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Research In Brief

Nebraska School Gardens and the Potential for Science, Technology, Engineering, and Math Learning

Abstract

School-based growing spaces support student engagement in science, technology, engineering, and mathematics (STEM) learning through authentic agricultural pursuits. We conducted a survey of Nebraska schools to characterize existing school-based growing spaces and to identify challenges limiting garden-based STEM learning. Our findings confirm the use of school-based growing spaces for kindergarten through 12th-grade STEM instruction, especially in the sciences. Opportunities for technology and engineering experiences are currently limited, and additional professional development support is needed to broaden garden-based STEM learning efforts. Our findings are relevant to current and future Extension efforts supporting school gardens, especially in rural agricultural communities.

Keywords: school gardens, STEM education, technology, engineering, agriculture education

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Introduction

In the 21st century, U.S. and global economies are increasingly reliant on job growth in science, technology, engineering, and mathematics (STEM) fields. Future U.S. prosperity hinges on a workforce that is ready and eager to engage in STEM-related professions (U.S. Bureau of Labor Statistics, 2017). Educators face the challenge of preparing learners with the necessary knowledge, skills, and interest in STEM education and career pathways (National Academy of Sciences & National Academy of Engineering, 2005).

Academic performance in science and mathematics declines as students advance from primary to secondary grade levels (National Center for Educational Statistics, 2016), and comparable decreases are found in student interest in STEM education and careers (Osborne et al., 2003; Vedder-Weiss & Fortus, 2011, 2012). Despite continued U.S. science education reform, gains in student achievement have been marginal (National Center for Educational Statistics, 2016). Trends suggest that many students are pushed out of the STEM education pipeline as they lack the necessary knowledge, skills, or interest in STEM to be successful.

Agriculture provides an interdisciplinary context in which students can engage in experiential STEM learning

and career exploration (Campbell et al., 2015). School gardens provide opportunities for youths to gain STEM knowledge and skills through authentic, personally relevant agricultural pursuits (Kelley & Williams, 2013; Lawrence & Rayfield, 2012; Zuiker & Wright, 2015). Although promising, the success of STEM-integrated agricultural learning experiences requires access to suitable growing spaces and educators equipped with necessary instructional resources and training.

Nationally, school-based growing spaces (e.g., outdoor gardens, greenhouses, tower gardens, containers) are increasingly accessible. The prevalence of garden programs in U.S. public elementary schools has more than doubled, increasing from 11.9% in 2006 to 31.2% in 2013 (Turner et al., 2016). While researchers have explored opportunities to implement STEM in school gardens (Kelley & Williams, 2013; Klemmer et al., 2005), data related to the prevalence, features, and use of these spaces and needs of educators working in them are limited (Cater et al., 2012; Life Lab, 2011, 2014).

To gain a better understanding of the use of these spaces for kindergarten-through-Grade-12 (K–12) learning, we designed and implemented a general needs assessment survey in cooperation with external partners to characterize the prevalence, features, and purposes of existing spaces supporting outdoor learning. We then explored barriers and challenges limiting expansion of garden-based STEM learning across Nebraska.

Methods

Web-Based Survey Development

We designed a web-based survey in accordance with the tailored design method (Dillman, 2009), creating items when necessary and using modified items from similar surveys of school garden programs (Life Lab, 2011, 2014) when possible. The 44-item survey instrument (see appendix) focused on the following topics:

- consent to participate and be added to a school garden database;
- participant demographics;
- garden/growing space status, age, features, production, and intended use;
- garden-based education efforts;
- garden program staff, funding, training, partners, and evaluation;
- barriers to growing space access or garden-based learning; and
- participant attitudes.

The proposed study protocol received approval from the University of Nebraska–Lincoln institutional review board on October 10, 2018 (IRB# 20181018719EX).

Participant Recruitment and Data Collection

Email addresses for Nebraska public school administrators were sourced from the Nebraska Department of

Education's Nebraska Public Schools Administrators Email Lists (https://www.education.ne.gov/nebraska-public-schools-administrators-email-lists/). Email addresses for private school administrators, Nebraska agriculture education teachers, and afterschool program leaders also were sourced from the Nebraska Department of Education.

In total, 1,216 school-affiliated personnel were invited to participate via a personalized recruitment email and two follow-up reminders distributed between October 10 and November 1, 2018, via Qualtrics Survey Software (Provo, UT, USA). Potential survey respondents were asked (a) to respond to the survey if they had adequate knowledge to describe any school garden program at their site or (b) to pass along the recruitment email to another adult with knowledge of the school's garden program. Therefore, some snowball recruitment (Creswell, 2012) occurred via forwarded emails to persons outside the recruitment sample. Email recruitment language emphasized the importance of gathering data from schools with and without access to a garden or other growing space.

Data Cleansing and Analysis

Prior to data analysis, we removed responses lacking consent or providing insufficient information about the presence or absence of a school garden. Due to snowball recruitment, the possibility existed for multiple participants to report data on a single growing space. Participant-provided location data ensured that the response rate was not inflated due to duplicate survey responses from a single school. After data cleansing, 334 complete and 29 partial survey responses remained for analysis (30% response rate).

Results

Prevalence, Features, and Instructional Use of School Growing Spaces

Responses were evenly split between schools with and without access to a garden or other growing space (Table 1). Half of all reported growing spaces had been added in the preceding 3 years (Figure 1), suggesting increasing popularity.

Table 1.

