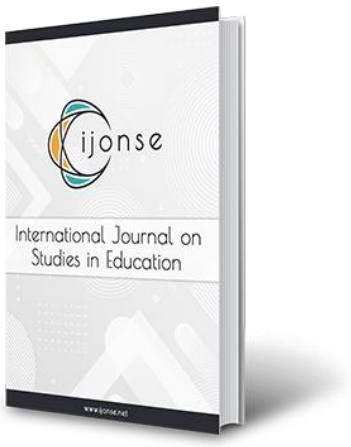

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Environment-based Education and Environmental Literacy: Instructional Strategies to Improve the Employability Skills of High School Students

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Abstract

The purpose of this quasi-experimental study was to determine which type of intervention would have an effect on high school students' knowledge of employability skills, either instruction based on 1) knowledge of natural and human systems, inquiry, and decision-making, or 2) action skills and personal responsibility. Experimental Group One (n = 39) combined the strategies of natural and human systems with inquiry and decision-making skills to plan and implement a garden. Experimental Group Two (n = 35) combined action skills with personal responsibility in the planning and teaching of a yoga class. In this pre-test/post-test design (N = 74), analyses of covariance and Pearson Correlation were used to analyze results. Experimental Group Two showed a significant improvement in the perceived importance of soft skills and also increased in their view that listening skills were an essential employability factor. Students' views on the importance of soft skills were correlated with their self-report of those skills. Ultimately, the intervention focusing on action skills and personal responsibility had positive effects on improving students' views of employment skills.

Introduction

Much research has been conducted on the benefits of environment-based education (EBE). The term describes a form of school-based education that uses the outdoors as the context for integrating subjects as well as providing a source for real-world learning experiences (Ernst, 2012). EBE is also heavily focused on knowledge, skills, and behavior (King & Franzen, 2017). Environmental literacy or sustainable education is also seen as an avenue to educate students on ways to act responsibly toward the environment with the added value of sustainability and social justice. Although the two terms are different, they blend well as strategies to foster positive action and change in education. The history of EBE within the school system began in Scotland in the 1970's and focused on skill development in outdoor recreation activities (Black, 2013). Today, EBE and environmental literacy are used to engage disconnected youth (Deed, 2008) and to aid in career preparation (Roberts & Suren, 2010). In this paper, environmental literacy methods and environment-based education will be combined for the purpose of career development and the understanding and attainment of employability skills. The primary focus for this study is to determine which combination of environmental literacy strategies has the most effect on the knowledge and acquisition of employability skills in the high school setting.

According to Meighan and Rubenstein (2018) there is an important need for Career, Technical and Agricultural Educators (CTAE) to use EBE as outdoor laboratory experiences. CTAE pathway curriculums lend themselves well to outdoor education and environmental literacy. Stapp and Cox (1974) define the framework of environmental literacy in five concepts: ecosystem, population, economics and technology, environmental decisions, and environmental ethics. Building on this research, McBride et al. (2013) simplified this framework into four concepts: the knowledge of natural and human systems, inquiry and decision making, action skills, and personal responsibility. This more concise framework will be used for the purpose of this research.

According to the United States Department of Education (2015), education, particularly in CTAE, has shifted towards meeting high standards in science, technology, engineering and math (STEM) over the past 10 years to fulfill a growing workforce demand. This recent change in focus has affected the learning goals for many CTAE students. Employability skills have become increasingly important and center on teamwork, empathy, and personal responsibility. The ability to successfully participate in teamwork is rooted in cooperative learning, and research has shown cooperative learning strategies to contribute to academic achievement (Tankersley & Cuevas, 2019). Roberts and Suren (2010) make the connection between EBE and a students' natural interest in the world and desire to be valued by others. Environment-based education works well to accomplish the needs of a responsive work force and a literate nation.

NOW (2013) reported the continued debate about the No Child Left Behind Act of 2001. The U.S. Department of Education gave schools new accountability guidelines as a way to improve educational achievement. Years later, however, scholars indicate that without environmental literacy being an important part of this, the gains are smaller than before the Act was adopted (Gruenewald & Manteaw, 2007). With this in mind, traditional education has credibility, yet what students learn through EBE and environmental literacy strategies builds on their skills and abilities (Roberts & Suren 2010).

Theoretical/Conceptual Framework

According to Ernst (2014) educational theorists Froebel, Dewey, Montessori, Steiner, Rousseau, and Malaguzzi all emphasized the role of experiences in nature as important elements for well-being and development. Each of these theorists based their findings on the idea that play drives learning. For decades, research has called for education to extend beyond the indoor classroom. As one of the most respected educational theorists of the twenty century, John Dewey, criticized educators for confining student learning to desks, blackboards, and a cramped schoolyard (Kali et al, 2018). Similarly, Ernst (2014) makes note that in spite of the documented importance of experiential learning, as well as recent brain research on the importance of imaginative, multisensory learning, outdoor curriculum programs are not widely used in the United States. However, it is important to note that experiential learning of this nature is not be to confused with kinesthetic learning styles, as learning styles have consistently been refuted and debunked across decades of research literature, including exhaustive reviews (Cuevas, 2015; Cuevas, 2016; Rohrer & Pashler, 2012; Pashler, et al., 2009; Scott, 2010) and experimental studies (Cuevas & Dawson, 2018; Rogowsky, et al. 2015), as well as texts focused on educational psychology (Cuevas, 2017; Kirschner & Hendrick, 2020).

