Systems Are "Not Escapable": Harnessing Individual Power to Navigate Complex Systems

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Introduction

The term "wicked problem" was introduced by theorists Rittel and Webber (1973) to describe the complexities and challenges of addressing planning and social policy problems. These types of problems, that inherently include social components, cannot be solved within the classical paradigm of science and engineering (or at all), only resolved to a certain extent (Rittel & Webber, 1973). Furthermore, problems in agriculture, natural resources, and the environment such as biodiversity loss, poverty, food insecurity and climate change can be considered wicked problems or complex societal issues as they have a social component (Detoni et al., 2012; Kuhmonen, 2018). These issues require a flexible way of framing, reasoning and acting that crosses disciplinary boundaries and allows differentiation in problem-solving (Grohs et al., 2018). As the complexity of challenges facing agriculture and the environment increases, students will need to be able to recognize the components, patterns, and drivers of change within systems. Systems thinking is an approach that fosters critical thinking around wicked problems. But where can this fit into the higher education curriculum? The purpose of this innovative idea was to include systems thinking principles into a leadership education course within a college of agriculture and assess how students described systems before and after the unit.

How it works/methodology/program phases/steps

The context of this project was an undergraduate course on the foundations of personal and professional leadership at [UNIVERSITY]. Systems thinking was presented as a leadership capacity needed for addressing complex problems in organizations and beyond. Students were primarily from majors in the [COLLEGE OF AGRICULTURE] although majors across the university were enrolled in the course. The final unit in the course focused on systems leadership, encompassed two class sessions, taught by two separate instructors. The first session included the following topics: (1)definition of systems; (2)overview of systems leadership; (3) overview of systems thinking; (4)change over time; (5)observation of patterns and trends; (6)mental models; (7)causal connections; and (8)iceberg model of systems thinking (i.e. how surface-level events are connected to underlying causes). These topics were contextualized within the students' leadership practice and experience at [UNIVERSITY]. Systems thinking tools (i.e. graphing and creating connection circles) were employed here. The second session introduced students to the concept of complex societal problems (i.e. wicked problems) and challenged them to apply systems thinking principles to two cases. The first case presented the increase in the price of eggs over a one-year period and unpacked the drivers for changes using the iceberg model, connection circles and a framework for mapping complex societal problems (CSP). For the second case, students worked in groups to analyze the causal relationships across events during Hurricane Katrina utilizing the CSP framework.

Results to date/Implications

Students were given a pre- and post-test to measure their understanding of systems thinking, prior to the class sessions and two weeks after the unit. The questions in the pre- and post-test are indicated below.

Do you believe you have the ability to influence a system? (Pre/Post)

Transitioning from pre to post, students kept the perspective of "small" systems, discussed the value of people in a system, and identified the bounds of the system that they would be influencing. They stated their belief to influence "parts" and "pieces" and described systems as "small" vs "large". They also responded in first or third person with statements, like "I can change the system", "everyone has the ability to influence", "we could", and "anyone can influence a system". A change from pre to post was students seeing the "ability to influence" as power and status to having leadership characteristics. Some of these characteristics included: courage, leadership, passion, knowledge, and confidence.

Do you believe you have the ability to influence a social system? (Pre/Post)

Students discussed the need for humans to develop relationships and communicate properly as crucial to the social system, stating that human behavior is "constantly changing". They also stated that being a part of the in-group held a better chance of having a positive influence. They believed that having "the right attitude" is critical to influencing and leading a social system. In the pre-test, they defined "social" systems as "easier" as it involves people or "harder" because it meant going into a group, they weren't a part of/didn't consider themselves a social person. In the post-test, they differed on their perspective of "leaders" of a social system, with some referring to themselves while others used prominent social activists such as Martin Luther King, Jr.

Major Takeaways (Post Only)

Participants communicated that systems are "not escapable". They are more complex than they thought, all parts of the system are interconnected, and systems thinking could be applied everywhere. Relationships are highly valuable, and people are the most important part of the system. They began to recognize the value that they invidually bring to a system, their role in the system, and the role of a leader in the system.

Future plans/Advice to others/Resources needed

The integration of systems thinking will be expanded in undergraduate leadership courses including a study abroad course that focuses on systems thinking leadership. Educators seeking to integrate systems thinking into their curriculum should prioritize practical application and real-world scenarios to demonstrate relevance to students. Start with relatable, small-scale problems before addressing complex problems to build students' confidence and skills.

The unit included topics and case studies that contextualized systems thinking by drawing on resources from the Waters Center for Systems Thinking, Donella Meadows' (2015) work, and publicly shared data. The lead instructor had undergone training in systems thinking; however, there are many free resources available to those interested in incorporating systems thinking into their courses. A link to resources will be provided during the presentation.

References

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