

# Imagining Schools with Planned Green Spaces to Benefit Students and Community Partners

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## Abstract

*This article imagines school campuses that have planned green spaces in which students can connect to the natural world in a peaceful and serene setting. In addition to plant beds that are visually appealing and can attract butterflies and birds, the space ideally could include walking paths, a gardening plot, shaded seating, and safe and attractive, water features. Campus green spaces can promote psychological well-being, develop interpersonal connections, support STEM learning, and introduce students to an array of career possibilities. Such spaces can also promote powerful school/university/community partnerships in which teacher educators can support these enriching experiences for all stakeholders.*

Keywords: campus green spaces; STEM engagement; school/university/community partnerships

In recent years a few, but not many, schools have gardening plots in which students can be outdoors, interact with the soil, and experience the joys and challenges of growing plants and producing food. These are rewarding and valuable experiences when available but are often limited to a small subset of students. Planned green spaces may or may not include gardening plots but expand beyond the typical gardening plot and have the potential to impact more students in profound ways. Campus green spaces can promote psychological well-being, develop interpersonal connections, support STEM learning, instill ecological stewardship, and introduce students to an array of career possibilities.

## What Constitutes a Planned Green Space?

There are many competing demands for indoor and outdoor space on school campuses but here the authors are advocating that educators recognize and embrace the benefits of a planted outdoor space in which students can

connect to the natural world in a peaceful and serene setting. Students should be allowed to be in this space when they are at recess, free time surrounding lunch, or other unstructured times during the school day so that they can visit the space to decompress, enjoy nature, and have a time/place for personal reflection. All students may find this opportunity helpful to their mental health, and it may be especially helpful to students who had lost a loved one or are struggling with issues that feel beyond their control.

The school space should be designed so that it can be expanded over time and features can be added as resources are acquired. In addition to plant beds that are visually appealing and can attract butterflies and birds, the space ideally could include garden paths, shaded seating, and safe and attractive, water features. The space might also include a gardening plot where vegetables can be cultivated, and students can receive first-hand experience with the growing cycles of food production. Irrigation for the space could include a drip irrigation system using water from a rainwater collection system. Doing so helps to

conserve water, and rainwater is the most natural way for plants to receive the hydration needed to thrive.

The planned green space also presents the opportunity to cultivate partnerships with the community members and organizations who can contribute in various ways to support the development and expansion of the green space and its features. It is, however, important that there be a well thought out plan that depicts the overall design and the suggested sequence of desired expansions so that school and community partners have a roadmap for their involvement. For example, a school Parent Teacher Association, might add a water feature one year and add additional shaded seating in a subsequent year. A community partnership with local landscape companies or with university engineering faculty and students could contribute to the development of the master plan. Such a collaboration on the design plan would also be a learning opportunity for the school's students and educators. Also, there are also virtual garden design applications where students can develop and share their ideas with the design group while learning to use a new type of design technology.

The school green space initiative can foster multiple community partnerships. For example, a local business might contribute supplies. A community garden club might choose to plant and maintain one of the plant beds as an ongoing community project. A university student service organization might help construct raised plant beds so that senior citizens could also participate through a partnership with agencies that support community involvement for older citizens. There are many benefits that are derived from intergenerational interactions. Intergenerational outdoor green space and garden projects create powerful bonds between young learners and older adult community members. Students gain authentic connections with older mentors while working side-by-side in shared outdoor green spaces (Intergenerational Garden, 2025). The design of the green space plan should allow for weekend access to facilitate the involvement of community groups and to allow neighbors and community members to access and enjoy the space.

Teachers could utilize the green space to support various curriculum connections as students learn about plants and food production, weather cycles, ecology and environmental sustainability, the interdependency of living species, and various other STEM-related topics. For the green space area to thrive, school administrators must embrace it along with other campus priorities and create opportunities for teachers to take a leadership role in helping to cultivate community partnerships to support the maintenance and expansion of the campus green space. Teachers serving in this capacity should receive incentives,

compensation, and recognition comparable to those teacher leaders who are supporting other campus priorities.

