Solution-focused undergraduate courses: hope and action as drivers for change

Estefanía Pihen González, PhD Candidate, UCSB (corresponding author)
e4educationca@gmail.com
2275 Aztec Avenue
Ventura, CA 928019
Diana Arya, Associate Professor, UCSB

19. Introduction

Post-secondary institutions (PSIs) play a critical role in providing citizens and communities with meaningful and effective platforms to address local social, economic, political, and environmental challenges. Beyond the issues faced at a community and regional level, planetary threats such as climate change and biodiversity loss demand immediate efforts from individuals, societal groups, industries, and nations. Education has long been reported as a fundamental enabler for infusing societies with individuals that have the knowledge, skills, attitudes, and values needed to address present and future sustainability issues (8;9). While policies are key for advancing sustainability through enforced regulations, transformative education may have the greatest potential for changing how people think and act as individuals, members of a community, and as professionals (19). Moreover, tertiary curricula provided by PSIs plays a major role in providing guidance for facing and addressing current sustainability challenges (22). PSIs that work under a transformative lens can simultaneously do the following: educate students on the complex processes and mechanics behind crises like climate change; position students in platforms for advancing change; prepare them with the technical aptitudes needed in new and current sustainability-related jobs; and cultivate values and attitudes needed to collaboratively shape a just and fair future for all living things and human groups (19;22). Through such a lens, university students can grow from merely knowing about issues to caring about these issues, to then doing something about these issues (32). This implies that PSIs must undergo a close examination of educational frameworks and curricula as well as the teaching practices used within their academic spaces; such a deep self reflection is necessary, to ensure that sustainability literacy is embedded in all disciplines and that higher-level cognitive and critical thinking skills are cultivated through all courses (32). By doing so, PSIs can make the necessary transformations that will in turn catalyze environmental, social, economic, and political change.

Learners attending PSIs undoubtedly need and deserve an education that enables them to become active actors within a just transition (6;19). A just transition is understood as "the transition towards a low-carbon and climate-resilient economy that maximizes the benefits of climate action while minimizing hardships for workers and their communities"(16). This transition implies moving away from current oppressive economic and production models that destroy natural environments and that disregard and harm social groups including women, Indigenous, Black, and Brown communities (16;19;25). In such a transition, green and blue industries become dominant, driven by a task force that has novel skills along with values that promote an inclusive and equitable future for all (19). More specifically, in order to co-construct a socially-, economically-, and environmentally-just human society, youth need to acquire skills needed for pursuing sustainable life-styles and careers, and such transformational actions cannot develop without a solutions-oriented approach (19). Such transformative skills can be cultivated through learning experiences that center youth's voices and active participation, while instilling hope in the face of global threats to our survival.

The opportunity for PSIs to become a force within the urgent green and just transition is immense and so is their responsibility to initiate corresponding changes within their programmatic and curricular structures. Many disciplines are already preparing learners for emerging new green jobs, nevertheless this type of education must reach students from all socio-economic backgrounds, regardless of the type of PSIs they are attending (19). It is also

important to highlight that those capacities required to perform at green jobs are not exclusively related to technical abilities. Having the ability to consider the well-being of others through personal and professional actions or caring about the impact that one's job has on a local environment and/or human communities are also examples of specific capacities required to thrive at green jobs (19). Transformative capacities include skills like systemic thinking, questioning the power relations that create and sustain social and environmental injustices, supporting local proposed policies, engaging in activism, and changing daily-habits (2;19;25). Beyond acquisition of skills for green jobs and transformative capacities, learners at PSIs need to be exposed to academics that cultivate life-skills that include values, ways of thinking, and attitudes to enable learning for sustainability. Critical thinking, having the desire and ability to understand the challenges faced by non-familiar communities, imagining fair and equitable future scenarios, engaging in innovative and creative thinking, problem-solving, and being open and respectful to the values of others, are attitudes equally cultivated through learning for sustainability (29;30). Hence, coursework and learning experiences at PSIs must provide students with more than subject-matter content as learners demand that their tertiary education also develops their confidence and abilities to enact change through their future professions and personal lives (6).