Through the coupling of EBE and environmental literacy strategies, experience learning was used to teach employability skills in the high school curriculum. A focus on the importance of play is at the root of experience learning. To bridge the gap between theory and practice, a closer look will be given to the definition of environmental literacy. Using the framework of McBride et al. (2013) the concept of environmental literacy was divided into four subsets: knowledge of natural and human systems, inquiry and decision making, action skills, and personal responsibility. For the purpose of this study, natural and human systems were combined with inquiry and decision-making skills to encourage focused research in this area of science. Students used their resources to investigate and collaborate in a cooperative learning endeavor. Action skills and personal responsibility were combined due to the shared focus on health. Activity, at any age, promotes personally responsibility for one's wellbeing and management of daily stress.

Subdivide text into unnumbered sections, using short, meaningful sub-headings. Please do not use numbered headings. Please limit heading use to three levels. Please use 12-point bold for first-level headings, 10-point bold for second-level headings, and 10-point italics for third -level headings with an initial capital letter for any proper nouns. Leave one blank line (1.5 times spaced) before and after each heading. (Exception: no blank line between consecutive headings.) Please margin all headings to the left.

Environmental Literacy: Knowledge of Natural and Human Systems and Sustainability

Sensitivity to the needs of our wildlife population while also meeting the needs of our growing human population is a complex sustainability challenge. The two systems must work together for both populations to survive. According to Carter et al. (2014), natural systems fall into two categories: land cover and wildlife. Land cover includes deciduous/evergreen forests, bamboo, wooded and flood plain grasslands. Wildlife includes both supported and endangered animals. Human systems include individual people and communities. Put simply, natural and human systems are the impact that wildlife has on humans and the impact that humans have on wildlife.

We can use this area of environmental literacy to build curriculum for the EBE classroom. Several outdoor activities that would fall into the natural and human systems category as cited by Lynch (1999) are beekeeping, botany, gardening, birds and their nests, flowers, and insects of all kinds. The idea that teachers could better equip students for future careers with this type of environmental literacy is also the claim made in the work of Shoulders and Myers (2012). In this research it was found that agricultural educators (CTAE) who used greenhouses, landscaping areas, and meat and small animal laboratories did more to facilitate career investigation. Meighan and Rubenstein (2018) also substantiated this claim in their findings that students, aged eight through seventeen, reported field investigation as the most successful career development tool used in EBE.

Experience learning in EBE can have a significant impact on a student's understanding and appreciation of the environment. Genc et al. (2017) conducted an eleven-day study on 30 seventh grade students to assess a change in attitude toward the environment and living organisms before and after the EBE curriculum implementation. After implementing the 11-day training program, a significant difference was found between the scores of the

students who participated in the nature trips and those who did not. During this experience, students were also encouraged to use such employability skills as teamwork, flexibility, and problem solving.

Environmental Literacy: Inquiry and Decision Making

A second area of EBE can be derived from the inquiry and decision making branch of environmental literacy. Kidman and Casinader (2019), defined inquiry skills as investigating, observing, and analyzing data in order to make decisions, predictions, and to develop theories. These employability skills can be augmented by the use of today's advanced technology. Studies have demonstrated that both problem solving and motivation can be enhanced when the use of technology is incorporated into instruction (Cuevas, et al., 2012; Doster & Cuevas, 2021). Although there is some concern that the use of technology in the classroom is detrimental to student engagement, several studies have found benefits to its use. Kemp and Bushnell (2011) studied a group of 86 ten to twelve-year-old students and found the use of cell phones in the classroom improved literacy skills such as reading speed and accuracy. Preston et al. (2015) confirms that digital cameras in cell phones can visually document change in scientific experiments, summarize field trips, and add to effective class presentations. Touch pad technology can also be used to improve communication with children with learning difficulties. A more recent study found that teachers could use technology to enhance communication with high school students to bolster their achievement in health and wellness classes (Moore & Cuevas, 2021). In these examples, technology is very useful in the research and documentation needed in inquiry and decision making.

Christie et al. (2016) suggested several technology-based learning strategies to meet the inquiry and decision making EBE goals. These strategies include internet searches of historical documents and the use of podcasts with experts in the field. Hougham et al. (2018) suggested the use of a digital observation technology skills (DOTS) kits to meet this educational challenge. In this study, the use of these kits resulted in a reported increase in confidence and knowledge of differing technologies and environmental literacy. These kits could be assembled by individual schools to include portable sets of microscopes, thermal imagers, a GPS unit, access to a mobile weather station, infrared thermometers, digital cameras, and tablets. Using these resources in a cooperative educational setting promoted a deeper level of inquiry and decision making skills.

Ernst and Monroe (2004) conducted a mixed-methods study to compare the relationship between EBE and high school students' critical thinking skills as well as their disposition toward critical thinking. An additional research focus was to determine what environment-based programs influenced critical thinking skills and disposition toward critical thinking. It was found that open-ended projects that required hypothesizing, investigating issues, and conducting student-designed research were the most effective. This research also found that when controlling for pretest score, GPA, gender, and ethnicity, there was a significant positive effect of the environment-based programs on students' critical thinking skills. Critical thinking skills, inquiry and decision-making skills, and responsible technology usage are all important to employability.

Environmental Literacy: Action Skills

The third component to EBE, according to McBride et al. (2013), are action skills. Action skills or active learning

techniques are seen as group activities that require students to apply their knowledge to reach a conclusion about an open-ended, real-world situation. Lessons are planned around movement. High adventure activities as well as simple games make a strong connection to environmental literacy. While much recent research has been devoted to helping students develop literacy skills across different age groups (Cuevas, et al., 2014; Wooten & Cuevas, 2024; Zavala & Cuevas, 2019), less research has examined specifically how physical activity may contribute to literacy.

