

# Collaboration and cross-pollination: teaching garden-based learning through PDS partnerships

Sarah Cramer and Mercedes Tichenor  
*Stetson University, DeLand, Florida, USA*

Garden-based  
learning

191

Received 10 June 2023  
Revised 30 August 2023  
Accepted 23 September 2023

## Abstract

**Purpose** – School gardening and garden-based learning (GBL) have gained great popularity in recent years, and the COVID-19 pandemic forced many educators to think creatively about safe, outdoor education. Scholarship from diverse disciplines has demonstrated the positive impact of GBL on student learning, attitudes toward school and various health outcomes. Despite widespread interest in school gardening, GBL remains absent from most teacher education programs. This is a critical disconnect, as teacher education programs deeply inform the pedagogy of future teachers. In this article, the authors discuss an independent study course for pre-service teachers designed to bridge this gap and share the perspectives of the future teachers who completed the course.

**Design/methodology/approach** – To understand and evaluate the experiences of the preservice teachers engaged in the GBL independent study course, the authors conducted an exploratory qualitative case study.

**Findings** – The authors argue that GBL curriculum integration in teacher education programs, along with garden-focused PDS partnerships, can be powerful levers in expanding gardening initiatives and preparing pre-service teachers to garden with their future students.

**Originality/value** – The authors also provide GBL suggestions for universities and partnership schools.

**Keywords** School gardening, Garden-based learning, Teacher education

**Paper type** Research paper

Garden-based learning (GBL) is an experiential, research-backed trend in the United States (US) education system that has many benefits for students. Additionally, as Stone *et al.* note, “School gardening is a timely and worthwhile pursuit for professional development school (PDS) partnerships” (2019). Though school gardens have been around since the early history of public elementary education (Hayden-Smith, 2006; Phipps, Osborne, Dyer, & Ball, 2008; Subramaniam, 2002), in recent years, school gardening has experienced a resurgence, and gardens have become a popular feature of many elementary and secondary school yards (Hirschi, 2015). School gardens are used as a hands-on tool for integrating gardening with math, science, social studies and language arts (Graham, Beall, Lussier, McLaughlin, & Zidenberg-Cherr, 2005; Passy, 2014; Stone *et al.*, 2019) while meeting Common Core Math and English Language Arts Standards and Next Generation Science Standards (NGSS). For example, in science, teachers can plan lessons aligned with NGSS on numerous topics, including the life cycle of plants, pollination, photosynthesis in plants and ecosystem

© Sarah Cramer and Mercedes Tichenor. Published in *PDS Partners: Bridging Research to Practice*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) license. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this license may be seen at <http://creativecommons.org/licenses/by/4.0/legalcode>

Addresses NAPDS Essentials 2, 3, 4, 5, 8 and 9.

The following Nine Essentials are highlighted in this article: Essential 2: Clinical Preparation Essential 3: Professional Learning and Leading Essential 4: Reflection and Innovation Essential 5: Research and Results Essential 8: Boundary-Spanning Roles Essential 9: Resources and Recognition.



PDS Partners: Bridging Research  
to Practice  
Vol. 18 No. 3, 2023  
pp. 191-202  
Emerald Publishing Limited  
e-ISSN: 2833-2059  
p-ISSN: 2833-2040  
DOI 10.1108/PDSP-06-2023-0023

interactions all within a school garden. Despite GBL's low-tech, old-fashioned roots, contemporary scholars also argue that school gardens serve as effective sites for cultivating 21<sup>st</sup> century skills and incorporating technology into STEM curricula in fresh and relevant ways (Gulhan, 2023). The positive, measurable impacts of school gardens on student fruit and vegetable consumption, activity level and academic performance have been repeatedly substantiated in both public health and education literature (Berezowitz, Bontrager Yoder, & Schoeller, 2015; Blair, 2009; Lautenschlager & Smith, 2007). Moreover, researchers have found that learning in a garden environment may engage students of diverse backgrounds and learning styles. Behaviors that may be deemed problematic or indicative of hyperactivity in a classroom environment may be channeled in unique and productive ways in the garden (Passy, 2014). Additionally, school gardening is one small piece of the larger movement to supplement and enrich traditional classroom education with outdoor and place-based education (Sobel, 2004).

