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Expanding the Agricultural Educator's Toolkit: Identifying Challenges in Digital Media Production Technology

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Abstract

This study explores the perceptions and experiences related to agricultural educators in Minnesota who have used digital media production tools and concepts as learning activities in the classroom. As the cost associated with digital media production equipment and software continues to decrease, this technology is becoming more accessible and creates the potential for new types of classroom outputs. This type of learning activity is in its infancy in School Based Agricultural Education (SBAE). As more educators look to embed 21st century skill-based projects in their coursework, it is important to begin exploring needs and resources identified by those currently engaged in this strategy. The researchers in this project aimed to better understand how the participants map knowledge and identify gaps when using digital media production as a learning tool. The project examined the motivations, experiences, implementation processes, and future goals of participants. A collective case study was used to explore this phenomenon. In-depth interviews with educators were examined using qualitative open coding techniques. This produced emergent themes regarding lesson design and implementation as well as perceptions of student learning. Educators highly valued this student learning activity to develop communication skills necessary for many career paths. Other emergent themes were an increase in student engagement, critical thinking, media literacy, and transferable skills. The study found barriers to digital media activities such as prior experience with technology, school district resources, professional development opportunities, and lesson preparation time. Educators identified a need for streamlined resources and accessible professional development to fully embrace digital media as a learning strategy.

Keywords: agricultural communication; digital media production as a learning tool; student engagement; school-based agricultural education; SBAE

Introduction

The increased use of digital screens in the American classroom is undeniable. As COVID-19 gripped the world in spring 2020 and has continued into 2022, screens have become an essential portal for the transfer of knowledge in K-12 school systems. The collective knowledge of educational practices that evolved during the pandemic has not yet been fully realized. However, the lessons learned by educators

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will have a lasting impression on how content is delivered in the future. These events have highlighted the need to understand how to use digital media tools to our advantage in all 21st century classrooms and continue research in priority area two of the American Association for Agricultural Education agenda, which calls for research into technologies within agriculture, including School Based Agricultural Education (SBAE) (Roberts et al., 2016).

The rapid advance in technology has opened the door to new ways of work in the field of education. As technology advances, barriers and challenges to classroom implementation are inevitable. However, offering a 21st century education requires navigating these challenges to produce students with relevant skill sets. A 21st century education can be defined as exposing students to crucial skills and processes necessary to become productive members of society, as well as meeting the needs of the current workforce (National Commission on the Future of Higher Education, 2006). Media literacy, coupled with critical thinking skills and the ability to problem solve, are areas that strengthen a student's ability to function (Hu et al., 2008). Engaging students with experiential learning opportunities offer ways to increase a students' knowledge of the lesson's content, as well as communicate results (Hilton, 2007; Merten, 2011). This sharpens student competencies in a variety of areas.

One way this type of instruction is happening in the classroom is the use of digital media production as a learning tool for a variety of subjects (Allam, 2008; Hilton, 2007; Hu et al., 2008; Merten, 2011; Sharkey, 2006). Instead of designing traditional assignments, educators are using digital media production concepts to create new outputs, including videos, podcasts, vlogs, infographics, and photo essays (McDonald, 2009; Reeder, 2005; Tatebe, 2011; Theodosakis, 2002). Digital endeavors are not void of barriers and frustrations. It is important to understand variables that influence the successful implementation of technology in SBAE to guide future educational plans. For example, Williams et al. (2014) writes, "In order for agricultural education teachers to adapt to an ever-changing educational environment, they must possess the skills necessary to integrate technology into their classrooms," (p. 1). Kotrlik and Redmann (2009) found different barriers and influences on technology adoption:

> The availability of technology and gender are predictors of the extent to which agriscience teachers had adopted technology in their teaching, with female teachers and teachers with higher levels of available technology being more likely to adopt technology for use in instruction (p. 71).

Despite challenges, some agricultural educators are pushing forward and working to improve their professional practice for student learning (Easterly & Myers, 2019), making a focused examination of this type of work worthwhile. As educators develop their tools and implement these strategies, they are gaining knowledge and experiences. The primary goal of this study was to examine the lived experiences of agricultural educators in Minnesota as they use digital media production as a learning tool. The term digital media carries a wide range of definitions which can be argued based on culture and context (Dewdney & Ride, 2013). In this context, *digital media* is being defined as a product or artifact that can be examined, viewed, heard, or engaged with by interaction. For the purposes of this study, we define the term *digital media production* as the process in which digital files are created, enhanced, encoded, and distributed using numerous methods via computer hardware and software applications. These files represent assorted media types, including audio, video, graphic, and written content (Turcotte, 2022).

Conceptual Framework

Community of Practice (CoP) has been employed by many educational researchers as a theoretical lens to better understand student and teacher learning (Adler, 1998, 2001; Frade et al., 2009; Graven, 2004; Grisham et al., 1999; Hanson-Smith, 2004; Hung, 2002; Hung & Nichani, 2002; Johnson, 2006; Winbourne & Watson, 1998). In their seminal work, Lave and Wenger (1991) proposed that learning has a process referred to as "legitimate peripheral participation," in which "learners inevitably participate in communities of practitioners," (p. 29). Legitimate peripheral participation allows learners to enter a community, examine the interactions of newcomers and established members, and slowly take up shared practices (Lave &

Wenger, 1991; Hoadley, 2012). Wenger (1998) evolved the theory by describing CoP to be bounded by three interrelated dimensions: mutual engagement, joint enterprise, and a shared repertoire. In a more recent iteration of CoP, the theory has been operationalized for professional development (Wenger et al., 2002).

