

Building Student Capacity for Collaborative Problem Solving

Matt Spindler; Virginia Tech

Curt Friedel, Virginia Tech

Natalie Cherbaka; Virginia Tech

Introduction

The escalating rate of global change has created mounting pressure to solve complex problems that require robust collaboration across disciplines.

Introduction

The potential benefits of educating and training future agricultural researchers and professionals as effective collaborative problem solvers are manifold and would likely help them to build upon competencies needed to pursue a range of STEM careers.

Defining Cooperative Learning:

Cooperative Learning: the instructional use of small groups wherein students (3-6) work together to maximize learning



Cooperative Learning

Cooperative learning has been and continues to be one of the most successful methods of instruction and it is well supported by hundreds of validating research studies (Johnson & Johnson, 2014).

Cooperative learning is widely used across the globe at all levels of education and in a wide variety of subject areas (Johnson, Johnson, & Smith, 2014; Schunk, 2008).

cooperative learning has been found to promote: a) higher levels of achievement and engagement; b) more frequent use of higher level reasoning strategies; and c) serve as an effective means for building interpersonal bonds and team identity.

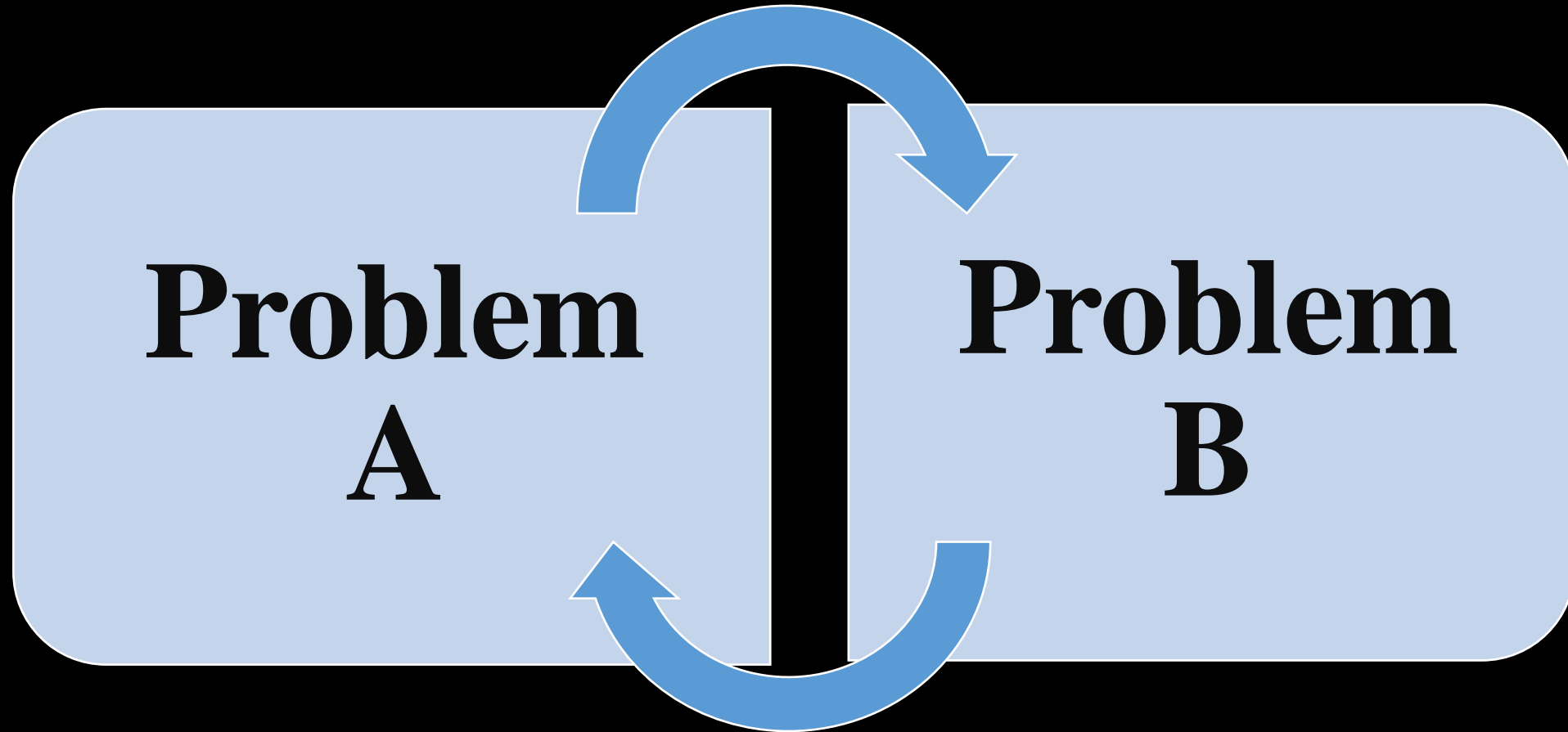
Cooperative Learning Theoretical Framework