Although there are many advantages to school gardening, teachers' knowledge of gardening and their comfort level of working with students in garden settings may keep teachers from gardening at school. In Blair's (2009) systematic analysis of literature on school gardening programs, she concluded that teacher comfort levels with GBL vary widely and that there is often a fundamental tension between the philosophy of GBL and the traditional approach to elementary education that prevents school garden programs from reaching their fullest potential. Beyond these limitations, classroom teachers also face extreme demands on their time during the school day, are often expected to cover far more content than they are able and are constrained by the expectations of high-stakes testing (Saeki, Segool, Pendergast, & von der Embse, 2018). In a study published in the *American Journal of Public Health* (Burt, Luesse, Rakoff, Ventura, & Burgermaster, 2018), researchers reported the greatest barriers to successful school garden programs are a lack of time and lack of support from staff. Further, they reported that funding, rigid curricula and space were additional barriers to GBL, echoing previous research (Williams & Brown, 2013; Yu, 2012). While the public and scholarly attention on GBL in recent years has generated resources that have helped schools and garden programs navigate many of these barriers, it remains the case that most GBL projects depend on a single champion teacher to keep the project going. A lack of deeper institutionalization means that when this champion leaves the school or becomes too busy to lead the garden project it will most certainly fold (Cramer & Ball, 2019; Dring, Lee, & Rideout, 2020). Despite the challenges, frustrations and sometimes outright gardening failures of GBL, Cramer and Tichenor (2021) reported in their qualitative study that teachers all agreed that some gardening, even unsuccessful gardening, was better than nothing.

A lack of teacher comfort with gardening is not surprising since GBL is for the most part still absent from formal early childhood and elementary teacher preparation programs (Desmond, Grieshop, & Subramaniam, 2004; Hoover *et al.*, 2021). This is a critical gap, as teacher preparation programs mold and define the beliefs and practices of future teachers (Pajares, 1993; Powers, 2004). In other words, if teachers are not exposed to garden-based education during their own education, it is not surprising that classroom teachers do not feel comfortable incorporating school gardening into their teaching. Through interviews with preservice teachers, Cramer and Tichenor (2019, p. 33) concluded that although preservice teachers were excited about GBL, they did not feel equipped with the skills necessary to successfully integrate GBL into their future teaching. Teachers' knowledge of gardening and their level of comfort working with students in garden settings is essential when integrating gardening with daily classroom activities. There is legitimacy and efficacy to school gardening initiatives that come only when the classroom teachers feel empowered to utilize the garden in their own teaching (Cramer & Ball, 2019).

In a study examining preservice teachers' ability to teach for sustainability, specifically food sustainability, through school gardens, Carney (2011) concluded that teacher education programs can impact teachers' likelihood to incorporate sustainability into their practice. For this to occur, Carney recommends teacher education programs explicitly include sustainability principles throughout their curriculum. She further noted that preservice teachers should have field experiences, such as school gardening programs, where sustainability principles are evident. Moreover, Nolet (2009) states that to teach for sustainability, preservice teachers "need to interact with tangible examples that support integration of sustainability into their own developing knowledge of practice" (p. 432). Though there is still a widespread dearth of GBL and GBL-adjacent content in US teacher education programs, some individual states illustrate what may be possible nationwide. For instance, the state of Washington emphasizes sustainability education by requiring teacher preparation programs to provide evidence that teacher candidates can teach for sustainability, particularly in preparing K-12 students to live in an environmentally sustainable and globally interconnected society (Nolet, 2009). Wisconsin similarly requires preservice teachers to demonstrate environmental education content knowledge (Ashmann & Franzen, 2017). In this article, we report on an independent study experience for a small group of preservice teachers that responds to the above calls in literature.

### Research case – independent study student cohort

The case we are reporting on in this article is made up of three undergraduate students who were enrolled in an independent study course with us (article authors) in the spring semester of 2020. These three students, two men and one woman, were able to participate in the course because they had already completed the required coursework for their Bachelor of Arts degrees in elementary education, including completing their student teaching. Not only was it valuable, in terms of knowledge, for these students to have completed the full education curriculum before engaging with GBL, but they also had established connections with classroom teachers from their time as student teachers on which to build during this independent study course. All three students worked with teachers at a single professional development school that has a longstanding school-university partnership with the authors' (and research participants') university. The course was new and was created because the students were interested in GBL but there was no existing course on the subject for them to take. It was also convenient for them to return to their internship site which has an established school garden, with GBL programming supported by the research team for about a year.