Wenger et al. (2002) described three specific components of a CoP: *the domain, the community,* and *the practice.* The *domain* refers to a shared domain of interest where there is a shared competency separating members from those outside. In pursuing their interests, members engage in joint activities and discussions, help each other, and share information. This interaction creates the second component of CoP: the *community*. It is important to point out that in CoP, members do not just share a common interest, rather they interact and learn together to create a *community*. Without this interaction a CoP does not exist. In a CoP, the community is defined by the group's emergent relationship around a topic (Cox, 2005). The final component of a CoP is the *practice*. This refers to members being engaged in common activities that create a basis for group learning. This is not immediate, as Wenger (2011) writes, "Members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice. This takes time and sustained interaction," (p. 1). For the purposes of this study, researchers employed Wenger et al. (2002) components of *the domain*, *the community* and *the practice* as the conceptual framework, and defined CoP as "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in the area by interacting on an ongoing basis" (Wenger et al., 2002, p. 4).

To operationalize CoP as the conceptual framework, the researchers identified the participants as members of an emerging CoP. A CoP can emerge because a group of individuals are working toward achieving the same pre-defined learning goals (Barab & Duffy, 2012; Goodyear et al., 2014; Hoadley, 2012). Participants in this study were identified as being part of a CoP in its infancy – based on data acquired in the interview process, as well as numerous prior interactions between the researchers and participants, including at training sessions, conference presentations, discussion groups, FFA contest preparation and participation, and advising sessions – that was beginning to demonstrate a shared interest, to seek out interaction opportunities, and to express need for more shared resources connected to using digital tools in their classrooms.

While identifying and confirming participants, researchers looked for early indicators of CoP components. Specifically, each participant demonstrated interest in using digital media production as a learning tool in their individual agricultural curriculum. There were also many examples of interactions between the participants in which they shared information, had formal and informal discussions around learning activities, and interacted during workshops, conference presentation sessions, and in other non-formal settings related to the shared domain of interest. These interactions are the basis of this emerging community. The practice is admittedly the least defined of the three components for this emerging CoP, and a component that we sought to better understand in our research. However, observations and interactions with the participants indicate they are moving towards a shared repertoire of resources and desire to strengthen their mastery of tools and processes. It should be noted that this emerging CoP is not limited to the participants of this study and the exact number of members is unknown but is thought to be a small percentage of the over 200 agricultural educators in the state.

Participants in this study do not work in the same school districts and do not have daily interactions, but they are engaged with each other through informal and formal communication channels that foster group learning focused on this topic. This is common in a CoP. In a survey of CoP literature, Johnson (2001) found that CoPs "form out of necessity to accomplish tasks and provide learning avenues, and they exist within, between, and outside defined organizations" (p. 48). Lewis et al. (2011) also writes, "within communities of practice, knowledge unfolds through a process of mutual engagement and collaboration, allowing for both informal and formal education to occur" (p. 157). In addition, Wenger (1998) writes, "Based on joint learning rather than reified tasks that begin and end, a community of practice takes a while

to come into being, and it can linger long after an official group is disbanded" (p. 96). Identifying the participants as being a part of an emerging CoP established a path for examining ongoing group learning efforts and opportunities to strengthen the CoP.

Purpose and Research Questions

The study was framed as a starting point to learn from those familiar with using digital media production as a learning tool in SBAE. The research questions explore motivations, challenges, successes, and appropriate areas to foster improved learning in this area. The overarching question that guided this study was: How do agricultural educators describe the experience of using digital media production concepts as learning tools in the classroom? To answer this question, the following research questions guided our study.

RQ1: What is the *domain*, or areas of common ground and motivations, that guide learning and give meaning to actions?

RQ2: How does this *community* share knowledge and build social fabric? Where are the gaps in that knowledge?

RQ3: What resources are needed for the community to maintain a shared *practice* and continue to develop new ways of working?

Reflexivity

This was a qualitative inquiry and data analysis was solely conducted by the researchers. This mode of research is subject to the bias of the researchers conducting the study. To ensure validity and follow best practices for qualitative inquiries as described by Creswell (2014), researchers reflected on our positionality to the topic under examination. All researchers involved are current agricultural communication faculty at the University of Minnesota. Their areas of expertise include oral presentations, professional writing, science communication, educational leadership, market analysis, content design, and media production. None of us have a background or are assigned to teach coursework in teacher preparation; however, all researchers have been actively engaged for many years in developing and delivering professional development workshops for current agricultural educators. As such, data linked to classroom assessment practices, institutional influences, and specific student/teacher experiences may have carried bias, or been missed, in this project. To limit the potential of bias created by our positionalities, we conducted the study in a "rigorous, systematic, and ethical manner" (Merriam, 2002, p. 24) and took steps to ensure trustworthiness, including member checks, enacting strategic interview protocols, triangulation of data, and considering multiple perspectives when analyzing data, all of which will be explained below in more detail.

Methods

A deeper understanding of the processes and barriers practitioners face when framing their instruction was key to this study. A case study was chosen as the mode to examine the experiences of ten agricultural educators within Minnesota. Creswell (2013) classified this as a *collective case study*, "in a collective case study (or multiple case study), the one issue or concern is again selected, but the inquirer selects multiple case studies to illustrate the issue," (p. 99).