Acton and Carter (2016) used active learning as a way to promote team building and trust among their subject group. Their claim was that by using active games and simple science experiments within the use of a forest environment, students who were the primary caregiver for an ailing parent or grandparent could find a calming place and gain coping methods for their stressful situation. The students in this study, aged 8-13, were selected for their caregiver role. Hide and seek and blindfolded sensory walks, as well as simple observation and science lessons, were the main mode of active learning. A pre and posttest showed improvements in motivation, self-awareness, self-regulation, and social skills. The physical activity gave them a chance to be carefree and learn the woods and themselves. They gained confidence through this active, hands-on activity.

Tiberi et al. (2020) studied the relationship between activity and movement in a physical education class and the acquisition of language skills. In this study, two groups of students in a 5th and 6th grade PE class were given a reading assignment and 10 language arts questions to answer. One group answered these questions after physical activity and the second group after participating in seat work. The results of this study showed increased comprehension skills from the active students on some of the days and the same or lower skills on others. Higher literacy scores were seen in active girls with little to no change in these scores for boys. Although the results of this study were inconclusive for boys, it did show an increase in literacy skills from the active group of girls. This may be an area for further study.

In similar research, Carrier (2009) examined the impact of environmental education lessons that compared active learning activities conducted in the schoolyard with traditional classroom activities. This study involved elementary aged boys and girls. In contrast to Tiberi et al. (2020), this study showed significantly greater scores in the outdoor treatment group of boys compared to the traditional classroom curriculum. Boys also scored significantly higher in terms of attitudes and behaviors than did girls in this experiment.

Environmental Literacy: Personal Responsibility

According to Purc-Stephenson et al. (2019), personal responsibility, as it related to EBE, is most often seen as conservation efforts and an appreciation for our environmental resources. It can also be seen in the goals of mental health and resilience. When students feel greater personal responsibility and enhanced resilience, it may be associated with greater internal locus of control and a growth mindset, which in turn are predictive of greater academic gains (Jennings & Cuevas, 2021). Shellman and Hill's (2017) study maintains that EBE builds personal responsibility and allows for physiological and mental health benefits. The goal in this study was to reduce stress and depression, enhance well-being, and increase peer support. In this study, 132 college students participated in

a thirteen-day EBE program. The first week involved staying at a residential camp with a structured schedule. Time was spent building community and outdoor skills, knot tying, tent/tarp set-up, canoeing and general orientation. The second week of the program involved splitting into smaller groups of five to six participants, led by an experienced guide. The groups spent six days on a self-contained canoe expedition in the Adirondacks. The original claim of this study was substantiated when, the post test scores, using Wagnild and Young's (1993) Resilience Scale, showed a significant gain in psychological resilience as well as social, emotional and psychological wellbeing.

In a similar study, Pretty et al. (2007) found that exercise conducted in natural, green space improved health and psychological well-being. The study was conducted with 263 participants from the UK. Activities were self-selected and included horseback riding and fishing. Pre and posttests were used to measure physical and psychological health. Self-esteem and mood status were also measured with a pre and posttest. The tests showed there was a large improvement in self-esteem, rates of confusion, and bewilderment and a decrease in depression and tension/anxiety.

According to Meighan and Rubenstein, (2018) environment-based education (EBE) is beneficial to high school students in the areas of career planning as well. Ernst and Monroe (2004) also found a significant positive effect of the environment-based programs on students' critical thinking skills. Acton and Carter (2016) used active learning in an EBE environment as a way to promote team building and trust among their subject group. These findings are supportive of the idea that EBE environments are fertile ground for the building of employability skills.

Research Questions

The primary focus for this study was to determine which combination of environmental literacy strategies had the most effect on the knowledge and acquisition of employability skills in the high school setting. Using the framework of McBride et al. (2013), the concept of environmental literacy can be grouped into four subsets: knowledge of natural and human systems, inquiry and decision-making skills, action skills, and personal responsibility. For the purpose of this study, natural and human systems were combined with inquiry and decision-making skills to encourage focused research in this area of science. Students used their resources to investigate and collaborate in a cooperative learning endeavor. Action skills and personal responsibility were combined due to the shared focus on health. By being active at any age, students are personally responsible for their wellbeing and management of daily stress.

The research questions that guided this study were the following:

1. Which combination of environmental literacy strategies has the most impact on a high school student's perceived importance of employability skills?
2. Which combination of environmental literacy strategies has the most impact on a high school student's perceived employability skill set?
3. Is there a relationship between a high school student's perceived importance of employability skills and

their perceived employability skill set?

The purpose of the first question was to determine which combination of instructional strategies, as independent variables, would have the greatest effect on high school students' perception of the importance of employability skills. The purpose of the second question was to determine which combination of instructional strategies, as independent variables, would have the greatest effect on the students' recognition of their own employability skill set. The purpose of the third question was to test for a relationship between students' perceived importance of employability skills and the recognition of those skills in themselves.

Method

Contextual Factors

This high school focused study took place in a north Georgia school district. This district had 27,433 students in grades PK, K-12 with a student-teacher ratio of 16 to 1. The student population was 49% female and 51% male. Of these students, 48.4% were classified as white, 43.2% were Hispanic, 4.7% were African American, 2.2% were Multiracial, 1.3% were Asian, 0.1% were Native American and 0.1% identified as Pacific Islander. According to state test scores, 41% of students were at least proficient in math and 36% in reading. The county, with a population of 204,441, had a median household income of $59,898 and a median housing value of $183,200. The school district consisted of 39 schools representing 20 elementary schools, 9 middle schools and 10 high schools. This district also had a 51.1% Free or Reduced Lunch rating.

