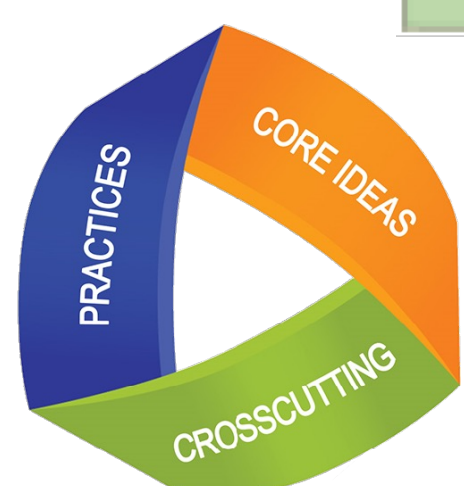
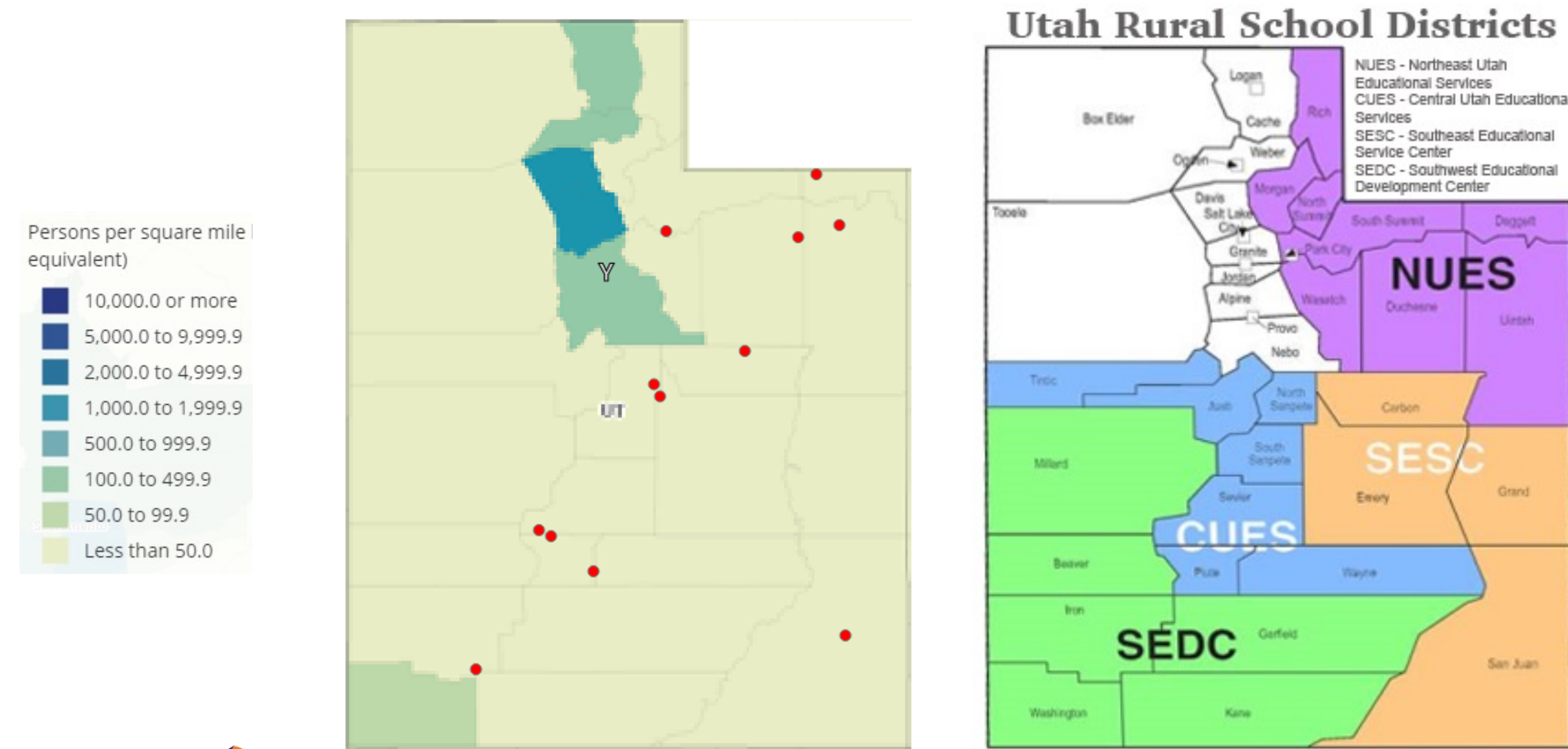


