Ecology-Based Curriculum Design for Transformative Times

An Integrated, Context-Responsive Approach

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Abstract

This chapter describes the innovative, context-responsive approach to integrated, ecology-based curriculum design used by the author with a sustainability-focused pre-K–12 school in Guatemala. A participatory methodology was implemented to aggregate and democratically reflect the viewpoints of multiple stakeholders – including students, teachers, and families directly involved in the school, as well as actors in environmental regeneration and conservation-driven change in Guatemala, a national environmental education policy, and the UN Sustainable Development Goals. The result is a leading example of teacher-empowered, ecology-based curriculum that responds to the local context of the school and is therefore inherently more sustainable.

The lessons learned from this unique experience can inform impending education projects that engage a similar form of research-design-implementation-feedback-adaptation feedback loop of community-informed, context-responsive engagement. The chapter elaborates on the importance of local experiences, and on the need for increased knowledge-sharing and connection across regional ground-level contexts as well as vertically between practitioners of local implementation of teaching and learning for sustainability and their political and academic counterparts.

Keywords

ecological education – community participation – curriculum design

1 A Coherent Vision of Education for Sustainability

Like much of Central America, Guatemala faces a number of critical environmental challenges: wide-scale deforestation of the “lungs of Central America”, agrochemical food production, devastating ecosystem and biodiversity loss,

and irreversible water and soil contamination due to unregulated extractive industries. These urgent issues require an urgent education transformation.

In the fall of 2018, a series of circumstances allowed Antigua Green School, a private, progressive pre-K–12 school located on the outskirts of Guatemala's former colonial capital, to jet forward as a leading example of integrated education for environmental and social sustainability, including climate change education. The specific circumstances conducive to these changes included a major shift in school ownership, leadership, and decision-making following the departure of the school's founder, in whom all of these roles had been consolidated. The new cohort of decision makers quickly realized that while they shared a common open-mindedness with regard to the *possibilities* of progressive, sustainability-focused education, they would need to flesh out a common strategic orientation for going forward. Together they took on a new dedication to institutional and pedagogical alignment consistent with the school's mission and vision.

Although the school had adopted the name Antigua Green School four years earlier, a diagnostic baseline data collection revealed a broad array of definitions of "green" and "sustainability" amongst parents, students, teachers, and staff. Indeed, the amorphous definitions of these terms are reflected in the wider field of sustainability-oriented education. "Green" at times may refer alternately to bamboo or other low-emission construction, to school-wide systems of waste-tracking or waste-reduction, or simply to a campus endowed with a plethora of plants and animals. "Sustainable" has been watered down by some corporate and development circles to mean only "lasting a long time" or "maintenance of the same". Worse yet, "sustainability" has been co-opted entirely to mean something akin to "prepared to contribute to neoliberal capitalism in a somewhat less destructive way", whether ecologically sound or not (Kwauk, 2020). For these reasons, we at the Research Foundation for the Innovation of Eco-Education employ the term *ecology* to encompass all aspects of environmental and social sustainability, the immediate and more distant web of interdependent connections and systems within which each one of us lives and enjoys well-being as an integral part of ecology. The term *regeneration* elevates the goal of our activities, ecological and otherwise, to attaining a situation in which we can expect, scientifically, to survive on this planet.

Within schools' and educational programs' teaching and learning processes, well-intended attempts at addressing environmental and social sustainability often embrace only the performative, the cursory, or the additive. Despite the greenwashed name change, Antigua Green School's pedagogical program had remained intact, essentially unchanged from that belonging to its previous identity as a bilingual Montessori school, a curriculum drawn from a Montessori teaching manual from Canada published in the 1980s.

