgeographic.org/society/education-resources/professional-development/courses/storytelling-for-impact/>), which each project teacher completed as part of their project onboarding.

Having reviewed the curriculum featured in the case, we turn now to key findings about the video case interface and our use of multimedia to develop pedagogical content knowledge. In so doing, we first present findings organized around major themes and then conclude with reviewer suggestions.

Design of the Video Case Interface

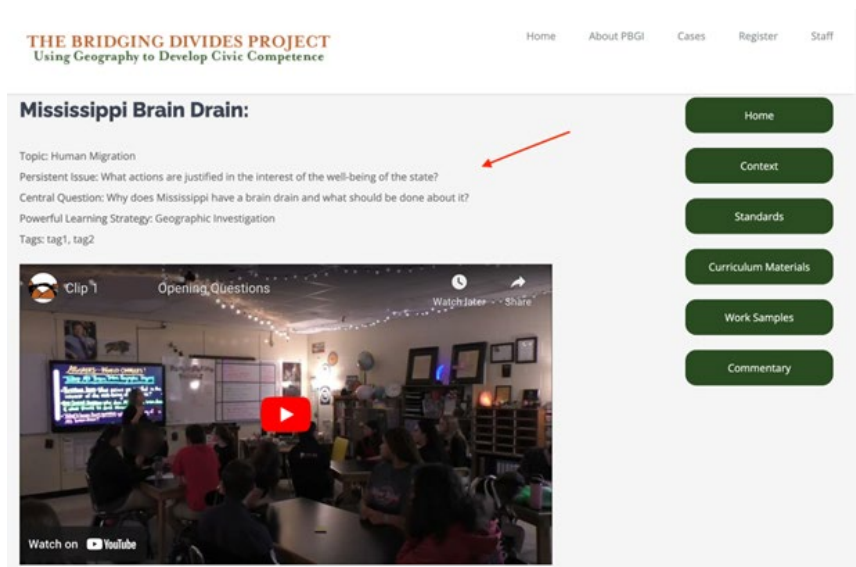
Drawing Users' Attention to the Unit, Not the Lesson

Our video case interface is designed to model expertise toward the goal of shifting teacher beliefs about the teaching and learning we can expect from students. Since our PBGI model emphasizes "planning units, not lessons" (Saye & Social Studies Inquiry Research Collaborative, 2014, p. 36), our PBGI video case interface intentionally draws the user's attention to the unit framework as opposed to individual lessons or individual strategies. Figure 1 provides an image of the overall video case container, with case information centered above Clip 1. This container accompanies every video in the case and includes a unit persistent issue and a unit central question.

These questions serve to situate every video case element within the larger unit, an important element of effective curriculum design (see, for instance, Wiggins & McTighe, 2011). The case container points the user to key, unit-level information that consistently provides context for understanding the materials and video within the overall case, while also avoiding distracting content to reduce extraneous processing demands (Mayer, 2017). Moreover, teachers who hold more absolutist

epistemologies about the teaching of geography (i.e., geography consists of a set of facts to be transmitted to students) are confronted with open-ended, debatable, unit-level questions that anchor the curriculum and drive the instruction featured in the video case.