For young citizens to understand the complexity and see the interconnectedness of environmental injustices, social inequalities, and ecological devastation, the education provided by PSIs must change; intellectual or cognitive goals must be reenvisioned with the integration of principles that drive future thinking and action for sustainable development (23). Simply put, citizens can no longer merely understand a concept or process as passive knowledge about the world. Fostering sustainability that is aligned with values and ways of thinking is challenging and requires practice; traditional normalizing systems of higher education institutions may be at odds with preserving our planet (6). Nevertheless, the acquisition of sustainability values is key for fostering a sense of agency that is required to engage in action. Researchers like Andersson et al. (2019) have reported that the acquisition of values leads to the formation of environmental beliefs in a person. These beliefs can include environmental awareness and environmental agency, which in turn lead to the adoption of environmental norms and behaviors. Similarly, the correlation between education and sustainability aligned behaviors, such as volunteering and participating in activism, have been shown by many other researchers (13;21;24).

The bold vision of positioning PSIs as forces to drive the needed change towards ways of living that are dominated by equity, equality, and respect for the natural world, is emerging across countries, along with the call for PSIs to respond with radical transformations (7). Kwauk et al. (2023) propose a New Green Learning Agenda for post-secondary institutions to support systemic changes within PSIs to make green learning accessible to all and thus drive transformation within our societies. Creed et al. (2022) propose a radical transformation for PSIs through radical thinking and transformative action, in order to cultivate innovations within the teaching approaches, academic content, learning activities, and learning opportunities used and developed by teaching staff. Through radical transformation and systemic changes, PSIs can truly capitalize on its people's transdisciplinary knowledge and wisdom and thus produce generations of empowered individuals that want to and know how to act locally and globally.

More than ever, we come across research and multitude forms of expression that emphasize youth's demands to learn not just about the consequences of the social and environmental crises, but mainly about what is being done and how they can be agents of change (6;19). Hence, PSIs must prepare educators in knowledge and skills that will support such dynamic educational experiences among youth. This notion that learning must be relevant and engaging is not new; radical thinkers like John Dewey called for education processes where learners could envision the applicability of every lesson (8). Similarly, Indigenous people have carried ancestral traditions that provide their youth with relevant and applicable learnings; as a consequence, their generations have been the stewards of pivotal environments that preserve millions of species and that combat global warming. The ways of learning and teaching delivered at PSIs must then be relevant to every student, not only to their learning profiles, but also to their lives. Furthermore, PSIs must provide learning opportunities that connect students

with local and external communities (19;25). Such engagement and collaboration with individuals and organizations that are acting locally and beyond a university's immediate community is part of the process for adopting new values and becoming involved in individual and collective agency (23).

2. Materials and Methods

The objective of this study is first of all to provide an overview and understanding of the structural and curricular components utilized in three practicum university courses offered at the University of California Santa Barbara (UCSB) and describe the future possibilities to develop more activities to foment learning for sustainability in these courses. Secondly, we aim to provide the foundations for a follow-up study on the effects of such structural and curricular components over students' sustainability learning outcomes.

2.19. Case-study approach

To provide such an overview, a single case-story approach as described by Yin (2012) has been applied to detail the process used to construct the syllabi, select the learning content, create the learning activities, and determine the teaching approaches utilized in three undergraduate practicum courses offered at UCSB. According to Yin, a case study is one of the best approaches for engaging in an in-depth exploration of relevant, sociocultural phenomena located within a particular place and duration of time. Such phenomena may include the development and implementation of interdisciplinary educational programs like ours. Such an in-depth focus includes a close reading and interpretation of planning, materials, activities, discussions, and artifacts created during a given program. The story we have constructed as a result of our qualitative interpretations serves as an initial phase of a broader effort to identify and operationalize key components of a transformative, ESD-integrated framework for PSIs. In order to uphold our commitment to culturally inclusive research practices, we used participant and program-specific language as much as possible during our analysis of all data sources. As such, our interpretations of gathered information provide a window into what happened with as few filters as possible.

2.2. Conceptual framework

The conceptual framework used to orient the development of the three courses described in this paper is Education For Sustainable Development (ESD) as it is considered an essential component of transformative education to align societies towards sustainable development (23;31). ESD is concerned with preparing and equipping youth with knowledge, skills, attitudes, and values to make informed decisions and take responsible actions for economic viability, environmental integrity, and a just society, for current and future generations (30). To support students mastery and application of sustainability aligned life-skills and transformative capacities, ESD promotes learning processes that contemplate and integrate the realities of students and of their immediate communities (26;27;31). Even more so, learning for sustainability through an ESD focus, positions learners and educators as co-receivers of new knowledge and co-creators of visions and ideas for a more just and equitable future. Youth's voices, ideas, feelings, and even fears are crucial in this collaborative endeavor. Such an approach may be the best response to the onslaught of negative news that floods social media spaces and dampens the hope needed for transformation.

