STATE OF THE WORLD

EarthEd

Rethinking Education on a Changing Planet

THE WORLDWATCH INSTITUTE

CHAPTER 25

The Future of Education: A Glimpse from 2030

Erik Assadourian

It's 2030. The world's population has now grown to 8.5 billion people. Global temperatures are now an average of 1.2 degrees Celsius higher than in 1880. Seas have already risen forty centimeters since 2016, suggesting that the models of that year that projected a rise of two meters by 2100 were likely significant underestimates. The Arctic Ocean is now consistently ice-free every summer. And several countries have lost a primary source of fresh water and freshwater storage as glaciers grow smaller and smaller each year.[1]

Many cities have been damaged significantly by climate change, and more than 40 million environmental refugees have fled their homelands and settled elsewhere, triggering sometimes violent backlash in their host countries. Flooding and disasters routinely cost tens of billions of dollars a year in damages, which has depleted the coffers of many national governments and diverted spending away from critical social investments, including schools.[2]

In many places, this has caused education to take a major step backward, with governments shuttering schools, laying off teachers, cutting instructional hours, and even reducing total years of schooling. In other places, however, the convergence of economic, environmental, and social crises has led to a flurry of educational innovation: new programs, new curricula, new priorities, and new types of schools, perhaps revealing the first steps on a new educational path that is better adapted to life on a changing planet.

Many pioneering schools saw the writing on the wall back in 2017 (and some even earlier), when climate change and other neon signs of a changing planet became too bright to screen out. Creative school leaders started to understand

Erik Assadourian is a senior fellow at the Worldwatch Institute and director of *State of the World 2017* and Worldwatch's EarthEd Project.

that "all education must be environmental education," to paraphrase environmental educator David Orr. On a changing planet, these pioneers realized, education must prepare children—and students at all levels—with the skills, knowledge, and wisdom necessary to navigate the turbulent future ahead.[3]

These schools integrated ecoliteracy and spending time in nature as a means to reconnect children to the Earth on which their lives depend. They taught systems thinking and critical thinking so that children would be prepared intellectually to deal with the rapid changes that they would face. They taught character education and social and emotional skills so that children would be prepared socially. They taught home economics and traditional and Indigenous skills so that children would be prepared physically. And they taught activism, social entrepreneurship, and leadership so that children would be prepared politically. Professional schools also evolved, integrating the environment directly into the teaching practices and curricula of economics and engineering programs, into the agricultural sciences, and into business and medical schools.

By today—2030—some of the most innovative schools have become global "franchises," making them as recognized now as Catholic schools, Waldorf schools, and Montessori schools were in earlier decades. For example, nature-based preschools are now present in nearly every country of the world. Many are located in forests, but others are situated on farms, beaches, deserts, mountains, and even rivers. The beauty of these nature schools is that they have integrated vocational training into the core of their curricula, providing students with a means not only to generate a livelihood later in life, but also to help the school sustain itself—whether through farming, tending livestock, hunting and trapping, or foraging forest crops such as acorns, fruit, maple sap, and lumber. This has enabled many nature schools to thrive even as neighboring conventional schools have been forced to shut their doors.

The chain of social entrepreneurship schools, founded by Mechai Viravaidya in 2009, also has expanded globally. Starting with just one high school in the Thai province of Buriram (see Chapter 14), in just two decades this movement has grown to more than three hundred and sixty "Bamboo Schools" spread over forty-three countries. Their model of empowering both students and the communities of which they are a part has proved highly attractive, as well as successful. A study from 2027 found that the presence of Bamboo Schools enabled those communities to maintain a decent quality of life, even as national economic trends declined, and helped them better resist the shocks of widespread climate disasters, as a result of the strong levels of social capital and local ecological knowledge built up over the years.[4]

Other efforts are still in their startup stages but show great promise. One need only glimpse at a "typical" day at three of the most innovative schools of 2030—a river-based middle school in The Gambia, an ecoengineering magnet high school in Singapore, and an activist high school in Brazil—to see this potential. As these examples reveal, wide differences remain not just in the level of resources available to schools, but in the direct effects that school systems have suffered from a rapidly changing planet. In places where flooding, droughts, and other climate disasters have become omnipresent challenges, these experiences and the strategies used to deal with them have become part of the core curriculum, even the school design. In places where stability has remained, these concerns have tended to be more "academic," with activity focused on how students can prepare both themselves and global society for thriving in a changing world.

Hawa's Day Aboard the Tigerfish Floating School

Today, Hawa arrived early at the dock where her middle school will pick her up for the day. Yes, instead of taking the bus, she will actually be picked up by her school, as the Tigerfish Floating School is a large boat. Over the course of the school day, Tigerfish meanders up and down a few kilometers of the Gambia River, just downstream of the city of Bansang, picking up the school's one hundred and sixty students.