### **The Benefits of Green Space Experiences for Students**

One only has to look at the chaotic world we live in to find indicators that mental health is on the decline and anxiety, stress and depression is on the rise. Mental health challenges for children and adolescents may have been exacerbated further by the COVID-19 pandemic. According to Matsumoto et al. (2023), school closures and social distancing may have affected mental health among preadolescent and adolescent children, who are in a social developmental stage. Rates of anxiety, depression, and stress have been reported to have increased during the COVID-19 pandemic among teenagers worldwide. Their study period covered January 2017 to May 2021, defining a school closure as an intervention event. The number of new diagnoses for schizophrenia and mood disorders increased early after school closure, while eating disorders showed an increasing trend several months later. Somatoform disorders (physical symptoms coupled with excessive and maladaptive thoughts, emotions and behaviors) showed a decreasing trend followed by an increasing trend. Time trends by sex and age also differed for each mental disorder. In the post-pandemic period, the number of new cases increased over time for eating disorders, schizophrenia, mood disorders, and somatoform disorders. The timing of increase and trends by sex and age differed for each mental disorder.

Social psychologist Jonathan Haidt and author of *The Anxious Generation* (2024) contends that the mental health of adolescents plunged in the early 2010s coinciding with the increase of social media and the transition from play-based childhood to phone-based childhood. In his earlier book *The Coddling of the American Mind* (Lukianoff & Haidt, 2018) the authors included a figure that tracked the increase of major depression among teens and then later updated the figure using data from the U.S. Department of Health and Human Services (2023). The increase of major depression among teens from 2010 to 2020 was 161% for boys and 145% for girls in this short 10-year period. Similarly, the increase in emergency room visits for self-harm among adolescents rose 48% for boys and 188% for girls from 2010 to 2020. While the primary contention of this body of work is the need to decrease the amount of access young people have to social media, Haidt also recognizes the restorative effects of outdoor time on young people. He writes, "Physical play, outdoors and with other children of mixed ages, is the healthiest, most natural, most beneficial sort of play."

The restorative effects of time spent communing with nature for children and adults is a well-accepted and well documented belief (Johansson, Friden, & Hedman Ahistrom, 2025; Dybvik, Sundsfjord, Wang & Nivison, 2018; Abbott, Taff, Newman, Benfield & Mowen, 2016). An existing body of literature provides evidence that experiences in nature can promote restoration and improve overall health and well-being. Previous studies have indicated that experiencing the restorative sounds of nature is important to visitors in national parks, and recent research has explored the positive relationship between natural sounds and cognitive health (Abbott et al., 2016).

In addition to the positive mental health effects of planned green spaces, students can also realize substantial educational benefits from such spaces. In the process of collaboratively designing, building and maintaining a planned green space, students can learn scientific content and engineering design processes while developing important life skills, and getting introduced to career possibilities in agriculture sciences and leisure and recreation. In the area of scientific content, students will get first-hand experiences in environmental stewardship, while learning about plant science, seed germination, and basic food systems (Intergenerational Garden, 2025). Further, they will cultivate their understanding of plants and ecosystems and learn the profound impact of community collaboration.

The inclusion of a gardening plot within a planned school green space offers an especially potent opportunity for students to engage in meaningful, hands-on experiences that nurture their social-emotional development while simultaneously fostering STEM engagement. Tending a garden demands patience, observation, collaboration, and resilience — all skills vital for healthy emotional growth. Students witness firsthand the cycles of growth, decay, and renewal, developing an intrinsic understanding of perseverance, hope, and adaptability. These life lessons are magnified when students work together, navigating shared responsibilities and celebrating collective successes. Beyond individual growth, gardening projects offer a natural catalyst for strengthening community bonds. Partnerships with local farmers, horticulturists, and university science departments can create multi-

generational mentoring relationships, reinforcing the idea that education thrives best when rooted in communal effort. In parallel, students apply STEM concepts daily as they track soil health, measure water consumption, calculate sun exposure, and analyze plant growth patterns — building both technical literacy and emotional intelligence in one living, growing laboratory.

