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Inspiring Action, Efficacy, and Connection: Weaving Sustainability into Environmental Science Curriculum through a *Connected Learning* Model

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Abstract: This comparative case study of teaching and learning experience explores connected learning design principles to improve engagement in higher education and weave sustainability practice into introductory environmental science curriculum through the integration of community, place, peer support, networking, and technology. For this study teaching and learning took place in multiple settings, online and in a brick-and-mortar classroom, and in students' communities. We set out to ask: *In what ways might the implementation of connected learning principles be used to improve engagement and weave sustainability into environmental science curriculum, broaden interest in science literacy, and encourage community action in introductory higher education courses?* Comparative analysis and collaborative autoethnography methodologies were utilized to compare professor experiences for analysis and synthesis of patterns. Findings suggest that connected learning curriculum can broaden access to science, improve engagement, and help weave sustainability into a variety of courses by presenting students with relevant applied opportunities, connections and critical thinking about place and community, peer support and intergenerational connections, networking, and technology. Students can also gain a sense of agency and career relevance especially important to students who might otherwise feel they cannot "do science" or make a difference in a changing world. Lastly, this approach can improve instructors' teaching experiences by relieving time and content constraints to incorporating sustainability into other course subjects as students submit more interesting passion-driven work, and are encouraged to network with and learn from individuals (family, community, and scientists) outside the classroom they may not have otherwise sought out.

Keywords: environmental science, sustainability, connected learning, higher education, autoethnography

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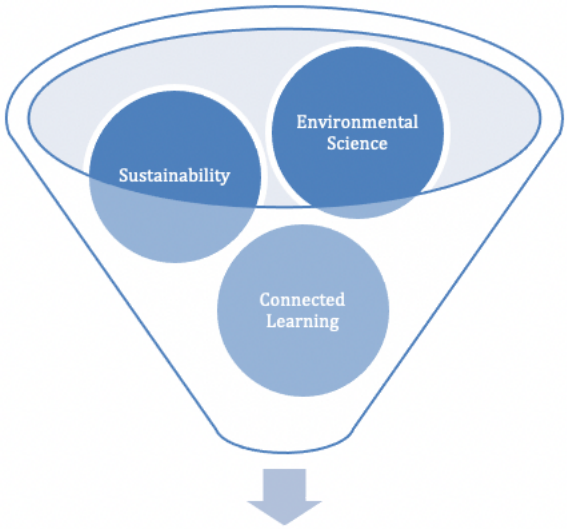

"Stakeholders at all levels are increasingly understanding that education must change for 21st-century learners and learning. This understanding calls for broadened access to learning that is socially embedded, interest-driven, and oriented toward educational opportunity." (Kumpulainen, 2014, p. 9)

"Bringing sustainability into your teaching offers a wide range of benefits to student learning, such as establishing relevance for your students, connecting course content to current topics in the news, and connecting course material with other disciplines. It can also empower your students to begin thinking about society and the Earth on a broader scale." (Interdisciplinary Teaching about Earth for a Sustainable Future (InTeGrate), 2019, para. 1)

Inspiring Action, Efficacy, and Connection: Weaving Sustainability into Environmental Science through a *Connected Learning* Model

Research has suggested that students in higher education today feel increasingly disengaged and education experts argue for changes in pedagogy that better meet the needs and challenges of this and future generations (Kumpulainen, 2014). This is especially critical for STEM and problem-focused disciplines such as environmental science that also require systems thinking skills. Connected learning is being proposed as an opportunity to improve pedagogy and is predicted to be a major contributor to progressive reform in education (Kumpulainen, 2014). Moreover, bringing in concepts of sustainability can strengthen natural science courses by encouraging systems thinking, interdisciplinarity, awareness, and understanding of social environmental interaction from local to global scales, and add relevance that connects science to current topics and other disciplines (InTeGrate, 2019).

For this case study we outline key characteristics of connected learning pedagogy for infusing sustainability into environmental science curriculum and explore in more detail the assignments and processes that were most influential to student learning and improved instructor experiences. Our aim for this research paper is to provide practical and grounded examples of connected learning rather than a theoretical analysis. The purpose of this paper is to explore connected learning curriculum development as a strategy for bridging sustainability with environmental science to improve teaching and learning in introductory undergraduate courses. For our research we asked: *In what ways might the implementation of connected learning principles be used to weave sustainability into environmental science curriculum, broaden interest in science literacy, and encourage community action in introductory higher education courses?*

This article compares the experiences of two instructors as well as resulting student assessment and reflections in two introductory environmental science classrooms, one brick and mortar and the other online. Although this research took place prior to the onset of the Coronavirus Disease (COVID-19) pandemic, it is currently pertinent to challenges being faced in higher education as connected learning can help relieve time-space barriers associated with online learning requires by social-distancing policies. Comparative case study analysis, collaborative autoethnography methodologies, and coding analysis were utilized to compare professor experiences for analysis and synthesis of patterns and to explore patterns in students' artifacts, assessments, and evaluations.