The purpose of the independent study course, titled "Garden-based learning in the elementary school," was to examine the benefits and impact of school gardening projects, explore strategies and resources to support teachers' learning of gardening and practice integrating GBL with the school curriculum. From the course syllabus, the goals were:

- (1) To explore the linking of gardening to school curriculum.
- (2) To support teachers' integration of gardening in classrooms.
- (3) To examine the benefits and impact of school gardening.
- (4) To explore strategies and tips for starting a school gardening program.

Funds from a GBL grant overseen by the authors were used to provide copies of the following texts for each of the students:

- (1) Hirschi, J. S. (2015). *Ripe for change: Garden-based learning in schools*. Boston, MA: Harvard Education Press.

- (2) Jaffe, R., & Appel, G. (2014). *The growing classroom: Garden-based science and nutrition activity guide*. Williston, VT: National Gardening Association.
- (3) Williams, D., & Brown, J. (2013). *Learning gardens and sustainability education: Bringing life to schools and schools to life*. New York, NY: Routledge.

Over the course of the semester, students were required to complete a minimum of five hours per week either working with classroom teachers to incorporate GBL into the school day or supporting the after-school garden club. During the school day students worked mostly with primary grade teachers (including a “garden champion” kindergarten teacher) but assisted with the school-wide garden club once per week for about an hour. The school garden consisted of two separate sites on the campus, one was a small vegetable garden with benches and other seating, and the second site was a large, landscaped butterfly garden. All teachers were welcome to use the gardens with their classes, but utilization of the spaces varied greatly depending on the teachers’ prior gardening experience. The school’s principal has long been supportive of GBL but deferred oversight of the garden space to the most involved teachers. Throughout the semester, the independent study students submitted regular reports on their work, read additional journal articles on GBL, and met frequently with the us, the authors and independent study instructors. Throughout this work, the students developed individual GBL projects at the school – for example, cleaning out, cataloging and refreshing the existing butterfly garden and applying independently for small grants or fundraising opportunities. It is worth noting, of course, that the COVID-19 pandemic arrived in the middle of their semester and shut down the school. The students shifted as much work to a virtual platform as possible, but their independent study experience was unquestionably marked by some unfinished projects.

### Methods

To understand and evaluate the experiences of the preservice teachers engaged in the GBL independent study course, we conducted an exploratory qualitative case study (Creswell, 2013; Merriam, 1998). Qualitative methods were appropriate given both our research purpose, and the small number of preservice teachers who completed the independent study course. Additionally, we framed this qualitative evaluation as a case study (Stake, 1995; Yin, 2003) due to the explicitly bounded system within which the participants operated – three preservice teachers from one teacher education program, completing an independent study course at one school, preparing to graduate the same semester. The primary data sources for this research were 30-min semi-structured interviews with each of the preservice teachers. Additional data came from course materials, submitted assignments, photos from “the field,” and regular, informal meetings with the participants. Interviews were transcribed and coded, line-by-line and aggregated to develop the themes presented below (Yin, 2003).

### Findings

Themes that emerged from our analysis of qualitative interview data and other data sources, are presented below. Representative quotes are included beneath each theme, and all participant names are pseudonyms.

#### *Gardens facilitate diverse and meaningful learning experiences*

Participants shared throughout the interviews about the unique ways in which the garden allowed them to stretch their pedagogies in novel and memorable directions. They spoke extensively about how time in the garden was significant to the elementary student learners, as well as significant in their own ongoing education as future teachers. This broad theme

clearly reflects the four course goals outlined above and indicates that students were successful in meeting these learning objectives. Isabel said:

I think the main thing I learned was how much it can be correlated with what kids are learning and how much you can put those two together, how many experiences you can create. So, any subject can be translated into the garden space. We saw them working on math in the garden by counting how many tomatoes, counting how many seeds they're going to put in. And then learning about science like how plants grow, what plants need, and then you can create stories from watching the plants grow or be imaginative from that. So, I think that's a really great thing because it just expands so many learning opportunities, but the kids love being able to be outdoors and have a new space to be in. I think that enhances learning in general.

Isabel's discussion of experiential learning in the garden captures a sentiment reflected by so many GBL researchers and practitioners – that the garden connects to all subjects, and that students respond positively to being outside. The garden pushed participants to think differently and creatively about how to meet learning objectives, and, as Andrew explains below, encourages educators to embrace flexibility and remain open to spontaneously generated learning opportunities. Andrew said:

The last time I was with the garden club, I didn't really have a lesson plan, or anything planned, but we did a quick Monarch butterfly lifecycle, acted it out. And that was so cool for them. And they loved it, but I came up with it on the spot and I would love to do that with more groups. And I think in any situation, like teaching, you're always learning.