The study relied on purposive sampling. Esterberg (2002) described purposive sampling as when "you intentionally sample research participants for the perspectives they may have" (p. 93). The researchers identified potential participants for the study based on prior interactions and educators' active engagement in using digital media production in the classroom; this process yielded seven participants. In addition to this targeted recruitment effort, a series of recruitment emails were sent out through a statewide listserv with the intention of tapping into the pool of unidentified educators interested in this practice. The recruitment email produced three additional participants. All participants were purposefully selected for interviewing based on the following criteria: a current K-12 agricultural educator, a desire to apply or has applied digital media production as a learning tool in the classroom, and over the age of 18 years old.

The interview guide consisted of 13 questions. We addressed potential researcher bias when developing the script by reviewing for potentially leading questions. In addition, during the interview process we were mindful to allow interviewees space and opportunity to describe negative experiences, limitations, and challenges with the use of digital media production to further avoid potential researcher bias. The interview script focused on four areas of inquiry: motivation, educational experience, implementation, and future goals, in order to connect questioning to our conceptual framework. For example, participants were asked, "Do you want to be able to use digital media production technology as a learning tool in the classroom, and why or why not?" This line of questioning had the potential to gain a clearer understanding of a person's motivations to engage in this type of work and clarify why the person entered *the domain* component of this CoP. Participants were asked to expand on their knowledge base and experience when asked, "What is your prior education, experience or training in regards to digital media production education?" This led to expanding on their knowledge of digital media production when implementing activities. They were also asked, "Would you describe a success and failure you have had when using digital media production as a learning tool in the classroom? What made this a success/failure? How might it be improved?" A focus on past educational experiences and implementation strategies can reveal gaps and areas of progress within the CoP *community*. Examining future goals might improve understanding of where the CoP's *practice* is headed, for example in questions such as, "Can you describe a specific assignment that you would like to be able to implement in the classroom which employs digital media production skills or concepts?"

The interview process started prior to the COVID-19 shutdown which forced our educators to provide online instruction. Three of the 10 participants were interviewed pre-pandemic in early February 2020 with the final seven participants being interviewed in late April and early May 2020. Interviews were conducted via phone or Zoom and the audio was recorded via a digital recorder and ranged from 25 minutes to 1 hour in duration. Field notes were taken by the researcher conducting the interviews to document the conversation and take note of anything that may not have been captured by the digital recording. The recordings were transcribed. Multiple reviews of the transcripts from multiple researchers served to decrease potential bias. After listening to the interviews, the first read of transcripts focused on viewing written words for new perspectives on the data. Next, the recordings were listened to again with the same purpose in mind. Following this step, the transcripts were read a second time. During this pass, the initial coding process began. The first review of the data was conducted to identify emerging themes. Esterberg (2002) referred to this process as open coding. In this phase, Esterberg suggested, "…you work intensively with your data, line by line, identifying themes and categories that seem of interest," (p. 158). We dissected the data by underlining any statement, topics, or words that helped answer our research questions.

Once open coding produced initial themes, focused coding was enacted, in which we returned to the key themes identified during open coding and compared them in a line-by-line analysis of the data. A color-coding system was used to categorize themes. Specific notes and descriptions produced by the researchers were considered as well. Emergent themes were organized in relation to the study's conceptual framework. The participants were then contacted for a member check to clarify interpretations of their responses. In this follow up, participants were given the chance to comment on the emergent themes and offer more description or clarification.

Limitations of the Study

This study is a snapshot of CoP members based on their own lived experiences, perceptions, and self-reporting. The conclusions are ongoing as this emergent *community* continues to gain experience, interact, and share ideas. This clearly creates limitations of this specific study. According to Brutus et al. (2013), self-reporting limitations such as selective memory, exaggeration, and the merging of recalled events are present in qualitative inquiry. The small sample size involved, purposive sampling strategies, and local examination of participants only being from Minnesota are additional limitations. Expanding the

sample may expand our understanding of challenges and barriers. The rapid pace of change in technology also creates a limitation to the experiences of these participants and our insights. As more user-friendly applications become available, the learning curve for technology flattens. Findings are specific to these participants and this moment in time. It is important to consider this study as a starting place to spur more in-depth, ongoing inquiries that can address these limitations.

Findings

We found common motivations for this CoP's domain, including a shared belief in the importance of digital media skills and media literacy for today's world, the high transferability of digital communication skills, and the desire to continuously strengthen student engagement with classroom activities. Our research also uncovered important shared knowledge, and gaps in knowledge, among the community, including desire to work with peers to build digital competencies and to create relevant, creative, and tested instructional strategies that incorporate digital tools. We also found a need for more resources that increase teacher confidence levels with digital tools and more hands-on training opportunities so teachers and students can practice using digital equipment. Our findings are shared in detail below and organized around insights connected to the CoP domain, community, and practice.

The Domain

Emergent Theme: High Value to Students Motivates Membership to the Domain

21st Century Skills. This group of agricultural educators make it a priority to prepare students for a 21st century digital world. Participants shared a clear understanding of the importance of this type of instructional design for the development of their students' skill sets and to strengthen media literacy. For example, Participant 3 stated, "It teaches them tools that I believe are going to become much more frequent in the future." Regarding instructor motivation to offer this type of learning activity to students, Participant 4 said:

> I think it's a great way for them to research and find information and filter it out. What's good and what's not so good, but also as a platform to create and hopefully inspire other people who are watching or reading the content that they're creating. Whether it be through a podcast that they create or an infographic or a blog post or something that they write up, not only how to develop their communication abilities, but also their ability to think critically...and how they are becoming digitally informed citizens.