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Makoko Floating School in Nigeria, an early prototype of the Tigerfish Floating School in The Gambia.

Today, it is Hawa's turn—along with her other classmates who meet at this dock—to harvest the day's catch from the school's dockside fish farm. Lunch each day consists of a mix of vegetables, rice, and the fish that the school raises in a series of small tanks, located on each of the docks. This ensures that even the poorest of Tigerfish's students get adequate protein every day. The fish farms also are an integral part of the curriculum: all students will graduate middle school with a comprehensive knowledge of fish farming—from

growing the insects that the fish eat, to proper harvesting and management of the tanks, to basic veterinary training.

After feeding the fish and harvesting today's catch, Hawa and her classmates see their school approaching. The floating school is a large, pyramid-shaped boat—designed not for speed but for stability, even in the worst weather. The school consists of several well-lit classrooms, a kitchen, and two science labs, as science is a priority at Tigerfish. Today, the first- and second-year students (sixth and seventh graders) are learning about circuits and solar electricity. With a solar array covering the boat, the students have the chance not only to learn about photovoltaics in the abstract, but also to take part in maintaining the boat's electrical system.

In the other science lab, the eighth graders, including Hawa, have been spending the day dealing with a problem. The tilapia in one of the school's fish farms have developed some sort of disease, with many of the fry dying and many of the adult fish developing skin lesions and rubbing themselves raw against the sides of the tanks. Over the course of the day, the students have dissected several fish to explore internal symptoms, examined fish cells under the microscope, and conducted online research—first on Googlepedia and then in academic journals—to assess the problem. Their hypothesis: the fish are suffering from Trichodina, tiny parasites that attach to the gills, skin, and fins and cause irritation.

The teacher, who has been quietly nudging the process along—helping with the equipment, engaging those who get left out, settling down those who get too excited—now makes a video call to the local veterinarian and allows the students to present their case that the tilapia are suffering from Trichodina. The vet, seeing the evidence, supports their conclusion and agrees to come by the next day to give the fish a potassium salt bath to kill the parasites. After the call, the teacher praises the excellent work of the class, although it is the success of correctly identifying and dealing with the problem that is most rewarding to Hawa and many of the other students.

Not every day does such a perfect project manifest at Tigerfish, offering the students an opportunity to expand their vocational knowledge, research skills, critical thinking, and ability to work together. However, routinely integrating river life into the school curriculum tends to offer more opportunities than otherwise would exist. Biology, chemistry, climatology, ecology, and physics are all naturally a part of life on a river—a river that most of these students will live along their entire lives.

Having a deep knowledge of and connection to the Gambia River is perhaps

the most valuable aspect of Tigerfish, although gaining an understanding of the many changes occurring in the ecosystem also is very valuable. As climate change and population pressures have reduced wild fish stocks to endangered levels, farmed fish have largely replaced wild fish. And after several serious floods made schooling impossible for tens of thousands of children living along the riverbank, the idea of floating schools was embraced, with one-quarter of The Gambia's students now spending at least some of their school years at a floating river school.

Recognizing the high risk for future climate-related changes—including the potential submersion of vast areas of the country—certain skills are an integral part of the curriculum: the ability to swim well, disaster education (how to respond effectively in a crisis), and, most importantly, multilingualism. Although English is the primary school language, all students also learn French and Mandinka. The hope is that knowing two global languages will increase students' employment opportunities in good times, and, if a large share of the population eventually becomes climate refugees (a possibility that the government now openly acknowledges), knowing both English and French will help people better integrate into other countries.

While floating schools are not solving the climate crisis in The Gambia and the other coastal areas where they have emerged, they have proven to be an ingenious adaptation—one that not only prepares students for life on a changing planet, but that has made them into vocal advocates for dealing proactively with the climate crisis.

Arivan's Day at the Garden City Eco-engineering Academy

Arivan has just stepped off Singapore's Mass Rapid Transit train and is now walking his last few blocks to his high school, the Garden City Eco-engineering Academy, along a pedestrian and bicycle-only street. This is his favorite part of the commute. Even though school starts later in Singapore to avoid the worst of the morning rush hour, the train ride is still chaotic. But these last few blocks along Agnes Avenue—with its lush tree canopy, birdsong, and verdant sidewalk cafés—is more park than street. Of course, not all roads in the city are so picturesque. But Arivan is proud that the students of Garden City Academy have played an important role over the years in helping to make Singapore one of the greenest cities on the planet.

Even as a second-year student, Arivan is still orienting himself to the possibilities—and responsibilities—that come with being a student at Garden City.

Students at Garden City Eco-engineering Academy examine specimens from their latest experiment.

Ever since he was little, Arivan's education has been centered on character education. Having a strong moral character, or, simply put, "being good," has been deeply integrated into every aspect of Singapore's educational system—from teaching empathy early on to exploring the moral complexities of modern life as children mature.