When asked if they would garden with their future students, all three participants enthusiastically responded "Yes!" (Andrew, specifically, said "Yes. 100%"). Paul stated:

I absolutely would want to garden with my future students. There's just too many connections to the content that we're supposed to be teaching to *not* use a garden, especially when it comes to science. But not only science! Math can be taught in a garden. Reading ELA definitely can. There's a ton of books for out loud readings in the library for gardening just in general. But yes, it's definitely something that I'd want to do, especially because it can be made in a low maintenance way.

Paul elaborated on the notion of gardening with students in a "low maintenance way," and described how GBL can happen in a large, flourishing, well-funded school garden, but that it can also happen with a small potted plant in the classroom windowsill.

This short independent study course opened participants' eyes to a different and valuable way of thinking about student learning and equipped them with a few introductory skills to make facilitating GBL less intimidating in the future. As Andrew said, "That's something that I'm grateful for, that we've had this opportunity this semester for the independent study, because it opened all of our brains a little bit more."

Finally, a powerful anecdote from Isabel illustrates the potential tangible, professional implications for engaging preservice teachers in school garden work. She said:

When I was interviewing for teaching positions, the school that I ended up saying yes to actually has a school garden. When I was talking to the principal, I was talking about the garden project, the independent study, and she was talking about how they have a garden and they're trying to get it a bit more incorporated into the school. And I think that was a big pull for both of us when it came to the hiring process because of my garden experience. Because I definitely want to be at a school that has a garden, or at least go to a school that wants to have a garden so that I can continue that type of thing, because I think that was very beneficial. I think that's really also just a great thing for the school in general.

We can reflect ad nauseum about the abstract and emotional implications of GBL for teachers and students, and these benefits are no doubt significant. However, in Isabel's case, her work with the school garden project *helped her get a job*. This is a compelling reason to push to

include GBL in teacher education programs, in school curricula, and in student teaching experiences. Interest in GBL only continues to grow, and being experienced, or at minimum conversant, in its tenets can set prospective new teachers apart.

*Gardens build broader community connections*

In addition to discussing the myriad benefits of GBL for elementary students, participants described the ways in which the garden helped connect students (and teachers) to the local community beyond the schoolyard. Though this was not an explicitly intended outcome of the course, it illustrates clearly one of the “benefits and impacts of school gardening” we hoped students would examine (course goal #3). When asked about perceptions of the garden among various stakeholders, Andrew reflected:

So, I think the teachers loved it, the administrative liked it. And I think it also was a good thing because it pulled more community members from the community that wouldn't interact with [the school], into [the school]. All the Master Gardeners, a lot of them didn't have grandchildren, they were all elderly women, but none of them had grandchildren that went to [the school]. They were just local community members that were trying to help, and the garden was a place that allowed them to do that. So, I think it's a positive aspect for everyone involved.

Because classroom teachers are not always equipped to facilitate GBL on their own (or, because they do not have time during the day to do so), it is often necessary to bring in Master Gardeners, parents, or other community member volunteers to sustain school garden programs. By eliminating some of the barriers between the school and the broader community, school gardens can help bring new, diverse and caring adults into students' lives. These seemingly small connections can position school gardens as levers of civic engagement, increase support for public education and contribute to the well-rounded social education of the next generation.

In a similar vein, Paul framed school gardens as bridges between school and home in his comment:

They [students] were all shouting and excited. And I thought it was also cool because they were able to take different vegetables or salad types back home. So, it was something that they could bring back to their family too. It wasn't something that just remained inside our bubble for that 15 minutes. It was something that, if you have a bag of lettuce with you, your parents are going to be like, “Where did you get that bag of lettuce?” It's a conversation starter when you get home too. So, it's something that expands outside of just school.

Finally, Isabel drew connections between the community-engaged nature of GBL to her college education overall. In her response we can find lessons for school garden projects, partnership schools and teacher education programs. She said:

The one thing I've valued a lot [about our university] is that there was always a lot of opportunity for hands-on learning experiences; opportunities to just be with the community. And I think [school gardens] are just great, another great way to connect the community to [our university]. I know [our university] is a pretty powerful force in the community, but I think this is a very beneficial partnership with the community because of how it benefits the educators, but also benefits the schools, and the students, and the families that we're growing things for the school that they can take home or use at the school.