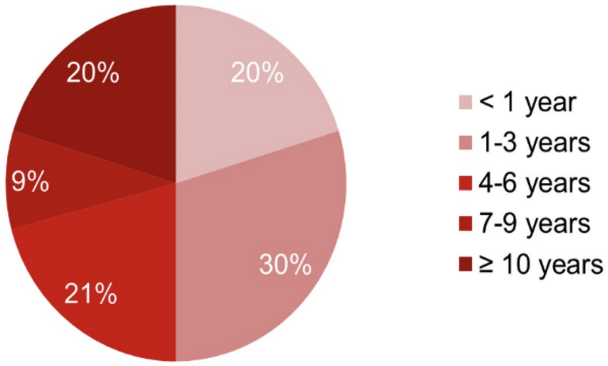
Access to Growing Space

Access to growing space	*f*	Percentage of responses
Currently have access	186	51
Previously had access	34	9
Never had access	143	39

Note. $n = 363$.

Figure 1.

Length of Time Growing Space Has Operated

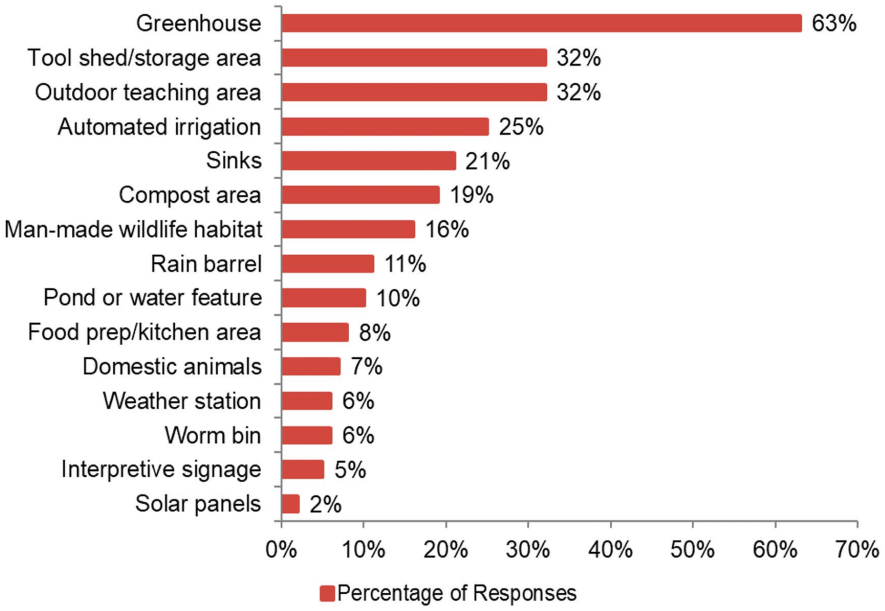


Note. n = 168.

Vegetables were the most popular plant type grown, reported by 84% of respondents (n = 149), followed by nonedible ornamentals (58%, n = 103), herbs (51%, n = 91), Nebraska native plants (26%, n = 47), fruits (16%, n = 29), and nuts (2%, n = 2). Growing spaces were outfitted with a variety of features, with greenhouses being the most popular, followed by a tool shed or other storage area and designated teaching areas that could include tables or benches (Figure 2).

Figure 2.

Growing Space Features

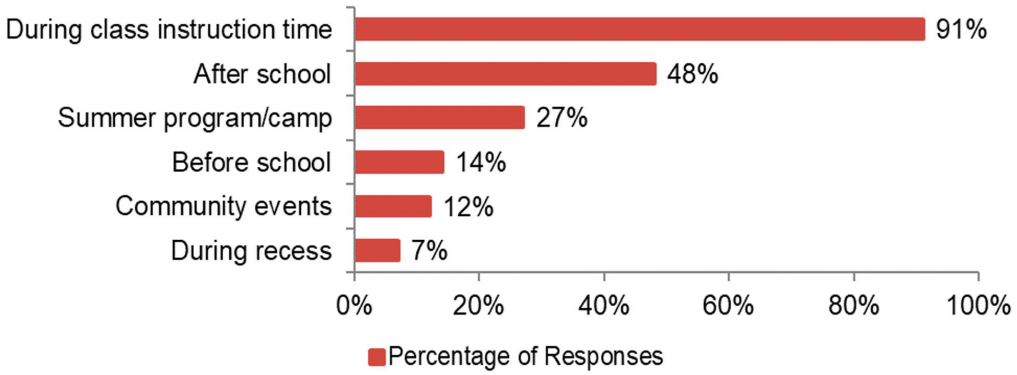


Note. n = 142.

In locations with access to a growing space, garden-based instruction was common (97%). Growing space instruction largely occurred during the school day (91%) or in conjunction with afterschool programming (48%) (Figure 3).

Figure 3.

