

December 2020

Ecopedagogy in the Fourth Grade Classroom: Reflections on Implementing a Multidisciplinary STEAM Program

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Recommended Citation

Campbell, Argie and Padgett, Gary (2020) "Ecopedagogy in the Fourth Grade Classroom: Reflections on Implementing a Multidisciplinary STEAM Program," *The STEAM Journal*: Vol. 4: Iss. 2, Article 7. DOI: 10.5642/steam.20200402.07
Available at: <https://scholarship.claremont.edu/steam/vol4/iss2/7>

Ecopedagogy in the Fourth Grade Classroom: Reflections on Implementing a Multidisciplinary STEAM Program

Abstract

This article is about teaching ecoliteracy/ecopedagogy in K-12 classrooms throughout North Alabama. Rather than present the information to students as a standalone science program, this research advocates for a cross curricular approach that grounds ecoliteracy in the social justice issues that necessary to teach about sustainability. This research employed a mixed method design as the current agriculture and biology curriculums were modified for cultural relevancy. The qualitative methods consisted of case studies and the quantitative methods consisted of analyzing the data collected utilizing the Connectedness to Nature scale, which was developed in 2004.

Keywords

ecopedagogy, ecoliteracy, fourth grade, STEAM, STEM, multidisciplinary

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Cover Page Footnote

The researchers was conducted with grant support from the University of North Alabama.

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Argie Campbell & Gary Padgett

Introduction

STEAM (science, technology, engineering, art, math) education is no longer a trend for educators to follow; it is a necessity for well-rounded students. In order to demonstrate this, a STEAM curriculum based on a classroom garden was developed in a laboratory school in Northwest Alabama. The following describes the positive outcomes of this program and its learning impact on eighteen fourth grade students.

Methods

Due to the scope and sequence of the fourth grade curriculum, students received ample instruction prior to conducting any fieldwork in the garden. Students were introduced to Native American culture, particularly through a social justice lens with an integrated social studies and reading unit. The garden incorporated plants used traditionally by Native Americans, and it was important to provide students with this context. Throughout this unit, students had multiple intentional opportunities to experience and develop their understanding of diversity and justice. Students interacted with text and others to recognize and acknowledge traits of dominant culture, their home culture, and other cultures; express comfort with people who are both similar to and different from them and engage respectfully with all people; develop language and knowledge to accurately and respectfully describe how people (including themselves) are both similar to and different from each other and others in their identity groups;

respectfully express curiosity about the history and lived experiences of others; exchange ideas and beliefs in an open-minded way; build empathy, respect, understanding, and connection; examine diversity in social, culture, political, and historical contexts rather than in ways that are superficial or oversimplified; recognize stereotypes and relate to people as individuals rather than representatives of groups; and recognize that power and privilege influence relationships. In addition to the book study, students attended the Oka Kapassa Native American festival and visited the Florence Indian Mound Museum to have a hands-on learning experience with Native American Indian culture.

As far as relevant scientific studies go prior to conducting fieldwork in the garden, fourth grade students completed a unit of the earth and space science domain in which they examined evidence to construct explanations for both slow and rapid changes on Earth's land features, described patterns of Earth's land and water based on maps, and carried out investigations relating to erosion.

In the spring, students were introduced to the garden project. They learned about the Three Sisters (corn, beans, and squash) and that they are referred to as the Three Sisters because they are grown together. Corn is planted first because corn is symbolic of the first creation; it sustains all life. Beans are then planted on either side of the corn; the beans grow up the corn to reach sunlight, and they also provide nitrogen for enriching the soil. Squash is then planted on the outsides of the beans to cover the soil and prevent weeds; this nourishes the soil for the corn and beans. One student asked, "Why are these plants referred to as 'sisters' and not 'brothers'?" They learned that females represent nourishment and new life because all new life comes from women. Sisters are part of an intimate family bond, and these three sisters support and nourish one another.

Next, they studied the kind of corn planted, Cherokee long-eared popcorn. The students examined a few ears of harvested corn and were asked, “Do you see any one color?” Students unanimously responded that they saw many colors instead of one single color. They learned this kind of corn does not grow as one color alone, but instead can only grow integrated. The students enjoyed connecting this to their prior cultural knowledge of civil rights and social justice. Science concepts were already covered in the land and water unit, and planting the garden served as an excellent review. Students, with a focus on engineering, pointed out that water has the power to displace land, which is detrimental to farmland or any area intended to produce a crop.

The garden served as a real-world example for students to be able to understand and apply perimeter, area, and units of measurement—all of these skills were taught at the end of the year, so this supplemented and guided math instruction. Fourth graders collaborated to measure the distance around the garden (perimeter) in order to determine how much fencing to buy. This involved critical thinking because the garden backs up to an exterior wall that does not require any fencing; thus, students should have known to omit the one side of fencing that would go up against a wall.

Lastly, planting the garden provided ample opportunities for character education. While planting, students needed to share tools, space in the garden, and take turns planting. Jobs were delegated and distributed so everyone played a part, and each role was considered significant. By learning and reciting the planting rhymes together, planting our garden was a community-building experience for the class.

Conclusion

The class was fortunate to have this gardening space for implementing project-based learning. For instance, if part of the fence needs to be replaced, students can use the engineering design process to troubleshoot solutions or even draft a completely new design for the fence. Determining the length of each section of fencing to see how many sections would fit along each side of the garden could extend math concepts; this would entail measurement, division, fractional understanding, and basic fact fluency. Additionally, students can inventory the garden to see how many of each plant they have and how many units of produce are actually harvested from each plant. This data would be interpreted and displayed in conjunction with a graphic sources literacy and math lesson.

This garden-based curriculum was implemented in the school years 2017-2018 and 2018-2019. Due to COVID 19, data from the 2019-2020 school is still pending. However, the success of this program contributed to the Summer learning programs put into place for students during the quarantine.