Universities possess great resources – human resources, library resources and material resources, to name a few – that should not be hoarded, but can be leveraged to uplift others in their vicinity. Additionally, school gardens can help bridge real (or perceived) “town/gown divides” to mutual benefit. A specific strength of institutional grants, like the one that helped fund both this school garden and the participants' independent study materials, is that they

---

allow us to distribute some of the resources of the university into the communities in which we are situated.

### *Subtle biases against GBL remain*

While the participants spoke extensively about the benefits of GBL, and enthusiastically agreed that GBL should become a part of teacher education programs and elementary curricula, their interview responses revealed some persistent, if subtle, biases against gardening during the school day. Rather than assuming that these perspectives represent an inherent view of the participants, it seems instead that their responses reflect a school culture that has yet to fully accept the garden as part of its academic mission (despite stated administrative support). For example, when talking about his time as a student teacher at the school, Paul said:

I had seen the garden in the center, and I thought it was always just a club. And then it was funny because the butterfly garden is outside of two different special [1] locations. And I'd always sit there waiting for my students to be done with their specials and I'm like, "I really liked this zone. I wonder why it's here."

It is telling that the purpose of these garden spaces was not explained to Paul before his GBL-focused independent study experience, and that he passed by them every day without knowing what they were. Others, in this sample of participants and in the school more generally, commented on how the various garden areas on the campus were beautiful and they liked looking at them, but that they did not know what they were for, who managed them, or if students spent any time in them.

Offering a different, but still subtle, bias against full integration of GBL into the curriculum, Andrew described the following context:

It was very apparent to me that gardening was kind of a reward-based thing. So, the students who were already on track in class were the ones who were able to come outside. And it was clear with just how respectful and interested they were in it. The hardest part of gardening was getting them to leave, but they have to go learn.

There are several things of note in this comment. First, while getting *any* students into the garden during the school day is better than none, a reward-based approach to GBL still excludes most students from benefiting from garden time. It also reinforces the notion that the garden is a special or fun space, and not a learning space like any other classroom. This division between the garden and academics was further emphasized in Andrew's final sentence above; that students would prefer to stay in the garden, but learning happens elsewhere and so they must go back to the classroom to learn. Isabel echoed this separation as well when recounting teacher impressions of the garden space, stating, "I know there were some issues with teachers not wanting them to be out there for so long or not liking the idea that they were missing classroom time."

In an interesting counterpart to the above quotes, Paul offered some observations about why he thought GBL efforts were more successful at this particular school than they might be at others. He believed that the support for the garden came from a school culture that had "a bit more care for the things that aren't strictly academic and test-related than other schools." While Paul's comment was intended to speak positively about the school, and school support for GBL *is* a positive thing, it again reiterates the perception that gardening, though good for students, is not academic. Continuing to frame GBL as supplemental to "real" curricula or learning will hold the GBL movement back in the long run. These responses indicate that more work must be done by scholars and school garden advocates to demonstrate how GBL can be an integral part of the school day, for all students, and help, rather than hinder educators' efforts to meet state standards and other learning outcomes.

**Discussion and recommendations**

The pre-service teachers in the independent study course were excited about and interested in GBL, but they did not feel adequately equipped by their college courses alone to incorporate GBL into their future pedagogy. Isabel, when asked what she had learned about GBL or outdoor education in her college classes, said, "I had honestly never heard about it or focused on it, I don't think, before this [independent study]." All of the participants, when asked what they had learned about GBL as student teachers, said "nothing," or "Honestly, not that much. We would walk past [the garden] every day and we would see teachers watering it, but it wasn't something that was advertised" (Andrew). They found the independent study experience to be a rewarding and enriching complement to their core academic experiences as education majors but recognized that a much earlier and more thorough integration into the education curriculum would have been beneficial in building their skills and confidence with GBL. Additionally, this group of pre-service teachers was only three students – a fraction of the number of future teachers who graduate each year from our small university alone. So, while the independent study course was valuable to this trio, for widespread change it will be necessary to significantly increase access to this sort of experience to all pre-service teachers. Below we present some recommendations for universities and partnership schools based on our findings and experiences with GBL education.

