Communication Skills: Problem Solving Pairs

Description

Problem solving pairs is based on a process called The Reflective Thinking Sequence (Dewey, 1910). The sequence describes a means by which problems can be investigated and solutions identified. The process contributes to students' learning by allowing them to "see for themselves" the content of their discipline; in addition, problem solving enables students to generate their own knowledge. Problem solving pairs provides a framework for learners to follow as they embark on problem solving while they are working in pairs, but it can also be used in groups or teams, or by an entire class. An advantage of introducing the process to students in pairs is that partners can support each other as they learn the process yet be held accountable individually for their contributions to the process.

Learners

Learners should be organized in pairs either randomly (numbering off, "draw straws", etc) or in some logical fashion (pre-existing lab partners, a pre-determined pairing schedule, etc.).

Equipment

No equipment is required for the Reflective Thinking Sequence.

Facilitator

The role of the facilitator varies with the nature of the class and the problem to be solved. However, initially, learners should have an opportunity to work through the reflective thinking process in class with a practice problem in order to clarify the purpose of each step.

If a complex or long term learning problem is assigned, the facilitator might meet with learners at the start of the process to discuss plans for working through the process and then meet with learners at predetermined points to discuss progress and emerging issues as a result of working through the reflective thinking process.

Instructions

There are seven steps to problem solving using the reflective thinking process. An assignment using the process might incorporate all seven steps or might stop at step five or six, depending on the learning goal. Here are the seven steps:

1. What is the problem? A specific problem may be assigned to learners (EX: How can greater amounts of vitamins be incorporated into astronauts' daily diets?); in other instances, the nature of the problem may be unclear and the

presence of a problem is recognized because undesirable circumstances exist (EX: Astronauts report general fatigue and lack of energy despite consuming all of their daily diets.). The first step of the process requires an understanding and agreement of the problem by participants.

Besides understanding the nature of the problem and agreeing on the nature of the problem, participants also need to understand their assignment. Are they to generate several possible solutions to the problem? Or only one solution? Are they to draw up a plan for implementing the solution? Should they also develop an assessment plan and schedule for reviewing the solution?

2. What do we know about the problem and what do we need to know? Learners identify what they know about the problem, what they do not know, and possible resources of information for acquiring additional knowledge about the problem. At this point in the process, a visual representation of the problem may be helpful to identify and understand causes of the problem, unmet needs, barriers to resolving the problem, etc.

3. What does the best solution to the problem look like? This is the point in the process where a criteria for solutions is identified. Criteria should be developed that take into account both needs and wants of the solution:

   Needs are features of the solution that related to inflexible requirements such as a timeframe, existing equipment or other facilities, staffing, or budget. For example, a criteria might designate that the selected solution must be implemented using existing facilities or staff.

   Wants are features of the solution that respond to areas where there is flexibility. For example, if time is not of the essence, a different solution might be more desirable as opposed to instances when a solution has an implementation deadline. Designing a more nutritious set of menus for the next space flight vs identifying vitamin deficiencies currently plaguing astronauts and making recommendations to resolve those deficiencies would be an example when time considerations would guide a solution.

4. What are possible solutions to this problem? Creativity, encouraging participants to think “outside the box” is important at this point. Brainstorming is helpful to generate possible solutions.

5. Which of our possible solutions best meets the criteria we developed? Using the criteria developed in phase three, the possible solutions generated are matched to the criteria. Ideally, the best solution is the one that meets all of the want/need qualifications. If such a solution does not surface, is there some way of amending a solution to meet all of the qualifications? Is there a “second best” solution that surfaces? Are there resource requirements that

must be met before an important area of the solution can be implemented? Is it possible to identify ways to meet the resource requirements?

6. What is an implementation plan for the problem? If implementation is part of the assignment, learners can view the implementation as another problem and begin at the top of the process. Implementation generally has as its criteria a time line, budget, equipment, and possibly other needs, and task delegation requirements.

7. What is a review schedule for assessing the implemented solution? If this is a part of the assignment, learners view development of a review schedule as another problem. As is the case with the implementation plan, a review schedule generally includes delegation of tasks, i.e., who will conduct the review, and a process for the review.

References

Dewey, J. (1910). *How we think*. Lexington, MA: D. C. Heath.