Findings suggest weaving connected learning design principles into environmental science curriculum can broaden interest and confidence in science and help to bridge environmental science and sustainability through practice and relevance—increasing learner agency and choice in the educational process and inspiring students to take action in their own lives and communities. A key finding of this study includes that connected learning pedagogy is especially helpful for students who might otherwise feel they cannot "do science" or make a difference and might lead to more diversity and inclusion needed in environmental science education. Findings further suggest that connected learning curriculum can be used to weave sustainability into a variety of courses by presenting students with relevant applied opportunities, connections to community, peer support, intergenerational connections, and appropriate use of technology that can lead to a sense of agency and career. Lastly, this approach can relieve time and content constraints and making grading more enjoyable for professors.

Theoretical Basis for Adding Sustainability to Environmental Science Curriculum

Sustainability for this paper is defined as, "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland et. al., 1987). Adding sustainability to courses such as environmental science can help integrate relevance; foster complex systems thinking; link local and global problems; natural sciences with economic, societal and policy issues; and incorporate a multidisciplinary perspective into course content (InTeGrate, 2019). Barriers to incorporating topics of sustainability include time and content overload (InTeGrate, 2019) that can be addressed using a connected learning curriculum to increase learner agency and choice in the educational process, encourage multi-pathway learning experiences that can transcend beyond time, space and content boundaries.

Theoretical Basis for Connected Learning Curriculum

Connected learning is described as a holistic approach that embraces students' "everyday learning lives" (Kumpulainen & Sefton-Green, 2014, p. 7) and is based on six design and learning principles that include interest-powered; peer-supported; academically oriented; shared purpose; production centered; and openly networked. It expands learning beyond the time and space boundaries that exist in many conventional higher education classrooms (especially large introductory or online classes) to create real world opportunities within students' own communities to practice science concepts and opportunities for action (Kumpulainen & Sefton-Green, 2014). Cartun et al. (2017) suggests that a connected learning framework can help "build engaged, participatory cultures" (p. 3).

Design aspects of connected learning encourage production-centered projects that are openly networked and share a purpose with others. Additional learning principles promote an academically oriented approach that is driven by the learners' interests and supported by their peers (Ito, 2013). This strategy offers a model for instructors to build a curriculum that allows for integrating community and critical thinking about place (as it relates to science and sustainability) into assignments and in so doing can "...increase learner agency and choice in the educational process" for students who might otherwise feel they cannot "*do science*" or make a difference. Adding a human and "cooperative approach to learning" and tying theory to experience can lead to more diversity in science education (Lundeberg & Mock, 1995, p. 313). Moreover a connected learning approach, including interdisciplinary opportunities in undergraduate science programs that connect STEM goals to community issues can better equip undergraduates with the skills they need in today's job market (Cailler et. al, 2014).

Connected learning is not new, but some of the most current research is credited to Dr. Mizuko Ito, a cultural anthropologist, who was inspired by the fact that her brother's learning style growing up was not supported by a conventional educational system. Connected learning is embedded in sociocultural learning theory focused on "meaningful practice and supportive relationships, and that recognizes diverse pathways and forms of knowledge and expertise" (Ito et al., 2013, p. 4). A connected learning model can help instructors plan multi-pathway learning experiences recognizing multiple learner epistemologies within an academically shared learning experience (Crosslin, 2018; Bali & Caines, 2018).

Methods and Analysis

We utilized a comparative assessment combined with qualitative data analysis to identify, examine, and interpret patterns and themes in textual data to consider student and instructor experience and determine how the patterns and themes helped to answer the research question. Data was collected via formative course assessments, student reflections, and artifacts and analyzed via coding and synthesis of patterns (Goodrick, 2014) that resulted from a newly implemented environmental science curriculum based on connected learning design principles. Data from student assessment, reflection, and artifacts was de-identified prior to analysis to protect confidentiality per IRB requirements.