The school at which this study took place had a student population of 1,589 students and was more racially and ethnically diverse in comparison with the district. Its population was composed of 25% White students, 67% Hispanic, 5% African American, 1% who identified as two or more races, and 2% who identified as Asian. The student-teacher ratio at this school was 18:1. According to state test scores, 42% were proficient in math and 46% were proficient in reading and language arts, which was higher than the composite county scores. The school had a lower socio-economic profile than the district, with 58% of the students receiving free or reduced lunch. This school received Title One funding.

The participants for this study were high school members of an Early Childhood Education pathway and part of the Career, Technology and Agricultural Education (CTAE) department. Two experimental groups were formed from five classes. The sample size for this study was 74 students. Each experimental group was taught employability skills using a combination of two environmental literacy delivery strategies. These strategies are the independent variables. There were no control groups.

Experimental group one consisted of 39 students; 38 were female and one was male. Within this group there were nine freshmen students, 10 sophomore students, 15 students in their junior year and five seniors. Also in this group were 34 Hispanic students, four Caucasian students, and one African American student. Four students in this experimental group had IEPs with accommodations that included small group and extended testing time. Seven students were on the ESL (English as a second language) spectrum.

Experimental group two consisted of 35 female students. Within this group there were 22 freshman students, three sophomore students, seven students in their junior year and three seniors. Twenty-four were of Hispanic descent, nine were Caucasian and two were African American. Five students in this experimental group had IEPs that required testing accommodations such as small group and extended testing time. Thirteen students were on the ESL (English as a second language) spectrum.

Materials

Each of the two experimental groups had different materials to accomplish their tasks. Materials for experimental group one included children's books with a gardening theme, a garden choice guide, small group planning documents, the project explanation, and rubric. Independent research was also done on school owned chrome books. Daily employability prompts and discussions began each class period, followed by movement into groups for planning purposes.

Materials for experimental group two included children's books with a yoga theme, small group planning documents, the project explanation sheet, rubric, and materials to create yoga pose flashcards. Independent research was also conducted with school owned chrome books for additional teaching techniques for elementary school children. Daily employability prompts and discussions began each class period, followed by movement into groups for planning purposes.

Measures

The participants of the above experimental groups in the Early Childhood Education Pathway completed sections two and four of the Twenty-First Century Workforce Soft Skills Assessment (Mitchel & Skinner, 2018). Section two required the responder to rate the level of importance of each employability skill from six (extremely important) to one (not important at all). Section four used the same scale to rate the importance of integration of each skill into a transferable employment setting. These sections were used independent of the entire instrument in order to have direct application to this study. The Cronbach's Alpha for section two, Importance of Soft Skills, is .87. The Cronbach's Alpha for section four, Integration, is .88. This provided evidence of reliability for this measurement and can be found under Appendix A.

The participants of this study also evaluated their perceived employability skill set by taking the Youth Teamwork Skills Survey (Nelson, 2018) as a pretest. This survey contained an imaginary teamwork scenario to consider while answering the 28 survey questions. Students rated their level of comfort, ease, and the likelihood of using each skill on a scale from one (needs work) to four (great ability). Employability skills were separated into five factors: communication related to sharing new ideas (coefficient alpha .87), communications when responding to a teammate's ideas (coefficient alpha .89), confidently sharing new research findings (coefficient alpha .85), discussing difficult or controversial views (coefficient alpha .89), and focused listening skills (coefficient alpha .78). The coefficient alpha for the Youth Teamwork Skills Survey (Nelson, 2018) ranges from .78 to .89. This provides evidence of reliability for this measurement and can be found under Appendix B.

Procedures

Experimental Group One - Knowledge of Natural and Human Systems and Inquiry and Decision Making

Understanding the impact that the human race has on the environment and the environment's impact on the human race is best accomplished with environmental literacy strategies based in sustainability. Experimental group one's project-based employability lesson was to research and plan a vegetable garden for a local preschool. Employability skills were taught in cooperative groups to encourage communication and decision making. This goal along with working to increase the usable food supply, teaching youth to do the same and creating sustainable resources, aligned well with the knowledge of natural and human systems and inquiry and decision-making skills.

Experimental group one conducted their project-based employability lesson by researching and planning the layout and seasonal plant selections for their garden. They used the school resource of Chromebooks for research. This project encouraged employability skills by using the inquiry and decision-making strategy within environmental literacy.

Experimental Group Two-Action Skills and Personal Responsibility

Action skills in this study described educational practices based in body movement. Experimental group two conducted their project-based employability lesson around the practice of teaching preschool yoga. The high school students researched the connection between movement and stress relief while practicing the poses in the classroom. Planning lessons and creating printed visuals and in-class practice of the yoga poses provided the "action" in this study.

The high school students held a Zoom yoga class with children in a nearby elementary school. As the high school students showed each pose in our media center, the elementary school children followed suit in their own media center. Personal responsibility was best shown in the combination of movement and the intentional betterment of the mental and physical health of all students involved. This lesson objective was well suited to the combined environmental literacy strategy of action skills and personal responsibility.

Results

The first research question investigated which combination of environmental literacy strategies had the most impact on a high school student's perceived importance of employability skills. To answer this question, an ANVOCA was conducted with the post-soft skills assessment as the dependent variable and the pre-soft skills assessment as the covariate. There was no significant difference in the perceived importance of soft skills between groups, $F(1, 52) = .001$, $p = .973$. There was, however, a significant difference in the perceived importance to cover soft skills in the high school curriculum, with experimental group two reporting a greater importance in including those soft skills in the high school curriculum, $F(1, 52) = 4.37$, $p = .041$. These results can be viewed in Table 1 and Table 2.