     The three practicum courses herein described centered on work by undergraduate students that engaged in social and environmental sustainability learning activities with fourth grade students attending a local California elementary school. To guide the establishment of the courses' structure, goals, learning content, and teaching practices, we utilized as a guiding framework the four domains entailed by ESD. These domains include societal transformation, learning outcomes, learning content, and pedagogy and learning environment domain (30). The societal transformation domain helped us to determine the general focus for the courses. From this domain, we drew upon the importance of empowering learners to transform themselves and

their societies (33). This led to the selection of an action-oriented learning delivered through a solution-based lens for the courses' structure, rather than focusing on the daunting facts of sustainability issues. For establishing the courses' goals, several key learning principles were used from the learning outcomes domain. These principles include futures thinking, systemic and critical thinking, innovative and creative thinking, clarifying personal and community values, and taking responsibility for present and future generations (4;33). As described by the learning content domain, we integrated critical local and global environmental and social issues into the course's curriculum/syllabus. In terms of teaching strategies, we implemented lessons through student-centered, interactive, collaborative, and action-oriented learning activities, as detailed by the pedagogy and learning environment domain (23).

ESD provides structure and guidance to formal and informal education systems to deliver learning processes that foster skills, perspectives, and values required for transforming unsustainable ways of living and creating just societies (20;28). Over the past 2 decades, ESD has been evaluated and implemented across nations and education organizations committed to promoting systems change for sustainable development (23). The ESD for 2030 Framework was recently adopted by UNESCO as a way to continue promoting the implementation of ESD across its member states, working partners, and education organizations in the global sustainability community (31). To add, through the signature of the Berlin Declaration in 20219, representatives of governments, intergovernmental and non-governmental organizations, civil society, youth, the academic community, and the business sector committed to "…integrate ESD into all levels of education and training from early childhood to tertiary and adult education" (31). We believe, as many authors and practitioners, that PSIs can draw from ESD myriad effective mechanisms to improve their curricular offer across all disciplines and deliver an education that is responsive to local needs and global crises. In the following sections, we will provide a description of how ESD was used as a guiding framework to deliver undergraduate courses set to increase students' awareness of social and environmental issues through an approach centered in agency and action.

3. Context

3.19. University of California Santa Barbara (UCSB). Our PSI is located at what is known as the birthplace for the modern environmental movement and the inaugural Earth Day. In 1969, the broader Santa Barbara community was rocked by the catastrophic conditions caused by one of the greatest oil spills in history. UCSB was integral to ocean and shoreline cleanup, making way for the development of the Santa Barbara Bucket Brigade, which has since evolved into a general environmental network that works to improve the surrounding preserves and public spaces by hosting community planting and cleanup events. UCSB's Bren School of Environmental Science and Management is one of the leading centers among PSIs, and works on environmental issues across disciplinary contexts including natural sciences, sociology, communication, economics, and law.

3.2. PSI courses. Our program was implemented through three undergraduate courses, the first of which was a practicum course designed to engage upper-division students in theories, methodologies, and practices to support the development of knowledge and action among elementary students attending our partnering elementary school. This course was first conceptualized by one of the lead faculty associated with our partnership program (see next section) and a staff member within marine sciences. The goal of this course was to create a PD experience that fosters interdisciplinary literacy skills while exploring locally relevant topics and issues for young elementary students. Since the first iteration of this course in fall 2019, our course curriculum has evolved to more explicitly focus on ESD principles, which is an anchor for all readings, discussions, activities and projects. Students who successfully complete this course are invited to continue supporting our partnership program throughout the remainder of the year via independent study.

3.3. PSI Partnering Elementary School. Since 2016, UCSB's education school has partnered with the local school district to provide educational and intern (placement) experiences that benefit both our undergraduate population and the district's student population, which broadly mirrors one another in terms of culture and language. Our PSI was the first in its network of research institutions to be acknowledged as a Hispanic Serving Institution (HSI). Similarly, the majority of students attending our partnering elementary school (more than 85%) have cultural roots in Mexico and speak at least some Spanish and/or Native language at home. As such, PSI students are a welcome resource given that the majority of teachers within the partnering school district (more than 80%) are white women who speak only English. The interdisciplinary literacy program created for our elementary school was informed by participating classroom teachers as well as school leadership. Generally speaking, this program is structured to be delivered in small-group configurations in which each group of 4-6 young students are facilitated by 19-2 undergraduates. Each group engages in reading discussions, researching, writing, and creative projects all focused on creating and/or communicating solutions to local environmental issues such as litter on the playground and the lack of a school recycling program.