One way to disperse the benefits of a limited course like this independent study throughout teacher education programs is to incorporate GBL into existing classes in the curriculum. For example, faculty can incorporate gardening mini units in various methods classes (e.g. math, science, reading and language arts) to help demonstrate the ease with which curriculum integration can occur. We recommend drawing upon the extensive resources available from organizations like Life Lab and the Edible Schoolyard Project when incorporating GBL into these courses. Life Lab, for example, maintains a searchable database (searchable by lesson, grade level, key word, or standard) that shows how lessons from their elementary-level curriculum book, *The Growing Classroom*, correlate to Next Generation Science Standards and Common Core Math and English Arts Standards (Jaffe & Appel, 2014; Life Lab, 2022). A copy of this text was given to each of the independent study participants and all found it useful in planning garden-based lessons. Paul said, "The book was an awesome tool to use in order to get more ideas!" We also encourage faculty to incorporate garden-themed books in children's literature classes during teacher preparation programs. The winners of the annual "Growing Good Kids Book Awards" from the Junior Master Gardener program are an excellent place to start (JMG, 2022). In addition to leaning on existing resources like those discussed above, we recommend that teacher educators who may lack confidence in the content themselves invite guest lecturers in during these mini units. Master Gardeners, other extension professionals, and non-formal educators from area gardening non-profits are eager to connect and share their expertise in new venues like the college classroom. These suggestions not only enhance teacher education programs, but also tap into the garden's potential to build broader community connections (discussed in the findings section). For teacher education programs with a bit more flexibility, we suggest faculty consider offering a full elective course on GBL or outdoor/experiential education to their students.

While the incorporation of GBL into formal college curricula is a critical component in building a teacher workforce equipped to garden with their students, enthusiastic pre-service teachers, like those in our independent study course, can also serve as powerful levers of change in the extra-curricular setting. Pre-service teachers with garden experience can share what they learned through informal peer learning networks. Additionally, they can invite members of Kappa Delta Pi (the education honor society) or local Future Educators Associations to provide workshops on gardening to pre-service teachers. The independent study students all discussed feeling excited and motivated to share what they had learned

---

through their GBL experience with others and having these student groups host educational events about school gardening can be a valuable way to channel this excitement and complement the more top-down nature of formal curriculum changes.

In line with our arguments earlier in this article that school-university partnerships offer the opportunity for universities to leverage their resources to support and strengthen the communities in which they are located, we encourage university faculty, students, staff, alumni and donors to explore ways that they may direct funds, materials and human resources to local schools interested in GBL. Universities can offer the expertise of their grant writers to schools interested in establishing or expanding garden programs and faculty can create physical (or virtual) spaces for teachers utilizing GBL to network and support each other. Additionally, we have found that a diverse coalition of donors are excited about the notion of kids gardening at school, and at our university we have been able to provide \$100 donor-funded mini-grants to teachers (30 during the 2021-2022 school year and 35 during the 2022-2023 school year) to use on small GBL projects in their classrooms (an idea that was proposed by Andrew during his interview!). As we have described extensively using the example of the independent study course, school-university GBL partnerships can take the form of pre-service teachers assisting with lessons in the garden, completing garden maintenance tasks so that classroom teachers do not have to, facilitating after-school garden clubs and generally getting teachers interested in GBL. We have observed throughout our work that simply having university students (education majors or others) deal with the daily, dirty chores of weeding and watering the school garden can be a major motivator for teachers to get their students outside. Teachers are spread so thin as it is that unburdening them of these tasks and offering an inviting, beautiful, well-tended garden space for them to teach in can be critical in their decision to attempt GBL or not. Finally, we suggest that faculty provide professional development sessions to local school partners on garden curriculum integration (emphasizing that learning occurs both in the classroom and in the garden) and share practical information about how to garden to help teachers feel less intimidated by the prospect. We have found, and prior research substantiates, that these sorts of collaborations and two-way learning experiences are energizing and beneficial to university faculty, school leaders, and teachers alike (Norman & Sparks, 2018; Petti, 2013).

Building towards our vision of a world in which schoolyards everywhere are filled with productive, beautiful and actively utilized educational garden spaces requires more than just the efforts discussed already, it requires broad changes in individual school cultures. We recognize that it is difficult to change school culture and that schools vary so widely even within a single district. However, there are a few key entry points that can help catalyze larger shifts and create school climates more conducive to GBL. Prior scholarship has demonstrated the significant role that principals play in shaping school culture and setting the overall tone for the campus (Reeves, 2007). In conjunction with the various efforts we have outlined in this section, we suggest targeted efforts to engage partnership school principals in GBL work, perhaps drawing on existing data such as Landy and Logue's (2017) survey of principals' perceptions of school gardens to guide these conversations. University faculty and GBL advocates can meet with principals to discuss various gardening possibilities, share grant opportunities, or connect administrators with existing resources and gain a sense of what is realistic given the particular context of the principal's school. Our independent study students described how integrated the garden had become into the partnership school's culture, and they observed that this school-wide support for the garden was something unique about the school that was not guaranteed in other places. Paul observed, "It was very cool to see how into it the principal was and how much the teachers wanted to have more of their students in the garden." Finally, to build towards this overarching GBL vision, we propose teacher educators and school garden advocates consider presenting to school boards about the benefits of GBL.