Some participants described their desire to enhance student engagement and meet students where they are, since many students have already integrated digital tools in their life. Leveraging the amount of screens and technology that are present in today's classrooms was expressed by multiple members. Participant 5 added, "I feel like giving them more of a purpose with that technology. It can show them what they're really capable of and could also help to ignite passion." Participant 1 acknowledged that these tools can also be also distracting and challenging, which can be a detriment to the classroom. However, in their view, benefits to a student's learning outweigh potential pitfalls.

Some participants also connected technology to transferable skills and career opportunities. This is described in more detail below.

Transferable Skills. The motivation of providing a platform to develop transferable skills was a key insight provided by the participants. In regard to their students, Participant 4 said, "They're going to be the people creating and editing and consuming material from technology in the future. So it is so important in the classroom." Participant 9 stated, "I think that where we're at as a society and where our jobs are, especially if we think about right now during the COVID situation, how much we're online utilizing video and digital media is such an important thing." Participant 2 explained their motivation to engage with this learning strategy:

> I think teaching students skills that they can transfer into any profession is really important. So that's one of the main things, looking at teaching communication and different skills, like video production in class, I think is really important….agriculture can just be a tool for them to be able to use or to be able to learn those different skills.

Educators also spoke of their own gap in digital skills as a motivational factor, as described by Participant 6:

> They're (students are) also working on skill sets that, as we are learning this week with COVID-19, may become more valuable as time goes on. Because they're learning…learning Zoom, learning all kinds of additional software right now. And video production has been something I wish I had a stronger background in right now.

A key takeaway was also the explicit need for students to hone digital communication skills focusing on agriculture. Educators expressed the importance that agricultural communication plays in their local and regional markets. These CoP members feel responsible for providing their current students opportunities to develop these transferable skills to positions of leadership and advocacy. For example, Participant 7 stated:

> One of the big reasons I became an Ag teacher was to encourage students to be advocates and to tell their story of agriculture…I think there's value in encouraging them to get their message out there, teaching them ways to get their message out there.

Heightened Student Engagement with Content. When students use this type of technology in the classroom, participants found that student engagement levels are heightened. Participant 2 reported, "oftentimes when students are doing some type of video or audio production, it seems like they're reaching that higher level of learning." Participant 3 has observed the connection to student activities outside the classroom as an opportunity to engage students with course content. Participant 3 explained:

> I think when we produce videos in our classes, it actually engages the kids a lot more because it's not something they're necessarily used to. It's something that they engage with a lot outside of school in a more fun setting like YouTube. So being able to teach them the tools that they need to do that well, helps them kind of buy into what we're teaching them in class as well.

The educators reflected that they observed an increase in student motivation and responsibility for their own learning using these classroom activities. Participant 5 stated:

> They always seem to have more interest when it's something that they really feel like they did. When they come up with the idea and when they can say they can be proud of what they created…it shows them that they're capable of overcoming some of these challenges that I put in front of them. They can really do something they're passionate about, or look at something that they're passionate about and have a little bit of ownership in.

Participants see value in this teaching strategy because it expands opportunities for students to express their knowledge of content, which in turn helps to reach the entire classroom. Participant 6 stated, "For some students they can communicate, articulate their knowledge gained better through that (digital production) then through a test or a written paper." Participant 8 said, "I think we need to use video technology to help reach them (students). There are still some that are very traditional learners, but I think it helps us reach everybody."

Developing Higher Order Thinking Skills. Tapping into higher order thinking skills such as creativity, collaboration, critical thinking, and problem solving were identified by the participants as key motivators. Participant 4 expressed:

> I really think that as teachers, one of our goals is to inspire creativity in kids. And I think one of the best ways we can do that, one of the most relatable ways we could do that, is by giving kids the

> chance to stand behind the camera or stand behind the microphone and come up with the product themselves.

A desire for new hands-on learning experiences for students emerged as a primary theme cutting through instructional strategies. Digital media production was found to be an engaging hands-on experience for students and a format that challenges a student's thinking processes. Participant 3 explained, "One of the big things is they definitely get a lot more hands-on experience and they're creating something versus just trying to memorize information, which is huge. It actually engages their brains quite a bit more."

Additionally, the benefits to student learning was identified as a key motivational factor. Participants observed how students process information and communicate their own learning in a non-traditional classroom activity. According to Participant 5:

> It gives them another outlet to show me what they've learned. I tell them that all the time, I don't want them to memorize and spit back at me. I want them to show me what they've learned, and this just gives me another outlet and gives them a way to let their brains work in a different way.

The learning opportunities that digital media production provides is the focus of these educators. Quality and subjectivity of the content students are producing were challenges when first offering these activities. However, participants stressed this student engagement opportunity is best capitalized upon by focusing on content learning and not technology mastery. According to Participant 6, "I'm not grading very heavily necessarily on the quality of that video. I'm just, in a lot of cases, I'm excited that the kids got it done. So I'm looking more for that content piece at this point." Participant 7 stated, "I need to make sure that I have a rubric, not necessarily on their proficiency with the technology, but more on how they manipulated and understood the content."

The Community

Emergent Theme: Community Interactions are Focused on Gaps in Knowledge and Instructional Strategies

Peer Interactions are Key to Learning Technology's Potential. As discussed above, the high value that these educators expressed in regard to student learning and skill development when using these technologies bonds this group and shared domain. As educators work to refine their instructional approaches, they are beginning to develop practical tools and applications. The process of developing new activities and resources can be an individual experience at times. However, when barriers or challenges present themselves, this group leans on interactions within their peer group and community. Participant 7 explained, "I don't really contact technical support when I have an issue. I talk to other teachers because usually the tools that I use have been recommended to me by other teachers." This group indicated that these types of interactions within the community are a normal occurrence when faced with a challenge or barrier, and successful practice sharing is often the focus of interactions. These interactions are what has formed this specific *community*.