In short, the lush coffee farm setting, recycling program, and weekly gardening classes of Antigua Green School were determined insufficient for legitimately claiming “green school” status. The new decision makers saw that it was not enough for students to be immersed in nature, nor even to have an immense appreciation for nature as so-called “stewards of the environment”, an identity imposed on students without provision of the requisite knowledge base to enable them to engage in informed environmental or social activism. Any truly meaningful ecological education must involve a deep dive into the most current findings of the environmental and social sciences, as well as “the knowledge, skills, and attitudes necessary to mitigate against further environmental damage” (Kwauk, 2020). Ideally, ecology-based education would engage and embolden students to participate in developing creative and innovative solutions for regeneration. Sustainability – defined by the new leadership of Antigua Green School as “a coherent and consistent orientation towards longevity, well-being, integrity, and renewable growth, with an innovative and inquisitive spirit” – wouldn’t simply need to be woven into the fabric of the curriculum. It would need to be the thread.

What emerged from this reckoning was recognition of a glaring need to reassess the mission, vision, and values of the school. With these as a foundation, a multi-phase curriculum design process would take place over the course of the next year, with the aim of ensuring pedagogical and institutional coherence and intentionality. An important assumption of this curriculum design project was that once integrated into a transdisciplinary, teacher-empowered, and context-responsive curriculum framework, education for ecological, environmental, and social sustainability is far more effective and meaningful for students and teachers than a standard education, be it with or without a superficial ecological component.

2 Designing and Defining the Educational Mission and Vision

Like much of the world, Guatemala suffers from a lack of innovation in education. Yet, reproduction of the status quo is a result of habit and professional culture rather than of regulation; the national policies and systems of education, such as the notably flexible Curriculum Nacional Base (CNB) to which all schools, whether public or private, must subscribe, allow for a fair amount of local interpretation. Indeed, Guatemala is a ripe arena for inquiring into how we enact schooling and exploring how we could potentially practice it differently.

If, upon critical reflection, we choose to negate the assumption that schools must exist as factory-like institutions for storing, processing, and constructing human resources as they mature (thereby freeing up their parental human resources for employment rather than childrearing), we are thereby charged with, and accountable for, reassessing what a school or educational program seeks to accomplish – in other words, its direction and purpose. What is education for? What is this particular school for, and why should it exist? What contribution will it make to the lives of the students and their families?

When we discuss education for sustainability (or further, education for ecological regeneration and transformation), which we know is essential for our very survival on this planet, we must consider in what ways we seek to accomplish that purpose. To determine this strategic direction, the leadership team of Antigua Green School drafted a statement of mission and vision that was then extensively workshopped in both Spanish and English, first with the entire teaching staff, then the board of directors, and finally the parents. The process required a word-by-word analysis and non-literal translations between the two languages, to reflect meaning, purpose, and utility. Conceptually, the mission and vision drew from the ideals of the stakeholders involved, as well as from the National Policy on Environmental Education document produced in 2017 by the Ministry of Environment and Natural Resources (MARN, 2017). A critical component that ensured long-term and ongoing buy-in was the inclusion of teaching staff in the validation process. School leaders, rather than taking an authoritarian stance – that is, unchecked imposition – followed up with the teaching staff with such questions as “Does this accurately reflect what you aspire to do through your teaching practice? Can you get behind this?” The mission and vision then became the basis of a survey of the entire school community and beyond. It asked what the students would need to learn in order for the school to achieve this mission in accordance with this vision. The results of the concept mapping process described below ultimately formed the curriculum framework.

In addition to assessing the purpose and direction of the school through its mission and vision, it was also critical to establish a set of values to guide institutional, pedagogical, and disciplinary decision-making. Such a foundation would prevent the kind of haphazard, inconsistent decision-making that often plagues schools (creating rifts and resentments amongst leaders, teachers, parents, and students), without leading to the opposite extreme – over-delineation of rigid protocols. As a “green school”, the school clearly would need to value sustainability (which, itself, required the development of a shared institutional definition), but greater precision of terminology was called for.

The values established as a result, including pivotal items such as *planetary citizenship* and *inclusive diversity*, fell into three key “pillars” (principles): Sustainability of the Self; Sustainability of Communities; and Sustainability of the Planet. As astutely observed by Kwauk, “By developing students’ self-awareness, social awareness, and ecological awareness, such a transformative education can change the frames of reference needed to create a new set of norms, systems, and relationships between people and planet” (2020).