A thoughtfully cultivated gardening plot integrated into a planned green space transforms a segment of the schoolyear into a living laboratory where inquiry, healing, and innovation converge. For many students, especially those grappling with the invisible burdens of stress, trauma, or isolation, the simple act of nurturing a plant can offer a profound sense of agency and hope. It restores a connection to life itself, affirming those small actions — watering a seed, tending a sprout — yield meaningful, tangible results. Simultaneously, the garden becomes a site of scientific wonder: students engage in experiments related to soil chemistry, sustainable irrigation, plant biology, and environmental systems thinking. STEM principles come alive when students predict germination timelines, design composting systems, or engineer supports for vertical gardens. Most importantly, in a world increasingly dominated by digital experiences, a campus garden offers a space where students can reawaken their natural instincts for curiosity, empathy, stewardship, and awe — all essential dispositions not only for future scientists and engineers but for future citizens of an interconnected, interdependent world.

The overall goal of a school green space is to create a vibrant, shared natural space that positively affects individuals of all ages while contributing to the larger tapestry of an interconnected community (Author 2, 2024). The benefits of green space on mental health and wellbeing may also arise from participation in activities occurring in these spaces, such as social interaction or physical exercise (Nutsford, Pearson & Kingman, 2013). These benefits include alleviation of stress and anxiety, and improved mood and attention (Lee, Jordan & Horsley, 2015).

Regarding life skills development, STEM educator Author 2 (2024) highlights the important skills that students develop through their interactions with nature. Her insights are summarized as follows:

Life Skill	Ways In Which Gardening Contributes to Skill Development
<b>Success Strategies &amp; Qualities</b>	
<b>Patience</b>	Gardening is not an instant gratification activity. It teaches us the value of waiting patiently for things to grow and mature, mirroring how long-term goals and dreams require time to come to fruition.

<b>Responsibility</b>	Caring for plants requires daily attention and care, instilling a sense of responsibility as we learn to tend to our commitments diligently.
<b>Planning and Organization</b>	Gardening requires thoughtful planning and organization, from planting to harvesting. It enhances our ability to organize our tasks and time efficiently in other areas of life.
<b>Attention to Detail</b>	Monitoring plants closely for signs of disease or pests teaches us the importance of paying attention to minor details, a skill applicable to quality control and problem-solving in various life scenarios.
<b>Adaptability</b>	Due to weather changes and other external factors, gardening's unpredictable nature
<b>Creativity</b>	Designing a garden space encourages creativity, as it offers a canvas for expressing personal aesthetics and innovative thinking.
<b>Problem-Solving</b>	Gardening presents numerous challenges that require inventive solutions, enhancing problem-solving skills that are transferable to everyday life.
<b>Teamwork</b>	Working in a community garden or with family members on a gardening project teaches the value of teamwork, communication, and shared goals.
<b>Resourcefulness</b>	Finding ways to deal with pests, maximize yields, and improve soil quality with limited resources fosters a sense of resourcefulness.
<b>Persistence</b>	Overcoming gardening setbacks, such as plant diseases or poor harvests, teaches persistence and the importance of not giving up in adversity.
<b>Financial Management</b>	Budgeting for gardening supplies and deciding how to use limited resources can improve financial planning and management skills.
<b>Emotional and Physical Health Development</b>	
<b>Stress Relief</b>	Gardening offers a therapeutic escape from the stress of daily life, promoting mental health and well-being through peaceful interaction with nature.
<b>Physical Exercise</b>	Regular gardening activities provide a form of physical exercise, emphasizing the importance of maintaining physical health through enjoyable activities.
<b>Nutritional Awareness</b>	Growing your own fruits and vegetables can foster a greater appreciation for fresh, nutritious food and better eating habits.
<b>Mindfulness</b>	Gardening encourages living in the moment, fostering mindfulness that benefits mental and emotional health.
<b>Gratitude</b>	Enjoying the fruits of your labor leads to a deep gratitude for the food on our tables and the beauty of nature.
<b>Empathy for Living Things</b>	Caring for plants fosters empathy and a nurturing attitude, which is essential for compassionate interactions with others.
<b>Science Content Learning</b>	
<b>Environmental Stewardship</b>	Gardening nurtures a deep respect for nature and teaches the importance of environmental conservation and sustainability.
<b>Science Learning</b>	Gardening is a practical way to apply biology, chemistry, and environmental science concepts, making learning engaging and relevant.