Figure 1
Video Case Container



Ensuring Ready Access to Unit-Focused Resources and Materials

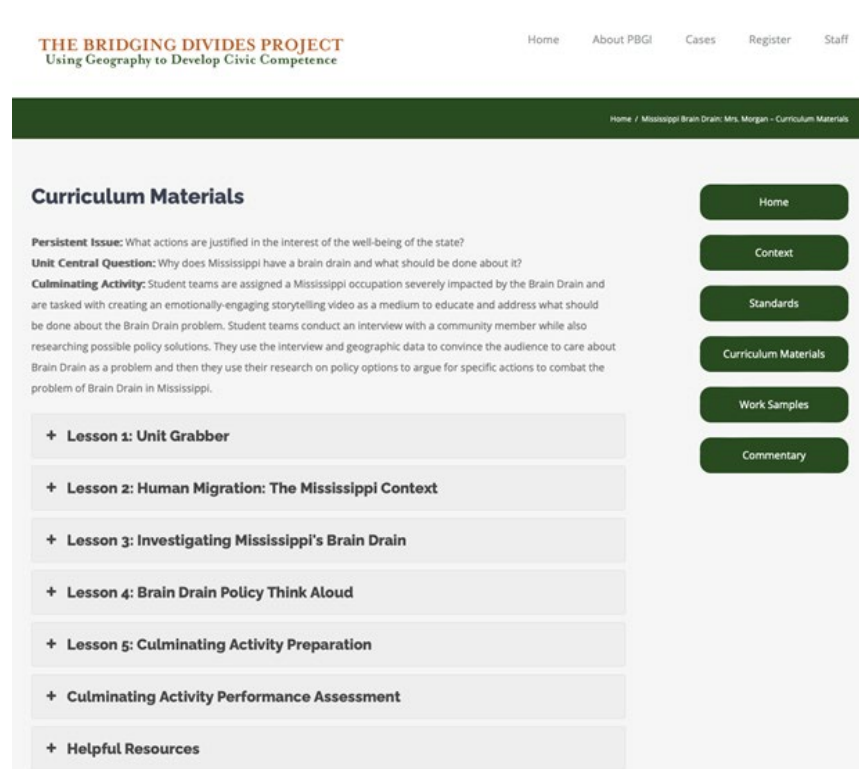
Our focus on the larger unit of instruction within the video case continues in the way that the curriculum materials are presented. Figure 2 shows what users see when they click on the Curriculum Materials button in the main menu. Users find an expandable menu showing the overall unit sequence. This overall unit sequence is visible at a glance such that users can grasp the sequencing of the unit, including hints at how the lessons build (i.e., from the unit grabber meant to engage learners and introduce the unit questions to the end-of-unit performance assessment through which students address the social issues embedded in the unit). Users can drill down into aspects of the unit that grab their attention.

Although every lesson within the unit is not fully developed at the time of this writing, the expandable menu makes clear that lessons do not stand alone but are part of a larger unit. Featuring the unit in this way is intentional. First, acknowledging the content knowledge deficits many geography teachers face, we want users to have access to as much content as possible and be able to get to that content in as efficient a manner as possible. Second, we want to scaffold users' abilities to deal with the complexity of a PBGI unit by situating novel content and novel strategies within an easily recognizable, understandable, and navigable unit container. Third, best practices for curriculum design, drawing from

research in cognitive science, encourage curriculum designers to focus on big ideas. Our video case interface should assist users in staying focused on those big ideas by drawing attention to the overarching unit framework and connecting lessons to that framework.

Finally, for teachers to shift their beliefs about the thinking students can do, they need examples of deep inquiry in practice. By combining the curriculum featured within the video case and video of its implementation, we attempt to model expertise in action.

Figure 2
Curriculum Materials Container in Video Case



Reviewer Suggestions for Improving the Video Case Interface

Video case reviewers made several important aesthetic suggestions that would improve the accessibility, functionality, and usefulness of the video case interface. Reviewer 2 and Reviewer 3 suggested the addition of captions for each video to improve accessibility while saying the interface was “very intuitive and easy to move around within” (Reviewer 2).

Reviewer 1 said the Curriculum Materials section of the video case was critical for weaving all other elements together. He suggested we consider ways to make the Curriculum Materials section of the video case appear before users can watch the implementation videos, saying “...It would be nice to have the context one gets from the curriculum materials before the

temptation to click on the implementation videos... [The curriculum materials section] contains some very important and pertinent information that could perhaps be overlooked.” Reviewer 1’s suggestion speaks to a dilemma we encountered when constructing the video case: Should we target construction for an independent user, or should we target construction for use by a skilled teacher educator or professional developer? While we hope to apply suggestions like those offered by Reviewer 1, such that the video case can stand alone as an educative tool, we recognize that significant scaffolding and guidance needs to be built into the environment to make this a reality.