Technology-Mediated Lesson Study: Facilitating Three-Dimensional Science with Rural Teachers

Michelle Hudson, Rebecca Sansom, Heather Leary, Max Longhurst, Josh Stowers, Tracy Poulsen, Clara Smith

RURAL EDUCATION IN UTAH



- Disciplinary Core Ideas (DCIs): Content
- Crosscutting Concepts (CCCs): Lenses
- Science and Engineering Practice (SEPs): Tools

Rural Professional Development

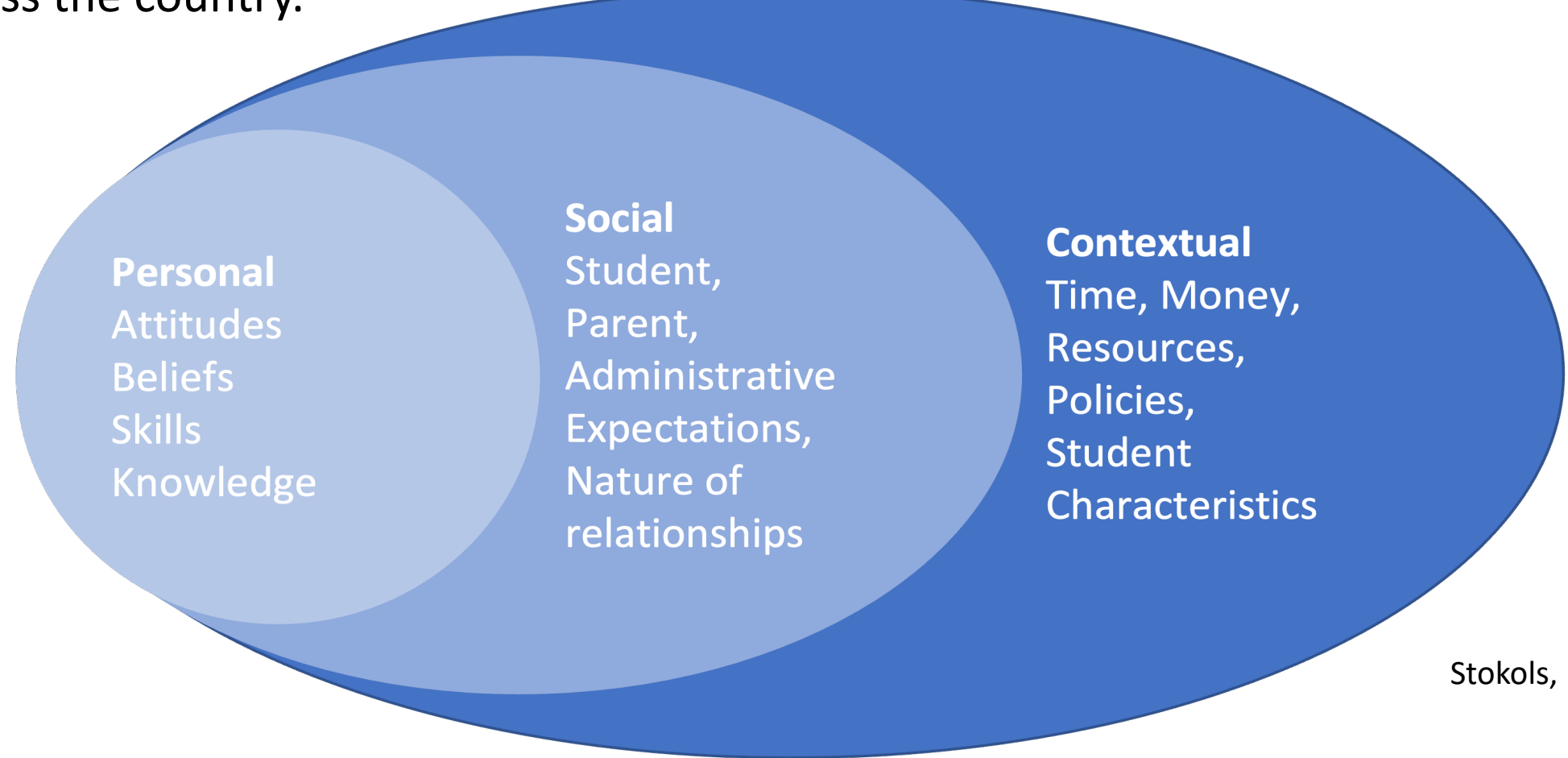
- Effective professional development should be ongoing, collaborative, and practice-based
- Rural teachers struggle with this
 - The only teacher in their field (e.g., physical science) or subject (e.g., biology) in their school/district
 - Geographical distance from other educators teaching the same subjects
 - Additional responsibilities (such as coaching, administrative work, etc.)
 - Reduced access to PD opportunities