4. Data Sources

To develop the case-study analysis we utilized instruments produced for the courses, by undergraduate students, and by fourth graders. These instruments include the ED134 syllabus; the ED134 final test; the ED199 winter quarter final test; drawings and sketches by fourth graders from futures thinking sessions; and drafts and final presentations of proposals for a contextualized solution developed by fourth graders. We also utilized interviews conducted with fourth graders explaining their proposals as sources for the analysis. Appendix 19 contains extracts from these interviews. Appendix 2 summarizes the final projects developed by undergraduate students for their final course test.

5. Analysis

In the following sections we provide a detailed account of the structure, learning goals, and implemented teaching strategies, as well as comments and insights from participating youth. This description has been drawn from the data sources previously detailed. We begin the description of the courses' design structure by first explaining the rationale for using solution-focused content as a way to foster action-oriented learning. Following the rationale, we offer descriptions of programmatic features and learning goals for each course, followed by highlights from learning sessions, which includes comments shared by fourth graders throughout the courses.

5.19. Hope and Action As Drivers for Systemic Change

Youth and adults alike are constantly exposed to terrifying news of the state of natural environments and social injustices. Research has found that headlines and content on the doom-and-gloom of crises like climate change are deemed more newsworthy than solutions and ways to act (9). Such news creates a feeling of despair in readers who are left without hope and knowledge for how to act (9). These feelings of inability and hopelessness created by the overwhelming amounts of information on the severe and life-threatening effects from climate change and biodiversity loss, for example, now has several names–headline stress disorder, ecoanxiety, climate change distress, eco-paralysis, and environmental cynicism (3;17). Such researchers continue to report that fear, rather than hope and action, is what is being cultivated through mass media in the face of global challenges. While informing about the consequences of major issues is essential, experts highlight that fear does not motivate us to act or think creatively, rather it pushes us to panic and freeze; moreover, if we only receive fearful information without efficacy of response we only breed feelings of powerlessness (15;17). Fear also manifests as hopelessness; hope, it turns out, cultivates confidence and freedom to experiment, which are linked to better performance and well-being (2). Hence, feeling hopeful is

not only good for our health; hope motivates us to envision ways we can engage in individual and collective action towards a better tomorrow.

Similar feelings of fear and despair have been reported amongst youth and young children. A 2019 survey from Amnesty International found fear of climate change ending the world was the prevalent feeling amongst ten thousand individuals ages 18 to 25 that were surveyed (2). The damage caused from overexposure to the doom-and-gloom of the planetary crisis, or the lack of education on current actions and solutions, is also seen among young children. A research review published by Current Psychiatry found that 82% of interviewed children, ages ten to twelve living in the US express anger, fear, and sadness when they engage in discussions about environmental problems (3). Working with students within California, we have also encountered concerning feelings and thoughts when teaching about environmental issues, including questioning why agency is needed if the state of the world seems so lost. As with many students we have worked with, the children included in the Current Psychiatry report had only experienced minor consequences from crises like biodiversity loss and climate change. These youth are exposed to fearful views of the state of the world as a result of their anticipation of what the future holds for them, not as a consequence of what they have lived yet (17). As researchers and educators, we see an even more concerning issue–formal and informal education is not exposing our youth adequately enough to foster knowledge about agency, stewardship, and systemic thinking. Furthermore, youth are not provided with enough learning opportunities for fostering futures thinking. If students do not learn about hopeful actions and direct examples of how they can engage as agents of change, they will never have a reference point of what is possible. Moreover, if students are not given the resources and support for analyzing the interlinked causes of issues as well as the agency for considering solutions and innovations, they will grow to lack the knowledge of what needs to be changed. Without explicit efforts to foster a futures-thinking mindset such as envisioning scenarios where global threats have been resolved, we are creating a generation of citizens without the skills to use creative and critical thinking to ideate and launch solutions for people and the planet.