Finally, a list of characteristics of the educational *experience* of students was created. How would the aims of the school be reflected not only in the curriculum, but also in the pedagogical approach, the enacted practices of teaching and learning as actually implemented? In short: creative; autonomous; interactive (through hands-on experience and collaborative group work); and transformative. It was interesting that this would turn out to be the aspirational description of the experience of both students *and* teachers, as both gained a stronger sense of agency in their teaching and learning processes.

3 Responding to Local Context through Participatory Methodologies

Although education for sustainability has garnered significant attention at the global level amongst academics, governments, and civil society organizations (namely, the UN), the attention to the issue has failed to translate into teaching and learning in classrooms. Too often, well-intended educational policies are imposed, whether from the top (in hierarchical governance contexts) or from the center (in centralized governance contexts), without regard for the everyday lived experience of teachers and students in classrooms and schools. While climate change and rapid loss of biodiversity are crises that gravely affect us all, local ecological challenges are unique. The scope and definition of education for environmental and social regeneration ought, therefore, to be determined by the environmental and social circumstances. The experience of Antigua Green School demonstrates that this context-responsiveness can be achieved through a participatory approach to curriculum design and development. This approach creates possibilities for meeting all national learning standards and assessment regulations while at the same time addressing the critical need for students to understand their unique ecological opportunities and to creatively problem-solve with regard to their unique ecological challenges. Thus, at the preschool level, language and literacy standards can be met alongside mathematics standards through an exploration of Guatemalan flora and fauna, or at the upper elementary level through debating the efficiency and measurable effectiveness of government versus non-governmental

organizations in Guatemala, drawing on student research and interviews with local and national representatives.

In addition to the policy–classroom disconnect, education for sustainability must contend with another critical issue. Private, progressive education worldwide is riddled with imported curricula from the Global North, curricula entirely disconnected from context, culture, and place. Yet, education is most effective when made relevant to the lives and experience of students (Monroe et al., 2017). We know that children and youth will face major challenges related to climate change, to rapid loss of biodiversity, to the unharnessed exploitation of our natural resources, and to the environment they live in's being put in jeopardy. Yet, if young people have no local context for understanding ecological threats, efforts to sound the alarm with them and to cultivate resilience, problem-solving, and change-making could potentially descend into abstraction or irrelevance. The local ecological context should inform curricular and pedagogical choices.

The process of co-creating the curriculum framework of Antigua Green School hinged upon the participatory methodology called community concept mapping. It involved aggregating and democratically reflecting the ideas and viewpoints of multiple stakeholders. Those surveyed included not only students, teachers, and families directly involved in the school, but also actors with experience in environmental regeneration and conservation-driven change in Guatemala. Also taken into account were ideas from the National Policy on Environmental Education document previously mentioned and the UN Sustainable Development Goals. The basis for having selected concept mapping was its capacity to connect the perspectives of diverse actors in the collective transformation of complex human systems processes, in fields such as public health or education (Willis et al., 2012). Unlike focus groups, which have the unfortunate drawback of unquantifiable social power dynamics amongst participants (related to such factors as age, gender, dominant language, professional hierarchy, and even personality type – for example, extroversion), concept mapping enables all voices and perspectives to be considered as equal inputs.

The survey invited the stakeholders to individually provide an unlimited number of responses (min = 3) in either Spanish or English to the central research question: “In order that the mission and vision of Antigua Green School be put into operation, what should students learn?” The intent of the question was to draw a direct connection between the stated purpose of the school and its actionable roadmap for achieving that purpose by cultivating students' relevant knowledge and skills. The survey welcomed responses concerning what students should know, be able to do, or understand.

The leadership team reviewed the responses from the stakeholders and fleshed out approximately forty common themes. A smaller cohort of parents and teachers was then invited to rate the themes according to level of importance and to sort the themes into like groups. Finally, the data collected from the school community stakeholders, ecological sustainability actors in Guatemala, and relevant policy documents, were entered into an online concept mapping platform called Ariadne for multivariate data analysis.