PRIMARY GOALS & CONCEPTUAL FRAMEWORK

People. Building capacity for culturally responsive 3D science teaching among rural Utah teachers. Creating community and collaboration within a broader network of rural teachers.

Principles. Designing, studying, and refining Technology-Mediated Lesson Study as a productive model for professional development.

Products. High-quality 3D science lesson plans that can be shared broadly with Utah teachers and with teachers across the country.



Stokols, 1992

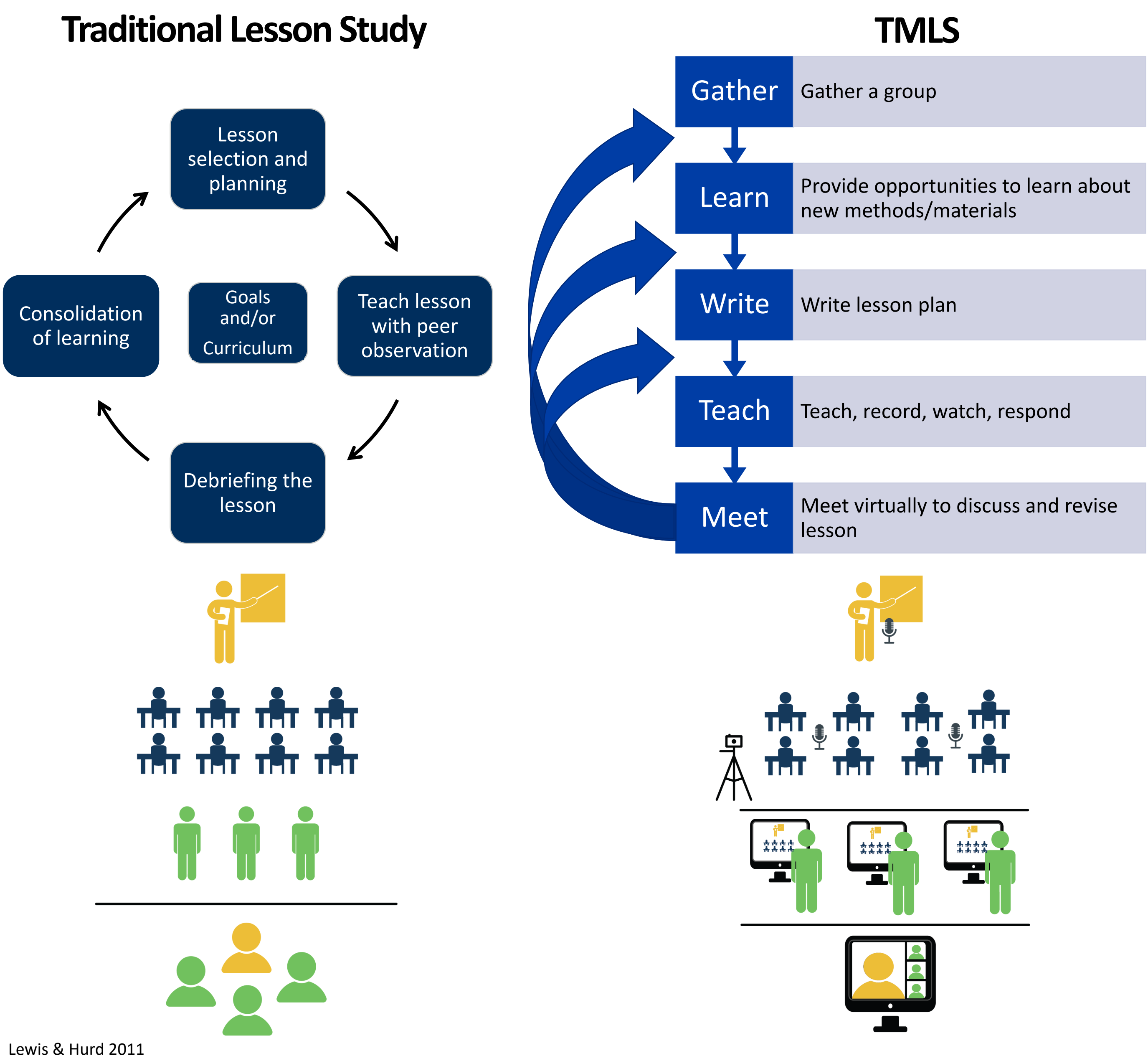
RESEARCH QUESTIONS

1. How does the process of TMLS help rural science teachers make meaningful professional connections and improve their collaboration with others?
2. How does the TMLS process help develop an understanding of 3D science for teachers?

METHOD

- Twelve rural science teachers from across Utah - 3 teams of 4 teachers
- Through the process of TMLS, teacher groups developed high school biology lessons aligned to Utah SEED standards
- Data sources:
 - Comments on recorded lessons
 - Teacher discussions during revision meetings
 - Focus group interviews

TECHNOLOGY-MEDIATED LESSON STUDY (TMLS)