Timing of Instruction in Growing Space

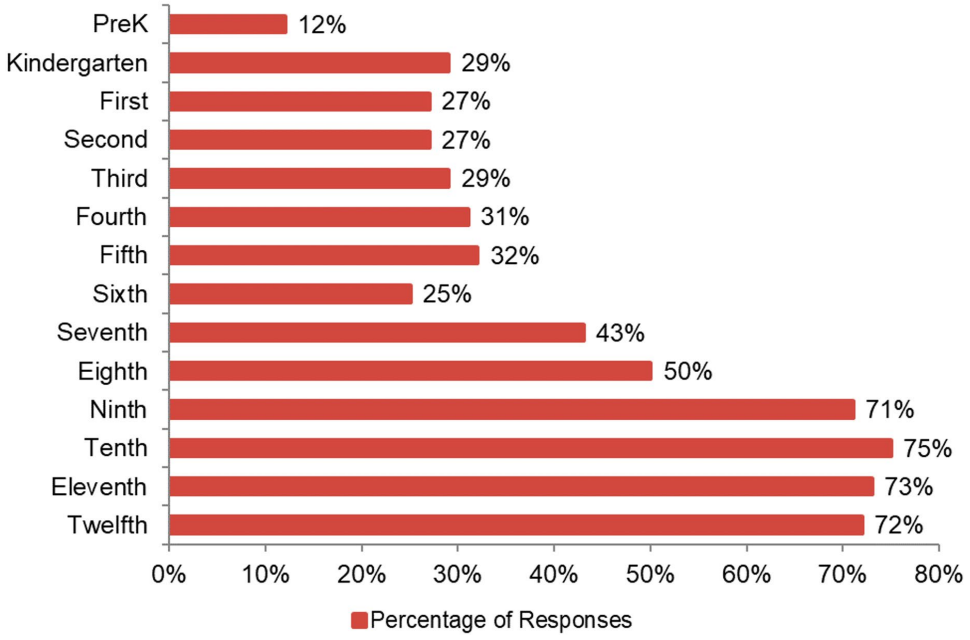


Note. n = 173.

Garden-based instruction occurred across grades preK–12 but was more prevalent in secondary grades than in primary grades (Figure 4).

Figure 4.

Grade Levels Taking Part in Growing Space Instruction



Note. n = 173.

Results suggest that growing spaces already support aspects of STEM learning, with predominantly science and math as core subjects and agricultural science and health/nutrition as noncore subjects (Table 2).

Table 2.

Use of Growing Space for Core and Noncore Academic Subjects

Subject type	Subject taught using the growing space	*f*	Percentage of responses
Core [a]	Science	125	99

	Math	50	40
	English/language arts	10	8
	History	10	8
Noncore [b]	Agricultural studies	137	83
	Health/nutrition	57	35
	Service learning/community service	41	25
	Family and consumer sciences/culinary arts	38	23
	Environmental studies	35	21
	Business/entrepreneurship	27	16
	Special education	18	11
	Art	18	11
	Physical education	5	3
	Computer technology	3	2
	Foreign language	0	0

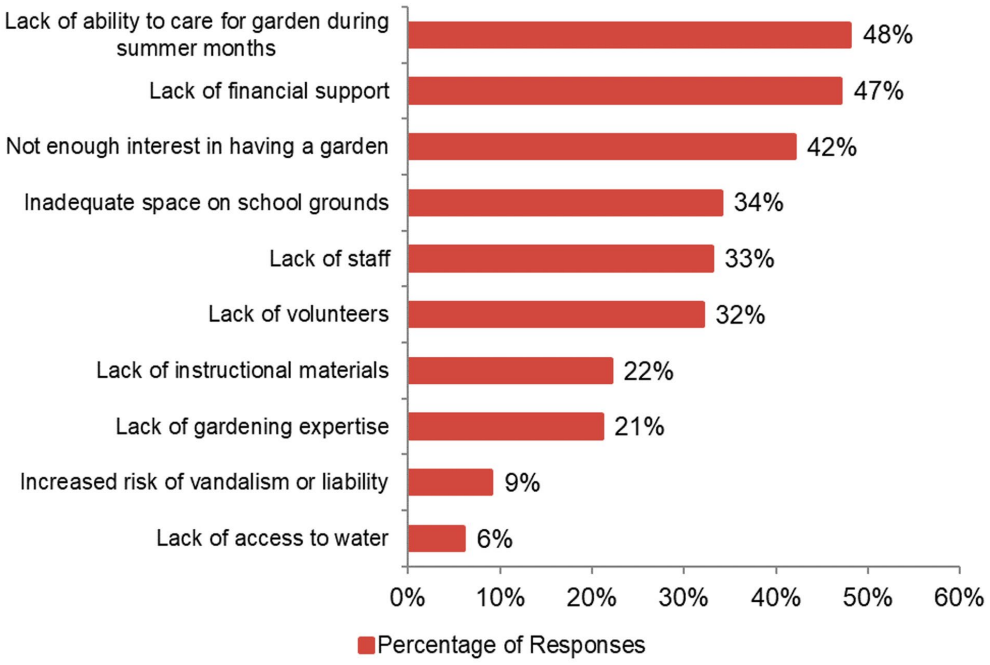
[a] n = 126. [b] n = 165.

Barriers and Challenges Limiting Access to or Instructional Use of Growing Spaces

In locations without a growing space, respondents identified several limiting factors, including lack of the potential for garden care during the summer months, financial support, interest, and physical space (Figure 5).

Figure 5.

Barriers to Accessing Growing Space

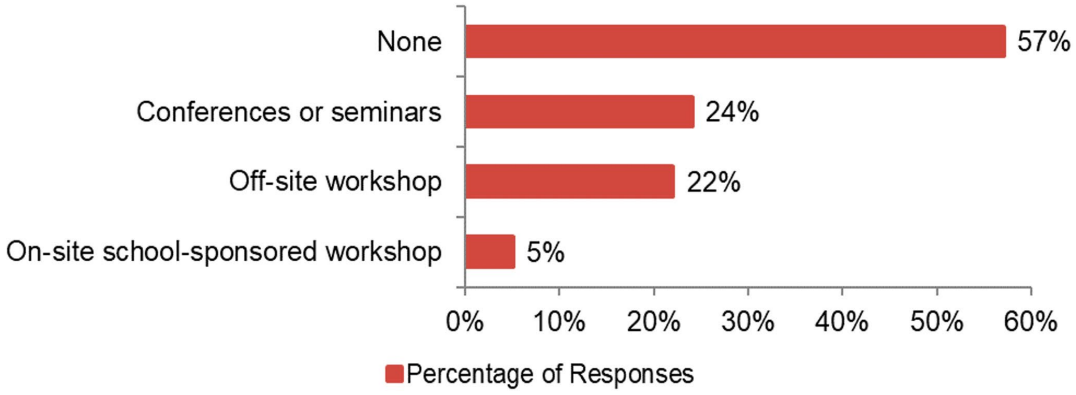


Note. n = 140.