Table 1. Descriptive Statistics: PostCurriculum

Group	Mean	Std. Deviation	N
1.00	5.1704	.58429	27
2.00	5.3143	. 90583	28
Total	5.2436	. 76152	55

Table 2. Tests of Between-Subjects Effects Dependent Variable: PostCurriculum

Type III Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	19.396	2	9.698	42.309	.000	.619
Intercept	.130	1	.130	.569	.454	.011
PreCurriculum	19.111	1	19.111	83.376	.000	.616
Group	1.002	1	1.002	4.373	.041	.078
Error	11.919	52	.229			
Total	1543.580	55				
Corrected Total	31.315	54				

The second research question focused on which combination of environmental literacy strategies had the most impact on a high school student's perceived employability skill set. To measure this, an ANCOVA was conducted with the post-teamwork survey as the dependent variable, with the teamwork pretest as the covariate. There were five constructs within this survey: communication related to sharing new ideas, $F(1, 52) = 1.05$, $p = .310$, communications when responding to a teammate's ideas, $F(1, 52) = 1.17$, $p = .284$, confidently sharing new research findings, $F(1, 52) = 1.50$, $p = .225$, discussing difficult or controversial views, $F(1, 52) = 1.78$, $p = 1.88$, and focused listening skills, $F(1, 52) = 6.41$, $p = .014$. Of the five constructs, four did not show a significant difference between groups. The fifth construct, focused on listening skills, did however show a significant difference, with experimental group two reporting that listening skills were more important in the employability skillset. These results can be viewed in Table 3 and Table 4.

Table 3. Descriptive Statistics, Dependent Variable: PostListening

Group	Mean	Std. Deviation	N
1.00	2.7037	.75845	27
2.00	2.9764	.91152	28
Total	2.8425	.84341	55

Table 4. Tests of Between-Subjects Effects, Dependent Variable: PostListening

Type III Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	13.156	2	6.578	13.544	.000	.343
Intercept	8.199	1	8.199	16.881	.000	.245
PreCurriculum	12.134	1	12.134	24.983	.000	.325

Type III Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	3.112	1	3.112	6.408	.014	.110
Error	11.919	52	.229			
Total	482.816	55				
Corrected Total	38.412	54				

The third research question was to determine if there was a relationship between a high school student's perceived importance of employability skills and their perceived employability skill set. To answer this question, bivariate Pearson correlations were run. All relationships were significant at the .05 level. Students who reported high levels in perceived importance of soft skills also ranked high in the estimation of their own soft skills set. These results can be viewed in Tables 5 and 6.

Table 5. Descriptive Statistics

Group	Mean	Std. Deviation	N
PostSoftSkills	5.3155	.74582	55
PostCurriculum	5.2436	.76152	55
PostShaaringResearch	2.8247	.79145	55
PostRespondingToIdeas	2.7940	.81985	55
PostSharingControversialIdeas	2.3995	.80317	55

Table 6. Correlations

		SoftSkills	Curric.	Sharing New Research	Respond Ideas	Sharing Controv. Ideas	Sharing Own Ideas	Listening
SoftSkills	Pearson Correlation	1	.832**	.512**	.456**	.318*	.521**	.492**
	Sig. (2-tailed)		.000	.000	.000	.018	.000	.000
	N	55	55	55	55	55	55	55
Curriculum	Pearson Correlation	.832**	1	.487**	.391**	.323*	.465**	.473**
	Sig. (2-tailed)	.000		.000	.003	.016	.000	.000
	N	55	55	55	55	55	55	55
Sharing	Pearson Correlation	.512**	.487**	1	.863**	.730**	.726**	.758**
New Research	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	55	55	55	55	55	55	55
Responding	Pearson Correlation	.456**	.391**	.863**	1	.715**	.685**	.678**
to Ideas	Sig. (2-tailed)	.000	.003	.000		.000	.000	.000
	N	55	55	55	55	55	55	55
Sharing	Pearson Correlation	.318*	.323*	.730**	.715**	1	.624**	.659**
Controversial	Sig. (2-tailed)	.018	.016	.000	.000		.000	.000
Ideas	N	55	55	55	55	55	55	55

		SoftSkills	Curric.	Sharing New Research	Respond Ideas	Sharing Controv. Ideas	Sharing Own Ideas	Listening
Sharing Own Ideas	Pearson Correlation	.521**	.465**	.726**	.685**	.624**	1	.793**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	55	55	55	55	55	55	55
Listening	Pearson Correlation	.492**	.473**	.758**	.678**	.659**	.793**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	55	55	55	55	55	55	55

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Discussion and Conclusion

Given the current research in the field, this study sought to further explore the use of environmental literacy strategies as vehicles for teaching employability skills at the high school level. The ability to successfully engage in group work is an increasingly important employability skill. Students in two experimental groups worked in this manner to explore ideas behind our three research questions.