The use of digital media production in the classroom is not a foundational skill set participants found in their teacher preparation programs. The challenge of building competencies with these technologies was addressed within the *community*. These educators explained they lean heavily on peers when it comes to developing traditional assignments, technologies, strategies, and other resources. It was also true for developing lesson plans in this context. Participant 10 explained where they look for materials when preparing a lesson in digital media production:

> I have collaborated or asked other agricultural teachers in my content area, outside my school. We have some different resource groups within the agricultural education profession. We have some Facebook groups, we have some online platforms where people share resources.

Educators found their peer interactions were key to learning within the *community*. Technical support within a school district produced varied success when troubleshooting or researching new technologies. Again, this group looked to peers for leadership and advice with implementing digital media production as a learning tool. Participant 4 outlined where they look for advice:

> People who are in the trenches with me as high school teachers. I know some other teachers across the state that like to use digital media in their classroom as well. So I like bouncing off ideas of successes and challenges with them.

Interactions can be categorized as ongoing conversations on blog sites and teacher message boards as well. Participant 5 stated, "A lot of the times I do look on different ag teachers sites specifically, the ag teacher discussion labs; NAAE communities of practice aren't updated as much anymore, but sometimes I fall back on that." When existing resources do not yield the information they are looking for, these educators look for direct conversations to spawn creative solutions. According to Participant 2, "A lot of this stuff that I've come up with, that I've kind of developed, has been either my own brainchild or connecting with people on Instagram and seeing what they do and then making it work for our classroom."

Time to Prepare Lessons. The participants expressed pitfalls to using this technology, specifically the time it takes to learn the applications, as well as gaining access to hardware and devices. This tends to take time away from main content areas and stands in the way of full embracement of this learning activity. Participant 7 explained, "The time that it would take to teach my kids video production technology would come at the expense of teaching my content." Participant 10 added:

> I think the biggest one is just taking the time and having students be familiar with how to use a platform or program that I want them to use…so I think the biggest struggle is just, how much time do I want to allocate to teach students how use this program or use this platform that we might only use once or twice.

The possibility of mismanaging instructional time due to new technologies was a cause for concern with this group, as was the preparation time for many of these instructors. Frustration came into play when preparing for these types of assignments. Participant 5 explained:

> I would say one frustration would probably be me just not understanding it. When I'm trying to implement it, I would say 9 times out of 10, I try to make sure that I have a really good understanding of it beforehand. And so if it is hard for me to use or I just haven't had the time to look at it and utilize it, that is probably the hardest part.

Strategies that were offered to navigate the learning curve with these technologies again produced time management challenges. One strategy mentioned to overcome time management challenges was learning these technologies alongside their students. According to Participant 2, "We (their students) just kind of learned together and kind of figured it out, what was the best way to implement it." Participant 6 said, "I was learning with the kids and I have no problem learning with the students, but it takes time to learn all that, you know, the software and that kind of stuff."

Access to Technology. The barrier of consistent access to technology produced ongoing frustrations as these educators navigated challenges to implement digital media production in their classrooms. Participants described the challenge of dealing with wide ranges of technology compounded by little experience with equipment. Participant 7 stated, "Doing like a legitimate video production is pretty daunting because that's a lot of expensive equipment or software that we might need to avoid." Participant 7 continued, "You would really have to be able to show the value that it is going to improve instruction." Participant 6 offered this perspective:

> Not knowing exactly what's even out there, you know, even if I was going to go purchase, I'm not sure what I'm looking for…it's a matter of what's available? What's good? I mean, I can read consumer reports all day long, but what actually works, what doesn't. You know that just takes a lot of time to sift through, and then, you know, the cost benefit analysis on each of those software and hardware options.

A key insight that emerged from participants was the belief that funding plays an important role in their ability to implement such technologies. Participant 5 explained:

> I would have to say my biggest challenge is funding if the program costs money. And how are we going to do *that* because we have Chromebooks? It's really interesting. The fact that not a lot of apps or software is necessarily supported by that type of technology.

School districts tend to have a wide variety of technologies offered from district to district. This in itself is perceived as a barrier to effective instruction by the participants. Participant 7 stressed "making sure that whatever I'm using is compatible with the devices that my students have access to." According to Participant 3, "Finding technology that works with a variety of different devices would be the other big, big piece." Inconsistent technology, lack of continuity, unstable funding, and little prior knowledge with cross platform options affects the streamlining of *community* interactions between members and emerged as a barrier. Participant 3 explained:

> Every kid has a different kind of cell phone, Apple, Android, no cell phone at all. Kids have access to Chromebooks here. We have access to a Mac computer lab and we have access to a PC computer lab and the different software, the editing software is different on all of them. It feels like…that's one of the biggest challenges. There is such a variety of different things that trying to make that anywhere near consistent would be challenging in the fact that the finances aren't there to make that consistent.

Time management and access to technology have a profound effect on an instructor's ability to implement these strategies. These two emergent themes are illustrated in context when Participant 4 elaborated on their process of introducing production software in their classroom:

> So I have to figure out a platform that's accessible for them that they can download and have on their Chromebook. And then utilize it on the internet without the internet crashing. Then I'm teaching myself how to use it, and then teach them how to use it. So there's a lot of elements in place and it's a little bit overwhelming. I find teaching myself how to do something, no big deal, but it's just kind of the fear of…well, I'm going to teach myself and then will I be able to teach kids how to do it? And will the technology that we have in our school support 35 kids using this platform in the same room with the same Wi-Fi connection or will it not work? So it's kind of a big risk that you're taking.