The resulting map of clustered concepts and competencies is a leading example of a teacher-empowered, ecology-based curriculum that responds to the local context of the school. A number of map interpretation workshops were held with the board of directors and amongst the leadership and teachers. An example of a workshop discussion: The concept mapping software allows for any number of concept clusters, so upon reviewing the various configurations, the optimal number of clusters was determined to be six (because the groupings made the most logical sense). Relevant cluster theme titles were selected to describe the concepts and competencies: Our Self, Our Environment, Citizens of Change, Our World & Our Values, Innovation & Creativity, and Organizing Our Thinking & Communication. In another workshop, teachers were asked to work in pairs to develop a grade-level-appropriate inquiry topic by relating two concepts from two different clusters, such as “Sustainable Agriculture” and “Environmental Systems & Policies”, for a unit of inquiry delving into small- and large-scale agricultural systems, including a long-term project constructing a school greenhouse with guidance from a local eco-builder. For the 2020 school year, the leadership team preselected the four inquiry topics for each class, drawing from a concept or combination of concepts from the map. But eventually, as the school becomes more confident and comfortable with the curriculum concept map, teaching teams will select their own inquiry topics from the map. The teaching team then determines a contextually responsive focus. A further example: To reflect current events, the lower secondary (Grades 7 and 8) teaching team chose to focus a unit of inquiry on diseases, epidemics, and pandemics, through combining curriculum concepts “Health & Nutrition” and “Self-Awareness & Self-Reflection”.

Ultimately, the inclusive process of map interpretation is likely to prove more sustainable than a top-down process in terms of pedagogical and institutional innovation, as well as more relevant to teachers and students as they engage in inquiry and learning. Involvement in the co-creative process cultivates an important psychological response in which contributors feel a sense of investment in the final product, in this case the sustainability-focused curriculum framework. Teachers, parents, and students who feel heard are more likely to feel motivated and constructive and less likely to engage in

antagonistic interactions with school leadership. Consequently, the leadership spend less time and energy on dispelling anxieties, justifying, and mediating and can dedicate more time and energy to supporting and improving teaching and learning. For this reason, Antigua Green School's leadership team is committed to periodically reviewing the curriculum framework through these kinds of participatory approaches in order to adapt and refine future iterations of the ecology-based curriculum design.

4 Teachers as Designers of Learning Experiences

4.1 *Design Thinking in Education*

It is of great detriment to students – and to humanity's creative response to the real problems we face in these transformative times – that teachers are trained and mandated to subscribe to prescriptive, reproductive pedagogical practices. If we take the example of the technology industry, no one will consider it reasonable to rely on a computer users' manual from the 1980s. Why do we consider it reasonable to do so with children and youth? As with computing and technology, the climate and earth sciences, not to mention neuroscience and the science of learning, have made great strides in recent years. Moreover, if 2020 has shown us anything, it is that the world is in a massive state of transition, one that according to climate science requires an urgent and collective response. Yet, teaching practice fails to change accordingly.

Indeed, teachers may at times even find comfort and predictability in repetitively delivering subject-matter content, year after year. The few teachers who make it out of their preservice education eager to engage critically with their pedagogical practice are subsequently reprimanded in the schooling workplace for disrupting the status quo, if not chased out of the field altogether. How, then, can we foster an enabling environment in which teachers are entrusted to do their job and held in high professional regard?

We urgently need to professionalize teachers and entrust them with the professional capacity to actively research and design meaningful learning experiences for students according to the local context, interests of the students, and most recent scientific research. Accordingly, the Antigua Green School leadership decided to refashion the role of the teacher, from *disseminator of knowledge* to *co-designer of learning experiences*. Design thinking, or human-centered design, is an iterative process that begins with empathy with, and deep consideration for, the user – in the case of education, students. It actively challenges assumptions in order to identify alternate strategies and solutions using a feedback process, which consisted of

research–ideation–implementation–feedback–adaptation, followed by subsequent iterations of the same.