In addition to these barriers, respondents expressed the need for professional development and resources to manage spaces or facilitate student learning. Over half of the respondents had not received professional development for using growing spaces for instruction in the preceding 3 years (Figure 6). In addition, most respondents indicated interest in attending training related to garden-based instruction, and nearly half indicated an interest in attending training to develop skills in outdoor classroom management or gardening (Figure 7).

Figure 6.

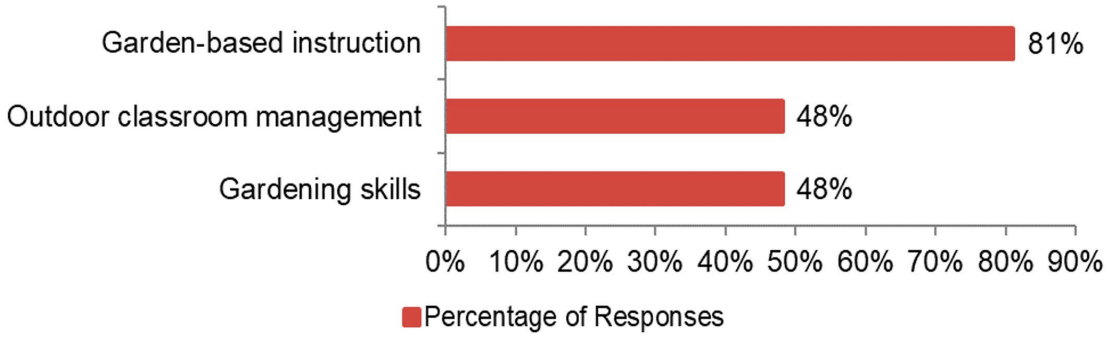
Garden-Based Professional Development Received in Past 3 Years



Note. n = 166.

Figure 7.

Reported Interest in Attending Local Training on Various Topics



Note. n = 149.

Discussion

The purpose of our study was to characterize the prevalence, features, and instructional uses of existing school growing spaces and identify barriers and challenges that limit garden-based STEM learning across Nebraska. Our findings suggest that school growing spaces in Nebraska support STEM instruction, especially related to the sciences, but that opportunities for technology and engineering experiences are limited and additional support is needed to broaden garden-based STEM learning efforts.

Previous research on school garden programs has tended to focus on elementary schools (Turner et al., 2016). Other school garden survey results have shown that garden programming is most prevalent in kindergarten through Grade 5 (Life Lab, 2011, 2014). In exploring the full range of K–12 education, we found that student learning in Nebraska school growing spaces occurs mostly in the secondary grade levels. This may be partially due to the recruitment and response of agriculture education teachers in our survey. Agriculture education programs may be overlooked, nationally, as a valuable noncore subject through which older students can engage in experiential STEM learning.

Our findings agree with California school garden surveys indicating widespread use of garden spaces for science instruction (Life Lab, 2011, 2014). Although science appears to be a well-supported tenet of STEM learning in school growing spaces, other areas of STEM may be overlooked. In our study, we found a lack of computer technology instruction and limited use of agricultural technology and engineering (automated irrigation, weather stations, and solar panels) linked to growing spaces.

Previous survey research examining factors affecting school garden success has indicated the importance of community support and warned against the trend of relying solely on "champion teachers" to spearhead school garden spaces (Burt et al., 2019). These findings suggest that ongoing investment in staff, funding, training, and resources is necessary to ensure long-term success of garden-based education programs. Our results confirm the need for professional development opportunities on creating and managing school growing spaces and engaging students in garden-based instruction to achieve learning outcomes.

Conclusions and Recommendations

Results from our study add to the body of knowledge about school garden prevalence and use to support instruction in K–12 education settings. Our findings suggest that school growing spaces are used to support agricultural and science learning experiences but are underutilized spaces for teaching real-world applications of technology and engineering. On the basis of our results and an examination of trends in K–12 education

policy, we suggest that a unique opportunity exists for Extension to strengthen and expand STEM education in outdoor learning spaces.

Over the past 15 years, concern about increasing obesity rates has led to policy decisions and youth garden/food education programs largely focused on improving student health and reducing childhood obesity (Child Nutrition and WIC Reauthorization Act, 2004; Healthy Hunger-Free Kids Act, 2010). Such efforts, including the U.S. Department of Agriculture's Farm-to-School program, aim to increase the availability of local food in school lunch programs and support hands-on agricultural and nutrition education in school garden spaces.

Extension is a valuable partner in furthering agricultural and health education efforts in school gardens. Extension program personnel have created and evaluated curriculum and educator professional development to support nutrition and plant science education (Cater et al., 2012; Vierregger et al., 2015; Welsh et al., 1999) and deliver local school garden programming (Benson, 2014; Griffin, 2019). The association between strong networks of community support and school garden success (Burt et al., 2019) further substantiates the role Extension can play in supporting garden-based nutrition and agricultural education to address childhood obesity, health, and nutrition needs.

Similar to K–12 education policy shifts in response to obesity concerns, the anticipated demand for a 21st century STEM workforce has increased calls for STEM preparedness in U.S. K–12 education. With this shift, there is increasing support for students to receive computer science (CS) instruction (K–12 Computer Science Framework Steering Committee, 2016), and accessible and age-appropriate computing education resources have become widely available (Wilson, 2013). Despite the relevance of CS in every facet of modern life, CS education resources largely focus on building video games, creating art, or solving online puzzles rather than creating or applying technologies to solve meaningful real-world problems such as school garden challenges.