With Arivan having passed both his character education and science exams at the top of his class, he has earned a coveted spot at Garden City (although, naturally, he accepted it with humility). Students here gain access to some of the most controversial environmental technologies on the planet, from genetically modified organisms (GMOs) and nanotechnology, to geoengineering and carbon capture and storage (CCS). They are expected to graduate not only with in-depth knowledge of these technologies, but also having helped advance humanity's understanding of them, and of how to use them responsibly (if at all).

Garden City's philosophy is that as the planet's ecological crises have accelerated, the need for eco-engineering has too. Not only are governments working diligently to make their cities and industries more sustainable, but widespread ecological disruptions are requiring us to make our key systems—water, electricity, transportation, agriculture, and coastal infrastructure—more resilient. As the planet continues to heat up, there will be greater and greater pressure to try more controversial technologies in an attempt to dig humanity's way out of crisis.

Rather than ignoring or banning these technologies outright, the Singapore government feels that it is better to train the next generation of scientists to be morally developed leaders who can analyze rationally whether the sacrifices that come with using the technologies merit the benefits. As an added bonus, many of the eco-engineers that have graduated from Garden City have become a valuable asset to Singapore, bringing significant global leadership in filing patents and generating abundant journal citations, royalties, and remittances.

When Arivan started at Garden City, he was invited to participate in a longitudinal study on the health and environmental implications of saltwater-tolerant perennial rice. This GMO crop was designed back in 2019 and has been undergoing long-term testing to ensure that, along with being safe, it is productive, palatable, and profitable. During the early years of the study, students were involved in growing and harvesting the rice and feeding rice meal to rats. When the field tests found no adverse health effects, students moved on to feeding the rice to chickens, then dogs and cats.

Two years ago, the students (under the close supervision of scientists at the school and at Singapore's Agri-Food & Veterinary Authority) declared the rice safe for human testing. The rice is now served in the school cafeteria. After all, one of the mottos of Garden City is, "What we expect of others, we must expect of ourselves." Arivan now plays an important role in collecting and analyzing health data. As a student in the school's GMO track, he routinely reads the latest journal studies and has even joined his team to present at the prestigious International Congress of Agricultural Biotechnologies. He and others in his track also regularly present updates of their work as well as broader "field briefs" to students in the other three tracks at Garden City: Geoengineering & CCS, Nanotechnology & Biomimicry, and Urban & Civil Design.

This morning, the day is starting with a presentation from a Civil Design team working on growing Singapore's first living house. Planted nine years ago, the trees and grasses that make up the house have now fused to a point where the interior can be built. As the lead presenter explains, "If all goes well, we'll have our first resident by the end of the school year." When not attending full-school presentations, most students are either taking core courses or participating in their teams' studies.

But it is not all science and moral education at Garden City. Languages—particularly English and Mandarin (the top two scientific languages), along with Malay—are a required part of the curriculum. The arts and other means to cultivate creativity and critical thinking are encouraged, as are opportunities to get outdoors in Singapore's many managed natural spaces. Arivan is part of the wilderness skills club, where he is currently learning how to make fire using a bow drill. As Garden City administrators often state, "Connecting students to the eco-social-technical organism that our city-state has become reveals the mysteries of our living planet and their duty as stewards." While that might sound like jargon to the outsider, it is music to the students of the Garden City Eco-engineering Academy.

Beatriz's Day at the Freire School of Activism

It is hard even to see the Freire School of Activism in São Paulo, Brazil, as a school. The two hundred high school students spend far more of their time directly engaged in activist campaigns than in anything resembling traditional academic work. Of course, there are classes—two days a week—where all the basics are covered: Portuguese and English, math, history, systems thinking, sustainability sciences, persuasive speech, advocacy, law, and ethics. But unlike other high schools in São Paulo, all coursework is regularly oriented toward how students can use this knowledge to make their communities, their city, their country, and their world more just, more sustainable, and healthier places to live.

To keep costs to a minimum, class days take place at a few local churches, and the tutorials and campaign meetings that dominate the week typically rotate among students' homes, public libraries, and cafés. Most meetings consist of updates and strategic planning for the dozen or so campaigns that the students have chosen to initiate and participate in—from efforts to clean up abandoned brownfields and establish new health clinics and bike paths, to campaigns to reduce air pollution and increase national carbon tax rates. Perhaps most ambitious is the students' ongoing campaign to persuade city officials to pass a law requiring green roofs and rainwater catchment systems on all new or rehabilitated buildings—essential infrastructure as climate change and a growing population make access to fresh water a dire challenge in the city.