All reviewers commented on the quality of the audio and video, including the teacher commentary voiceovers, saying that the sound is clear and easily understood. In response to Reviewer 1, however, we will add a new commentary to the video case landing page where we preview the dilemma, unpack the strategy modeled, and speak to the elements of our curriculum model the case does represent. This addition will act as an “explicit prompt” to structure the user’s initial interactions with the case, thereby reducing the user’s cognitive load and encouraging active processing about the case (Brunvand, 2010, p. 251).

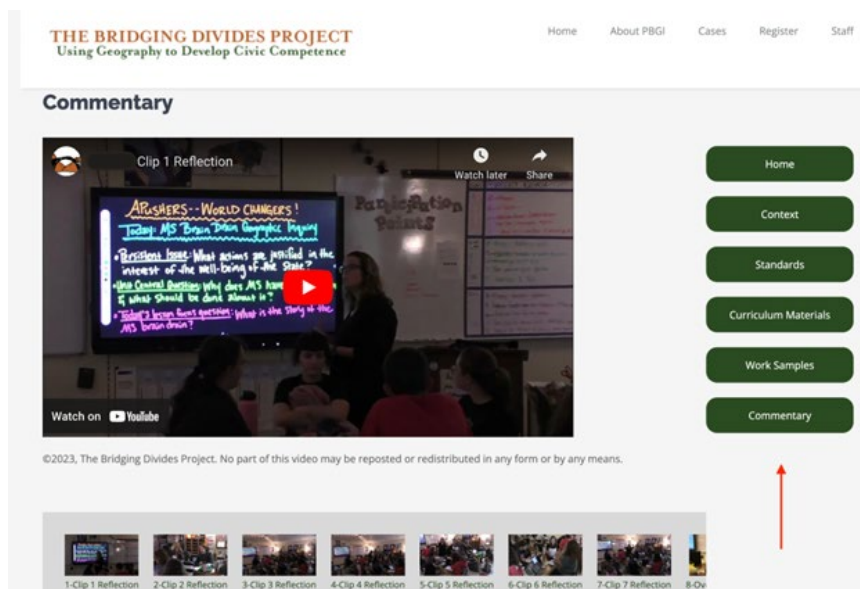
Multimedia Designed to Develop Pedagogical Content Knowledge

Video Elements Encouraging the Development of PCK

Multimedia elements of the video case were intentionally selected and highlighted to help develop users’ pedagogical content knowledge (PCK). These elements are in the Commentary and Work Samples sections of the case, both of which are accessible within the case menu. As seen in Figure 3, the classroom video previously presented is repeated, but the original audio for each clip is turned down and replaced with audio commentary from the video case teacher herself. This audio was captured during an interview session in which the teacher reacted or thought aloud about seven clips documenting her classroom teaching. The interview audio was edited for clarity and overlaid on top of the video clip itself. The effect of this is a time-specific explanation or critique of teacher decision-making and student responses captured in the original video.

In one commentary video, for instance, the teacher explained how and why she used the persistent issue and central question to connect and anchor learning at the start of the lesson back to the larger unit goals and questions. In another commentary video, the teacher critiqued a small group discussion and speculated on what might be done to help students better draw from the sources presented in the lesson itself. These multimedia reveal the teacher’s thinking and decision making and enhance the users’ understanding of how teacher moves enhance students’ content understanding.

