

Agricultural Education and Training Good Practices: Elements of Reasoning

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Elements of Reasoning

Often students want to be told “the” answer when facing problems in agriculture. Problems are often very complex and require a logical process to understand which of the many potential solutions are better or worse. Utilizing the elements of reasoning provides a framework for students to dissect complex questions, understand potential solutions and determine the best way forward.

Why is this a good practice?

Giving students the tools to understand complex problems and solutions in agriculture helps them to enhance their critical thinking skills, make better decisions, evaluate information more thoroughly, and develop better reasoning skills. The Elements of Reasoning can be used in variety of environments, both formal (classrooms) and non-formal (in the field). These skills are especially useful in AET, where systems are dynamic and problems and solutions are not always clear

Approaches to using the Elements of Reasoning

Be sure to consider multiple perspectives of problems, ask critical questions to define problems, develop potential solutions, discern between better and worse solutions and employ a reasoned approach to test solutions.

Teaching students to think in and about agriculture is a challenge for agriculture teachers at every level of instruction. Sound reasoning skills are important in agriculture so that students can think quickly and discern the way forward in difficult circumstances.

This modified model utilizes seven elements of reasoning;

- Purpose and objectives
- Information, facts, and data
- Assumptions
- Data interpretation
- Concepts and theories
- Points of view
- Conclusions, implications, and consequences.



Students are faced with a greenhouse management problem where they need to decide on the plants to produce for the next year. The students are interested in profit maximization as well as ease of production. Students worked through the elements of reasoning to design and implement potential solutions to their problem to decide which plants to grow for the upcoming harvest season.



In the Field Example: Step by Step

Purpose and objectives	To begin, clarify that the students understand the problem and situation. It is important to keep the purpose of our thinking at the forefront of the reasoning process and avoid getting sidetracked. For example, students are faced with a greenhouse management problem where they need to decide on the plants to produce for the next year. The students are interested in profit maximization as well as ease of production.
Information, facts, and data	From this point, it is possible to address the remaining six elements in any way that is logical for the problem. After clarifying the purpose, collect information, facts, and data about the problem. What types of plants can be raised in a greenhouse? What is the growing season for these plants? Which plants offer high profits while requiring the lowest labor and financial inputs? What kinds of plants would consumers buy?
Assumptions	What do we presume to know about the situation? In this example we would assume that we could raise plants in the greenhouse, that we have access to fertilizer, water, and inputs for production. We probably would also assume that we have the expertise to raise the plants selected.
Data interpretation	In the data interpretation element, we would ask students to assimilate what they have found and begin to formulate potential decisions. Perhaps we are able to eliminate some plants at this stage while moving others to a “short-list” for production.
Concepts and theories	The students would then identify concepts and theories related to the question that would help them arrive at a decision. The concepts and theories for this problem would likely include supply and demand, growth requirements for the plants, and greenhouse management.
Points of view	Seeking the opinions of others is the primary concern of the element “points of view.” We want to consider the positions others facing the same decision have. Asking for expert advice, looking at case studies, and studying management plans proposed by others are all examples of this element.
Conclusions, implications, and consequences	Finally, we want students to come to a conclusion or final decision based upon what they have learned through the elements of reasoning. In identifying their conclusion they should consider the potential consequences and implications of their decision.

The elements of reasoning is an extremely useful tool in agricultural education and training to teach decision making and reasoning skills. Teachers can use this model as an instructional framework or for evaluating conceptual understanding.

Reference: Paul, R. W., (1995). Critical thinking: How to prepare students for a rapidly changing world



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