

Pandemic Student Experience as Foundation for Engagement with Sustainability and Solutions

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Abstract This paper showcases the shift in student engagement with sustainability perspectives during the pandemic in the Spring 2020 semester. While experiencing the epidemic first hand, students spontaneously made connections between the pandemic, sustainability, and environmental justice. The connections were further enhanced by various assignments. Evidence is drawn from student assignment artifacts: midterm papers, class discussions, VoiceThread, wikis, pre and post-class surveys, and other assignments. Students also demonstrated an increase in social solidarity, empathy, awareness of social and environmental injustice. The pandemic experience provided a catalyst and motivation that resulted in increases in sustainability learning core competencies: system and future thinking; interpersonal and ethical literacy; and creativity. These competencies are integrated into our curriculum with the objective of developing the capacity for our students to be effective agents for systemic sustainable change.

Introduction and Methodology.

This paper showcases the shift in student engagement with sustainability perspectives during the emergence of New York City as an epicenter for the COVID-19 pandemic in the Spring 2020 semester. While experiencing the epidemic first hand, students spontaneously started to make connections between the pandemic, sustainability, resilience, and environmental justice. Students also demonstrated an increase in social solidarity, empathy, awareness of social and environmental injustice. Recognizing this initial shift, the faculty (authors of this article) further stimulated the establishment of these connections. The review of the authors' and students' experience suggest that

incorporating the principles of sustainability, resilience and environmental justice across the curriculum will deepen student understanding of the pandemic and develop student learning sustainability learning competencies and prepare students to be agents of systemic change.

The observational evidence (qualitative data) is drawn from student assignments in an environmental justice program and sustainability across disciplines including economics, theater, and art at a public and private university in New York City, an epicenter of the pandemic. The data is collected from a variety of student assignment artifacts: midterm papers, class discussions (e.g. Discussion Board), VoiceThread, wikis, journals, pre and post-class surveys, and other assignments. Students that wished to be anonymous with quotes used in this paper are assigned pseudonym first names. Students that requested or gave their permissions for attribution, are identified with their full name.

Theoretical and Pedagogical Framework.

We approach teaching sustainability and environmental justice (e.g. curriculum design and assessment) through the theoretical and pedagogical frameworks of the sustainability core competencies (SCC), socio-scientific inquiry and reasoning (SSI & SSR), and the ethic of care that we have found useful to guide curriculum design and environmental justice faculty development workshops (Bartlett, Popov & Ruppert, 2020). Sustainable Development Goals provide a policy action framework along with the use of Environmental Justice case studies. We have explained elsewhere this approach in greater detail and its value elsewhere (Bartlett, Popov & Ruppert, 2020).

Student-centered learning of sustainability problems and solutions involve “Socio-Scientific Inquiry” (SSI) and Socio-Scientific Reasoning (SSR) processes of complex “wicked problems” that typically have no singular cause or solution, with many unknowns and uncertainties. SSI/SSR pedagogical approaches involve integrating values, attitudes, behavior, and ethics with other education reform pedagogical strategies in the classroom (National Research Council [NRC] 2012, 2007; Sadler and Donnelly 2006; Sadler et al. 2011; Zeidler et al. 2005; Zeidler 2016; Feinstein & Kirchgasser 2015).. As such guided inquiry, problem based learning and project based learning are especially suited for SSI/SSR of sustainability and environmental justice problems.

SSI/SSR requires certain competencies for students to become effective in civic engagement with real sustainability and environmental justice problems. Wiek et al. (2011a, b, 2015) and Rieckmann (2012) at Arizona State University and Northern State University identified many sustainability competencies and consolidated them into five categories: systems thinking, futures thinking, values thinking, and strategic thinking. These competencies merge to become a collaborative problem-solving competence that can be learned in project based learning or case study approaches pedagogically, and

in practice to become effective collaborators for systemic change. Self-awareness of the learning process and competencies (meta-cognition) are important for student success (Konrad, et al 2018, 2020; Bartlett et al 2020, PNAS 2020).