Figure 3
Commentary Section of Video Case



Textual Elements Encouraging the Development of PCK

The Commentary section of the case also includes textual elements via quotes from student focus group interviews conducted with students who appear in the classroom video footage. These focus group data give the user a sense of the students' experiences with the curriculum and help to draw the user's attention to elements of the curriculum featured in the video case that students appreciated or felt were lacking. In the focus group excerpt that follows, for instance, the students argued that the lesson provided them with the opportunity to examine human migration using multiple data sources. This use of multiple sources to develop students' understanding of a complex civic problem is a key element of curriculum design captured in the video case. Consequently, we draw video case users' attention to the presence of multiple sources throughout the case: We provide those multiple sources with the Curriculum Materials, we feature students discussing their appreciation for multiple sources within this Student Commentary section, and we feature a Teacher Reflection Commentary video where the teacher discusses ways to enhance students' interpretation of those sources.

Researcher: Did you enjoy the geography lesson on human migration that had the three artifact sets in it?

Student 5: I like to be able to look at the different aspects of stuff, that we didn't just look at what people were moving. We looked at what kind of people were moving and the age groups and stuff like that. There was a bunch of different aspects of it.

Student 1: Kind of [the] why behind it, like why people are moving, why people are moving in, why people are moving out.

Student 3: I like how all the questions were kind of pretty well connected. It wasn't like random. ... They all do one category.

When given the chance to critique the lesson featured in the video case, two students argued for more authentic, hands-on work that included discussions with individuals impacted by brain drain. Interestingly, the students' comments about what they would change reflect elements of our proposed unit culminating activity through which student groups would be tasked with creating an emotionally engaging storytelling video as a medium to educate and address the public on what should be done about the brain drain problem. As part of this performance assessment, student teams would conduct an interview with a community member while also researching possible policy solutions. They would use the interview and geographic data to convince the audience to care about brain drain as a problem, and then they would use their research on policy options to argue for specific actions to combat the problem.

Researcher: If you could change something about that lesson, what would you change?

Student 5: I feel like it'd be cool if, as part of the lesson, somehow the kids could go talk to a specific person who brain drain related to and ask about it. ... So I guess interact more outside of just looking at the pictures and stuff.

Student 1: I think something maybe like more hands-on would be more beneficial because it helps you get a physical grasp on what you're learning.

The fact that students expressed a desire to do what we planned for the end-of-unit culminating activity suggests that the wider unit featured in the video case, but not yet fully developed, holds promise for engaging students.

Annotated Student Artifacts Encouraging the Development of PCK

One final multimedia element consists of student work samples, which the user finds by clicking on the Work Samples button in the main menu. In this section of the case, three samples of student work, representing various degrees of success, are provided. The small thumbnails shown in Figure 4 are clickable; when clicked, a full PDF as shown in Figure 5 opens in a new window revealing the student's work.

Accompanying the example of student work (see Figure 5) is commentary from the researchers. This commentary initially focuses on trends that were identified in the responses provided to question prompts students encountered during the geographic investigation. Since these responses were jointly constructed by a group, the bulleted notes generalize from the student work sample (e.g., *Students did not accurately interpret the map...*). The next section of researcher commentary highlights gaps in this

specific student's content understanding as revealed in the individual formative essay assessment that concludes the lesson featured in the video case.