In much the same way that school garden spaces provide meaningful contexts in nutrition and agricultural education, gardens can support CS education initiatives. Increasing access to school growing spaces and affordable sensors and other modern agricultural technologies provides new opportunities to merge CS education with garden-based learning. Students can develop CS knowledge and skills through engineering technology-rich solutions to tackle authentic garden challenges. Such efforts support career exploration by expanding student understanding of CS beyond building video games and solving puzzles.

Extension is well suited to lead the integration of CS education into garden-based learning. As a trusted developer of curriculum materials and professional development experiences, Extension has a successful track record of contributing to CS education initiatives through 4-H robotics competitions (Barker & Ansorge, 2006; Barker et al., 2010) and curricula that focus on wearable technology (Keshwani et al., 2016). In addition, Extension's interdisciplinary nature allows content experts in agricultural technology and engineering to work directly with youth education experts to design learning experiences that help students connect with modern agricultural engineering challenges to increase efficiency and conserve natural resources.

Garden-based CS programs may afford a multitude of benefits for both K–12 students and Extension. Such programming would potentially diversify youth participation in both 4-H robotics and Extension-supported school garden programs. Combined with the growing prevalence of school gardens in Nebraska and across the nation, there is potential for gardens to not only support positive health and nutrition outcomes but also provide authentic settings for students to gain valuable CS knowledge and skills that will enhance STEM

preparation and broaden awareness of STEM career pathways.

Author Note

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References

Barker, B. S., & Ansorge, J. (2006). Using robotics as an educational tool in 4-H. *Journal of Extension*, *44*(5), Article 5IAW6. https://joe.org/joe/2006october/iw6.php

Barker, B. S., Grandgenett, N., Nugent, G., & Adamchuk, V. I. (2010). Robots, GPS/GIS, and programming technologies: The power of "digital manipulatives" in youth Extension experiences. *Journal of Extension*, *48*(1), Article v48-1a7. https://www.joe.org/joe/2010february/a7.php

Benson, M. C. (2014). Exploring Extension involvement in farm to school program activities. *Journal of Extension*, *52*(4), Article v52-4a4. https://www.joe.org/joe/2014august/a4.php

Burt, K. G., Lindel, N., Wang, J., Burgermaster, M., & Fera, J. (2019). A nationwide snapshot of the predictors of and barriers to school garden success. *Journal of Nutrition Education and Behavior*, *51*(10), 1139–1149. https://doi.org/10.1016/j.jneb.2019.06.020

Campbell, B. T., Wilkinson, C. A., Shepherd, P. J., & Gray, P. (2015). Industry and Extension partnership to enhance STEM and agricultural education. *Journal of Extension*, *53*(4), Article v53-4tt6. https://www.joe.org/joe/2015august/tt6.php

Cater, M., Fox, J., & Fletcher, B., Jr. (2012). Louisiana 4-H Seeds of Service school gardens: A descriptive view. *Journal of Extension*, *50*(4), Article v50-4iw5. https://joe.org/joe/2012august/iw5.php

Child Nutrition and WIC Reauthorization Act, Pub. L. No. 108–265 (2004). https://www.congress.gov/108/plaws/publ265/PLAW-108publ265.pdf

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Pearson Education Inc.

Dillman, D. A. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method* (3rd ed). Wiley & Sons.

Griffin, B. (2019). Systematic approach to meeting the needs of school garden clients. *Journal of Extension*, *57*(1), Article v57-1iw4. https://www.joe.org/joe/2019february/iw4.php

Healthy Hunger-Free Kids Act, Pub. L. No. 111–296 (2010). https://fns-prod.azureedge.net/sites/default/files/PL_111-296.pdf

K–12 Computer Science Framework Steering Committee. (2016). *K–12 computer science framework.* http://www.k12cs.org/

Kelley, S. S., & Williams, D. R. (2013). Teacher professional learning communities for sustainability: Supporting STEM in learning gardens in low-income schools. *Journal of Sustainability Education*, *5*, 327–345.

Keshwani, J., Barker, B., Nugent, G., & Grandgenett, N. (2016). WearTec: Empowering youth to create wearable technologies. *2016 IEEE 16th International Conference on Advanced Learning Technologies (ICALT)*, 498–500.

Klemmer, C. D., Waliczek, T. M., & Zajicek, J. M. (2005). Growing minds: The effect of a school gardening program on the science achievement of elementary students. *HortTechnology*, *15*(3), 448–452.

Lawrence, S. G., & Rayfield, J. (2012). School gardens: Ripe with STEM and experiential learning; fertile soil for agricultural program growth. *The Agricultural Education Magazine*, *84*(4), 7.

Life Lab. (2011). *2010–2011 California school garden survey.* Life Lab. https://www.lifelab.org/2011/01/schoolgardensurvey/

Life Lab. (2014). *2014 California school garden survey.* https://www.lifelab.org/2013/12/schoolgardensurvey2014/

National Academy of Sciences & National Academy of Engineering. (2005). *Rising above the gathering storm: Energizing and employing America for a brighter economic future.* The National Academies Press. https://doi.org/10.17226/11463

National Center for Educational Statistics. (2016). *The nation's report card: 2015 science at grades 4, 8 and 12.* https://www.nationsreportcard.gov/science_2015/

Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education*, *25*(9), 1049–1079. https://doi.org/10.1080/0950069032000032199

Turner, L., Eliason, M., Sandoval, A., & Chaloupka, F. J. (2016). Increasing prevalence of US elementary school gardens, but disparities reduce opportunities for disadvantaged students. *Journal of School Health*, *86*(12), 906–912. https://doi.org/10.1111/josh.12460

U.S. Bureau of Labor Statistics. (2017). *STEM occupations: Past, present, and future* (p. 35). https://www.bls.gov/spotlight/2017/science-technology-engineering-and-mathematics-stem-occupations-past-present-and-future/home.htm

Vedder-Weiss, D., & Fortus, D. (2011). Adolescents' declining motivation to learn science: Inevitable or not? *Journal of Research in Science Teaching*, *48*(2), 199–216.