What has been most powerful about the activist educational model is that the students, like any good campaigners, learn to reach out to a broad range of constituencies to build strong coalitions. Students at Freire learn to identify potential partners, communicate strategically, engage groups with varying interests, and apply a whole host of skills such as running meetings, management, and organizing. Inevitably, they also end up spreading a philosophy of empowerment to their families and communities as they seek out broader support, often inspiring others to join the campaigns.

Beatriz, now a teacher at Freire, graduated from the very first class in 2024. One of the school's earliest campaign successes was an effort to expand the Clean City Law—a 2007 law that banned billboard advertising across the city of São Paulo—to the entire state. The removal of billboards from the city had significant impacts on revealing social inequities and also reducing materialism and unhealthful consumption patterns. Although the campaign succeeded a few years after Beatriz graduated, her role in organizing nonviolent

civil disobedience actions—including a relentless "ad-jamming" campaign to replace billboard ads with public service announcements and artwork—had a major impact in exhausting the opposition and persuading the populace and the state to pass the new law. Today, the state of São Paulo is the largest ad-free area in the world.[5]

Now, Beatriz teaches Portuguese, persuasive speech, and civil disobedience and serves as a mentor and adviser for students as they run their campaigns. It is part of the philosophy of the school that students always lead the campaigns (including organizing the spokespersons, community liaisons, lobbyists, and other leadership) and that teachers take only an advisory role. A recent survey of the school's first decade found that the majority of Freire graduates have continued to be socially and politically active, and many have gone on to be leaders in local and state government, in education, and in socially responsible business.

Beatriz speaking with students at a demonstration in support of raising Brazil's carbon tax.

Beyond activism, complementary skills such as conflict mediation, debate, and management are deeply integrated into the curriculum at Freire. And everyone is encouraged to participate in physical activities—particularly aikido, a martial art that encourages exploration of both how to de-escalate conflict and, when that fails, how to use the attacker's energy against himself, a skill regularly put into service in the students' activism. While there are many more campaigns to wage, the Freire School has been instrumental in making the city and state of São Paulo healthier, more sustainable, and more livable places to reside.

How Can We Get Here?

Forest schools? Schools on boats? Activist, social entrepreneur, eco-engineering, and character education high schools? These may sound fantastical, but, even in 2017, models exist for the schools described above. Admittedly,

such robust forms as these are few and far between, but the foundational stones from which similar schools could be built are already in place. Consider the more than one thousand forest schools now found around the world, the Makoko Floating School in Nigeria and the successful Semester at Sea program in the United States, Barefoot College's Night School, or the Mechai Pattana "Bamboo" School for social entrepreneurs and philanthropists in Thailand.[6]

Yet the question remains: how can we transition away from schools that are based on outmoded ideas or even rote memorization; that feed children unhealthy foods and give them just twenty minutes a day to be outside and active; that overwhelm them with technologies for which they are not ready; and that "teach to the test" rather than offer creative opportunities to learn cooperatively, connect with nature, and "learn how to learn"?

While the scenarios presented above cannot offer answers on how to get there, one can hope that success will breed success and that the challenges faced will breed a resolve to innovate, not capitulate. As more children attend—and thrive in—forest schools, and as parents demand spots for their own children or even start their own forest schools, the movement will grow. As climate change-induced flooding inundates school after school, more designers and governments will give floating schools a try, and—if the schools prove not just to be safer and unsinkable, but also to accelerate learning opportunities—these too may proliferate. As social entrepreneurship schools create new opportunities for students as well as for the villages, towns, and cities of which they are a part, communities may clamor for these. And as more social change leaders recognize that students are natural activists, activism schools may go from being a rare phenomenon to a leading trend of the future.

The key, as always, will be cultural pioneers—whether in the role of educators, students, administrators, policy makers, or parents—who refuse to take no for an answer. These pioneers are instrumental in creating new programs, working within educational systems to adapt them to the changing century, passing new laws, funding new projects—and never giving up, even as resources grow more scarce and as the challenges thrown at them from a growing population and a changing planet intensify.[7]

Regardless of what, exactly, education in the future looks like, if it is designed to be Earth-centric—teaching students to understand their dependence on a living planet and providing them with the skills that they need to live restoratively and to navigate the conflict that life on a changing planet will bring—then they will be better prepared for the tumultuous future ahead. Perhaps that is the most we can hope that education can provide.

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Chapter 25. The Future of Education: A Glimpse from 2030

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THE WORLDWATCH INSTITUTE, in its flagship publication, analyzes how we can equip students with the skills to navigate the turbulent century ahead. With global environmental changes locked into our future, what we teach must evolve. All education will need to be environmental education, teaching students to be ecoliterate, deep-thinking, and deeply moral leaders, ready to face unprecedented challenges. *EarthEd* explores traditional areas of environmental education such as nature-based learning and systems thinking, as well as new essential topics including social-emotional learning and the importance of play. This latest edition of *State of the World* examines how, by rethinking education, people worldwide can better adapt to a rapidly changing planet.

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