



Understanding, Measuring and Cultivating Hope about Climate Change among High School Students

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Introduction

Hope has been identified as one of the important learning outcomes for education and Extension programs.^{1,2} People who are hopeful are more likely to be actively engaged in problem solving.³ We explored whether climate change education can increase hopefulness among high school students.



Photos by Jessica Ireland

According to Hope Theory, hope is a thinking process in which people exhibit agency thinking and pathways thinking. Agency thinking refers to the appraisal that one is capable of executing the means to attain certain goals, and pathways thinking is the appraisal that one is capable of generating those means.⁴

Designing Instructional Activities to Cultivate Hope

We applied Bandura's Self-efficacy Theory⁵ and Hope Theory⁴ in designing instructional activities to help students set reasonable goals, develop pathways thinking, and utilize their agency thinking in solving problems caused by climate change. The following four strategies were used:

1. Seeing Connections
2. Others Care
3. Other Are Doing Things
4. Things I Can Do



Photo by Annie Oxart

Research Questions

This study explored the relationship between knowledge about climate change and hope among high school students with the following questions:

1. Can climate change education programs nurture hope?
2. Does an increase in knowledge decrease hopefulness?
3. Does forest proximity affect hopefulness when learning about forests and climate change?

Procedures and Participants

We sent an invitation through several email lists to recruit secondary teachers from the southeastern United States. An online resource was offered to help teachers use the activities and conduct the evaluation. We asked teachers to administer the student pre-and post-survey within a week before and after they implemented activities.

Twenty-four pilot testers completed their activities and returned student data. High school students (n=924) completed the pre- and post-surveys.

- They were equally divided by sex;
- About 57% were 11th and 12th graders and 43% were 9th and 10th graders.
- The majority were white (70%) and non-Hispanic (84%).

Instruments:

- Knowledge-based questions
- Climate change hope scale
- Decision-makings skills about consumption scale
- Systems thinking skills
- Demographic questions

Data Analysis and Results

Student Learning. We used dependent t-tests to compare student pre- and post-tests in terms of knowledge gain, hope change, and skills building. Data suggest that:

- Knowledge increased significantly among package 1, 3, and 4.
- Hope concerning climate change increased significantly among all four packages.
- Decision-making skills about consumption and systems thinking skills also significantly increased among students who received the packages that featured these skills (Table 1).

Table 1. Dependent T-tests Results from Students' Pre- and Post-tests

Learning Outcome	Pre-test Mean (n)	Post-test Mean (n)	T (one-tailed) (df)
Knowledge			
Package 1: Life cycle assessment (LCA) and externalities	2.83 (114)	4.25 (114)	2.98 (113)***
Package 2: climate science, modeling, and forests management	3.64 (84)	4.15 (84)	0.9 (83)
Package 3: carbon cycle and the role of forests in mitigating climate change	4.97 (171)	6.98 (171)	4.48 (170)***
Package 4: climate science, LCA, and the role of forests in mitigating climate change	5.41 (178)	6.14 (178)	2.04 (177)***
Hope			
Package 1	58.28 (188)	60.37 (188)	1.56 (187)**
Package 2	56.87 (239)	58.46 (239)	1.29 (238)*
Package 3	56.65 (227)	58.40 (227)	1.43 (226)*
Package 4	62.03 (231)	64.06 (231)	1.86 (230)**
System thinking skills			
Package 4	2.21 (194)	2.40 (194)	1.07 (193)*
Decision making skills about consumption			
Package 1	29.24 (174)	30.24 (174)	1.08 (173)*

Data Analysis and Results

Knowledge, Hope, and Proximity to Forests. Multiple linear regression analysis were used to determine whether or not learning about forests and climate change significantly affected change in hopefulness and whether proximity to forests affects hope among high school students.

Table 2. Multiple Regression Results on Knowledge, Hope, and Proximity

Package		B	SE B	β	t
1	Constant	3.49	2.31	--	1.51
	PostK-PreK	1.03	.34	.29	3.06**
	Gender	-.71	1.72	-.04	-.41
	Grade level	-2.64	2.10	-.14	-1.23
	Forest Proximity	-.01	.01	-.16	-1.45
4	Constant	4.93	2.21	--	2.23*
	PostK-PreK	.98	.26	.28	3.82***
	Gender	.78	1.22	.05	.64
	Grade level	-2.88	2.14	-.10	-1.3
	Forest Proximity	-.06	.03	-.13	-1.7

*p<.05. **p<.01. ***p<.001.

The results of the regression indicated (Table 2):

- The change in knowledge was a significant predictor in affecting change in hopefulness in package 1 and 4 when controlling for gender and grade level.
- As score in knowledge increases by one unit in package 1, hope increases by 1.03 units in package 1 and .98 units in package 4.
- Proximity to forests did not significantly affect change in hopefulness across any of the packages.
- The association between knowledge and hope depends on the type of information.

Discussion

This study suggests that hope about climate change can be nurtured by environmental educational materials. An increase in knowledge about climate change can be accompanied by an increase in hopefulness, and these changes are not a function of gender and grade level. However, we believe the association between knowledge and hope depends on the type of information students receive. If the knowledge empathizes the things students can do and highlights connections between today's decision and tomorrow's impacts, it is more likely that an increase in knowledge will lead to an increase in hopefulness. Proximity to working forests does not affect hope, suggesting that students can understand and learn about concepts and both urban and rural students can gain hope about the role of forests in mitigating climate change.

References

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