<b>Understanding of Life Cycles</b>	Observing the life cycle of plants from seed to harvest teaches about the cycles of life and death, offering profound lessons on growth, renewal, and letting go.
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In addition to the many educational benefits and life skills derived from collaborative garden projects, experiences from such initiatives also introduce students to possible future career pathways. Workforces in agricultural science specifically, and STEM-related careers in general, need the next generation of career professionals (Executive Office of the President, 2018). Our nation's ability to meet its needs for future scientists and engineers, and for that matter the United States' capacity to sustain global competitiveness and prosperity, are directly tied to the U.S. education system's ability to produce a robust and well-adjusted society with a substantial workforce prepared in the science, technology, engineering and mathematics (STEM) fields (National Science Board, 2024; National Center for Educational Statistics, 2020; U.S. Bureau of Labor Statistics, 2021; Handelsman, 2010; Author 1 & Resta, 2020). Currently, these careers have substantial underrepresentation among certain populations (namely women, persons of color, and those from economically disadvantaged groups) and widespread implementation of school green space initiatives can help rectify this imbalance in STEM fields.

Research indicates that students' early, pre-college STEM experiences such as would be the case in green space initiatives are critical in inspiring students to subsequently pursue future academic programs in STEM and ultimately to enter STEM career fields (Freeman et al., 2014; Singer, Montgomery & Schmool, 2020). These early experiences collectively promote the process through which students form their personal STEM identities that will be a determining factor in what STEM opportunities they pursue and their belief that they can be successful in STEM pursuits.

STEM identity has been defined as how people envision themselves in relationship to STEM experiences and the meaning of these experiences (Carlone & Johnson, 2007). People who have developed STEM identities think about themselves as science learners and perceive themselves as someone who knows about, uses, and sometimes contributes to science" (Cohen, Hazari, Mahadeo, Sonnert & Sadler, 2021). STEM identity development is a complex process that begins long before students enter college, select academic majors, and make career choices. Research indicates that early

STEM experiences such as those that would be achieved through school green space endeavors are central in engaging, inspiring and motivating students to pursue STEM opportunities that ultimately lead them into academic programs of study and future careers. STEM identity has been shown to have a powerful role in an individual's success in educational environments, as well as on their career goals and trajectories (Chemers et al., 2011; Perez, Cromley & Kaplan, 2014; Simpson & Bouhafa, 2020). Achieving a robust and well-qualified workforce will not only require providing students with opportunities to interact with persons from various career fields while gaining hands-on experiences with STEM content but will also necessitate attracting greater numbers of students from groups that have traditionally been underrepresented in STEM fields and are reflective of the demographic makeup of today's K-12 schools.

Campus green space initiatives will provide multiple positive benefits for participating students, educators and community members. Providing experiences to interact with nature is in alignment with what educators' and taxpayers' priorities for school quality. In their recent Texas education surveys, the Charles Butt Foundation (2024a; 2024b), found that both educators and community members rated highly the importance of "helping students learn self-management, interpersonal skills, and decision-making" and "supporting students' sense of belonging." Also, there was strong agreement on the importance of "preparing students for college," "preparing students for a career" and "preparing students for civic engagement." Campus green space initiatives are in alignment with and help students achieve these priorities. Interestingly, each of these priorities were rated higher than "preparing students to do well on standardized tests" by both educators and community members alike.

### **The Role of Teacher Educators in Supporting School Green Space Initiatives**

There are various ways that teacher educators can support school green space initiatives. One way is to provide professional development to educators on both the benefits for students and the ways in which green space initiatives can be started and maintained. For example, one Texas university planned and conducted a day-long

professional development experience titled “Cultivating Minds, Harvesting Knowledge, and Building Communities.” Workshop participants left the experience with vermicomposting and vermiculture bins filled with red wiggler worms, vertical gardens that they constructed for their classrooms, and plants that can be grown hydroponically. Many of the materials used in these construction projects were recycled materials which would be readily available to teachers who chose to replicate some of these activities with their students. More than a year after the professional development session, participants were reporting that the gardening activities are quite popular among students and that they were continuing to use the activities with their students. Their district produced video about the gardening activities at the campus of some of the workshop attendees and that video is shared on the district’s website with parents and community members.