The first research question of this study investigated which combination of environmental literacy strategies had the most impact on a high school student's perceived importance of employability skills. Experimental group one combined action skills and personal responsibility due to the shared focus on health, in a group project. Experimental group two utilized the combination of natural and human systems with inquiry and decision-making skills in a group project to encourage focused research in this area of science. The difference in perceived soft skill importance between the two experimental groups was not significant. These results are not consistent with the research of Ernst et al. (2004) whose treatment group, which used environment-based programs to measure the disposition of critical thinking skills, significantly outperformed the control group on post-tests. The research focus of Ernst et al. (2004) was limited to critical thinking, which is a specific soft skill. This raises the question of whether the narrowed focus of singular soft skills in isolation contributed to the difference in outcome. There was, however, a significant increase in the perceived importance of these skills to be taught in the high school curriculum, among the participants in experimental group two. This suggests that during the group learning experience within this group, the students saw a value in the skills they were learning and the need to include them in future curriculum. Although both experimental groups represented students from grades 9 to12, group two was made up of students in the first level of the Early Childhood Education Pathway. Employability skills are covered at all three levels. Because this was their first exposure to the concept of employability skills, this may explain the significant increase in the perceived importance of these skills to be taught in high school.

The second research question focused on which combination of environmental literacy strategies had the most impact on a high school student's perceived employability skill set. The Teamwork Survey used to explore this research question covered five constructs: communication related to sharing new ideas, communications when

responding to a teammate's ideas, confidently sharing new research findings, discussing difficult or controversial views, and focused listening skills. Of the five constructs, focused listening in experimental group two saw a significant increase from pre to post. These results are not consistent to the findings of Ginting et al. (2020) whose treatment group, which used team-building games to instill employability skills, failed to see a significant increase in any targeted employability skill. This suggests the effectiveness of teamwork used to accomplish a tangible class project over teamwork used in a game setting in affecting employability skills.

In congruence with the research of Paisley et al. (2008) whose treatment group did not see a significant increase in communication skills after using environmental literacy strategies, this study's pre and posttest of general communication did not see a significant improvement. This result would suggest that this combination of strategies was most effective in the perceived importance of active listening skills. This increase could be attributed to prior knowledge and interest. The Early Childhood 1 students had experience gardening in the fall, in the school's E.C.E. sensory/vegetable garden. This was a new experience for many in this group and they were excited to have the extended opportunity of gardening once more. The increase in active listening skills could be the result of an eagerness to learn.

The third research question was to find if there was a relationship between a high school student's perceived importance of employability skills and their perceived employability skill set. The Pearson correlation showed a significant relationship between these elements which suggests that students seek to cultivate the employability skills that they deem most important. In contrasting result in a study by Stott et al. (2014) college students seeking a major in outdoor related studies were participants in determining the level of perceived employability skills developed during their college program and the perceived usefulness of these skills in terms of future employment. Leadership and communication skills were the top two perceived skills gained during the educational program; however, practical experience and professional qualifications were qualities found as most useful in finding employment. The qualities that were most important in finding a job after graduation were not the qualities they focused on during their college career. In this example the employability skills that the students gained in the program did not match what they thought was most useful in gaining employment. The students in this study did not seek to cultivate the employability skills that they deemed most important.

Limitations

This study had several weaknesses. First, because it was only conducted in one teacher's classroom, we must be cautious in generalizing the results. Second, this study took place during the Covid-19 pandemic. Students were coming in and out of quarantine and missing instruction at key points, resulting in the small usable sample size of 55 students. Third, the intervention period of this study was relatively short at only 7 weeks.

An additional factor that impacted this study is the fact that during the second week of the intervention, the instructor was diagnosed with the pandemic virus. At that point bi-weekly reflections were assigned to monitor the progress of the two experimental groups, as they completed the projects without direct instructor input. While students had access to learning materials through the school's on-line Canvas platform, the uncertainty of the

health crisis at school and in their own homes had unmeasurable effects on their learning progress.

Conclusions and Implications for Future Research

Researchers have recently raised two key points regarding the quality and efficacy of instruction in public education (Cuevas, et al., 2023). One is whether the most effective instructional strategies are being regularly employed in classrooms on a daily basis. The next is whether teachers have sufficient understanding of the cognitive science on learning to allow them to make sound judgments in choosing the best research-based strategies to guide their daily lessons. To that end, empirical research has been conducted in various content areas, from social studies (Dalton & Cuevas, 2019), to English language arts (Hendy & Cuevas, 2020), and mathematics (Hughes & Cuevas, 2020; Skinner & Cuevas, 2023) across various age groups to identify evidence for methods that will most benefit student learning. It is also important for teachers to have open-minded views about including students of varying levels in a wide range of different types of instruction to fully serve all student populations (Neal & Cuevas, 2016). The current study is one additional step in that process.

Career and technology teachers continue to search for the best way to instill employability skills in their students. Given the College and Career Readiness Performance Index, (C.C.R.P.I.) that rates a high school's ability to prepare their students for life after high school, there is an urgency to achieve this goal. Meighan and Rubenstein (2018) confirm the connection between CTAE teachers and environmental literacy with their view that there is an important need for Career, Technical and Agricultural Educators (CTAE) to use environment-based education as outdoor laboratory experiences. CTAE pathway curriculums lend themselves well to outdoor education and environmental literacy. Further research is needed to identify effective ways to incorporate these elements into a high school classroom.

Suggestions for further research would include the need for larger and more diverse sample sizes, as well as a longer period of time in which to implement instructional interventions. Along with extended time and a more diverse participant pool, further research could also explore whether environmental literacy strategies are more or less effective with students in the career and technology field as compared to other disciplines.

This study includes a brief instructional lens on environmental literacy and its effect on the employability skills of high school students. The results suggest that the combined environmental literacy strategies of natural and human systems and inquiry and decision-making skills result in a significant increase in the perceived need to cover soft skills in the high school curriculum. This combination also suggests the need to increase active listening skills and revealed a positive correlation between a high school students' perceived importance of employability skills and their perceived employability skill set. This information can be built upon in future research to hone best practices for instilling employability skills in high school students.

