

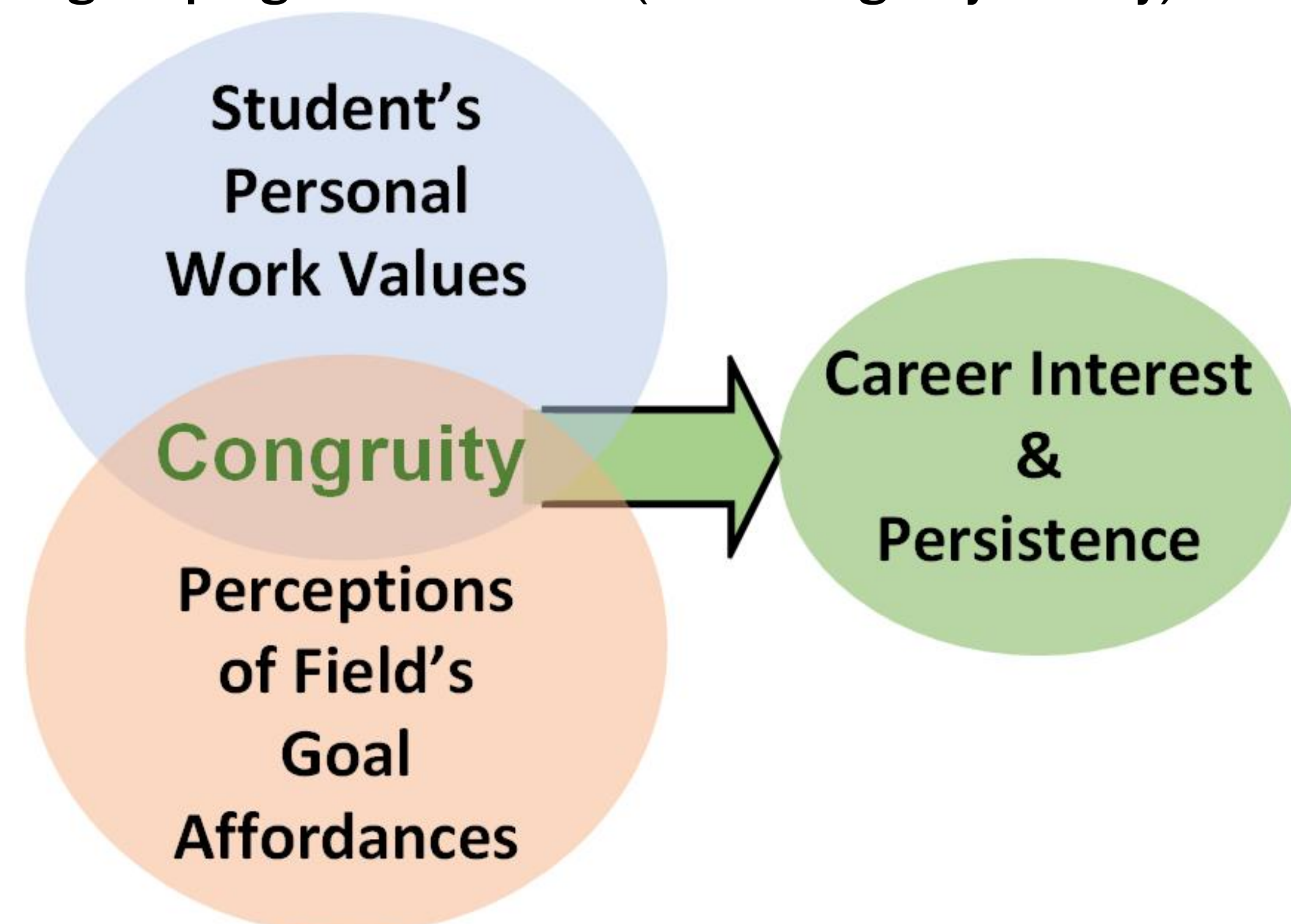
Abstract & Motivation

This poster presents the results of a project conducted at Montana State University (MSU) to measure the prosocial affordance beliefs about the electrical engineering (EE) profession and its effect on student motivation to persist in EE. This poster also presents the initial results of a classroom intervention where students are given a video production assignment that forces them to make connections between EE course material and its prosocial affordance.

Background & Rationale

Previous studies have indicated...

- When students hold stereotypes about a profession that match their own personal trait endorsements, their motivation to persist in that degree program increases (Goal Congruity Theory).