Rieckman (2017) extended and integrated sustainability competencies into learning objectives as a foundation for the useful resource “Education for sustainable development goals: Learning objectives” (UNESCO (2017). The Sustainability Curriculum Consortium, and affiliate of the Association for the Advancement of Sustainability in Higher Education (AASHE) has made sustainability competencies as central to their work and resources (SCC, 2020; Buckmann and Engle, 2017). Penn State University elevated Creativity/Imagination to the level of a core competency (Engel et al., 2017, 2018), which the authors agree with, and have made central to our curriculum design and pedagogy (Bartlett et al 2020). The ability to imagine and construct future scenarios necessary for sustainability learning and work requires creativity and imagination, but is important in other areas, so deserves a core status.

Table 1. Sustainability key competencies, descriptions and justifications (Engle et al. 2016.)

Competency	Description	Justification
Systems Thinking	Ability to analyze complex systems across multiple domains and at different scales.	Necessary for understanding complexity of sustainability concepts; ubiquitous in sustainability competencies literature.
Temporal Thinking	Ability to draw upon and anticipate states and narratives of past and future societies and environments.	Emphasizes the ability to extract and apply lessons from the past and to envision the needs of people in the future and the effects of current actions on those needs.
Interpersonal Literacy	Ability to comprehend, motivate, enable, relate to, and communicate across diverse individuals, political systems and organizations.	The societal and policy changes necessary to deal with issues of sustainability require that individual sustainability advocates have the skills to negotiate complex personalities, networks,

		assumptions and political/power systems.
Ethical Literacy	Ability to identify and assess ethical issues and controversies (related to sustainability), and to discuss, respond to, and reconcile them, applying personal and societal values and goals.	Sustainability issues are inherently value-laden and must be analyzed through an understanding of ethics.
Creativity (Imagination)	Ability to envision, develop and apply innovative and strategic solutions, frameworks, etc. in order to adapt to changing and challenging situations.	Identified by research participants as necessary for addressing unforeseen outcomes and scenarios; not addressed in other categories.
<i>Foundational Competencies</i>	<i>Expected capabilities based on education and adaptation.</i>	<i>These baseline abilities are needed in order to further develop meta-competencies.</i>

We found that the ability to understand the pandemic experience, a novel infectious disease with many unknowns and uncertainty, involves the same SSI/SSR abilities and the sustainability competencies above. We find that the teaching of sustainability, resilience and environmental justice with the pedagogic framework of SSI/SSR prepared our students to understand their pandemic experience in a greater societal context, as we will see below. Moreover, an objective of developing our student skills in SSI/SSR and the sustainability competencies is to graduate students that can become agents of systemic change in their work and civic engagement. The pandemic exposed many systemic shortcomings and fragilities of our public health system and intertwined social and economic systems. The sustainability competencies and SSI/SSR abilities are expected to help students to be future agents of change. We provide below artifacts of student learning that demonstrate these claims.

Pandemic Student Experience and Academic Learning, Spring 2020, New York City.

As many people in New York City, this spring 2020 during the COVID-19 pandemic our John Jay College students in the Environmental Justice and Sustainability Program have

experienced many hardships, from losing their jobs and loved ones, to racism, helplessness, and risking their health and lives as essential workers. One out of three students at John Jay College are essential workers, and worked with the public during the pandemic. Through various class assignments and discussions we have given our students the platform not only to express their pandemic experiences, but also to make connections between their experiences and the course materials.

In one of our Environmental Justice classes and in the Theater and Justice class students were given an option to either write their coronavirus journals or write book reflection for their final project. Both types of the assignments have shown that students spontaneously made connections between their pandemic experiences and environmental justice, sustainability, and resilience. For example, a student that has penned her experience of losing her job, struggling to find a job during the lockdown, fearing for her fiancée that is an essential worker, mourning the loss of a family member and feeling helpless, finished her journal with the question/statement if people are more concerned with profit than human health and future of the planet. Another student, after experiencing a virtual funeral of a family member and illness of another loved one, made a similar statement in his journal, adding that by making a coronavirus journal and learning about environmental justice at the same time, one is “really onto something” - one is able to better understand the current situation.

Many students, such a student that works as a hospital security guard that besides else, secures belongings of people that died from coronavirus, have thanked the professor for giving them an opportunity to share their stories with the professor and their peers. These interactions not only brought cathartic feeling to students through ethics of care, but also enabled them to place their experience into a context of resilience, environmental justice, and sustainability.