As sustainability educators exploring the merits of connected learning, while at the same time teaching introductory environmental science courses, we discussed the benefits that connected learning might provide to introductory students taking our courses as general electives. Consequently, we set out to conduct research in this regard leveraging a collaborative autoethnographic approach for data collection and co-construction of themes and patterns. This

approach was determined appropriate because collaborative autoethnographic research can produce richer perspectives than a single participant-researcher.

Researchers can cooperatively make decisions about the process while challenging the anecdotal and personal reflection of the experience thereby building accountability (Chang, Ngunjiri, F., & Hernandez, K.C., 2016). We independently collected autobiographical data and then shared and reviewed each other's stories to extract data and explore patterns and themes via coding analysis. We also worked alone to weave a connected learning curriculum into each of our environmental science classes and then adopted a sequential model where each instructor wrote about our experiences passing it back and forth.

We decided to weave sustainability into our environmental science curriculum using the six connected learning principles into a variety of assignments in our courses and to compare our student reactions, artifacts, assessments, and evaluations, on the various assignments. As connected learning can take many forms, we elected to create our own connected learning assignments to develop a table of examples (Table 1.) that could be shared, as well as examples of how past course curriculum differed from connected learning implemented assignments.

This study took place at two public institutions, one in Michigan and one in Colorado. Most students were between the ages of 18 and 25, taking environmental science for the first time as a general elective course. There were no prerequisites for the courses. One course was taught online and the other was held in a conventional classroom setting. Both courses had 20 students (n=20). Course assessments, based on anecdotal student feedback and our reflections, informed the lessons learned regarding weaving connected learning design principles into introductory environmental science courses. Student perspectives were also incorporated into the analysis through conversations that took place with students during and after the assignments and via coding reflections, artifacts, and summative assessments. Such exchanges would likely be characterized as typical student-teacher interaction. These conversations simply served to support and inform the autoethnographic reflective findings for us.

Table 1. Connected Learning (CL) Design Principles and Assignment Examples Used in Two Environmental Science Classroom Settings Contrasted with Conventional Assignments

	CL Assignment - Classroom Setting	**CL Assignment - Online Setting**	**What Prior Assignments Looked Like Without CL**
Interest Powered	Students may explore any environmental science topic that students are "excited" about	Students choose an environmental issue that is of concern to them in their community and reach out to local experts in the field	Students are assigned a topic to explore
Peer Supported	Weekly peer collaboration sessions and an opportunity to work together in groups	Students share findings and reflect online in an open forum/Students earn extra credit for sharing assignments with family and friends and reflect on the experience	Limited or no collaboration with peers, family, or community
Academically Oriented	Projects build upon and reinforce course curriculum and individual academic pursuits	Students are asked to research and reflect upon how their own academic discipline relates to environmental science	Assignment that may not be relevant to introductory student's academic discipline
Shared Purpose	Students are encouraged to build connections and work with others in the community that have similar objectives	Students share their general location, biography, and description of their environment via story mapping	Operates in a silo process that focuses on the individual
Production Centered	Project requires "making a positive change" or "presenting a plan for change"	Students write a letter to an elected official that includes environmental science concepts they have learned in the course to describe an issue of concern to them/within their communities	Students do not produce, create, experiment or design artifacts
Openly Networked	Students are required to build a list of connections they have leveraged Students must share their learning with others outside the classroom (e.g., conferences, web pages, brochures, videos, presentations, etc.)	Students help with a chosen citizen science project and connect with the scientists to ask questions and blog with others who are helping with the online data collection	Results shared with instructor only

Connected Learning Case Study One: A Classroom-Based Introductory Environmental Science Course

I (Halliwell) integrated sustainability into environmental science curriculum using a connected learning model in two introductory undergraduate environmental science courses at a Colorado-based college. This approach presented opportunities for incorporating and critically engaging place (e.g. local, global, physical, cultural, colonial (Tuck E. & Mckenzie, M., 2014), application, and networking to enhance overall learning and teaching experiences. Specifically, I used a semester-long assignment to ask students to complete a community project that offered them an opportunity to apply the science that they were learning to a real-world setting, and to share it in their communities beyond the classroom.