- Stereotypes and personal trait endorsements have been shown to fall into two categories: agency (self-oriented, wealth, prestige) and prosocial (other-oriented, working with and helping others, benefitting society).
- A student can certainly have stereotypes and trait endorsements that are both agentic and prosocial; however, prior studies have shown that the prosocial component has a higher impact on student motivation (Diekmann, 2016) compared to agency.

Prior interventions in the sciences have shown...

- Writing assignments that force the students to make connections between the material and their own prosocial traits strengthens their stereotype about the career that it is prosocial in nature.
- As students' stereotypes about a profession being one that fulfills prosocial goals strengthens, their motivation to persist increases.

Research Design

Survey to Measure Student Goals & Motivation to Persist

Year 1: Give survey w/ existing instruments that measure:

- agency and prosocial stereotypes about EE
- agency and prosocial trait endorsements
- experience of interest in EE
- persistence intentions in EE

Year 2: Pilot survey in introductory EE course (n=77)

- analyze data for differences in prosocial vs. agency beliefs
- test mediating variables: interest & persistence



Classroom Intervention to Highlight Prosocial Value of EE

Year 3: "Public Communications Video Assignment"

- students create a 2-3 minute video discussing a EE topic covered in class in their own words.
- the control group simple describes the technical details of the topic.
- the experiment group describes how the topic helps others, benefits society, and affords opportunities to work with others (forcing the student to think about the prosocial value of EE).
- when students upload video, they take a survey on the video creation experience
- when students upload video, they also take a survey on their prosocial/agency beliefs and persistence intentions.

Year 3: Analyze data

- are there differences between the groups in prosocial stereotypes about EE?
- do increased prosocial stereotypes about EE relate to increased persistence intentions?

Implementation

- Initial survey administered to students in an introductory-level EE course (n=77) during 2017 academic year.
- Public video assignment administered in same class a year later (n=71). The class was randomly assigned to control/experiment groups. Each group received their own unique instructions on how to create the video.

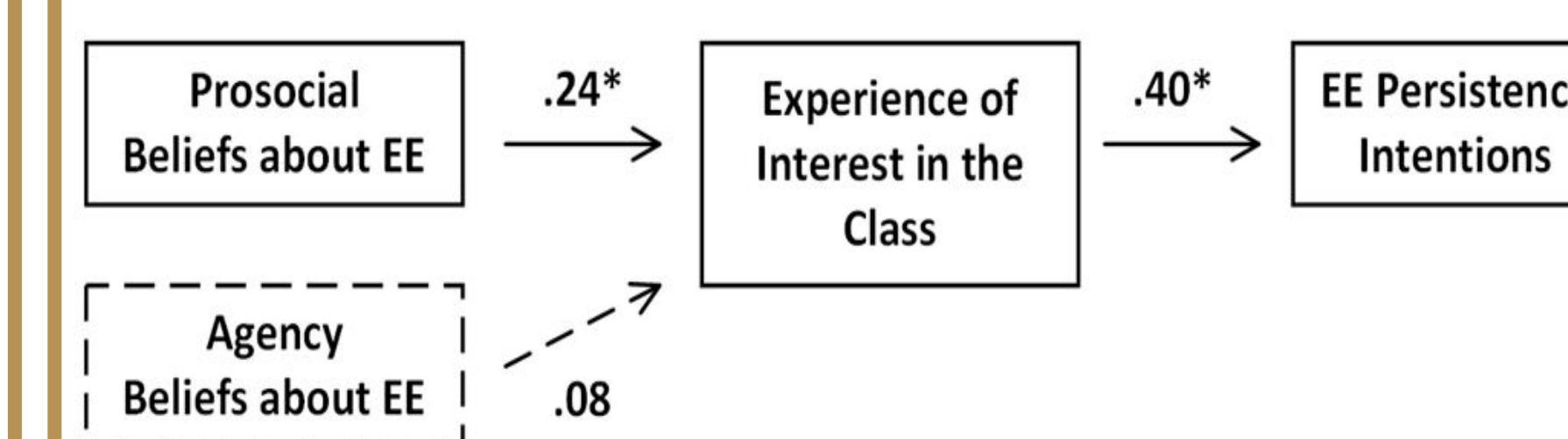
Analysis & Results (Work in Progress)

R1: Does Increased Prosocial Beliefs about EE Relate Persistence Intentions?