While most of our recommendations above are recommendations for teacher education programs, we also propose some suggestions for future research that may build upon the somewhat limited findings that emerged from our case study. First, we suggest repeating this study with a larger number of preservice teachers, perhaps comparing experiences at Title 1 and non-Title 1 schools. Though qualitative research does not lend itself to replicability, we do hope that our qualitative findings have laid a foundation for future scholars working in similar contexts. Next, the experiences of middle or high school preservice teachers were beyond the scope of this project, but they would be worthy topics of future research as well. Future research could also explore the perceptions of principals towards preservice teachers and GBL. Finally, we intend to continue this line of research ourselves by evaluating the recommendations for teachers and teacher education programs we put forth in this paper, and we encourage other scholars to do so as well. The intersections of GBL, school-university partnerships and teacher education are ripe for continued inquiry.

### Conclusion

The school garden movement only continues to grow, expand and diversify, and as the next generation of classroom teachers, pre-service teachers are poised to bring GBL into the mainstream of elementary education. However, without unique and enriching opportunities like the independent study course examined in this article, they do not currently feel capable of doing this work on their own, nor do they feel fully prepared by their university education. It is our hope that not only will this independent study course serve as a model for other teacher education programs but also that the additional suggestions provided in this article will help stimulate broader conversations about the place of GBL in school-university partnerships. Both the university and the partnership school have unique and ample resources to bring to these conversations, and we are optimistic about the potential held by these partnerships to meet shared goals of improving student learning and preparing future educators through hands-on practice.

### Note

1. "Specials" refer to special area classes such as art, physical education or music.

### References

- Ashmann, S., & Franzen, R. (2017). In what ways are teacher candidates being prepared to teach about the environment? A case study from Wisconsin. *Environmental Education Research*, 23(3), 299–323.
- Berezowitz, C. K., Bontrager Yoder, A. B., & Schoeller, D. A. (2015). School gardens enhance academic performance and dietary outcomes in children. *Journal of School Health*, 85(8), 508–518. doi: 10.1111/josh.12278.
- Blair, D. (2009). The child in the garden: An evaluative review of the benefits of school gardening. *The Journal of Environmental Education*, 40(2), 15–38.
- Burt, K. G., Luesse, H. B., Rakoff, J., Ventura, A., & Burgermaster, M. (2018). School gardens in the United States: Current barriers to integration and sustainability. *American Journal of Public Health*, 108(11), 1543–1549.
- Carney, J. (2011). Growing our own: A case study of teacher candidates learning to teach for sustainability in an elementary school with a garden. *Journal for Sustainability Education*, 2, 1–18.
- Cramer, S. E., & Ball, A. L. (2019). Wild leaves on narrow STEMs: Exploring formal and non-formal education tensions through garden-based learning. *Journal of Agricultural Education*, 60(4), 35–52.