From my experience in higher education introductory courses typically offer great breadth but little depth where students are encouraged to move from one topic to another with a focus on content to gain a broad understanding of a field. Allowing students to undertake a community project in order to support their learning cultivates depth around a topic they are passionate about. For this particular project I asked students to identify an area, topic, or issue where environmental science could be applied to positively impact others empowering students to enact change or present a proposal for change to other individuals, organizations, or a more academically focused conference. They were further required to present their final project to their classmates. A key objective of this assignment was also to allow the students freedom to explore topics they deemed interesting and important, something that they felt was worthy of their effort and had a positive impact on their community—a noteworthy aspect of connected learning. Ultimately students can benefit from knowledge diversity by combining in-class and out-of-class knowledge to a practical effort. As this was a connected learning assignment, it was designed so that the learning experience was outwardly focused and does not exist or remain in the classroom alone.

While many classrooms have relied on the instructor and a textbook as resources, I required students to network beyond the classroom to leverage at least 20 additional community and field experts, or connections (as referred to in this research). Such connections included communication (e.g. email, phone, letter, zoom, interviews) with mentors, other teachers, organizations, subject matter experts, community leaders, classmates, coaches, parents, authors, videographers, and magazine editors. The provision of opportunities for networking is a key element of a connected learning approach that encourages life-long learning skills and teaches students to explore and sort through the multitude of resources available beyond the classroom. In addition, students were provided time in class to critique, offer input, and provide guidance on one another's efforts. While the project was straightforward, the path to learning was varied, diverse, and beautifully complex. Students were encouraged to leverage the resources in their lives and reach out to new untapped resources, potentially building relationships with future mentors or references, to learn and accomplish their objectives.

Despite being tasked with an open-ended project, students achieved particular learning outcomes. I allowed the latitude to explore topics that interested students, an open-ended approach not commonly afforded in a conventional higher education setting. Assignments and educational objectives are commonly spoon-fed to students allowing them little room for creativity and exploration (Freire, 1996). Students however clearly exhibited excitement about their project, making it additionally more exciting for me as their instructor. I should note there was an adjustment period where students asked for more guidance, if could take on certain projects and how to find them. They also requested clarification for how best to take advantage

of connections, but once students grasped the connected/networking approach they embraced the learning wholeheartedly. As a result of such a strategy, students tackled topics that were uniquely their own and engaged learning clearly followed resulting in notable sustainability efforts based on science, such as: instituting community plastic bag bans; the adoption of biodegradable pet waste bags; development of avalanche education materials; creation of neighborhood composting programs; proposed modifications to campus cafeteria menus; invasive species education efforts; and campus cleanup.

Students were clearly empowered to make changes within their sphere of influence. They recognized that they could have a role in identifying and solving environmental issues. Furthermore, many students broadened their sphere of influence addressing projects that required them to venture into uncharted territory, learning to work with and learn from individuals they may not have otherwise sought out. This sort of networking is also certainly a social skill that has applications in many areas of life.

Finally, embracing connected learning allowed students to explore science and apply their learning in a practical and relevant way. Potentially the most notable outcome that resulted from integrating a connected learning approach in environmental science education was that students felt a sense that they could contribute to science and take action. Many students venture into an introductory course because their degree requires it. It was evident to me that many of these same students in the beginning had always felt that science was something that was out of their reach and something they could not do. In short, students felt that they could finally '*do*' science, expressing this by saying, "I never thought science was for me but after this class I see that I actually can do science, and I really like it." (Undergraduate student, personal communication, April 2018).

Connected learning capitalizes on the interests of the learner. It empowers them to involve themselves in issues that surround them and allows students to build learning connections that exist in a myriad of resources that are available beyond the classroom. Integrating sustainability into an environmental science curriculum through connected learning offers numerous benefits. Among those benefits are an excitement for learning, empowerment to make change, the ability to foster and develop learning connections, and to cultivate a sense that they can contribute to science and sustainability.

As an educator it is always exciting to see students push beyond their learning paradigms and explore topics that inspire them. I appreciated the new pathways of exploration that were opened allowing for the enjoyment of learning and passion in students when they realized that were no longer confined to the typical time-space, classroom boundaries. It was encouraging, from my perspective, to see students take ownership of their learning and realize that they do have the ability to impact the world around them. The experience inspired hope as I watched students take their learning and ground it in application.

Connected Learning Case Study Two: An Online Introductory Environmental Science Course

As the instructor of environmental science curriculum in two online introductory undergraduate environmental science courses at a Midwestern university, I (Bertossi) utilized principles of connected learning to weave sustainability into the curriculum. I taught six-week summer courses that afforded limited time (compared to lengthier fall semester courses) to cover the usual breadth of introductory material found in textbooks. This challenged me to focus less on content and more on deep learning from experience and application—goals closely aligned

with connected learning. Connected learning-based assignments included: a series of blog reflections; four engagement activities; interactive assessments that helped build intergenerational connections by encouraging students to practice explaining what they had learned to household and community members; as well as tips and opportunities for leveraging new media and online technology.