5.2. Course Design

Inclusion of young voices as a key component for delivering action-oriented learning was a central and common element across the design and implementation of the PSI courses herein described. With the aforementioned rationale of the urgency to provide students of all ages with knowledge about the possibilities for creating an impact, regardless of its scale, we delivered practicum courses rooted in hope and agency. Our main goal was to utilize case studies of local and global actions, efforts, and innovations that are helping to address the causes, and alleviate the consequences, of environmental sustainability issues.

5.2.19. ED1934- Fall 2022

For its second year of instruction, we delivered ED194 as a practicum course that first provided undergraduate students with key foundational knowledge on transformative pedagogy and teaching methods. One of such methods is the CRUSH-it model, created to support the development of critical consumers of texts (1). As critical thinking is one of the learning principles promoted by ESD (28), the CRUSH-it model serves as a powerful tool that can be used by seasoned teachers as well as by less experienced undergraduates. In conjunction, enrolled undergraduates learned about ESD, its contribution to transformative education, teaching strategies conducive to delivering learning about and for sustainability, and learning objectives fostered through ESD. To add, undergraduates also learned about the methods for adapting scientific texts into fourth grade level texts. These methods were used by enrolled students during the production of the course's final exam: an adapted text that included information of a local maritime environment and current threats, but that focused on concrete examples of actions that can be taken by youth to help tackle causes generating an issue that is affecting a marine environment.

Once undergraduates engaged with methods for critical reading and teaching for sustainability, they engaged once a week with fourth graders from the PSI Partnering Elementary School. We developed sessions organized into three learning portions. During the first portion, undergraduates met in teams to select, from a curated list, fourth grade level texts to be used for reading sessions with the elementary students. These texts focused on local maritime ecosystems and their ecology, current threats, and environmental, cultural, and economic importance. To support reading sessions that fostered critical thinking and other ESD learning goals, we presented undergraduates with graphic tools on how to implement the CRUSH-it model and on the type of questions that could be asked to promote learning for sustainability. On the second portion of each session, undergraduates guided reading activities with small groups of fourth graders that also provided fourth graders with opportunities to share their opinions, feelings, and wonderings consequent from the read text. At this stage, undergraduates implemented the CRUSH-it model during reading activities while also providing guiding questions to cultivate creative, systemic, and innovative thinking towards individual and collective agency. During the third portion of sessions with fourth graders, we unpacked challenges and shared successes experienced during the reading activities. We also delivered short informational sessions focused on key content of the mechanics, causes, and consequences of global warming and climate change. To provide fourth graders with relevant examples for stewardship and agency, undergraduates submitted as their final test an adapted text that was edited through several weeks under the guidance of the course's teaching team. We gifted these edited adapted texts to the school's digital library.

5.2.2. ED199 Winter 2023

ED199 was offered as an independent studies course that built upon the work developed during Fall through ED134. Similarly, ED199 engages undergraduates with the same fourth grade students. Thus as instructors we considered the exposure that these students had received to learning through a critical and sustainability lens when we designed the structure and selected the content for ED199. As a consequence, sessions developed during winter centered around developing hope and agency through a combination of case studies of environmental work and futures thinking. Sessions were divided in two portions. During the first one, the course' instructor presented through story-telling and by using engaging visuals, a concrete example of an individual doing work to address an environmental issue. The case studies included people from different nationalities that work in technologies for ocean conservation, art as a means for environmental education, environmental law, and entrepreneurship for social justice. By sharing the stories behind each individual, we highlighted efforts currently underway along with the many ways to create an impact. Conversations during the story-telling were promoted to allow students to share how the case study inspired them to take action for nature. An important focus of these conversations was reminding learners that jobs and trades to address an environmental problem not only include technological ones; the arts, law, activism, ethical business models, and social innovations are all powerful means to help resolve crucial environmental issues.

During the second portion of the winter sessions, undergraduate students guided fourth graders in future thinking exercises. Based on the case study presented earlier, fourth graders were tasked with imagining a future where similar innovations and efforts were successfully deployed. Students were also told to picture they had no restrictions in resources, whether those were existing technologies, established laws, or financial resources and to then draft their own innovation using the case study as inspiration. The only rules established for the futures thinking exercises was that imagined scenarios and innovations could not hurt any group of people, any natural environment, and any living organism. Undergraduates facilitated these sessions by presenting questions that focused on critical and systemic thinking, creativity, empathy, and respect for personal and community values. Ideas and designs by fourth graders were welcomed as sketches, drawings, written pieces, or oral explanations.