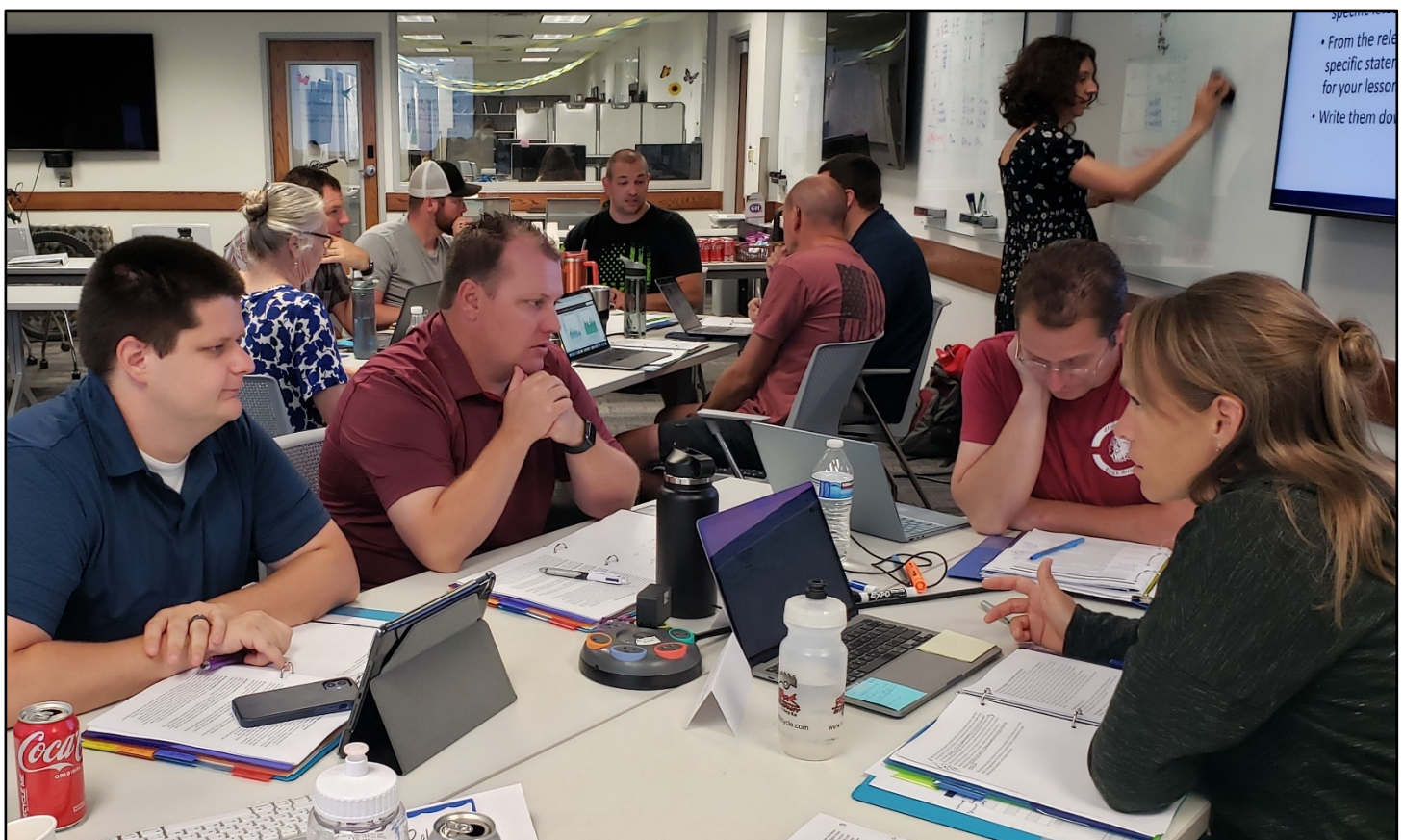
Lewis & Hurd 2011

TMLS PROCESS RESULTS

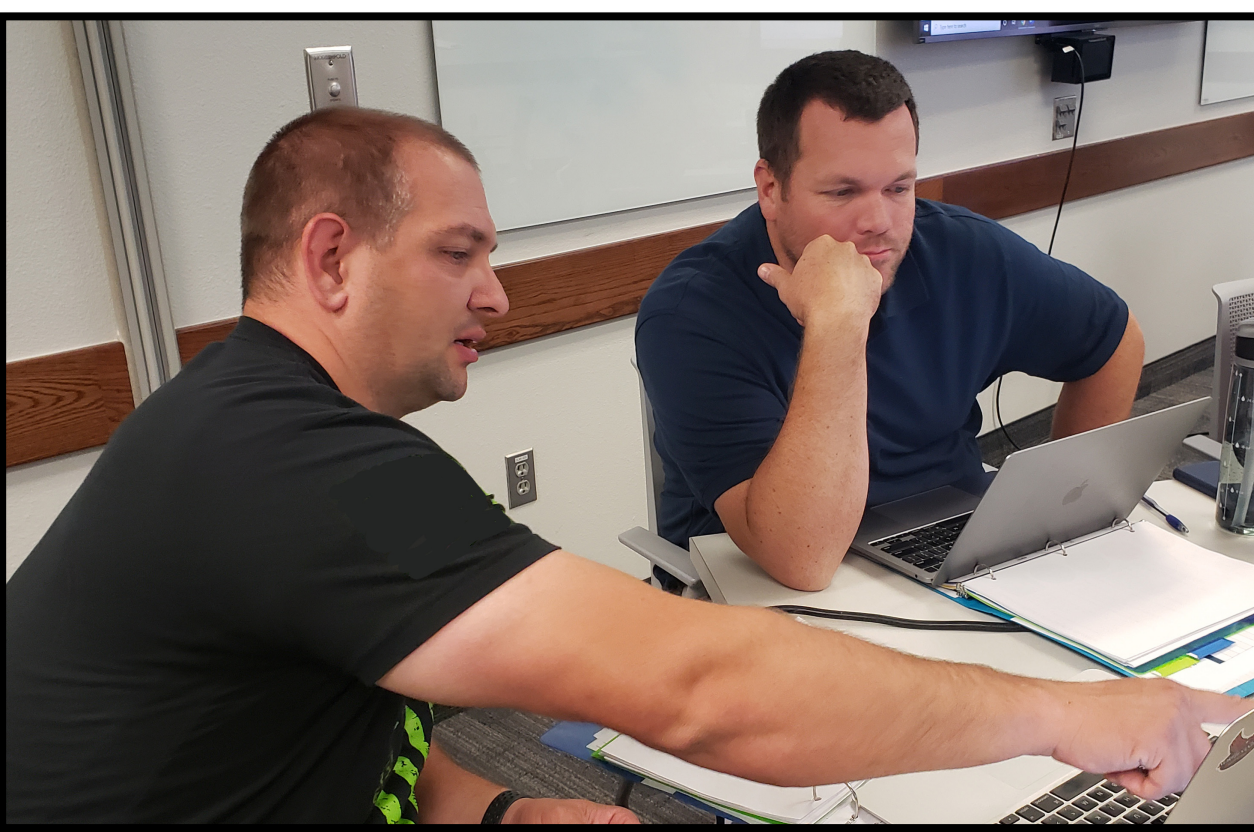
It's so nice having other people...who have different strengths but then also different perspectives. They're going to notice things that I don't notice. And it's so nice having a group that is very focused on creating content and not dealing with school drama. There's no external education problems. We're just creating content.



The DCIs, the SEPs, and the CCCs are now things that are conscious on my mind when I'm planning a lesson; whether I implement every single one, every single lesson is another story. But they're in my mind, and I do my best to implement at least a couple of those things into each of the lessons I plan.



It may take a long time, but then by being able to be a part of a research group like this, you are now afforded some time to really deep-dive into some of those teaching components that are going to really help your lessons.