The Pandemic made students realize what is essential, as students from other two Environmental Justice and two Earth Justice: Introduction to Sustainability Studies classes have noted in their assignments. For example, in the post-class survey where students were asked to state and explain if their views on environmental issues have changed or strengthened during the pandemic one student wrote that the priority should be the protection of the environment and that it should not take a pandemic for nature to be restored. Another student (Jennifer) made a similar statement: “After experiencing the COVID-19 pandemic, I felt that everybody or every nation should prioritize resolving environmental issues happening around the world. This pandemic is a result of our negligence to environmental problems.” Tiffany Hodge, an Environmental Justice minor student added: “On the flipside, I am also happy about all of the good that has come from this pandemic. Some people have returned to a sense of community, we have been reduced down to what is “essential”, we are appreciating low paid essential workers, people are helping others, animals are returning, waterways are cleaner and the environment is healing itself. Another student also wrote about positive aspects of the

pandemic stating that pandemic made people to start to appreciate the planet and to be aware that they need to invest more in the environment, health care, and social programs.

Besides these spontaneously made connections, in the assignment where students were directly asked to reflect on the pandemic and the changes in their community, several students also wrote about the necessity of a community to come together during a crisis and to build a resilient future. For example, one student wrote that he supports his neighborhood coffee shop as much as possible, and that neighbours in his building help each other with grocery shopping and even post supportive messages, such as “stay strong” and “we’ll get through this” in the building’s lobby. A similar reflection was made by a student who stated that during crisis people cannot wait for the government to do everything, adding that she volunteers for Invisible Hands student organization that provides grocery shopping and prescription pick-ups for at-risk individuals, and that used to also provide essential grocery subsidies for individuals financially impacted by the pandemic (but has stopped due to lack of funds). She finished her reflection by calling her classmates to notify this organization if they want to volunteer there, donate, or know someone who can benefit from the help the organization provides.

Besides noticing positive changes in their communities during the pandemic, students have also noticed negative trends such as environmental and social injustice. One student has started her post-class survey by stating that the importance of handling environmental problems have only strengthened in her mind after experiencing pandemic since the pandemic has shown her the inequality that exists. Another student from the same class, Tiffany Hodge noted: “While I have been very aware of the issues we are facing, I will say my views have strengthened and I am even more adamant that we need change. I must also note that while I was aware things were bad, I did not think that they were so bad that a pandemic where people are dying and we are facing a pre-depression could bring out the worst in people.” This statement was further elaborated in class discussion by another student from the same Environmental Justice class that noticed that resources such as testing kits were not sent to minority neighborhoods (individuals at higher risk of contracting the virus) on time, but were given quickly to celebrities and other wealthy individuals. Another student added to the discussion thread that the pandemic experience has given enough evidence that shows the existence of environmental racism in the United States. He elaborated his claim by stating that since polluting facilities and hazardous waste sites are predominantly located in minority communities, these communities are disproportionately affected by air pollution which enhanced the spread of virus in these communities. From this statement we can see that the student made connections between pandemic experience and the class topics. These connections are evident from Tiffany Hodge's post-class response: “Many people would like to return back to normal, but our past normal was clearly not working. Our past normal created the fragile systems that have now fallen apart during this pandemic. We need to start fresh from this refined version of society and build

positive changes from there. We need to repair our health care and food systems that have contributed to minorities having weaker immune systems and not being able to fight this disease. Speaking of minorities they are more likely to be front line essential workers and highly underpaid, which has contributed to them catching COVID-19 at higher rates. We need to invest in minority neighborhoods and school systems so that there are better chances of upward mobility. These are just a few things but I hope that people are inspired by the acts of good and repulsed by the acts of selfishness and greed that has got us here.”

What is evident from the last student statement is not only that the student made connections between the pandemic and the course topics, namely environmental justice, sustainability, and resilience, but also that the student has learned the sustainability meta-competences that were engraved into the curriculum. The student used system thinking to make connections between the source of environmental problems, its various effects, and possible solutions, used ethical literacy to point out to the moral problems in the society, used temporal thinking to make connections between the past, the present, and the future of our environment, and used strategic planning to address how sustainable solutions can be achieved. The implementation of sustainability meta-competences is evident in many other student statements. For example, if we look at the following post-class survey answer by Tenzin, we can see that student pandemic experience has increased their system thinking meta-competence:

“As a result of the pandemic, people have been staying home for a long time and less automobiles being used as well as some factories are closed. This has improved the air quality in many places or has reduced air pollution. It reveals that our actions are causing all the environmental problems...” (Tenzin Choedon)