Figure 4
Work Samples Container in Video Case

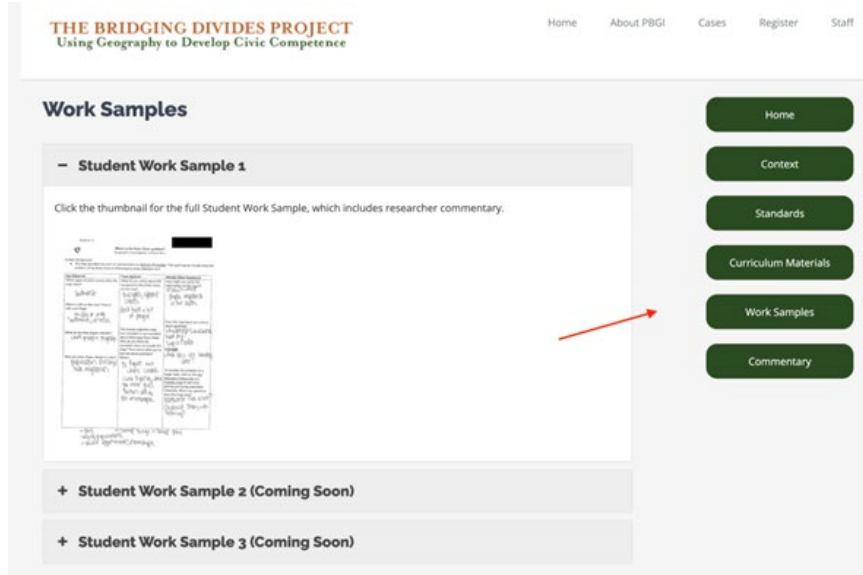
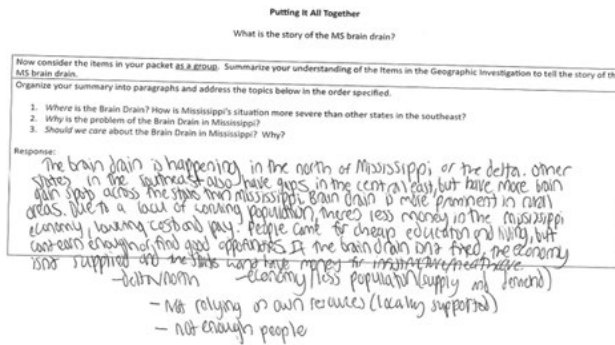


Figure 5
Sample of Annotated Student Work in Video Case



Student notes in response to Artifact Sets 1-3 within the lesson suggest:

- Students did not accurately interpret the map in Artifact Set 1 and needed to have attended to the title of the map.
- Students did not recognize the boundaries of Mississippi in Artifact Set 1.
- Students accurately interpreted the graphs and maps in Artifact Set 3.

As a formative assessment for this lesson, the essay suggests the student:

- Needs to revisit the evidence showing that Brain Drain is a problem throughout Mississippi.
- Needs to revisit the evidence to better identify specific trends related to the problem.
- Understands that people who leave the state of Mississippi take their tax dollars with them, thereby lowering the tax base. A smaller tax base could hurt the state's economy, healthcare, and infrastructure.

As a formative assessment for this unit, this essay suggests the teacher may need to review the evidence in the Artifact Sets prior to beginning the next lesson on policy options to target the gaps noted in the student essay.

Finally, a brief note identifies the next step — what the student and teacher may need to revisit or review to prepare for the unit culminating activity. These efforts at providing additional commentary on student work help to make the student work samples more educative. In the hands of a teacher educator or social studies professional developer, the student work commentary could be used to develop pedagogical content knowledge through analysis, reflection, and conversation about how formative assessment data should drive learning.

Reviewer Suggestions for Improving the Video Case as a Pedagogical Tool

All three reviewers suggested that the video case had strong potential as a pedagogical or professional development tool. After noting the case container's emphasis on considering human migration from diverse perspectives, Reviewer 1 offered the following general reaction to the unit presented in the case:

I think the unit does a really good job of painting a nice picture of the cultural mosaic that makes up the population of Mississippi. It also does so with respect and dignity, leading students to understand how diverse their world can be and why it might look the way it does...

Reviewer 1 also noted that they were “excited to see this possibility for sharing with our students who do not always see quality lessons,” adding that the video case, once fully completed, will show “a variety of pedagogical strategies in action.” Reviewer 3 wondered if the video lessons could be paired with an evaluation instrument so that viewers could evaluate the lesson(s) and identify areas for improvement.