For the course's final test, undergraduates selected a young inspiring innovator or individual working in environmental sustainability and produced a short presentation about this person. Each undergraduate was recorded presenting the content as if they were live with the fourth graders to include provoking questions aligned with critical and futures thinking. The recordings and individual presentations were provided to the school's digital library to support its access to sustainability learning resources.

5.2.3. ED199 Spring 2023

Building from both ED134 and ED199 winter, we delivered a third practicum course during spring 2023 at the Partnering Elementary School. The course engaged undergraduates as mentors of fourth graders during a design process aimed at generating an idea for a plausible action or effort to tackle a local environmental issue. To provide undergraduates with adequate teaching tools, they were taught about ESD, learning for sustainability, and learning goals that promote acting for sustainability. Discussions about local social and environmental issues were developed in the earlier weeks of the course, to provide undergraduates with an opportunity to increase their knowledge and understanding about these issues.

We structured the course in three main stages. The first stage included 3 weeks during which teams of undergraduates discussed with groups of fourth graders about environmental issues that concerned them and that were happening in their neighborhoods and/or larger community. These conservations included exploring the causes of such issues and identifying the larger systems that each issue belonged to, in order to identify actors and institutions that should be acting to address the problem. The first stage culminated with each team selecting a local issue. During the second stage, undergraduates guided fourth graders in sessions that centered around envisioning contextualized solutions for the issue they had selected. These sessions included drafting action plans and revising the same with the undergraduates' advice, by keeping in mind that the end goal was to design an action proposal that was feasible. The second stage concluded with the teams of undergraduates and fourth graders selecting this action plan. Through the third stage, students worked with different materials to create a draft or physical sample that showcased their proposed action. During the quarter's last session, teams presented their proposed idea; several students and teams were also interviewed to collect their thoughts, feelings, and opinions of the process of producing an idea and learning through agency. Appendix 19 details the final proposals and the issue that each proposal focused on.

5.3. Student's Comments and Insights

Throughout the three courses, a myriad of interactions occurred between fourth graders and undergraduates, amongst undergraduates, and between the teaching team and both groups of learners. Due to the vastness and richness of these interactions, we solely focus on key comments and insights shared by fourth graders based on our research question about the general impressions of course-based materials and activities. Appendix 1 and 2 contain more detailed comments from both elementary and undergraduate students. In a follow-up study, we will analyze these interactions to describe the effects of the teaching content on the fourth graders level of desired agency and views of individual and collective action for sustainability.

As excerpted comments from fourth graders will illustrate, learning through a solution-focused lens combined with platforms to propose actions that include youth voices, generated feelings and beliefs of hope and desire to take action among participating youth. More importantly, when working on drafts and proposals for imagined and feasible solutions and actions, these students demonstrated critical and systemic analysis as they considered the multiple factors that are part of the causes of complex issues. The same type of analysis is required when adults are confronted with decision-making that can have an impact, from purchasing options to engaging in civic action.

During a conversation with J, a fourth grade multilingual female student of Hispanic descent, we learned about her preconceptions of women's role in professions like engineering. B shared her drawing of an imagined technology for cleaning the oceans from plastic pollution

and received a comment stating that the design she used reminded one of an engineer. J nodded while replying that "engineers are only men, white men, I could never be an engineer". Four months later, without being requested by the course' instructor, J proudly shared the final project she had produced for Science class, unrelated to our course. She stated that I know that math can be used for helping the planet, but I made flyers for the Science project to educate people on how plastic harms whales and other animals and to teach people about ways they can stop producing plastic waste. While B did not explicitly say that she believed her creative thinking could indeed be used in a career in engineering regardless of her gender and race, her last statement indicated an evolution of seeing herself as a change agent.

In an interview with three multilingual fourth graders that had worked together on a poster proposal showcasing the world as of now and a future world free of environmental destruction, we heard about the impact of action-oriented education. The students shared that we liked working with the undergraduates because it was working on our ideas, they told us that what we think can become possible solutions and we worked together on an idea to help with the pollution in our beaches. Similarly, both fourth grade teachers shared in an informal conversation with us that students look forward to these sessions because it's about what they think and they learn about what is being done, not just how bad things are.

