

# GROWING ACADEMIC RESILIENCE IN STUDENTS OF SCIENCE THROUGH MIMICRY OF FOREST RESILIENCE

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## ABSTRACT

For this education-based classroom research project, inspiration was drawn from the mechanisms used to transmit nutrients and information between individuals in a forest through the mycorrhizal network. Whereas forest resilience is based on speed of recovery and ability to regenerate biomass, academic resilience is based on the student's ability to recover from a setback and remain engaged in the learning process. The goal of the project was to mimic the communication network observed in forest mycelium and thus transmit information and receive feedback from students continuously, to support growth of academic resilience.

The hypothesis of this classroom research project was that in fostering communication between students and creating opportunities for communication between individuals in the classroom, overall student resilience, grit, and content understanding would increase. During the 9-week study, students communicated their level of confidence in understanding content, provided insight into misconceptions they may have been developing, and gave advice to other students to enhance understanding of the material being taught. A culminating whole-class inquiry project was used to encourage students to work together on finding the solution to a problem.

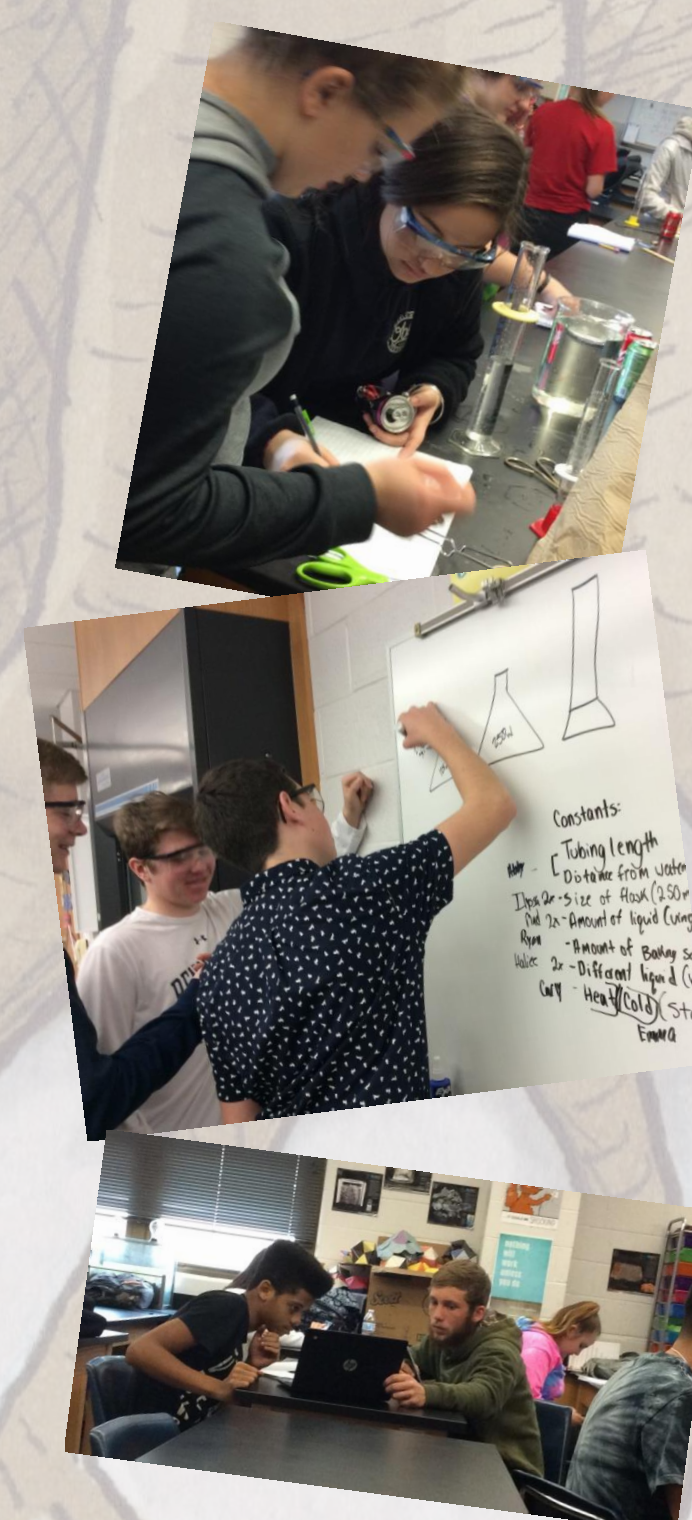
While not statistically significant, positive growth in resilience was observed in 57% of project participants. All students demonstrated a statistically similar change in resilience over the course of the project. While not statistically significant, honors-level students reported higher levels of resilience at the start of the project than those of their general-level counterparts. A statistically significant growth in grit was observed in honors students over the course of the school year. Growth of at least 20% in content understanding over the course of the project was observed in 91% of student participants.

No singular data point was determined to be a predictor of student capacity for resilience, but development and use of a regular survey process provided insight into student mindset and personal opinions. Due to student inability or unwillingness to give themselves credit, development of a resilience recognition program is recommended as part of the next phase of research to foster self-awareness of practices that exemplify resilient practices.