Reviewer 2 noted how the commentary videos were one key highlight of the video case because they reveal the teacher's “decision-making,” saying, “The questions and answers are fantastic.” He went on to say,

I am very impressed with the production value and especially the content of the video cases. The commentary videos are a wonderful glimpse into the thoughts of the teacher. For example, within the “8-Overall Reflection” [commentary video], the teacher discusses how the students performed really well with the difficult artifacts. She talks about how she was not sure whether the students would meet her high expectations; yet, they did. (Although I was surprised to learn that she thought the students did not need a lot of support from her. I would have thought much scaffolding was needed... and in fact a lot of scaffolding did occur: the handouts and the discussions. Still, this is the type of discussion I would like to have with preservice teachers. The conversation about scaffolding in the real-world classroom is valuable in itself.)

Reviewer 3's comment reflects the promise we believe is present in the multimedia presented: the potential to develop geography teachers' PCK. Reviewer 3 noted the complexity of the presented case — the commentary videos containing teacher reflection, the careful scaffolding he saw, and

opportunities for conversation about scaffolding — and drew our attention to its potential as a tool to develop teachers' PCK.

However, Reviewer 2 provided a final critique that revealed limitations in the potential of the video case to develop pedagogical content knowledge *for geography*:

Sometimes, the teacher seems to emphasize the elements of geographical thinking without using the terms, as with the political cartoon. Perhaps the ISL (Interactive Slide Lecture) could have more overtly emphasized the 21st century value to the skills under study. The geographical thinking skills can translate to the modern context of students to help them make sense of the world around them: and they would benefit from hearing that overtly and perhaps often.

When planning for the development of our video case, we initially intended to identify one teacher of six to serve as the video case teacher. For this one teacher, we intended to video record all instruction and then edit that footage for one online video case. However, during our preparations for recording and following the critique by Reviewer 2, we were struck by the unique differences between two teachers — Mrs. Cielo and Mr. Abbot.

While Mrs. Cielo emphasized a citizenship or civic purpose for her social studies teaching and did so effectively, Mr. Abbot had taught AP Geography for many years and had developed a depth of knowledge about geography, which Ms. Cielo admittedly lacked. These contrasting strengths and Reviewer 2's feedback led us to the idea of featuring both teachers within respective video cases but with the same curriculum. While Mr. Abbot's case is still in development, we believe that the two cases in the hands of a teacher educator could be a powerful tool for considering the ends to which we put social studies instruction — disciplined inquiry vs. disciplined civic inquiry.

Figure 6
Two Contrasting Cases with Same Curriculum

The screenshot shows a website for 'THE BRIDGING DIVIDES PROJECT' with the tagline 'Using Geography to Develop Civic Competence'. The navigation menu includes Home, About PBGI, Cases, Register, and Staff. Two case entries are displayed, both titled 'Mississippi Brain Drain'. Each entry includes a topic (Human Migration), a persistent issue (What actions are justified in the interest of the well-being of the state?), a central question (Why does Mississippi have a brain drain and what should be done about it?), a powerful learning strategy (Geographic Investigation), and tags (high school, 11th grade, human migration, Mississippi). The first entry also includes connections to a model (Linking Lesson to Unit Persistent Issue and Central Question; Deepening Students' Understanding of the Problem Landscape). The second entry includes connections to a model (text). Each entry is accompanied by a small photograph of a classroom setting.

Conclusion

We are currently working on the curriculum featured in the video case while simultaneously working on the video case interface and materials. As we use feedback and data to improve the curriculum, we anticipate that the video case will communicate our PBGI goals more clearly. Conversely, as we work on the video case to make it more intuitive and user friendly, our ability to use the video case to overcome barriers to the adoption of PBGI will likewise be improved. As we examined the data presented in this paper and considered communicating our rationale and conclusions to others, we uncovered refinements that would further enhance the video case.

Table 2 summarizes key findings and the video case improvements we envision implementing to address each finding. Holistically, our efforts to improve the video case will track along two pathways: (a) foregrounding the geographic content and geographic thinking our video case seeks to highlight and (b) foregrounding what the video case highlights about our PBGI instructional model by clearly defining what can be learned from the case.