Vedder-Weiss, D., & Fortus, D. (2012). Adolescents' declining motivation to learn science: A follow-up study. *Journal of Research in Science Teaching*, *49*(9), 1057–1095.

Vierregger, A., Hall, J., Sehi, N., Abbott, M., Wobig, K., Albrecht, J., Anderson-Knott, M., & Koszewski, W. (2015). Growing healthy kids: A school enrichment nutrition education program to promote healthy behaviors for children. *Journal of Extension*, *53*(5), Article v53-5iw3. https://joe.org/joe/2015october/iw3.php

Welsh, D. F., Whittlesey, L. A., Seagraves, R. L., Hall, G. W., & Harlow, M. M. (1999). Junior master gardeners program addresses youth needs. *Journal of Extension*, *37*(3), Article 3IAW1. https://www.joe.org/joe/1999june/iw1.php

Wilson, C. (2013). What's up next for Code.org? *Computer*, *46*(8), 95–97. https://doi.org/10.1109/MC.2013.292

Zuiker, S. J., & Wright, K. (2015). Learning in and beyond school gardens with cyber-physical systems. *Interactive Learning Environments*, *23*(5), 556–577.

Appendix

Survey

Nebraska School Gardens Needs Assessment
Research Participant Informed Consent Form (IRB#20181018719EX)

Purpose of Research: The purpose of this research is to gather information about Nebraska school gardens and other growing spaces in order to support creation, management, and use of these spaces. Information gained from this survey will be used to guide garden-based curriculum development and provide Nebraska school gardens with additional support. You are invited to participate in this research if you are 19 years of age, live in Nebraska, and have knowledge of school-affiliated garden spaces in your area.

Specific Procedures to be Used: You will be asked to answer closed- and open-ended questions about school-affiliated garden spaces in your area. You will be asked to provide limited demographic information. Providing this information is entirely voluntary.

Duration of Participation: This survey will take approximately 5-20 minutes to complete. This length may be shorter or longer depending on your location, experiences, and input.

Risks: There are no known risks or discomfort associated with this research.

Benefits: By participating in this research, you will have the opportunity to share your experience and knowledge of your local school-affiliated garden spaces. Findings from this study will be shared with educators, administrators, curriculum developers, government agencies, and non-profit organizations that support school garden efforts in Nebraska, to inform development of garden-based resources and tools.

Incentive: No monetary incentive will be offered for participating in this study.

Freedom to Withdraw: Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researchers or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which you are otherwise entitled.

Confidentiality: This survey was developed and implemented using Qualtrics Survey Software. Their privacy policy can be found at http://www.qualtrics.com/privacy-statement/. No information identifying you to the

research results will be published. Your responses will be kept confidential on secure server with password protection. Responses will be destroyed five (5) years after completion of the study. Results from this study may be published in scientific journals or presented at scientific meetings but identifying information of participants will not appear in any written report or presentation.

Opportunity to Ask Questions: You may ask any questions concerning this research by contacting Erin Ingram (402-318-2319 or eingram3@unl.edu) or Jenny Keshwani (402-472-9614 or jkeshwani@unl.edu). If you would like to speak to someone else, please call the Research Compliance Services Office at (402) 472-6965 or irb@unl.edu.

Q1: **Consent**: You are voluntarily making a decision whether or not to participate in this research study. By clicking on the "I Agree" button below, you agree that you are 19 years of age or older and consent to participate. For future reference, you should print or save a copy of this consent form for your records.

- □ I Agree
- □ I Do Not Agree

Q2: Contact information

Your name _____

Email address _____

Q3: Which of the following best describes your role?

- □ Teacher
- □ School administrator
- □ Other school staff
- □ Parent volunteer
- □ Community volunteer
- □ Non-profit support organization
- □ Other support organization (Please specify.)

  _____

Q4: School information

School name _____

School address _____

School city _____

School zip code _____

County _____

School district _____

School enrollment (best estimate) _____

Q5: School type

- □ Public
- □ Private

Q6: Can we add your information to our Nebraska school garden database?

Contact information in the database will be used to disseminate curriculum resources and information about available support for school gardens in Nebraska. If you wish to withdraw from the registry at any time, you may submit your request via email to eingram3@unl.edu.

- □ Yes, I **would** like to add my information to the school gardens database.
- □ No, I **would not** like to add my information to the school gardens database.

Q7: Has your school ever had a garden or other growing space (greenhouse, community garden, aquaponics, tower gardens, etc.)?

- □ Yes
- □ No

Q8: Please choose all applicable reasons that best describe why your school does not have access to a school garden or other growing space.

- □ Lack of financial support
- □ Lack of gardening expertise
- □ Lack of staff
- □ Lack of volunteers
- □ Lack of ability to care for garden during summer months
- □ Not enough interest in having a garden
- □ Lack of instructional materials
- □ Inadequate space on school grounds
- □ Lack of access to water
- □ Increased risk of vandalism or liability
- □ Other (Please specify.) _____

Q9: Does your school currently have a garden or other growing space (greenhouse, community garden, aquaponics, tower gardens, etc.)?

- □ Yes
- □ No

Q10: How interested are you in gaining access to a school garden or other growing spaces?