As we can see from this statement, pandemic experience enabled students to make causal connections through system thinking. From this base, they used ethical literacy, temporal thinking, and strategic planning to envision sustainable development. Students understood that for any change to occur the first step would be to have ethics of care. One student elaborated that humans first need to care enough to be able to secure the future of life on earth. Here we see the intricate connection between ethical literacy and temporal thinking. Another student also pointed to the ethics of care at the end of her survey response by stating that before pandemic humans were too busy with their daily routines to see the effects of their negative actions on the environment, and that for a new start humans need to realize the importance of keeping the earth clean. Besides temporal thinking and ethical literacy, in this student statement we can also see the connection with interpersonal thinking meta-competence. The combination of these three sustainability meta-competences that started with system thinking, are evident in the following statements by Tenzin Chedon, Mauricio, and Diego as well:

““This virus was spread from an animal and it is so deadly that it has shaken the whole

world right now. Therefore, we shouldn't disorder nature, earth, and animals. We shouldn't use or kill animals for our own purpose, for experiment or for fun (poaching). Also, we shouldn't cut or burn trees, and reduce carbon emission to preserve biodiversity because many of the plants can be used for medicinal purposes and maybe we might find our cure in these plants... We should be responsible and be mindful about actions if we all want to survive and stay happy. From now on, we should treat our planet like how we want to be treated." (Tenzin Choedon)

"During the COVID-19 pandemic, hearing the news that everything was becoming cleaner, such as like animals going back to the waters, the skies are clearer, and others. It really makes me realize that we humans are the main culprits of what is going on here. We couldn't see our actions and that it had to take one virus that really quarantined everyone to realize it. What we first need to do is to realize what we have done and start from there and find the solutions of how we can change for the future."

"I've read articles about the decrease of pollution in the least month it is so great to hear that the environment is healing and that sea animals/creatures are prospering. The importance of these issues have in fact increased for me because it proves that we can save the environment, the problem is that we choose not to and to be ignorant of these problems. In reality these problems that may continue will affect the future and we are to blame if we do not limit our habits(Carbon footprint), limit bug industries and not stand up for what is right."

In these post-class survey answers, students expressed that ethics of care should guide future human actions. In their statements we can also see their hopes and doubts. One student stated that she can see how pandemic was a wake up call for so many people. This discussion thread was followed by another statement of hope (stated by Kwasi): "My view on the importance of handling environmental problems did change after COVID-19. It really showed me how much humans are affecting the environment because once we were forced into quarantine, the Earth started to heal. Pollution in places that have the highest in the entire world went down and the water started to clear up. I hope this shows everyone how much we need to change." The thread continued with a student expressing her desire for vibrant blue skies above New York City to become a norm, and another student wondering if pandemic hit people and leaders enough for them to start handling environmental problems better. Along the same line of critical thinking, in the same class' discussion thread one student wrote about the need for strategic planning, another sustainability meta-competence, pointing out that humans need to start thinking about 'what if' in order to plan a better future. In these discussion threads we can also see peer-to-peer learning. Learning from their pandemic experiences, their peers, and curricula that insist on sustainability meta-competences, students become agents of change. This is evident from various student assignment responses where students pointed to solutions. For example, many students stated that the pandemic and our classes opened their eyes, and that they will educate their

community on what they learned since educating one another is a big step in the right direction. Other students stated that after the pandemic people should continue staying at home once a month to let the planet breathe, shut down polluting facilities, switch to reusable items and renewable energies. Since our curricula insist on increasing creativity/imagination sustainability meta-competence by using artistic assignments and by showing creative solutions in our classes, many of our students in their post-class surveys noted the value of creativity in solving various environmental problems, as evident from the following student statements by Melinda, Jorge, and Jason:

“We can use our trash to make beautiful art. Prof. Popov showed us her beautiful purse which was made from candy wrappers. We can use the art made from garbage to advocate for a cleaner environment.” (Melinda)

“Creativity can be an alternative to law in bringing earth justice. Instead of law one can make awareness about environmental issues using literature, arts, music. Through these means one can show how human actions are resulting in environmental degradation or harming of earth. People will be able to connect and understand better through creativity than just laws.” (Jorge)

“Creativity can be related to Earth Justice because we can use the creative minds in order to find out unique ways to find a solution to problems that is not usual to the scientists and that it complements perfectly and actually solves the issue.” (Jason)

The students also stressed that sustainable development goals will be achieved only with partnership for goals (SDG 17) - collaboration between government and industries, and between governments. For example, one student noted that the blame should not be put on one single event, industry, or country, but rather on the damage we have all contributed to overtime. The student further elaborated that people need to combine forces in order to survive the next millennium. Another student pointed out that this period of crisis should be an opportunity for companies to contemplate on how they can change their production process to reduce pollution, and a prospect for governments to envision sustainable change of the transport sector. Majority of students understood the pandemic as an inevitable and a necessary shift that should unite the leaders around the world to use it as a fresh start in the right direction.