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Appendix A

Section 2: Importance of Soft Skills

In your opinion, how important are the following soft skills in AFFECTING SUCCESS IN THE WORKFORCE? Please circle the appropriate number.

8) General Communication (the ability to communicate with clients, colleagues, and the general public)

Not Important					Extremely Important
1	2	3	4	5	6

9) Oral Communication (the ability to present information to a group or speak in public)

Not Important					Extremely Important
1	2	3	4	5	6

10) Written Communication (the ability to write business correspondence like memos, letters, and reports using correct grammar and format)

Not Important					Extremely Important
1	2	3	4	5	6

11) General Ethics (the ability to do "the right thing" in business situations)

Not Important					Extremely Important
1	2	3	4	5	6

12) Diversity (the ability to work with and appreciate differences in others)

Not Important					Extremely Important
1	2	3	4	5	6

13) Teamwork (the ability to work effectively with a group in order to achieve team goals)

Not Important					Extremely Important
1	2	3	4	5	6

14) Time Management/Organization (the ability to effectively manage time and complete tasks within a specified time frame)

Not Important					Extremely Important
1	2	3	4	5	6

15) Problem Solving/Critical Thinking (the ability to find effective solutions to problems)

Not Important					Extremely Important
1	2	3	4	5	6

Section 4: Integration

In YOUR OPINION, how important IS THE INTEGRATION of the following skills into the business/marketing education curriculum? ***Please circle the number that corresponds with your opinion.***

	Not Important					**Extremely Important**
52) General Communication	**1**	**2**	**3**	**4**	**5**	**6**
53) Oral Communication	**1**	**2**	**3**	**4**	**5**	**6**
54) Written Communication	**1**	**2**	**3**	**4**	**5**	**6**
55) General Ethics	**1**	**2**	**3**	**4**	**5**	**6**
56) Diversity	**1**	**2**	**3**	**4**	**5**	**6**
57) Teamwork	**1**	**2**	**3**	**4**	**5**	**6**
58) Time Management/Organization	**1**	**2**	**3**	**4**	**5**	**6**
59) Problem Solving/Critical Thinking	**1**	**2**	**3**	**4**	**5**	**6**
60) Customer Service	**1**	**2**	**3**	**4**	**5**	**6**
61) Leadership	**1**	**2**	**3**	**4**	**5**	**6**
62) Business Etiquette	**1**	**2**	**3**	**4**	**5**	**6**

Appendix B

Teamwork Scenario

Imagine you are in the [program name] and have just been placed in a team to complete a [project/challenge] together. There are two other youth on the team, one girl and one boy, so there are three of you total. All three of you are in [middle/high] school. You met your teammates for the first time today. Before working on your [project/challenge] together, you all participated in an activity where everyone in the program shared their name and five interesting facts about themselves.

Your team reviews the details of the [project/challenge] and makes sure everyone on the team understands what they need to do. Then team members share with each other what they already know about the [project/challenge] topic. As a team, you decide that you all still need to learn more about the topic. The team members split up to find information by searching online, reading books or magazines, or looking at information provided by your program. After everyone has done some research, the team comes back together, and team members explain what they learned. Your team then starts to share and discuss ideas about what they might need to do to complete the [project/challenge]. The team decides what tasks need to be done, who will work on which tasks, and then gets to work. Team members work on tasks both together and alone. Completing the final [project/challenge] is dependent on everyone's contributions so team members are constantly checking in with each other to make sure the team is on track to reach their goal.

Throughout the survey, you'll be asked to imagine yourself doing lots of different things as a member of the imaginary team described in the Teamwork Scenario. Please answer the survey questions openly and honestly about what you might do as part of this team. There are no right or wrong answers to the questions and you aren't graded on them.

On the following pages, you'll see a statement followed by three questions. Imagine yourself doing what the statement says as a member of the imaginary team. You will be asked how good or bad you think you might be at doing what the statement says, how comfortable or uncomfortable you might be doing it, and how likely or unlikely it would be that you would actually do it on the imaginary team. Remember, the imaginary team is only you and two other people in your program.

The first thing for you to think about doing on the imaginary team is:

Sharing information you found about the topic of the [project/challenge] **that none of your teammates have mentioned yet.**

1) How good or bad do you think you would be at doing this on the imaginary team?
   - ☐ Bad at this
   - ☐ Kind of bad at this
   - ☐ Kind of good at this
   - ☐ Good at this

2) How comfortable or uncomfortable do you think you would be doing this on the imaginary team?
   - ☐ Uncomfortable doing this
   - ☐ Kind of uncomfortable doing this
   - ☐ Kind of comfortable doing this
   - ☐ Comfortable doing this

3) How likely or unlikely would you be to actually do this with the imaginary team?
   - ☐ Unlikely to do this
   - ☐ Kind of unlikely to do this
   - ☐ Kind of likely to do this
   - ☐ Likely to do this

For the following statements, imagine you are sharing ideas about the [project/challenge] with your two teammates in the imaginary team.

The next thing for you to think about doing on the imaginary team is:

Explaining an idea you have to the team.

4) How good or bad do you think you would be at doing this on the imaginary team?
   - ☐ Bad at this
   - ☐ Kind of bad at this
   - ☐ Kind of good at this
   - ☐ Good at this

5) How comfortable or uncomfortable do you think you would be doing this on the imaginary team?
   - ☐ Uncomfortable doing this
   - ☐ Kind of uncomfortable doing this
   - ☐ Kind of comfortable doing this
   - ☐ Comfortable doing this

6) How likely or unlikely would you be to actually do this with the imaginary team?
   - ☐ Unlikely to do this
   - ☐ Kind of unlikely to do this
   - ☐ Kind of likely to do this
   - ☐ Likely to do this

Asking your teammates if they understand your idea.