I first focused on encouraging students to effectively leverage cutting-edge technologies for their learning, to both build peer support and network with academic experts in the field of science and sustainability. Connected learning research highlights the new risks and unprecedented opportunities of new media and technology and the need to teach students to "cultivate skills such as mindfulness and "crap detection" to minimize risks and maximize learning opportunities" (Ito et al., 2013, p. 3). Students used *ESRI story mapping software* and an online citizen science-based data collection website known as *Zooniverse*.

Using ESRI based *Arc GIS StoryMap* students could mark an area nearby where they live (not their exact address), upload an image of their local environment and include a paragraph describing their surrounding environment and any environmental science-based issues within their communities. Student interactions and assessment clearly demonstrated they were excited to be introduced to these new technologies, helping them build peer support and identify many shared environmental concerns. Students especially appreciated learning about other places, including rural-based students able to virtually visit major cities (and vice versa), and to learn internationally. In the following example one student was able to identify a pattern of shared environmental concerns (based on the shared purpose connected learning design principles) and to see how they fit into a broader scale with their peers and their shared purpose with the world at large:

> Just by looking at the environments on story maps, cool idea by the way, for those of us in this class it is easy to tell we cherish the world that surrounds us. Obviously as environmental science students, we are biased this way, but I am sure that the larger percentage of the population generally feels the same way. We all see problems in our own communities, pollution, i.e., waste, light, noise, air, etc. and if we see this, I am sure most everyone else is aware on some level that this is not good and things need to change.(Undergraduate student, personal communication, July 2018)

Furthermore, students appeared to appreciate their contributions to the citizen science projects on *Zooniverse*. For this assignment I asked them not only to participate in collecting data, but to blog with the researchers and other participants from around the country, and the world, and to practice asking research questions. Ito et al. (2013) argue that new media affords the "…opportunity to share and gain audiences for youth work…a crucial opportunity for learning and feedback" (p. 76). As an instructor who has taught introductory research courses for five years, I have never experienced students having more fun collecting data. I think this is due to that fact that data in *Zooniverse* is collected via video game-like efforts, an approach students particularly enjoyed and a common pattern found in student evaluations represented by the following student comment:

> I actually chose to participate in multiple projects. This website is pretty fun and kind of addicting...the first project I am participating in is Michigan Zoomin a project in which I was asked to identify different types of wildlife found in game cam pictures taken in

> Michigan. I chose this project because I liked that it was studying wildlife in my home state. The next project I took part in is called snow spotter which is a project dealing with forest snow interception patterns. I was asked to look at satellite images and determine whether there was snow on the branches of the trees. I chose this project because even though I am not much for the cold weather, I know that precipitation is an important part of the water cycle and I might be helping track weather patterns. (Undergraduate student, personal communication, July 2018)

The last connected learning activity built upon one of the first assignments where students explained their local environment to their classmates and were then asked to reach out in their local communities to participate in projects to identify an environmental issue. This is especially important for online students who can feel isolated, and it aids students in applying the science they are learning to the real world. Students made real world connections with experts in the field, sometimes even volunteering. This assignment utilized the 'production-centered' connected learning design principle using their research and scientific findings from experts in their communities to write letters to an elected official of their choice. After receiving feedback, students were required to either send the letter on their own or have the instructor send it for them. Most students elected to have me mail their letter out and were very excited in some instances when they received responses to their letters as well.

For the final assessment, and based on the peer support design principle, I included opportunities for students to earn extra credit points if they shared their artifacts and final assessment reflections with their families or friends to encourage intergenerational connections. Students remarked that they had discussions about climate change with their uncle who never "believed in climate change before" and enjoyed sharing their creative artifacts with their mother, their child, or with a friend. Formative assessment results also demonstrated the power of weaving the interest-driven connected learning design principle into the curriculum. Students were able to relate their lived experiences to environmental science thus giving them agency to do science as well as to better understand the role they might play to take steps to create change and apply their new science understandings to the real world. For example, one student and the child of a farmer, with long time family ties in animal husbandry, explained that they had never thought about related environmental impacts and need to improve agriculture towards greater sustainability:

> Animal agriculture has always been near and dear to my heart. As I have mentioned in previous essays, I grew up a farmer's daughter and have always had a hand in raising my own food as well as a huge interest in animal husbandry. My first time around (college), I attended Michigan State University to pursue a degree in Animal Science. While I wanted to focus on horses, I did take a few management courses for other livestock animals. And I vaguely remember talking about methane output and other environmental concerns, but I never truly put it into perspective until this class. (Undergraduate student, personal communication, July 2018)

As another example, one student, who was a truck driver from Texas explained that for the first time ever he was considering how he might mitigate CO2 emissions:

> I come from a place where it is extremely common to see massive trucks burning an outrageous amount of fuel everyday on the roads, Texas. However, as you may know cattle farming is a huge industry in Texas. I personally drive a heavily modified 2006 LBZ Duramax ...Until now, however, I have not considered the effect that this may have on my environmental footprint. As an individual, I have the ability to effect change on a small scale… One idea that I have for mitigating my CO2 emissions is adding what is called a "tuner" to my truck… Another thing I can do to make my truck more fuel efficient is put on smaller and narrower tires in order to reduce rolling friction. Electric motors exist today that are capable of towing an extreme amount of weight but the problem I am faced with is the astronomical cost of such technology. Perhaps someday soon this technology will become mainstream and affordable and I will be able to switch over and reduce my environmental footprint further. (Undergraduate student, personal communication, July 2018)

Connected learning and sustainability helped make online teaching about environmental science more rewarding for me as an educator as well. This is because students were more excited than in prior courses, so their artifacts were more creative, interesting to me, and exciting to read, making grading feel far less burdensome; the networking aspect helped relieve my time constraints as students reached out to others in the field and to peers and relatives for support (rather than relying solely on the instructor). Furthermore, I was able to get to know my students better than in previous online courses thus supporting them better and providing more meaningful feedback as they shared information about their interests, communities, and households.

Conclusion and Areas for Future Research

We have highlighted the benefits of integrating sustainability into undergraduate environmental science curriculum through connected learning. Examples are illustrated (see Table 1.) in the instructor experiences and student perspectives. Findings suggest that using connected learning to integrate sustainability into science curriculum might broaden access to science, encourage action and practice, help students gain skills for networking, and embolden them to share their learning and seek support from within their communities and households. We utilized connected learning design principles to encourage students to connect with external and interdisciplinary resources that also helped relieve time constraints for the instructor. Connected learning and sustainability helped students through assignments that challenged them to not only explore alternative paths to learning but also to apply their learning in practice (social, economic, policy-related ways) using passion-driven means and to make behavioral changes to take action towards sustainability in their daily lives.

A connected learning approach, combined with sustainability, can make space for applied science that might not exist in a non-connected learning classroom setting, and it can change the focus from breadth to depth. It opens up new learning opportunities in an applied, engaging, and production-centered way. As everyone is surrounded by an environment of some sort the application of weaving sustainability through connected learning in environmental science has great place-based merit to encourage students to reflect on their lives and get involved in and think critically about their place and others' places, to network with others, and to see connections to others on a larger scale as they share their experiences.

Furthermore, although this research took place prior to the onset of the Coronavirus Disease (COVID-19) pandemic it is currently pertinent to challenges being faced in higher education as connected learning can help relieve time-space barriers associated with online learning required by social-distancing policies. As illustrated in this paper, connected learning assignments can be integrated successfully into remote learning curriculums. Further, networking with connections remotely has grown more common as a result of the pandemic. Students can reach out to meet or correspond in a virtual setting. Moreover, it is reasonable to expect that organizations that a student might choose to connect with are also offering more materials, instruction, or information that can be accessed remotely as they respond to the current pandemic.

Lastly, research will utilize a formative assessment pre-test and post-test to see not only how connected learning can broaden access to science literacy, sustainability, and encourage action, but how well these design principles help students understand basic environmental science and sustainability concepts. Additionally, future research would include exploring how a connected learning approach to incorporating sustainability into environmental science might shape or alter academic paths and unsustainable behaviors. Environmental science, which explores relationships that exist in the natural world, is ideally suited for a sustainability and connected learning approach in either a classroom or online setting. Fusing sustainability into an environmental science curriculum through connected learning is a powerful strategy that capitalizes on the sweet spot that is found at the intersection of time, space, and content barriers associated with interdisciplinarity, student interest, relationship building, and networking and career opportunities in order to help students better understand the complexities of understanding problems related to social and environmental interactions in the world around them.

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