- Cramer, S., & Tichenor, M. (2019). Preservice teachers' perceptions of garden-based learning: Opportunities for growth and partnership. *Florida Association of Teacher Educators Journal*, 4(2), 59–75. Available from: <http://www.fate1.org/journals/FATE-Journal-4.2.pdf>
- Cramer, S. E., & Tichenor, M. S. (2021). Just do it: Teachers' perspectives on garden-based learning. *Kappa Delta Pi Record*, 57(3), 138–142. doi: 10.1080/00228958.2021.1935507.
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Thousand Oaks, CA: Sage.
- Desmond, D., Grieshop, J., & Subramaniam, A. (2004). *Revisiting garden-based learning in basic education*. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Dring, C. C., Lee, S. Y., & Rideout, C. A. (2020). Public school teachers' perceptions of what promotes or hinders their use of outdoor learning spaces. *Learning Environments Research*, 23, 369–378.
- Graham, H., Beall, D. L., Lussier, M., McLaughlin, P., & Zidenberg-Cherr, S. (2005). Use of school gardens in academic instruction. *Journal of Nutrition Education and Behavior*, 37(3), 147–151. doi: 10.1016/s1499-4046(06)60269-8.
- Gulhan, F. (2023). The order of garden-based learning from science education to STEM education. *Eurasian Journal of Science and Environmental Education*, 3(1), 17–23.
- Hayden-Smith, R. (2006). *Soldiers of the soil: A historical review of the United States School Garden Army*. 4-H center for youth development [monograph]. Davis: University of California.
- Hirschi, J. S. (2015). *Ripe for change: Garden-based learning in schools*. Cambridge, MA: Harvard Education Press.
- Hoover, A., Vandyousefi, S., Martin, B., Nikah, K., Cooper, M. H., Muller, A., & Davis, J. N. (2021). Barriers, strategies, and resources to thriving school gardens. *Journal of Nutrition Education and Behavior*, 53(7), 591–601.
- Jaffe, R., & Appel, G. (2014). *The growing classroom: Garden-based science and nutrition activity guide*. Williston, VT: National Gardening Association.
- Junior Master Gardener Program (2022). Growing good kids book awards. Junior Master Gardener Program. Available from: <https://jmgkids.us/bookawards/>
- Landy, A., & Logue, B. (2017). Survey of Principals regarding perceived benefits and barriers of school gardens. *Journal of Child Nutrition & Management*, 41(1).
- Lautenschlager, L., & Smith, C. (2007). Understanding gardening and dietary habits among youth garden program participants using the Theory of Planned Behavior. *Appetite*, 49(1), 122–130. doi: 10.1016/j.appet.2007.01.002.
- Life Lab (2022). Life Lab academic content standards database. Life Lab. Available from: <https://lifelab.org/standards-database/>
- Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco, CA: Jossey-Bass.
- Nolet, V. (2009). Preparing sustainability-literate teachers. *Teachers College Record*, 111(2), 409–442.
- Norman, P., & Sparks, B. (2018). A funny thing happened on the way to PD: Revisiting PDS leaders' roles to support children's learning directly. *School University Partnerships*, 11(2), 92–96.
- Pajares, F. (1993). Preservice teachers' beliefs: A focus for teacher education. *Action in Teacher Education*, 15(2), 45–54.
- Passy, R. (2014). School gardens: Teaching and learning outside the front door. *Education 3-13*, 42(1), 23–38. doi: 10.1080/03004279.2011.636371.
- Petti, A. (2013). Seeking mutual benefit: University and districts as partners in preparation. *School University Partnership*, 6(2), 32–48.
- Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. L. (2008). *Handbook on agricultural Education in public schools* (6th ed.). Clifton Park, NY: Thompson Delmar Learning.

- Powers, A. L. (2004). An evaluation of four place-based education programs. *The Journal of Environmental Education*, 35(4), 17–32.
- Reeves, D. (2007). Leading to change: How do you change school culture? *Educational Leadership*, 64(4), 92-94.
- Saeki, E., Segool, N., Pendergast, L., & von der Embse, N. (2018). The influence of test-based accountability policies on early elementary teachers: School climate, environmental stress, and teacher stress. *Psychology in the Schools*, 55(4), 391–403.
- Sobel, D. (2004). *Place-based education: Connecting classroom and community*. Great Barrington, ME: Orion.
- Stake, R. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.
- Stone, H., Valentine, K., Rye, J., Forinash, M., Kieffer, K., & Hacke, A. (2019). Germinating fractions through garden-based learning in an elementary professional development school. *PDS Partners*, 14(2), 33–38.
- Subramaniam, A. (2002). *Garden-based learning in basic education: A historical review* (Vol. 4). Davis: H Center for Youth Development Monograph Series, U. C.
- Williams, D., & Brown, J. (2013). *Learning gardens and sustainability education: Bringing life to schools and schools to life*. New York, NY: Routledge.
- Yin, R. K. (2003). *Case study research: Design and methods*. Thousand Oaks, CA: Sage.
- Yu, F. (2012). School garden sustainability: Major challenges to the long-term maintenance and success of school garden programs. (Masters thesis). University of Delaware, Newark.

**Corresponding author**

Sarah Cramer can be contacted at: [scramer@stetson.edu](mailto:scramer@stetson.edu)

---

For instructions on how to order reprints of this article, please visit our website:

[www.emeraldgroupublishing.com/licensing/reprints.htm](http://www.emeraldgroupublishing.com/licensing/reprints.htm)

Or contact us for further details: [permissions@emeraldinsight.com](mailto:permissions@emeraldinsight.com)