7) How good or bad do you think you would be at doing this on the imaginary team?
- ☐ Bad at this
- ☐ Kind of bad at this
- ☐ Kind of good at this
- ☐ Good at this

8) How comfortable or uncomfortable do you think you would be doing this on the imaginary team?
- ☐ Uncomfortable doing this
- ☐ Kind of uncomfortable doing this
- ☐ Kind of comfortable doing this
- ☐ Comfortable doing this

9) How likely or unlikely would you be to actually do this with the imaginary team?
- ☐ Unlikely to do this
- ☐ Kind of unlikely to do this
- ☐ Kind of likely to do this
- ☐ Likely to do this

Encouraging your teammates to ask you questions about your idea to make sure they understand it correctly.[1]

10) How good or bad do you think you would be at doing this on the imaginary team?
- ☐ Bad at this
- ☐ Kind of bad at this
- ☐ Kind of good at this
- ☐ Good at this

11) How comfortable or uncomfortable do you think you would be doing this on the imaginary team?
- ☐ Uncomfortable doing this
- ☐ Kind of uncomfortable doing this
- ☐ Kind of comfortable doing this
- ☐ Comfortable doing this

12) How likely or unlikely would you be to actually do this with the imaginary team?
- ☐ Unlikely to do this
- ☐ Kind of unlikely to do this
- ☐ Kind of likely to do this
- ☐ Likely to do this

Sharing an idea even if you think your team might dislike it.

13) How good or bad do you think you would be at doing this on the imaginary team?
- ☐ Bad at this
- ☐ Kind of bad at this
- ☐ Kind of good at this
- ☐ Good at this

14) How comfortable or uncomfortable do you think you would be doing this on the imaginary team?
- ☐ Uncomfortable doing this
- ☐ Kind of uncomfortable doing this
- ☐ Kind of comfortable doing this
- ☐ Comfortable doing this

15) How likely or unlikely would you be to actually do this with the imaginary team?
- ☐ Unlikely to do this
- ☐ Kind of unlikely to do this
- ☐ Kind of likely to do this
- ☐ Likely to do this

Bringing up an idea for the [project/challenge] that is different from the idea the team just finished discussing.

16) How good or bad do you think you would be at doing this on the imaginary team?
- ☐ Bad at this
- ☐ Kind of bad at this
- ☐ Kind of good at this
- ☐ Good at this

17) How comfortable or uncomfortable do you think you would be doing this on the imaginary team?
- ☐ Uncomfortable doing this
- ☐ Kind of uncomfortable doing this
- ☐ Kind of comfortable doing this
- ☐ Comfortable doing this

18) How likely or unlikely would you be to actually do this with the imaginary team?
- ☐ Unlikely to do this
- ☐ Kind of unlikely to do this
- ☐ Kind of likely to do this
- ☐ Likely to do this

Now you are going to imagine that your teammates are sharing ideas with the imaginary team about the [project/challenge]. Remember, the imaginary team is you and two other people.
The next thing for you to think about doing on the imaginary team is:

Asking your teammate to explain their idea in a different way so you can understand it better.

19) How good or bad do you think you would be at doing this on the imaginary team?
- ☐ Bad at this
- ☐ Kind of bad at this
- ☐ Kind of good at this
- ☐ Good at this

20) How comfortable or uncomfortable do you think you would be doing this on the imaginary team?
- ☐ Uncomfortable doing this
- ☐ Kind of uncomfortable doing this
- ☐ Kind of comfortable doing this
- ☐ Comfortable doing this

21) How likely or unlikely would you be to actually do this with the imaginary team?
- ☐ Unlikely to do this
- ☐ Kind of unlikely to do this
- ☐ Kind of likely to do this
- ☐ Likely to do this

Asking your teammate to repeat their idea because you are unsure if you understood it correctly.[2]

22) How good or bad do you think you would be at doing this on the imaginary team?
- ☐ Bad at this
- ☐ Kind of bad at this
- ☐ Kind of good at this
- ☐ Good at this

23) How comfortable or uncomfortable do you think you would be doing this on the imaginary team?
- ☐ Uncomfortable doing this
- ☐ Kind of uncomfortable doing this
- ☐ Kind of comfortable doing this
- ☐ Comfortable doing this

24) How likely or unlikely would you be to actually do this with the imaginary team?
- ☐ Unlikely to do this
- ☐ Kind of unlikely to do this
- ☐ Kind of likely to do this
- ☐ Likely to do this

You are almost done! This next set of statements are about a variety of things that might happen while your imaginary team is working together on the [project/challenge]. Think about how easy or hard it would be for you to do what each statement says as part of this team.

How easy or hard would it be for you to do each of these things with the imaginary team?

	Hard to do this	Kind of hard to do this	Kind of easy to do this	Easy to do this
25) Listen closely to a teammate share an idea instead of focusing on what you are going to say to the team about your own idea.	☐	☐	☐	☐
26) Stay focused on the conversation your team is having instead of letting your mind wander.	☐	☐	☐	☐
27) Fully focus on what a teammate is saying instead of thinking about what you are going to say next to the team.	☐	☐	☐	☐
28) Stay focused on what a teammate is saying when you would rather be working on your part of the team [project/challenge].	☐	☐	☐	☐