**SPECIAL THANKS to Perry Shirley for permission to use his image depicting the mycorrhizal network.**

## GOALS

- Develop an understanding of each student's individual as well as whole-class resilience ecosystems.
- Determine if students who are more networked build greater academic resilience., grit and content understanding.



## BIOMIMICRY

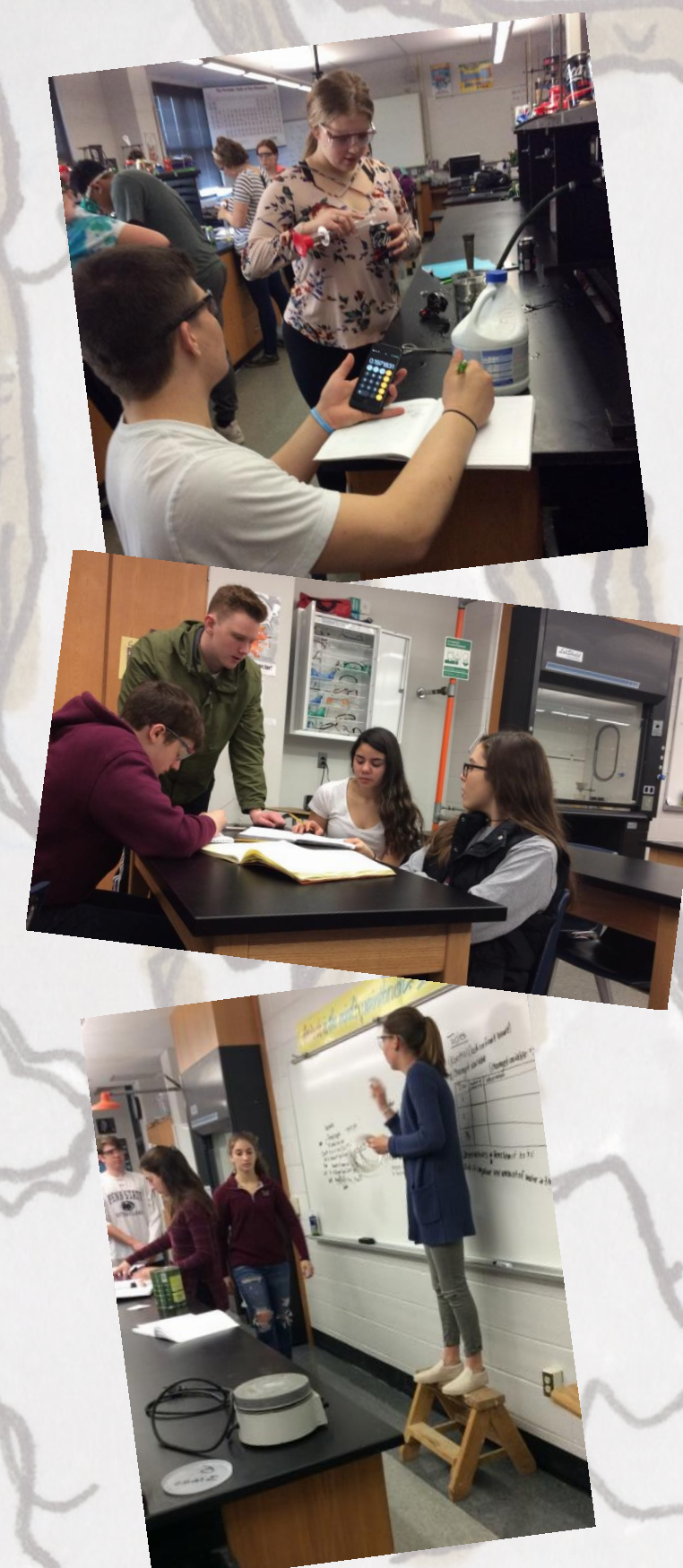
- Nature often has already developed solutions to the problems and challenges that humans face.
- The study of how forests respond and rebound from disaster was used to inspire this project's methodology.
- The ability of a forest to recover from a stress event, such as drought, fire, or nutrient deficiencies, relies on fungi transporting resources from an area of high concentration to an area of low concentration (Simard, 2012).

## METHODOLOGY

**Data Mining and Collection:** Used available data and student-reported information to determine student resilience strengths and weaknesses.

**Ecosystem Mapping:** Evaluated Degree of Student Connectedness by identifying nodes and non-nodes. Node students are characterized as highly interconnected, high content understanding and confidence, and who is willing help others.

**Pre- and Post-Study Resilience Surveys (Martin & Marsh, 2008; Wagnild & Young, 1993), Pre- and Post-Course Grit Surveys (Duckworth & Quinn, 2009), Pre- and Post-Unit Content Assessments:** Used a variety of instruments to gather data for use in calculating changes.