Table 2
Summary of Select Findings and Improvements

Select Finding	Video Case Improvement
The viewer needs more contextual information about the case before accessing implementation videos (Reviewer 1).	Add a video introduction that sets up the learning experience to help viewers understand what can be learned from the case.
The video case could feature an opportunity for learners to identify ways to improve the lesson using an evaluation instrument (Reviewer 3).	Integrate a viewing guide with scaffolded questions and opportunities for the viewer to evaluate the lesson in relation to PBGI goals/principles.
The video case could better highlight application of geographic thinking skills and use of key terms. Additionally, students might be guided to better envision how these skills have contemporary relevance for civic problem-solving (Reviewer 2).	Add a second video case focused on the same lesson featuring a teacher who places greater emphasis on geographic thinking. Paired together, the two cases should draw out the contrasts noted by Reviewer 2 and raise interesting questions for viewers.
The curriculum should require interviews with people impacted by brain drain (Student focus group interview).	Fully develop all unit materials, including the culminating activity, to model the type of learning experience recommended by the students.

Mayer (2017) and Brunvand (2010) envisioned effective video/multimedia instruction as an active learning experience for the user. The principles and techniques they advocated can be seen throughout our video case. We carefully organized and chunked the lesson videos chronologically based on the flow of the lesson, a technique that should help the user to more efficiently process new information (Brunvand, 2010).

We added teacher commentary videos to make the internal thoughts of the expert explicit throughout the different phases of the lesson, helping the user to “notice” aspects of instruction that might have been otherwise missed (Brunvand, 2010, p. 250). Bolded text is used to signal key information, such as the persistent issue, central question, and culminating activity (Mayer, 2017, p. 407). Several additional features correspond with best practices in the literature, but this study has also revealed a need to refine and expand our use of these techniques.

As noted in Table 1, we plan to integrate a video introduction to better set up the case and emphasize learning objectives related to both geography and the problem-based model. This practice aligns with Mayer’s (2017) principle of “pre-training” of key terms/ideas (p. 411), and it also incorporates the idea of using “explicit prompts” that supply important contextual information prior to a learning event to support learning (p. 251).

We will also craft a viewing guide that might be used independently by the user or in conjunction with an instructor-led professional learning experience. The guide will be designed to motivate the learner to engage more deeply with the case or, in the words of Mayer (2017), promote “generative processing” (p. 406). It will also include suggestions for interacting with case content (especially when coupled with Mr. Abbott’s case), discussion questions/tasks, and opportunities for guided reflection. This resource will provide clear objectives and tasks for the learner, as advocated by Brunvand (2010), and will be consistent with viewing guides provided by similar professional learning sites (see *Social Studies in Action*).

Overall, we are pleased with the video case, improvements notwithstanding, because we can envision its potential in helping geography teachers overcome barriers to the adoption of PBGI. First, our video case should help these teachers address any content knowledge deficits. The final case will include all materials needed to implement the lesson in the unit *and* all content-related materials used by project teachers during the curriculum development phase. Second, our video case should help teachers develop deeper PCK for problem-based inquiry, generally, and problem-based geographic inquiry, specifically. The commentary section of the case and the enhancements/improvements noted previously, should help teachers grapple with what is required to translate geographic content into meaningful instruction that leads to citizenship thinking and skill.

Third, the video case should help teachers navigate the complexity of engaging students in inquiry. Hearing our video case teachers talk openly about how they navigated that complexity, where they struggled, and changes they would make should assist others in thinking about how they might do something similar in their own context. Last, our work in this project and in previous video case-related work suggests that “seeing is believing.” When teachers see students in other classrooms engaging in deep inquiry, they may become more open to taking the necessary risks in their own classroom.

Ultimately, our next step is to implement a refined version of the video case, during professional development with teachers, as part of our second

iteration of DBIR. Doing so should help us test our assumption that additional models of pedagogical expertise could jumpstart teachers' adoption of PBGI instructional strategies. It should also help us identify features of video cases that are most effective in supporting teachers in adopting practices associated with the PBGI model.

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