TABLE I
DESCRIPTIVE STATISTICS AND T-TEST VALUES FOR STUDY 1 VARIABLES

Variable	Class	n	M (SD)	Reliability (Cronbach's α) ^a	One Sample T-Test [†]
EE Agency Affordance	Novice	77	3.78 (.72)	0.84	9.63*
EE Prosocial Affordance	Novice	77	4.01 (.64)	0.87	13.96*
Experience of Interest in EE	Novice	77	3.98 (.63)	0.81	13.79*
Persistence Intentions in EE	Novice	77	4.46 (.58)	0.72	22.19*

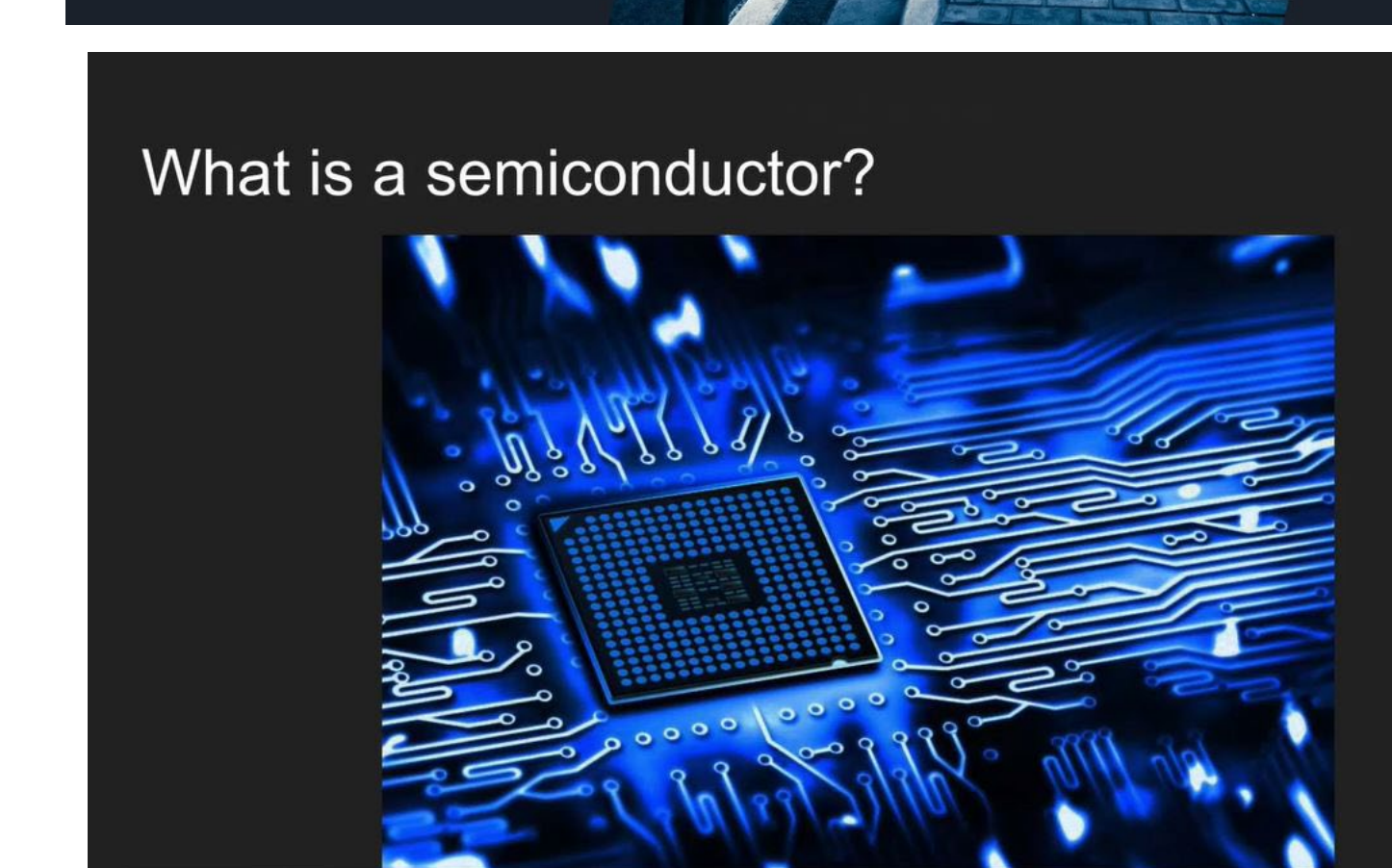
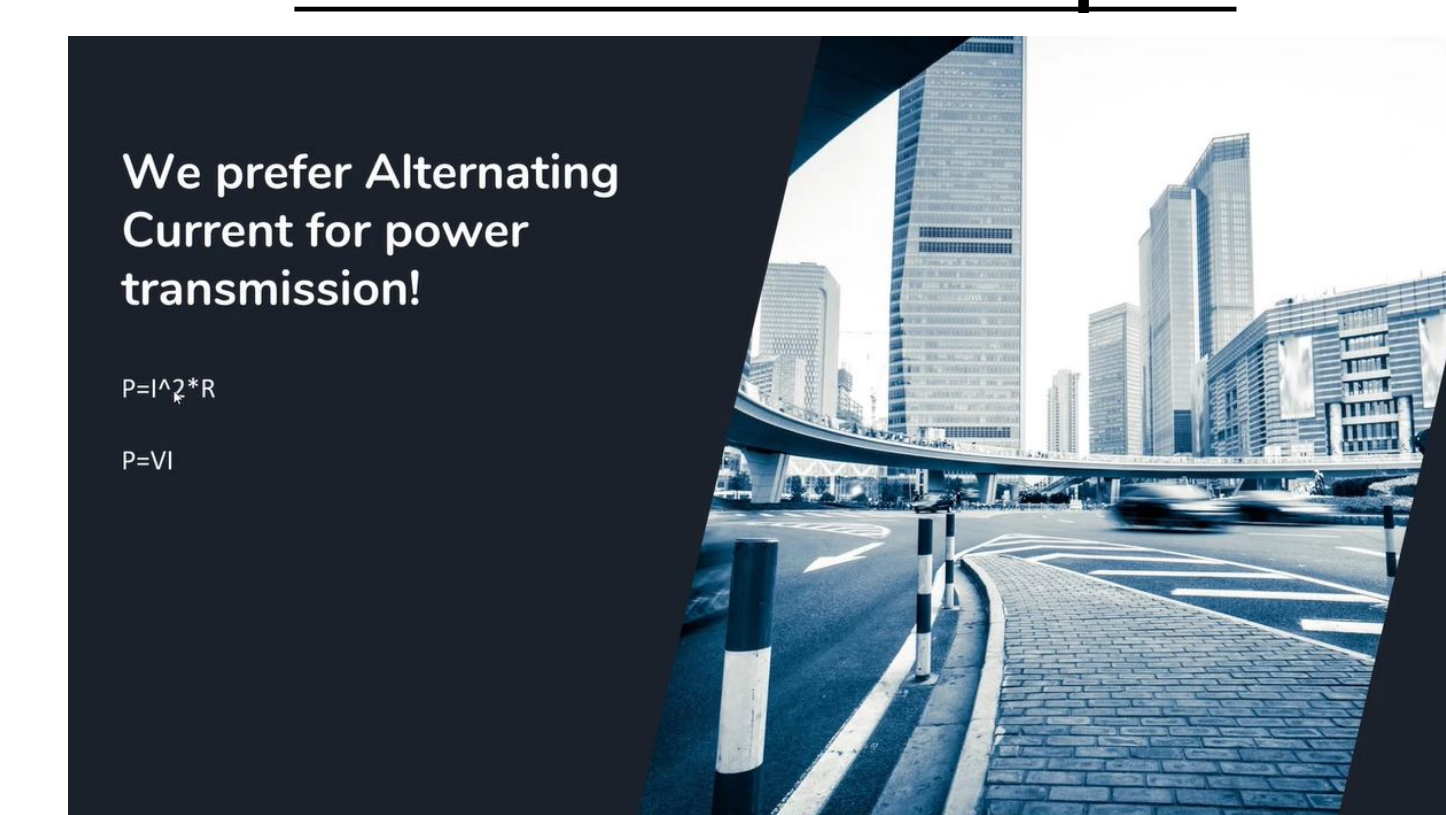
Note 1: [†] Tested value was the midpoint of the scale. Greater numbers indicate stronger endorsement.
Note 2: All items are on a 1 to 5 scale (midpoint = 3).
Note 3: ^a an $\alpha > 0.7$ is considered an acceptable level of reliability.