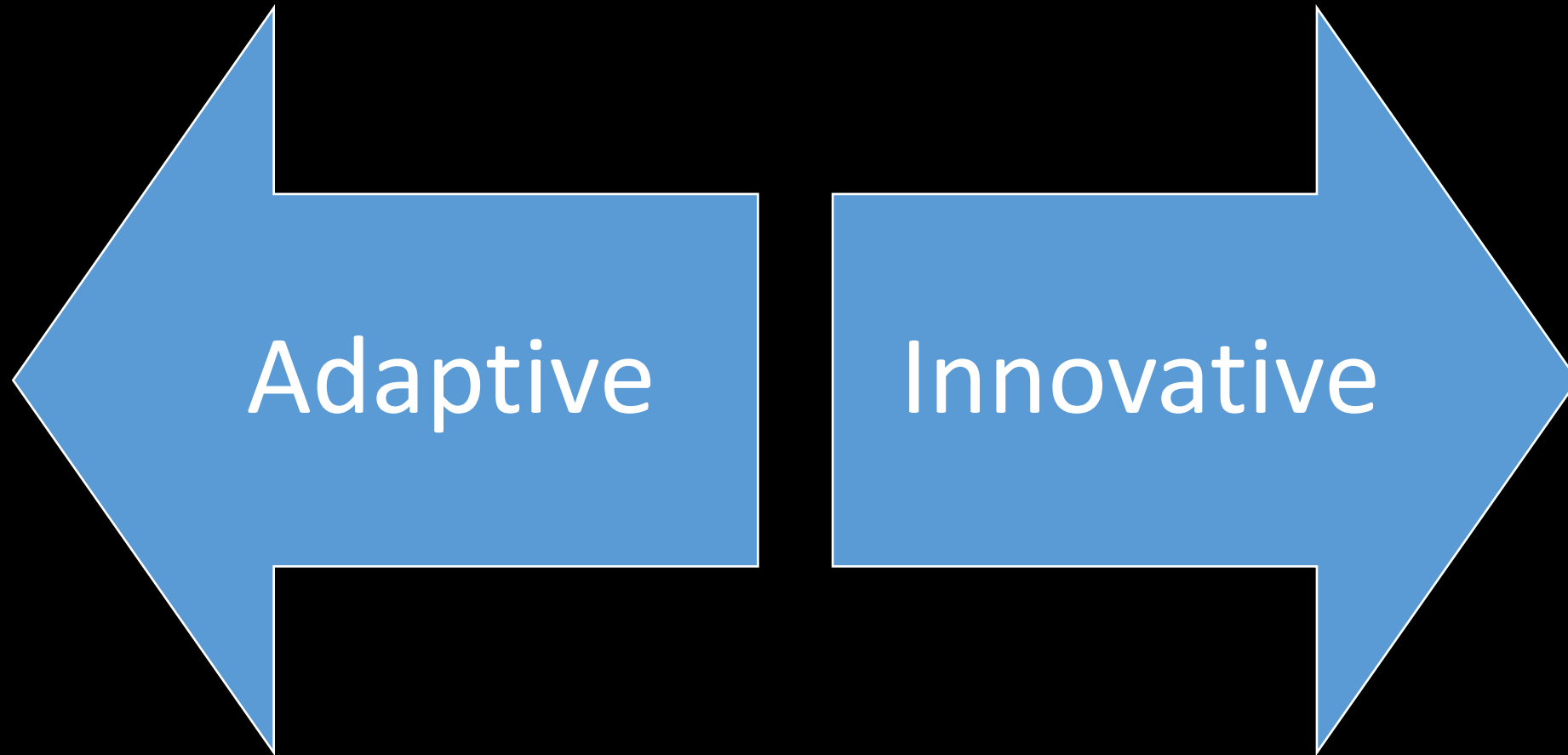
- Social interdependence arises when individuals share common goals and the outcomes each individual experiences are dependent on the actions of others to which they are connected (Deutsch, 1962; D.W. Johnson & Johnson, 1989).
- Social interdependence theory is based on the conception that how participants' goals are structured determines the ways they interact and the resulting interaction pattern determines the outcomes of the situation (Deutsch 1949; Johnson & Johnson, 2009).

Cooperative Learning Conceptual Framework



Kirton's Adaption – Innovation Theory





Adaption – Innovation Theory

Purpose

The purpose of this descriptive study was to determine the extent to which cooperative learning strategies could be utilized to build students' capacity to collaboratively solve problems.

Methods

- 121 out of 217 students granted permission for their data to be included in the research study.
- Cooperative groups were formed based on KAI scores
- Students were introduced to both cooperative learning and KAI theory as part of the study
- Cooperative groups planned for and participated in a dynamic problem solving simulation activity with 10 iterations
- Pre and post surveys; simulation scores; peer evaluations

Findings

- Participants believed that the cooperative learning framework and practice benefited them as individual cooperative agents
- Participants believed that they were able to learn more from the simulation activity because they worked cooperatively with their collaborators to solve the problems

Findings

- Participants believed they were able to more effectively address the dynamic simulation problems because they had a better understanding of cooperation and cognitive diversity
- Observational data revealed high levels of individual participation in cooperative group activities and that students managed changing scenarios with the simulation by utilizing the strength of their collaborative capacity

Recommendations

- Further research should investigate the impact that multiple goals have on cooperative group interaction patterns and beliefs about the cooperative problem solving exercises.
- Research that seeks to link cooperative learning with other theoretical and conceptual frameworks (e.g., KAI) should be carried out.
- Efforts should be aimed at collecting longitudinal data regarding the impacts of cooperative learning and problem solving exercises.

Building Student Capacity for Collaborative Problem Solving

Matt Spindler; Virginia Tech

Curt Friedel, Virginia Tech

Natalie Cherbaka; Virginia Tech

Contact: spindler@vt.edu