- □ Extremely interested
- □ Very interested
- □ Moderately interested
- □ Slightly interested
- □ Not at all interested

Q11: Can you provide a reason for why the garden or growing space is no longer utilized? (Select all that apply.)

- □ Loss of garden leader(s)

- □ Loss of volunteers
- □ Loss of access to the growing space (e.g. school renovations, parking lot, etc.)
- □ Lack of funding for continued garden management
- □ Loss of interest
- □ Lack of gardening expertise
- □ Issues with plant health (e.g. insect pests, disease, poor soil, etc.)
- □ Issue with groundskeeper(s)
- □ Unknown reason(s)
- □ Other (Please elaborate.) _____

Q12: How long has the school garden or other growing space been operating? (when was it first created)

- □ < 1 year
- □ 1-3 years
- □ 4-6 years
- □ 7-9 years
- □ ≥ 10 years
- □ I don't know

Q13: Did your school receive funding to support creating/starting your growing space? (Please do not include continuing funds for management or staff.)

- □ Yes (Please specify funding amounts and/or funding sources if possible.) _____
- □ No

Q14: How would you describe your school garden? (Select all that apply.)

- □ In planters/pots/containers
- □ In raised beds in one or more areas
- □ In the ground in one or more areas
- □ Greenhouse
- □ Hoop house
- □ Off school campus (Please specify location.) _____
- □ Other (Please specify.) _____

Q15: What types of plants exist/will be grown in your school garden this academic year? (Select all that apply.)

- □ Vegetables
- □ Herbs
- □ Fruits
- □ Nuts
- □ Nebraska native plants
- □ Ornamentals (any non-edible plants)
- □ Other (Please specify.) _____

Q16: Which of the following features does your school garden have? (Select all that apply.)

- □ Compost area
- □ Worm bin
- □ Man-made wildlife habitat (e.g. bird bath, bird feeder, bird or bat houses, bee nesting block, etc.)
- □ Pond or water feature
- □ Tool shed/storage area
- □ Weather station
- □ Food prep/kitchen area
- □ Sinks
- □ Outdoor teaching area (e.g. benches, tables, etc.)
- □ Interpretive signage
- □ Rain barrel
- □ Solar panels
- □ Automated irrigation
- □ Greenhouse
- □ Domestic animals (e.g. chickens, ducks, rabbits, etc.)

Q17: Is the school garden or other growing space used to support student learning?

- □ Yes
- □ No

Q18: Which, if any, of the following are barriers to student learning in the garden? (Select all that apply.)

- □ Lack of garden-based instructional resources
- □ Lack of standards-aligned learning in the garden
- □ Lack of professional development or training opportunities in garden-based learning
- □ Lack of instructional time
- □ Concern that students may harm or disturb garden plants
- □ Concern about student behavior in the garden
- □ Other (Please specify.) _____

Q19: When is the garden used to support student learning? (Select all that apply.)

- □ During class instruction time
- □ During recess
- □ After school
- □ Before school
- □ Summer program/camp
- □ Non-school community uses
- □ Other (Please specify.) _____

Q20: Who teaches students in the garden? (Select all that apply.)

- □ Paid school staff (e.g. garden coordinator, afterschool staff, etc.)

- □ Paid non-school staff (e.g. Americorps, non-profit, etc.)
- □ School teachers
- □ Older students (buddy teaching)
- □ Master gardeners
- □ Parent volunteers
- □ College interns/volunteers
- □ Other community volunteers
- □ Other (Please specify.) _____

Q21: Which grade level(s) participate in garden programming for student learning at your school? (Select all that apply.)

- □ Pre-K
- □ Kindergarten
- □ First
- □ Second
- □ Third
- □ Fourth
- □ Fifth
- □ Sixth
- □ Seventh
- □ Eighth
- □ Ninth
- □ Tenth
- □ Eleventh
- □ Twelfth

Q22: What percentage of your school's students do you estimate visit the garden for formal classroom instruction per academic year?

- □ 10%
- □ 20%
- □ 30%
- □ 40%
- □ 50%
- □ 60%
- □ 70%
- □ 80%
- □ 90%
- □ 100%

Q23: Which of the following core subjects are taught using the school garden? (Select all that apply.)

- □ Math

□ Science

□ History/Social Studies

□ English-Language Arts

Q24: Which of the following non-core subjects are taught using the garden? (Select all that apply.)

□ Agricultural studies

□ Art

□ Business/Entrepreneurship

□ Computer technology

□ Environmental studies

□ Foreign language

□ Health/Nutrition

□ Family and Consumer Sciences/Culinary Arts

□ Physical education

□ Special education

□ Service Learning/Community Service

□ Other (Please specify.)

Q25: Which educational resources and materials are used to teach in the school garden?

□ Textbooks

□ Trade books (fiction or non-fiction literature)

□ Garden-based curriculum (Please specify. e.g. Junior Master Gardeners; Learn, Grow, Eat, Go; etc.)
_____

□ Nature-based curriculum (Please specify. e.g. Project Learning Tree, Project Wild, etc.)
_____

□ Self-created lesson plans

□ Resources received at workshops or seminars

□ Websites

□ Other- Please specify. _____

Q26: What is done with plants or food grown in the garden? (Select all that apply.)

□ Used in school lunch

□ Used for academic study

□ Sold

□ Donated

□ Composted

□ Harvested and eaten during garden time

□ Harvested and eaten during other school time activities (e.g. classroom tastings, cafeteria tastings)

□ Harvested and eaten during activities out-of-school activities (e.g. PTO meetings, school board meetings, etc.)

Q27: When plants or food from the school garden are sold, is this associated with any student business venture?