Process analyses for the indirect effect of prosocial beliefs on novice students' motivational experiences in electrical engineering. Numbers represent standardized regression β . Significant indirect effect (bootstrapped; 95% CI: .01 to .34).

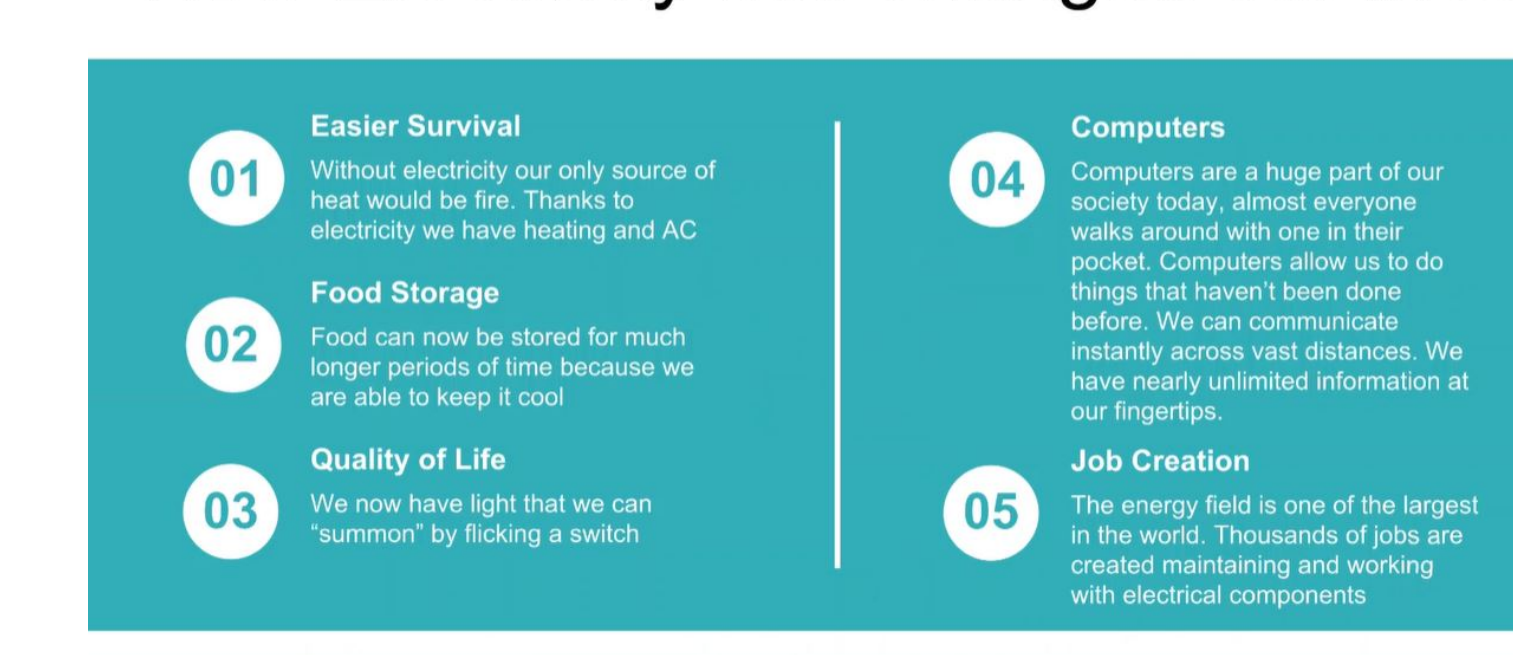
R2: Does a Prosocial Classroom Intervention Increase Prosocial Stereotypes about EE?

Control Video Examples



Experiment Video Examples

How Electricity has changed our lives



Infographic showing benefits of electricity: Easier Survival, Food Storage, Quality of Life, Computers, Job Creation.

How does this benefit society?

- Allowing people to communicate across broad regions closes the gap for friends and families, as well as companies needing to contact each other or individual workers
- Exploration, studies, and processing data is far quicker
- Surveys and political ballots are sped up to find results quicker
- Hundreds of thousands of tests can be sorted, manipulated, and categorized instantly for easier access and more accurate data
- Tasks previously unimagined like sending people to space is now accessible, thanks to computers calculating variables such as position, velocity, and acceleration faster than people can on their own

- Scores for the video creation experience (confidence, importance, involvement, and interest) were all significantly above the medium point of 3 ($p < 0.001$).
- No significant difference was seen between the control and experiment group after the classroom intervention.
- Upon a manipulation check, it was found that only 13 of the 36 (36%) in the control group followed the directions and discussed the prosocial value of EE. The rest just discussed the technological aspect of the topic. Still no difference.

Discussion

- Prosocial stereotypes about EE showed a significant indirect effect on persistence intentions when mediated through the experience of interest (agency was not significant).
- No difference was seen in field stereotypes after intervention. It is suspected that:
 - the instructions weren't clear. Of the 36% that did mention prosocial value, they only did so in passing and not as the main part of their video.

This work is based in part by support from the National Science Foundation's *Research Initiation in Engineering Formation* (PFE: RIEF) program through award number 1544147. The findings of this work are those of the author and do not necessarily reflect the views of the NSF.