As the case of Antigua Green School demonstrates, this process of professionalizing teachers to employ student-centered design thinking can be quite painstaking. It requires a culture shift from one of complacency and compliancy to one of reciprocal feedback and multiple iterations of adaptation. The unknowns inherent in such a process can be daunting and uncomfortable for teachers, especially if they are accustomed to following a regimented model in a top-down workplace. A major notable challenge for teachers lies in not knowing what a curricular or pedagogical transformation will look like in terms of daily routines and activities. Likewise, it is difficult to know how a given learning experience will unfold; an innovatively designed learning experience may fly or flop. The leadership of Antigua Green School resisted the urge to respond preemptively to these anxiety-driven concerns and insisted on a collective conversation, always continuing to refer back to the mission, vision, and values developed during the early stages of the curriculum design process. Over time, early adopters and most staunch resisters adapted to the shift. A six-month period of resistance and professional unlearning and relearning was accompanied by an intensive, week-long summer workshop with each teaching team, as well as by weekly all-staff study meetings to reflect on various progressive education practices, such as project-based learning and research-based community interviews.

4.2 *Understanding by Transdisciplinary Design*

In the new pedagogical formulation fully launched as of 2020, Antigua Green School no longer asks its teachers to follow a model or manual, but rather professionalizes them as agents of their pedagogical practice. This approach means teaching teams do extensive lesson planning. Taking as a base the curriculum framework established by the concept mapping process, the school now asks teachers to design learning experiences rooted in conceptual understanding. As a guide, the school uses a school-based adaptation of a planning process called Understanding by Design (UBD). The essence of UBD, a three-stage backward design process developed by Grant Wiggins and Jay McTighe, is to put students' learning at the center. Three questions are at the crux of the teaching team's role in designing units of inquiry at Antigua Green School: (a) What are the big ideas or significant understandings that the teaching team considers essential with regard to the unit's concept(s)? Then: (b) What opportunities will students have to demonstrate their enduring understanding, that is, what they know and what they can do (rather than superficially meeting performance benchmarks or demonstrating content retention)? And finally:

(c) What meaningful learning experiences and exposure can the teaching team provide in order to cultivate those enduring understandings? Teaching teams purposefully map into the unit relevant competencies and national learning standards, as required by government regulation, but only insofar as they are directly relevant to, or are easily accomplished via, the understanding-by-transdisciplinary-design process.

Setting student understanding as the objective of learning-experience design – rather than compliance with, or coverage of, national learning standards – can prove a challenging reorientation for teachers. The challenge of reorienting their goal is matched with the concomitant challenge of transdisciplinary teaching. Prior to Antigua Green School's curriculum design process, the prescriptive Montessori curriculum was delegated amongst the teaching team according to subject matter. For example, a veteran lower elementary teacher would essentially "own" mathematics for several years. Subsequent to the curriculum design transformation, however, all teachers would share equal responsibility for all transdisciplinary learning experiences designed to cultivate understandings related to the particular concept being focused upon. (An exception: Spanish- and English-dominant teachers would retain responsibility for literacy in their respective languages.) Significant communication amongst teaching team members is required to distribute and delegate roles and responsibilities, particularly during the "Inquiry" block of the daily schedule. At the middle school and high school levels, teachers guide students' inquiry according to their subject-matter expertise but still practice team design of learning experiences. Many teachers initially resisted, reluctant to teach subject matter outside of their subject area of training or expertise, whether they be traditional subjects, such as mathematics, or topics with which many teachers are not often familiar, such as sustainable agriculture or climate change.

Moreover, teachers experienced a major shift from implementing compartmentalized subject matter, as the majority of them had been trained, to designing transdisciplinary learning experiences with ecology or sustainability woven in as a foundation. An inquiry unit on ecosystems and biodiversity at the lower elementary level would include graphing and other foundational statistical analysis skills, for example. Such integration of ecological sustainability and regeneration into the core curriculum of such traditional subject areas as mathematics and science can seem to some teachers like added workload, or as a distraction from traditional subject content and skills. They experience what Kwauk describes as the "false dichotomization of learning priorities" (2020). Leadership, teachers, and parents alike contend with the supposed mutually exclusive choice of resource and curriculum allocation, a false "either-or" between eco-literacy and traditional subject-matter literacy.