## DATA

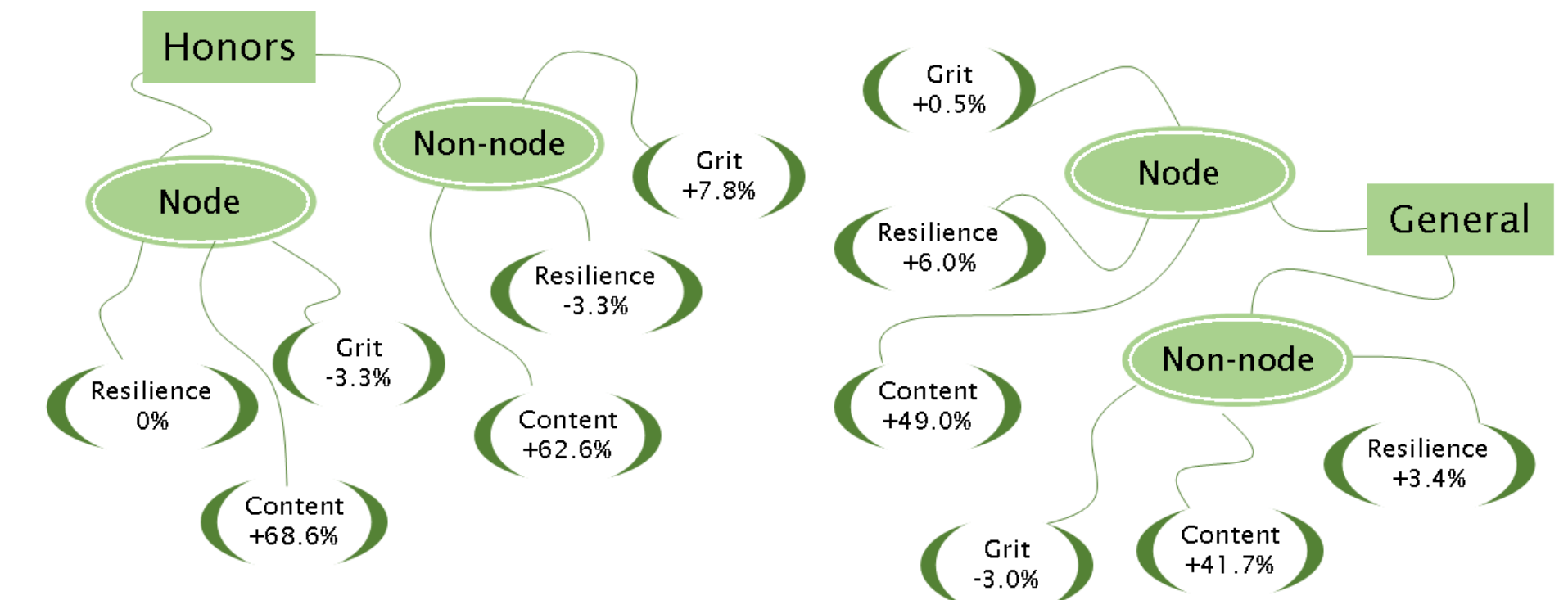


Fig. 1: Observed Percent Change in Academic Resilience, Grit and Content Understanding in Honors & General Level Students

## FINDINGS

1. Lack of resilience in the face of adversity is a serious threat to academic success.
2. While statistically significant growth in resilience was not observed in any population, growth in both grit and content understanding was significantly higher in honors-level learners compared to general-level learners (Fig.1).
3. Understanding and being sensitive to the connections within the classroom helps the teacher to modify classroom practices, be sensitive to student tendencies, and to keep an eye out for distress signals (Fig. 2).
4. Development of a recognition program in the future that clearly provides examples of resilience in action could be a way to teach students more explicitly about what resilience looks like. This intervention may help to promote greater self-awareness and appreciation of resilience growth.

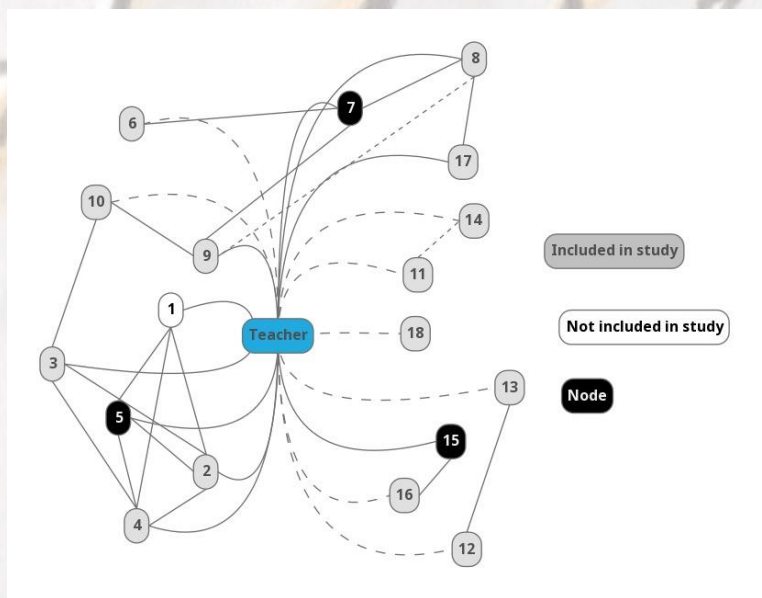


Fig. 2: Example of a Class Ecosystem Map

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