Experience and Confidence with Technology. This group of educators value this type of learning experience for their students but are oftentimes left on their own looking for relevant resources when developing specific lessons. Barriers of implementation also stem from the lack of prior experience, relevant resources, and personal education. As these educators navigate barriers within the *community*, working solutions and areas of interest are evolving.

Many participants desire a higher confidence level with this technology to design and produce effective teaching activities. This desire stems from a lack of formal education with these technologies. Participant 4 stated, "Video production is probably the one that I feel the least prepared or comfortable about modeling in my classroom simply because I never really took a class on it in college or in high school." These educators are relying on resources they have found or have been recommended within the *community*. Participant 2 stated, "I've just kind of recently jumped in with both feet as far as video and audio production." Participant 2 continued, "I did not have any college classes on it to be honest, I am very much self-taught." Participant 8 claimed they had "no formal training, that's for sure. It's trial and error." This theme was echoed by Participant 3 when they reflected, "I guess the biggest barrier (to implementation) is going back to my education."

The lack of formal education and obtaining information from secondary sources stunts the rapid growth of confidence within this group of educators and is perceived as a key barrier to effective implementation. Additionally, it was found that there is a lack of recent and relevant educational

opportunities to build skills and confidence levels in these areas. Often their own high school experiences were referenced. Participant 5 shared:

> My only experience that I can think of offhand comes from high school. We used a lot of iMovie to create different things. And we had video recorders that we could check out and MacBooks that we could use or Mac desktops, but thinking through my college experience, I had slim to none in training.

This lack of confidence, coupled with the rapid progression of technology, creates a negative perspective on the potential reality of successfully teaching these skills in their classrooms. This is described by Participant 7 in the following:

> It is really intimidating to look at a program that you've literally never looked at before and try to figure out how it works before your kids get in there and do it. Cause you have to be able to answer questions.

Nonetheless this group of educators has looked beyond their lack of formal training in this area with the intention of improving their knowledge base and boosting their confidence levels. The group is working within the *community* to develop resources and processes. As formal and informal interactions continue within the *community*, these educators begin to create vetted strategies and tools to support student learning. This collection of processes makes up the *practice* of this CoP. Next, we discuss emergent themes identified by these educators about the practice that have the potential to flatten the learning curve and open access to more CoP members.

The Practice

Emergent Theme: Educators Desire an Intentional Effort and Varied Resources to Improve Practice

Organized, Structured Interactions in the Practice. An emergent theme was the desire to have ongoing structured conversations in order to increase confidence levels and instructional aptitude. Members currently share resources and tools at agricultural education conferences where participants also access training sessions, presentations, and impromptu exchanges of ideas. Within Minnesota there are only two dedicated statewide SBAE conferences per calendar year. It was found that only having two formal meetings a year may not be congruent to the rapid pace of technological shifts.

When developing or identifying materials that work well, educators said materials are not always distributed effectively due to the lack of intentionally structured interactions. Participant 6 explained, "That's the other problem I'm running into right now is everybody's got content and everybody's willing to share, but what's good? What's bad? And then where do you keep it to remember that?" Moving training or resources online was a strategy that emerged. Participant 3 explained, "When I went to workshops, either summer or winter conference, those are the places that I would mostly get my information. But having easy YouTube videos or online things that I could use as a teaching tool would be super awesome."

Streamlined Resources Dedicated to the Practice. Participants expressed the desire to streamline resources that have been tested in the field. This included best practices, user friendly equipment and software, media examples, and instructional assessment strategies. Participant 6 explained the current unfiltered process of looking for resources:

> It's been trial by fire. YouTube is a big one. And then as I come across things. It's amazing how when you put your email into something and then all of a sudden, all kinds of stuff starts showing up, but then you have got to siphon through what's good, what's bad, how this one's going to cost too much. And what's available in the cost price range that kids can use.

Instructional tools such as rubrics, lesson plans, media examples, farm tours and how-to videos were also specific areas of desired professional content. Participant 7 stated, "I think that the biggest thing that I can do for the assignments is to show them examples." Finding relevant examples and developing

effective rubrics takes time and can affect educators' confidence levels, which can lead to confusion on how to develop materials for instruction. Participant 6 explained:

> I think part of that is because the (agricultural) content is what I'm comfortable with. I know going forward, you take a look at everything that's out there, the YouTube videos, the blogs, the video blogs, all that stuff. It's going to become more important on how agriculture tells that story. And the more kids we have trained on that, the better we're going to be, but I don't know that I'm confident enough telling kids this is what needs to happen and what should be on that video screen. Or to be able to assess that and tell those kids that this is the way that it has to be done.

Participants voiced that there is a struggle with developing assessment strategies based on their own competency levels with the technologies. There was a desire for the intentional sharing of these tools to help offer more effective student learning. Participant 4 reflected on presenting a digital media assignment when not having well vetted materials at their disposal:

> I didn't really give them an example of how or what to model, that kind of needs to be done. I kind of dug my own grave a little bit. I sort of showed them the graphic design. It wasn't going to be the best because I didn't really teach them that much about graphic design. But when I do give them an example or when I do provide them with an example, or rubric, or something, that's a little more concrete. That says this is what you should kind of be looking for.