Many students have also shared with their class not only their thoughts on strategic planning and how SDGs should be achieved on a governmental and an inter-governmental level, but they have also shared with their class what can be done on an individual level. They shared what they want everyone to do, what they plan themselves to do, or have already done to support sustainable action:

“Get involved! Be conscious of what you eat, wear etc.Get your community involved and stand up for the people that cannot do it on their own.” (Julissa Martinez)

“COVID has strengthened my belief in climate action. I have been in my house for almost 3 months and this experience has shown me how much garbage my family and I produce. We need to have less non-compostable waste.” (Fatima)

“What each person can do is just educate each other on these matters. We need the environment, the environment really doesn't really need us. Indigenous people teach that the environment has provided when nothing else has. By promoting and learning more about these environmental injustices we can truly be advocates of justice.” (Omer)

“Individuals can consume less, only buy what is necessary, gather more information about environmental justice and manufacturing production behind the used item, start using reusable items, such as bags, reduce the energy use, make smarter choices, and instead of buying brand clothes, buy second-hand clothes which help with the reduce, reuse, recycle method.” (Pamela Vasquez)

“With everything that is going on today with regard to this pandemic, I would have to say that my views most certainly have changed. Being stuck at home and doing all these assignments (especially the fast fashion in particular) has really made me realize that I have too much clothes and I really don't need it..... I have always donated clothes in the past and will continue to do so, but when we are able to go back outside again, I will most definitely rethink my purchases and try not to buy what I don't need. I will also start giving some of my unwanted clothes to my daughter since she can already fit into some of my shirts. All in all we need to teach and show these eye opening videos to our future generation so that they do not make the same mistakes we have and can hopefully live in a better world.” (Julissa Martinez)

“Some solutions to environmental problems such as global warming and climate change would be to cut carbon emission by shifting from oil, coal, and fossil fuels to renewable energy sources such as wind, solar, water, and geothermal energy. Reduction of carbon emissions will maintain the earth's temperature, further preventing the glaciers from melting, sea level from rising, and minimizing hurricanes and tsunamis. Moreover, people should use public transportation, electric and hybrid cars to reduce the CO2 emissions and air pollution. Every person should consume less and minimize the input to reduce waste. Everybody should follow the three Rs- reduce, reuse, and recycle.” (Ivan)

“We as people can first start by reading, analyzing and having honest discussions. As more people become aware the more people there are that can hold leaders accountable for their actions and elect individuals into office who have our and the planet's best interest at heart. We can also do personal things such as volunteer at local farms, grow our own foods and buy local to help combat food insecurity. We can push for environmental justice and sustainability to be taught in schools as a part of core curriculum. We can be allies to groups that are marginalized and plagued by

environmental injustice and advocate for them. We can cut back on meat and dairy consumption. Push for better transit systems. Reduce Overconsumption of items we do not need and support local businesses that create longer lasting products. We can do research and hold corporations responsible by refusing to purchase from companies who disregard environmental injustice.” (Yolanda)

From these student statements we can see that students have already become agents of change.

Implications and Conclusion.

The student quotes demonstrated an increase in social solidarity and empathy, as well as an awareness of social and environmental injustices. There is a continuum of student understanding of the more typical topics of sustainability and resilience and environmental justice case studies, and the complexity of the pandemic. We found a synergy between sustainability, resilience, environmental justice and the pandemic experience. The pandemic experience was a foundation to understand sustainability and environmental justice, and vice versa. Our intention is to graduate students that not only have conceptual knowledge and critical analytical cognitive skills, but also a high level of awareness of the interconnectedness of humanity and other systems, and that there are multiple possible future scenarios that they can help shape. We believe that the pandemic experience demonstrates the value of integrating sustainability and environmental justice across the curriculum, and disciplines with the sustainability competencies and learning objectives.

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