Guatemala experiences the “double burden” (Kwauk, 2020) of disproportionate vulnerability to climate change and a lack of basic quality education in numeracy and literacy. In reality, the need for eco-literacy and for facility with transdisciplinary competencies is urgent.

5 From-the-Ground-up Knowledge Production: Opportunities for Institutional, Local, and Regional Sharing of Knowledge

By breaking down the culture of reproducing and unquestioningly adopting various “best practices for progressive education” (out of context and often hailing from elsewhere), education leaders can instead introduce a culture of innovation, intentionality, and knowledge production. One approach is to support teachers to share the lessons learned from their innovation iteration process with one another. As was observed at Antigua Green School, successes are initially easier to share than failures, particularly in environments in which territorial competition amongst teachers is the norm. With time, consistency, and coherency, a culture shift allows for teachers to become more comfortable with reflecting critically on their practice together (Larrivee, 2000).

Knowledge, practice, and challenge sharing and collective reflection processes may occur at the institutional level amongst teachers at the same school, and externally, at local or regional levels. One month after the launch of its new curriculum in January 2020, Antigua Green School – in collaboration with the Research Foundation for the Innovation of Eco-Education – organized the inaugural conference on eco-education in Central America and the Caribbean. The aim of the conference was to bring together educators, policymakers, and academicians from around the region to learn from one another. Simply knowing that other practitioners are oriented toward sustainability, ecology, and regeneration motivates educators and education leaders to continue carving out their own innovative, intentional, and context-responsive paths. Together, professional cohorts of educators and education leaders can co-create a new set of norms and aspirations oriented toward ecological sustainability and regeneration. An idea that came up over and over in discussions among conference participants was that there is not one particular or perfect way of doing ecological education with children and youth.

While the problem of the global climate crisis and other environmental issues can feel overwhelming, evidence of positive impact, albeit on a small scale can inspire, especially when the evidence is compiled at the regional level, across similar local contexts. This form of professional opportunity to connect educators and education leaders directly provides them an opportunity to

hear the successes and challenges of their colleagues, and to understand to what extent a context-responsive approach in one locale might be connected, transferred, or translated to another locale.

Forums for local and regional sharing of knowledge provide also an important opportunity for educators to share classroom and school-based experiences with policymakers and academic researchers. Too often, the communication flows mono-directionally in the opposite way, from decision makers with little connection to, or experience with, everyday teaching and learning, to those who are commanded to implement top-down policies. By creating a local or regional metacommunity of “climate-oriented education systems for optimal impact” (Kwauk, 2020), we can begin to actively address the lack of systemic support for teachers, which is a major roadblock to efforts to advance environmental and social sustainability education. With bold examples of courageous innovation, the imagination of educators, education leaders, and policymakers alike can extend beyond the redundant and reproductive (the most insidious interpretation of “sustainable”) into alternative and creative possibilities for regeneration, potentially inspiring transformation of the system itself.

6 Lessons Going Forward

In order to disrupt the status quo of reproductive education that harbors anti-ecological principles such as individualism, norming, competition, hyper-production, and a lack of either relevance or critical reflection, we need to imagine *and enact* possibilities and alternatives. The case of Antigua Green School can be a significant global example of how to combat the five major roadblocks to transforming sustainability-oriented and climate change education. All this, despite a marked lack of supportive education policy or mainstream teacher education related to environmental sciences, nature conservation, protection of the environment, or active problem-solving amidst a climate breakdown. With such national systemic support of educators, entire education systems have the potential to transform themselves in the direction of integrated, ecology-based education for sustainability and regeneration. Yet, even without national systemic support, educators and education leaders, whether individually or in cohorts of local or regional professional networks, can make a profound difference. To lead transformation of education toward ecological regeneration and meet the challenges of these transformational times, we must show that it is possible to design context-responsive teaching and learning as a reality across a variety of educational environments, whether under conducive circumstances or not.

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