Hands-on Training Events Specific to Practice. These educators reiterated that training would cut down on lesson preparation time and build confidence levels. Identified variables that were affecting this group's learning were found in the areas of technical support, available technologies, faculty size, and geographic location. To improve the *practice,* educators wanted more hands-on training with resources to broaden their understanding of the potential of digital media production as a learning tool. This would help them teach and plan more relevant lessons that integrate digital tools. The reinforcement of streamlined resources through hands-on events was desired to broaden the view of these technologies and gain instant feedback in real time. Participant 8 offered the following:

> I think students and teachers kind of come at it with a narrow lens, like this is what we've seen. So this is what we know we can do. And I think there's a lot more out there. And so I think that becomes a challenge. I do think distance learning obviously forced us out more, but I'm sure there's still so many more cool things we could do.

Participants do not want to be an expert in digital media production, but rather to be competent and able to offer more opportunities for students. Participant 3 suggested:

> Maybe I don't have to be the expert, but I can take a video of someone who is an expert and share that. That would be really helpful…What would be super useful would be somebody else who is an expert knowing this is going to students and teaching students about it and me being able to share that.

Discussion

The findings of this study are specific to the bounded unit that participated in this research and are viewed through the conceptual lens of CoP. The participants in this study are in the initial stages of a developing CoP. They have embarked on the process of learning and sharing resources to strengthen the *community* in order to refine and improve instructional techniques with digital media production in the classroom. Framing the group as an emerging CoP gave emphasis to members' process of learning as a group. The findings are a primary step to clarifying areas of opportunity and refinement within this CoP as members learn to use digital media production technology as a teaching tool for their students. This project revealed the participants are learning in a decentralized process as they work on refining their own individual teaching practices and lean heavily upon other agricultural educators' experiences to inform their practices.

Membership in a CoP is based upon a shared domain of interest where there is a shared competency. In this case, the *domain* is defined as users or those interested in using digital media production as a learning tool in their agricultural education classroom. This shared domain can be linked to their motivation to engage in these educational practices. The snapshot of this group's motivation to become members in the *domain* was examined to better understand the practices and interactions within this CoP. Members felt this method of instruction was of high value for their students. There were frustrations and barriers that this group experienced in the instructional process; however, these frustrations and barriers did not deter the group from moving forward and learning how to engage in this practice more effectively. The continued development of new tools and resources by members was evidence this group believes in a student-centered philosophy of teaching. The members placed a high value on the skill development students gain with these technologies. In addition, members are motivated by offering these activities to better prepare students for future careers, to help them develop transferable skills, and to engage in higher order thinking, similar to Reeder (2005), Sharkey (2006), and Theodosakis (2002).

As this CoP continues to develop the *practice*, newcomers will enter the *domain* and offer new perspectives and create key interactions within the *community*. New members, or those not part of this study, can impact future group learning. Membership to a CoP's *domain* is fluid, as new members influence the collective with their knowledge and experiences (James, 2007). As Morgan (2011) writes, "By virtue of membership of a CoP, an individual can also access and contribute to a collective identity, which itself becomes an important component of communal knowledge" (p. 101). Future developments by new or current members may produce breakthroughs in group learning and circumvent some identified barriers.

The *community* component of this emergent CoP was defined by interactions of members. Educators described the process of developing their own knowledge as an individual experience, but one that relied heavily on the input of trusted teachers within their community. This can be identified as intentional learning. Members also described strategies of learning that were collaborative with students, which can be categorized as naturally occurring learning. According to Printy (2008), a CoP "does not isolate intentional learning efforts from the naturally occurring learning embedded in the day-to-day practice of teachers" (p. 189). Interactions and learning strategies described by the participants hold key insights into areas that may need further examination to support community functions and development. Building a stronger, more defined community may be necessary to accelerate learning.

The *practice* component of this emergent CoP focuses these professional educators and others as they leverage group learning processes and provide ongoing support for one another, who are all at different stages in their work to adopt digital media tools and integrate digital media into classroom activities. Ultimately, CoPs take time (Wenger-Trayner, 2015; Schlager et al., 2002). This CoP is in its infancy and does not reflect decades of evolution in regards to the *practice*. We found the interactions these practitioners engage with produced emergent themes about desired resources. For example, due to the nature of school districts' geographic dispersion across Minnesota, participants found a lack of dedicated face-to-face discussion around these topics and wanted a more intentional space to share ideas, tools, and resources. As this community is developing its practice, a more intentional support model may be necessary to strengthen potential outputs and benefits.

Accelerated group learning is also hindered by the participants' lack of prior experience with digital media production. This identified gap in knowledge impacts the implementation process, lesson preparation, and instructional assessment of digital media projects. Currently, these educators struggle to balance the time needed to lesson plan and get up to speed on digital media tools and production processes. Addressing this knowledge gap is key to the full embracement of this activity in the classroom, as well as increasing these instructors' confidence levels.

The desire for ongoing structured interactions within this CoP was also identified as a key insight to strengthen the potential benefits to student learning. Organized online delivery of vetted resources such as digital tools, lesson plans, instructional strategies, learning experiences, and ways of addressing recurring problems carry great benefit to this CoP to develop the *practice*. In addition to online resources, hands-on learning through expert-led training was desired. These trainings need to be developed to specifically address challenges found when teaching in the agricultural education environment, which include budgetary constraints, varied access to technologies, time management in lesson planning, strategies for teaching career preparation, agricultural topics and issues, and instructional barriers produced from previously identified knowledge gaps.

Data collected in this study offers insights that may help fill gaps and address challenges educators face. However, to address these issues, we must first look for strategies to support this emerging CoP. It is worthwhile to first discuss how to implement findings into actions that strengthen this CoP as they move from an emergent phase to a more sustained CoP.