□ Yes (Please elaborate.) _____
□ No

Q28: Would you define your school garden as part of Farm to School programming? (Farm to School programs connect schools with local farms with the objectives of serving healthy meals in school cafeterias, improving student nutrition, providing health and nutrition education, and supporting Nebraska's farmers.)

□ Yes

□ No

□ I don't know

□ I hadn't heard of Farm to School until now

Q29: Are there any paid staff that manage the garden or teach in the garden outside of classroom teachers? Select yes if there are any (school or non-school) support staff that receive any types of funds for garden programming.

□ Yes

□ No

Q30: What is the hourly pay rate range for paid (non-classroom teacher) garden support staff?
(If you have more than one paid staff, list the highest paid staff. If garden staff is paid an annual stipend, please estimate hours worked per year to come up with an hourly rate.)

□ $1-5/hour

□ $6-10/hour

□ $11-15/hour

□ $16-20/hour

□ $21-25/hour

□ $26-30/hour

□ $30-35/hour

□ $35/hour

Q31: During the academic year, on average, how many hours per week do paid staff (non-classroom teachers) work/teach in the garden? (For multiple staff, please list separately.)

_____

_____

_____

_____

_____

Q32: In the past three years, what types of garden-based professional development have educators at your school received? (Select all that apply.)

□ None

□ On-site school-sponsored workshop

□ Off-site workshop

□ Conferences or seminars

□ Other (Please specify.) _____

Q33: Which of the following school garden topics would you attend or like to see offered in your area? (Select all that apply.)

□ Gardening skills

□ Outdoor classroom management

□ Garden-based instruction

□ Other (Please specify topic.) _____

Q34: Has your school conducted program evaluation or assessment for your school garden program in the past five years?

□ Yes

□ No

Q35: During the last academic year, what was your total annual school garden budget (including staff and materials)?

_____

Q36: During the last academic year, how was your funding divided?

Garden materials (e.g. tools, plants, hardscaping, etc.) _____

Professional development (e.g. workshops, curriculum, etc.) _____

Maintenance staff _____

Instruction staff _____

Other (Please specify resources.) _____

Total _____

Q37: During the last academic year, what were the funding sources for your school garden program? (Select all that apply.)

□ School or district funds

□ Individual donations

□ Community/business donations

□ Grants

□ PTA/PTO funds

□ Other (Please specify.) _____

Q38: During the last academic year, with which of the following support organizations did your school garden program partner or collaborate? (Select all that apply.)

□ Non-profit organizations
□ After school programs
□ University or college partnerships
□ Local businesses
□ Local farms
□ Other (Please specify.) _____

Q39: Please indicate which of the following have had a role in starting or continuing to manage in your school garden.

	Starting the garden	Summer management (weeding, watering, etc.)	Fall or Spring management (planning, prep, planting, etc.)
Master Gardeners	□	□	□
Parent volunteers	□	□	□
College interns	□	□	□
Other volunteers	□	□	□
Paid garden staff	□	□	□
Paid non-school support organization staff	□	□	□
Classroom teachers	□	□	□
Students	□	□	□
Custodial or grounds staff	□	□	□
Administrators	□	□	□
Other (Please specify.)	□	□	□

Q40: Which of the following positive observations have you made in your school garden participants? (Select all that apply.)

□ Increased environmental attitudes
□ Increased community spirit
□ Increased self-confidence
□ Increased social skills/behaviors
□ Increased leadership skills
□ Improved attitude toward school
□ Sense of volunteerism
□ Improvements in health and nutrition
□ Improved motor skills
□ Academic gains

□ Other (Please specify.) _____

Q41: Describe any negative observations that you have seen in your school garden participants.

_____

_____

_____

_____

Q42: Please rate the importance of the following **potential benefits** in your school garden.

	Extremely important	Very important	Moderately important	Slightly important	Not at all important
Learning opportunities for core subjects (math, science, language arts, etc.)	□	□	□	□	□
Increasing environmental attitudes	□	□	□	□	□
Improving attitude toward school	□	□	□	□	□
Increasing fruit and vegetable intake	□	□	□	□	□
Trying new foods	□	□	□	□	□
Improving social/emotional health	□	□	□	□	□
Improving social skills	□	□	□	□	□
Improving decision-making skills	□	□	□	□	□
Improving health and nutrition	□	□	□	□	□
Increasing awareness of careers (agriculture, horticulture, culinary arts, food service, etc.)	□	□	□	□	□
Growing food for the school cafeteria	□	□	□	□	□
Growing food for community distribution (e.g. food pantry)	□	□	□	□	□
Improving community engagement	□	□	□	□	□
Beautifying school grounds	□	□	□	□	□

Q43: Please rate the importance of the following **potential challenges** in your school garden.

	Extremely important	Very important	Moderately important	Slightly important	Not at all important
Managing an aesthetically pleasing garden space	□	□	□	□	□

Finding and securing continued garden funding	□	□	□	□	□
Supporting student learning and engagement	□	□	□	□	□
Maintaining a good relationship with groundskeeper(s)	□	□	□	□	□
Engaging community members	□	□	□	□	□
Minimizing noise or other disruptions	□	□	□	□	□
Minimizing risk and liability	□	□	□	□	□

Q44: Please rate how important each of the following factors/resources would be in supporting the school garden as an academic instructional tool.

	Extremely important	Very important	Moderately important	Slightly important	Not at all important
Access to standards-aligned curriculum and materials	□	□	□	□	□
Teacher training in gardening skills	□	□	□	□	□
Teacher training in garden-based learning instruction	□	□	□	□	□
Teacher training in outdoor classroom management	□	□	□	□	□
Lesson planning time	□	□	□	□	□
Encouragement from administrators to use the garden as an instructional tool	□	□	□	□	□
Other (Please specify.)	□	□	□	□	□