Students also shared insights about their decision-making process while selecting the idea for their action proposal. G and Jo, two male bilingual fourth grade emergent learners that had recently moved to the US, explained during an interview why they chose to propose an education campaign targeted at their neighbors. The boys' proposal detailed that they would go home by home to explain to adults about the effects of single use plastics and how they could reduce their consumption. G shared that because adults need something in return we are going to give them bracelets made by us only after they have heard us. Jo explained that if they know they will get something they will listen. S, a multilingual male fourth grader, explained that his proposal was about educating families on inflation because then people will know how prices can rise and they will stop buying so much stuff that pollutes. These statements indicate systemic thinking when analyzing the different factors that are part of larger complex problems such as ocean pollution.

6. Discussion

Delivering solution-focused activities generated the hopeful, innovative, creative, and systemic thinking that research has long reported as consequent to this type of education. The weekly lessons averaged 45 minutes of active learning, which was purportedly of mutual benefit for both the undergraduates and fourth graders. These discussions seemed to engage both groups in conversations that led to proposals and ideas for which the young students had immense pride. Moreover, centering the activities around the common goal of agency and producing together on proposals to issues that students had identified infused learning with a certainty that action can be taken through myriad approaches, professions, and trades. More importantly, overwhelming facts and information of the dire state of natural environments and of crises like climate change, ocean pollution, and biodiversity loss were more palatable in the face of solutions that are actionable.

As we mentioned in the introduction, students at PSIs are demanding for learning opportunities that are relevant to the issues they will be facing as part of their immediate future, and even more, of education that positions them as agents of their learning and creative work. We clearly heard the demands of our undergraduates enrolled in our practicum course, and once word spread that our curriculum focused on social actions to locally relevant environmental issues,   the number of undergraduate enrollment tripled during the spring quarter.. As practitioners, we will continue to provide learning experiences that empower students of all ages to be agents of change driven by hope and optimism. As individuals with a deep concern for the state of education and a firm belief in transformation for socially just, sustainable t futures for all, we call for others working within PSIs to take the lead and infuse their instruction with action-oriented and solution-focused education.

Appendices

Appendix 1. Description of the proposals as explained by fourth grade students

Answer from Fourth grader	What is the local issue that you worked on?	What is the idea that you and your team worked on?
A	Plastic pollution on Earth	We did a poster to show Earth with a Clean side vs Dirty side for plastic pollution. The dirty side has many cars making greenhouse gases and rivers plastic… it is so sad! If one person litters another person follows. On the clean side people are riding bicycles. So on that side there are no greenhouse gases.
B	Plastic pollution	We made a poster that shows one side with animals dying with plastic that hurts their stomachs. The other side is the future…and we got there by not throwing trash first, then also picking up trash, because the trash in the grass is also killing the flowers. We also have 4 solutions to get to the clean future Earth: 1. More trash cans. 2. More glass bottles. 3. More jobs so people can work in helping clean the trash. 4. Less factories and more electric cars so we put less greenhouse gases.
C	We do not have a garden to grow food as a community. We should plant more food here so we don't have to go to the store and use plastic bags.	We are proposing a community garden so we don't waste plastic bags. We know that we should talk to the mayor, Randy. I would like to tell him to get us some supplies to help start a community garden.

Answer from Fourth grader	What is the local issue that you worked on?	What is the idea that you and your team worked on?
D	Sea pollution because a lot of fish, turtles, and sharks are dying because of plastic they eat.	Our idea is to make a contest to see who can pick up more trash in their environment and the contest will be held at our school. Hopefully that helps people to pick up more trash because they are getting prices. Also hopefully if the kids are doing it [picking top trash] then adults will join. It matters that we protect these animals because a lot of animals are going extinct. It is just really sad that people are not taking care of animals that were here once before and they are just not doing anything about it.
E	Wasting cloth is the problem we chose	We thought of a clothing swap that we do in the school's cafeteria and one side is for woman and the other for men. And people just come and swap their clothes that they don't want. It is a problem because people are just throwing away clothes that they don't want anymore, and some people don't even have any clothes. We hope people learn from our cloth swap that instead of throwing their clothing away they can donate it. Like some people buy clothes and they put them in their closet and don't even wear them.