Supporting the CoP

This study is a starting point to analyze how to support the integration of digital media production methodologies into agricultural sciences classrooms. The data from current members of the CoP provided in this study may help foster the creation of possible professional development strategies and spur innovation in classroom practices. In regards to interactions within a CoP, Schlager et al. (2002) stated:

> Newcomers gain access to the community's professional knowledge in authentic contexts through encounters with people, tools, tasks, and social norms. New practices and technologies are adopted by the CoP through the evolution of practice over time. Thus, a CoP can be an effective *hothouse* in which (a) new ideas germinate, (b) new methods and tools are developed, and (c) new communities are rooted. The CoP can help professionals gain access to, and facility with, ideas, methods, content, and colleagues; help novices learn about the profession through apprenticeship and peripheral participation (p. 131).

This description of a CoP provides a glimpse into the potential for this emergent CoP. To tap into the collective knowledge and experiences these educators offered, intentional actions need to be taken to support their efforts. The members suggested a need for an online platform to help facilitate their learning. Hew and Hara (2006) examined online learning by identifying factors that encourage interactions within a CoP in a virtual setting. They found five motivation factors that encouraged knowledge sharing: (a) self-selection, (b) desire to improve the profession, (c) reciprocity, (d) a non-competitive environment, and (e) role of the moderator. These factors need attention if the intentional construction of an online platform is introduced for the current and interested members of this CoP. In addition to these factors, Hew and Hara's (2006) study also found barriers that hinder the sharing of knowledge within a CoP in this setting. These barriers were: (a) no new or additional knowledge to add, (b) unfamiliarity with the subject, (c) lack of time, and (d) technology.

Barriers identified by Hew and Hara (2006) are similar to those in our study. The lack of formal training with the subject, time to implement practices, and variable technology are all areas to be addressed when developing an online format for this CoP. To encourage interactions that do not hinder the group learning within the CoP, a platform needs to be introduced that addresses these barriers. For example, the platform should include a space that encourages member participation regardless of knowledge and experience, a combination of online and face-to-face training, resources to alleviate time of implementation, and guidance on available technologies.

In an effort to understand how to support this emergent CoP and strengthen their tools and resources, Gannon-Leary and Fontainha (2007)'s list of Critical Success Factors (CSF) in virtual learning communities is helpful: good use of Internet standard technologies, good communications, trust, prior knowledge of membership, sense of belonging, user-friendly language, time to build up the CoP, and

regular interaction. These CSFs suggest that ongoing development of content is important for CoP success, but so is a culture of trust and consistency with messaging.

Conclusion and Recommendations

The participants in this study offered great insight about the motivations, challenges, and desired support needed to use digital media production as a learning tool in the classroom. Group learning, described in the context of a CoP, yielded proven processes, solutions, and areas of interest that may lead to future successes for this educational strategy. Preparing students for 21st Century careers, addressing instructor gaps in knowledge, and developing an intentional structure to support resource sharing are some of the key conclusions found in this study.

Recommendations for Research

To build upon the findings of this research, a more comprehensive quantitative survey or longitudinal study including a larger population of agriculture teachers in Minnesota and/or the national level would provide a rich data set for future studies. In addition, student learning in both secondary and higher education is prime for this type of inquiry. Exploring recent graduates and early-career professionals in a variety of agricultural careers may highlight the practical applications of digital media technologies. This would clarify the role digital media production and media literacy play in a student's education. Finally, analyzing digital artifacts may produce a baseline understanding of how these outputs reflect the relationship between student learning and lesson design.

Recommendations for Practice

The recommendations for practice that emerged from this study are in regards to strengthening the emerging CoP, addressing teacher preparation, professional development, and administrative leadership. A focused effort to offer members more face-to-face interactions, and more importantly, a virtual platform that is inclusive and built on trust is essential for the CoP to accelerate their learning and implementation of this practice. Specific tools, resources, and ongoing interactions need to be addressed. Online training and intentional digital media production educational modules will help gain and retain members to contribute to this process. It can also support those in-service educators who lack formal training and address barriers of rapid changing technology. These resources may need to be produced through consultation with experts outside of this CoP to address technological barriers.

Teacher preparation programs expose students to teaching and learning technologies throughout a program's plan of study. However, merely exposing future teachers to the possibilities of technologies through theoretical study limits the practical application to student learning. Coursework or modules dedicated to digital media production foundations is one way to address this knowledge gap that emerged from participants in this study. Other strategies to address this gap would be for teacher preparation programs to build partnerships with existing digital media educators, industry professionals, or in-service educators with robust digital media experience. This recommendation would be the first step to build foundational knowledge for future teachers.

Professional development that is focused on digital media production as a learning tool for both pre-service and in-service teachers is also recommended. These opportunities may need to be developed and provided by local universities, community colleges, private organizations, or government agencies such as state departments of agriculture or education. A focus on hands-on workshops, as well as developing online resources, to spur continued interactions will increase conversations around innovation found in the classroom by SBAE professionals. An online forum that includes discussions, recommendations and resources dedicated to this population that is managed in real-time would have a great impact on group learning as well.

School administrators and educational leaders need to harness available resources, both financial and personnel, to develop a collaborative culture that supports digital media in the classroom. Every school district has unique challenges that may affect how digital media production can be implemented as a learning tool. However, two primary steps can be taken to initiate a path to fully embrace this teaching strategy. First, educational leaders need to recognize the powerful impact instructors are finding with these technologies. Second, focused planning and collaborative initiatives need to be created that bring together support from inside the district. Creating a culture of innovation can positively impact membership and perspectives within the CoP. The increase in collaboration from a wider talent pool can advance this type of work and formulate more effective learning for students and members of this *community*.

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