In conjunction with the professional development workshop, the faculty member also created a 110-page teaching guide consisting of three fully developed teaching modules complete with illustrations and interdisciplinary lesson plans that were correlated with the Texas Essential Knowledge and Skills (TEKS) from science, mathematics, language arts, social studies, technology applications, and art (Author 2, 2024). This resource is designed to be flexible so that teachers can tailor the material to fit their classroom circumstances. In her introduction to the teaching resource, Author 2 (2024) offers this encouragement, “Explore activities, mix and match lessons, and adapt the unit to suit your students' needs and interests. *Cultivating Minds, Harvesting Knowledge, and Nourishing Communities* brings your students joy, curiosity, and a deeper understanding of the natural world.”

Teacher education candidates can also get involved in supporting the initiatives at the campuses where they are engaged in on-site fieldwork. This same Texas university operates a Teacher Residency Program and several of the participating districts have placed multiple residents at a single campus for their year-long experiences. While teacher candidates do not typically have the agency to launch green space initiatives on their own, the cohorts could be ideal supporters of evolving green space initiatives. Doing so would enrich their preparation experiences by allowing them more opportunities to collaborate with teachers and students from across the campus and to engage with community partners. It has been this university’s experience that the districts are eager to hire those candidates who have completed the year-long residency, and many are being employed at the same campuses where they were teacher residents. Active participation in a campus priority initiative could increase their chances of employment at that campus where they

could continue their involvement in the rewarding activities in which they invested while they were residents.

Finally, teacher educators can utilize existing university relationships to help facilitate the involvement of other faculty members from across the university campus and solicit the participation of student organizations from within the College of Education and in other academic departments. This approach is consistent with the one advocated by Author 1 (2024) who suggested that teacher educators are in a prime position to provide leadership for STEM education partnerships. She wrote, “It is logical for university faculty and staff to facilitate the development of collaborative efforts that support STEM education because of the credibility they are afforded, the expertise they offer, and the unique position that universities fulfill in their respective communities.”

As a further example of university suitability to provide leadership for university-school collaborations, the Office of Research and Sponsored Programs at the same university that provided professional development around gardening initiatives has organized multiple interdisciplinary research teams to develop multidisciplinary research efforts. One such team has faculty members from education, engineering, agriculture science, and health administration and they are currently focusing their efforts to explore the cognitive, physical and emotional effects of intergenerational gardening experiences with the intention of pursuing grant funding to support green space initiatives that would serve students and older adults.

### **The Path Forward Toward Planned Green Spaces at Schools**

If planned green spaces on school campuses are to become the norm than the exception, it will require educators who believe that student emotional health is important and who recognize the value of having students interact with the natural world while gaining firsthand experience with environmental stewardship. Investments in planned green spaces on school campuses will require an openness to community partnerships and a recognition of the benefits of a shared purpose and the value of interactions between group members who have not typically worked together.

District leaders will need to factor in the outdoor space needs required to accommodate green spaces on campuses and these needs may factor into site selection decisions for new campuses. There will be logistics to consider and safety and security factors to manage. The undertaking will require financial and human resources, but these resources may be available through currently untapped community partnerships.

Planned green spaces on school campuses will not be achieved instantaneously but rather can be implemented

and expanded over time with leadership and a well thought out design plan. It is true that some schools, due to limited outdoor space, will be prohibited from having planned outdoor green spaces on their campus, but these schools could also achieve some of the same benefits with classroom activities centered around building and maintaining classroom vermicomposting bins complete with worms, vertical classroom gardens, and hydroponic growing experiments. Limitations must be acknowledged while making sure that perfection does not become the enemy of continuous improvement. If one is indeed

imagining a better future for our children, let us consider that young people can derive important cognitive, physical and emotional benefits while learning about environmental stewardship in planned outdoor green spaces. Further, students can develop important and long-lasting life skills through their interactions in these outdoor green spaces and their involvement with community partners who can help support this noble undertaking.

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