Answer from Fourth grader	What is the local issue that you worked on?	What is the idea that you and your team worked on?
F	We learn about plastic pollution and how that even affects sharks and so we wanted to tell people about this because a lot do not care.	We are making flyers and we are going around the neighborhood to talk to people about plastic pollution. I would hope that people would share with their friends and family our idea and that people understand a little more that they should not do that
G	Pollution in the oceans	I made a poster about how to not do plastic pollution and I am going to print it out at home and I am going to give it to my family and maybe even at the parks because a lot of people go to parks
H	Air pollution, like smog, gas	We can use electric cars, they are still bad, but gas cars are worse because they release smog and gases. I also learned about global warming. It is caused by greenhouse gases and if we cut down forests it can cause way more [global warming]. I hope that people [from the posters and ideas from us and our classmates] try to find solutions to global warming or pollution and stop burning forests. I would like to tell adults to stop releasing oil, taking oil from the oceans and to stop the smog.
I	Pollution in the rivers and in the oceans. We learned that the best way to take care of this problem is for everyone to do a small part and eventually it can become a big solution.	I would teach the kids [with our posters about pollution] because if they grow up they don't litter and they all know that it is a huge problem.

Answer from Fourth grader	What is the local issue that you worked on?	What is the idea that you and your team worked on?
J	Our school is not recycling even though we have the blue bins. All the trash ends up going into the same place.	We made a trash can with plastic bottles we collected in our houses and around the school's soccer field. We want to put the trash can at the school's entrance so we can have the school recycle.
K	Trash in our neighborhoods	We want to go to the houses and talk to the adults to explain how they can stop trashing the neighborhood. We will give them a bracelet that we will make if they listen to us first.
L	Trash in our school	We picked trash after recess for several Fridays and with all the collected trash we made a soccer ball. Now we are going to play with that ball so the kids see it and do not throw trash in our school's soccer field.

Appendix 2. Description of the final projects developed by undergraduates during each course

Quarter	Description of Final Project
Winter 2022	Adapted text for fourth grade focused on the ecological importance of sharks, including ways to locally become involved in efforts for their conservation.
Winter 2022	Adapted text for fourth grade focused on the local wharf with examples of activities and ways to engage in economic and environmental sustainable activities at the wharf.
Winter 2022	Adapted text for fourth grade focused on the steelhead trout, its ecological importance, threats, and direct examples for individual and family agency to help protect this local species.
Winter 2022	Adapted text for fourth grade focused on the ecological importance of kelp forests, its role as a carbon sink, current threats, and examples for local agency in kelp conservation.
Winter 2022	Adapted text for fourth grade focused on oil spills and tar on local beaches, its connection with the oil industry, and examples of local agency to help reduce dependency on oil for plastic production.
Winter 2022	Adapted text for fourth grade focused on sources of pollution to local coastal waters, including pesticides from agricultural use, and mismanagement of sewage water, including examples to reduce one's contribution to these sources.
Winter 2022	Adapted text for fourth grade focused on the Chumash people, their paramount past and present cultural and environmental conservation contributions, and ways to connect with such teachings.
Winter 2022	Adapted text for fourth grade focused on the Chumash knowledge of medicinal plants, with explanations on how this knowledge supports the preservation of native plants that are key in the California water crisis.

Quarter	Description of Final Project
Spring 2023	Presentation and video explanation of ARCHIREEF by Vriko Yu, an innovation to help advance coral reforestation.
Spring 2023	Presentation and video explanation of the environmental and social injustices consequent from fast fashion, with examples of how youth can help reduce their consumption of fast fashion.
Spring 2023	Presentation and video explanation of Weaving a Home by Abeer Seikaly, an innovation to help create disaster shelters for refugees.
Spring 2023	Presentation and video explanation of BioLite by Johnathan Cedar and Alec Drummond, an innovation that helps bring light to remote areas living in extreme poverty.
Spring 2023	Presentation and video explanation of Flash Forest, an innovation that helps reforests through the use of drones.
Spring 2023	Presentation and video explanation of Isla Vista Compost Collective, a local Santa Barbara project to help families compost organic waste.
Spring 2023	Presentation and video explanation of Yael Aflalo and her social enterprise that creates sustainable fashion by empowering workers and using environmentally sustainable practices.
Spring 2023	Presentation and video explanation of Olaf van der Veen and his innovation to help reduce food waste, both as a source of methane emissions but a contributor to food insecurity.
Spring 2023	Presentation and video explanation of The Alarm Cup, an innovation by 192 year old Rumaan Malik to fight food waste within households.
Spring 2023	Presentation and video explanation of the Pedal Powered Washing Machine by Remya Jose, an innovation to help lower income families in India have access to non-electric washing machines that require little amounts of water.

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