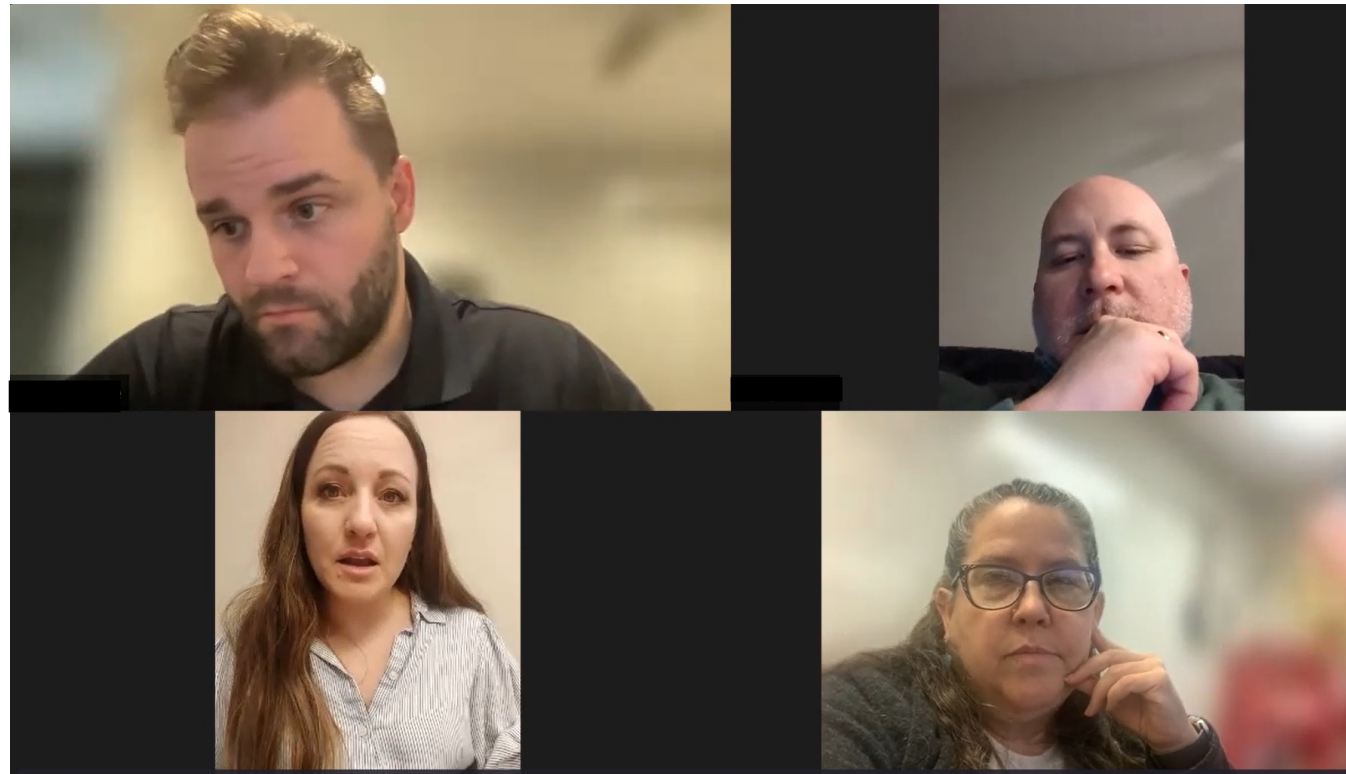
TEACHING, RECORDING, AND RESPONDING TO CREATED 3D SCIENCE LESSONS



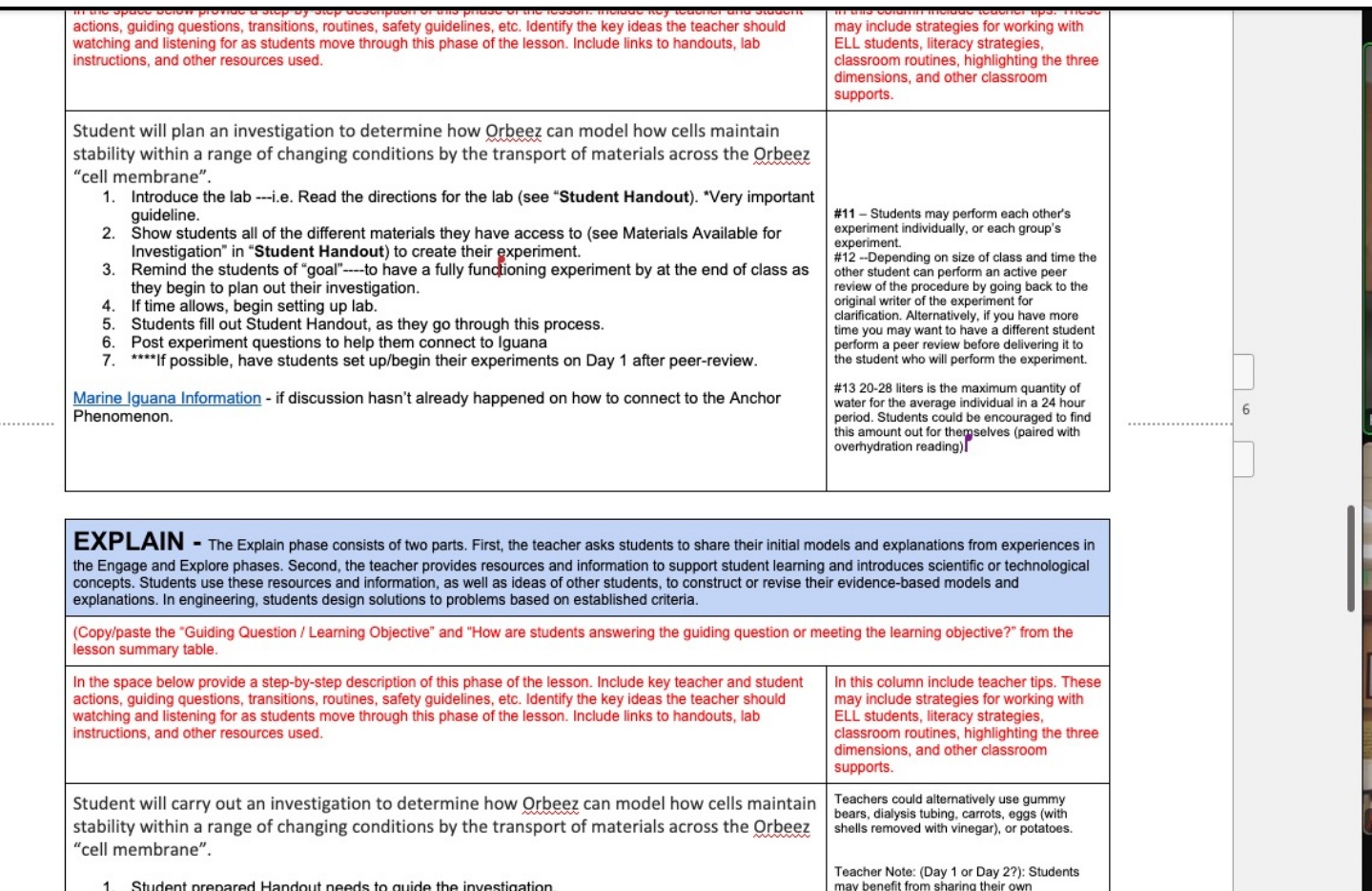
Ronan: I think mentioning explaining the genes that are being changed is something that should be added into the lesson.
EquiP: Sense-making requires performance that integrates SEPs, CCCs, and DCIs
Rich: This activity really gives students a chance to start forming their evaluations and provides a formative look at where students are at.
EquiP: Embeds formative assessment processes throughout
Wayne: I think one of the best things we are doing with this lesson is giving plenty of time and information to help students form an opinion and evaluate what biotechnology is doing.
EquiP: Provides opportunities for students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally and/or in written form as appropriate

MEETING VIRTUALLY TO TALK ABOUT THE LESSON

Ellen: I think adding a slide that says this is what it is, and this is what it isn't. What do you guys think?
Charles: I think more clarity is always better.
Brock: That's the teaching battle we have, right? Our desire to make sure that students understand versus trying to help them learn to figure out some of the things as they go.
Ellen: In my experience, when I spell it out for them, they forget, and they are more likely to remember if they have to figure it out.
Meganne: The slide show, as we have it, doesn't have a list, but we can have the students generate a list, maybe as a check for understanding.
Brock: Right. Because their ideas are creating the definitions. I think this slide is a good idea because it...
Ellen: ...forces them to be part of the lesson.



REVISING THE LESSON BEFORE IT IS RETAUGHT



CONCLUSIONS

- TMLS assists rural science teachers in developing new connections, which strengthen over time.
- The professional development process of TMLS allows teachers the time to practice and develop knowledge and skills that extend beyond the lessons created in this project
- Teachers improve their 3D science teaching skills by writing lesson plans, teaching the lesson one at a time, watching each other teach it, and revising the lesson as a group.

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