Problem Solving Approaches

Foundations of Technology

Problem Solving Is…

In this presentation you will learn that problem solving in its simplest form means to "think." Problem solving is a series of decisions to resolve a situation. Problem solving is considered the most complex of all intellectual functions and many approaches can be used to solve technological problems as well as problems not related to technology.

There are many approaches to problem solving, depending on the nature of the problem and the people, products, or systems involved in the problem.

What's the problem ?
What type of problem?

People in general usually realize that a problem exists when they encounter a difficulty and are not sure how to resolve it. A problem can be as simple as how to clear snow from a road or as complex as how to land a person on Mars. Note that not all problems are **technological problems**, however.

You might have a problem with a classmate or family member. This is a **social problem**. You might have difficulty identifying the weather produced by some types of clouds. That is a **scientific problem**. You might be trying to decide whether to keep some money you found in a wallet on the street. That is an **ethical problem**.

Universal Solving Approaches

Problem solving is a common human activity. We all use a fairly universal process as we approach problems using any approach. In short we do the following:

- **Develop and understanding of the problem through observation and investigation**
- **Devise a plan for solving the problem**
- **Implement the plan**
- **Evaluate the plan**

Consider the problem-solving approaches on the next few slides and think about situations or problems that may be solved using these approaches.

Technological Problems

In technology education we use the Technological Design Model approach to solve problems. This approach is used not only where a technological problem exists but also where you might see opportunities for improvement. You face a **technological problem** if you need to develop tools, machines, or systems to help you do the work to solve the problem.
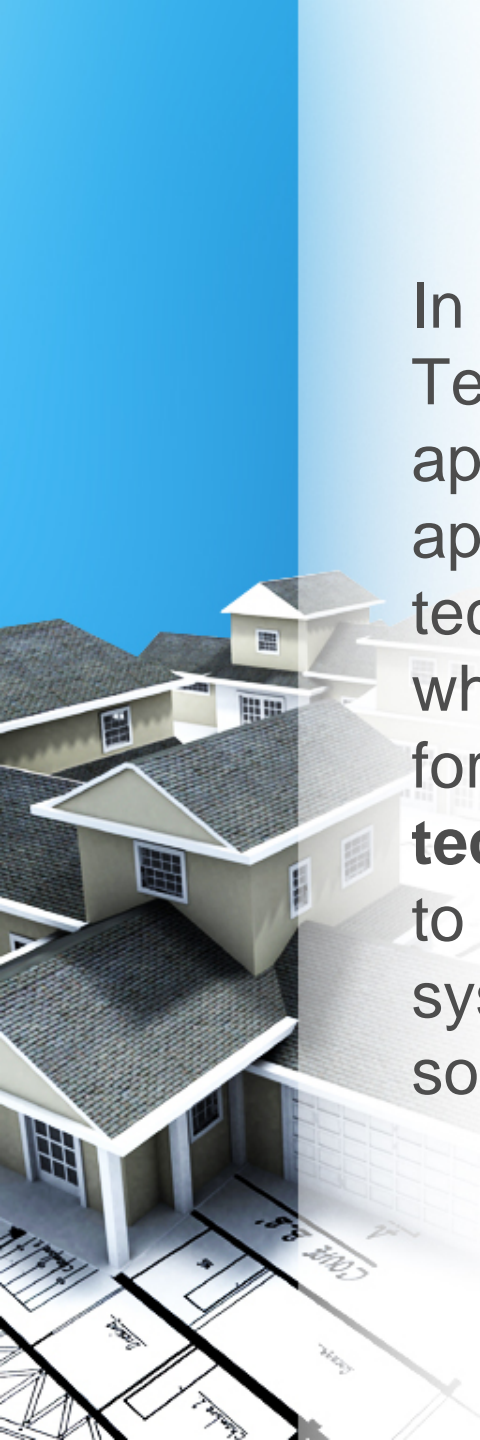
Traditional Approach

The more traditional, rational approach is typically used and involves a clarifying description of the problem, analyzing causes, identifying alternatives, assessing each alternative, choosing one, implementing it, and evaluating whether the problem was solved or not.

Appreciative Inquiry Approach

Another, more state-of-the-art approach is appreciative inquiry. That approach asserts that "problems" are often the result of our own perspectives on a phenomena, e.g., if we look at it as a "problem," then it will become one and you probably will get very stuck on the "problem."

Appreciative inquiry includes identification of our best times about the situation in the past, wishing and thinking about what worked best then, visioning what we want in the future, and building from our strengths to work toward our vision.

Finding Creative Solutions

When you encounter a new problem or decision that must be made, you will probably react with a decision that seemed to work before. It's easy with this approach to get stuck in a circle of trying to solve the same problem over and over again using the same approach over and over again.

Not all problems can be solved using the same approach. This is often where students struggle. Students react to what they think the problem is. Instead, seek to understand more about why you think there is a problem. To find creative solutions to problems you need to get your mind looking in new directions.

Challenge your assumptions

Consider as an example, a situation where you aren't making enough money with your part-time job and you assume you need another job. Ask yourself, "do I really need a better job?" Maybe you can get a raise, or you can make the job that you already have better. Don't let your assumptions limit your possible solutions.

Break big problems down

Break big problems down into smaller ones. This is true of many problems. Start by addressing all of the components of a problem individually, and it may not seem so overwhelming. This makes it easier to motivate yourself.

Ask three people

Ask three people for their opinions and/or advice. They may have good ideas, but in any case this helps you be sure that you are not overlooking anything obvious. Make sure the three people you ask don't all think the same way.

Brainstorming

Write down the problem then find another way to express it and write that down. Continue with all the possible solutions and any ideas that come to mind. Write EVERYTHING, then come back to it later to pick the best of what you have.

Change your perspective

Change your perspective and pretend you are very rich, very poor, a child, a visitor from another planet. How would you see the problem from this new perspective. Einstein imagined riding on a beam of light to come up with his theory of relativity, so this technique has been known to work.

Assume the Absurd

Another approach used to solve problems involves "assuming the absurd." Putting a store in the home of the consumer was an absurd idea at one time, but isn't that what television shopping networks and internet stores do? What at first may seem crazy can solve your problems or lead to other ideas that do so.

Backpackers get tired of carrying heavy packs, and one had the "crazy" idea, "What if backpacks had wheels?" It is for sale right now (the "Wheelpacker"). It can handle most rough trails with its modified bicycle wheel.

Causing Problems

Another way to solve problems is by asking how you can cause them. This can be a good technique for personal problems. Too much stress? Think of the most effective ways to cause more stress. Hmm...promise too much, don't sleep enough, be constantly interrupted, leave many decisions hanging there unresolved, and so on.

Each of these ways to cause stress can possibly show you something about how to reduce it: Make fewer promises; sleep more; don't allow too many interruptions; make a bunch of small decisions now to get them off your mind, and so on.

The point is that if you only look at the problem from the perspective of "how do I solve it?" you tend to see only solutions based on your hidden assumptions. If, for example, you are assuming that your stress is simply due to having too many things to do, you may miss many possible solutions. So looking at how to cause a problem can show you more ways to solve problems.

Problem Solving Approaches

There are many ways to approach a problem and solve it. It does not matter whether it is technological or any other problem life throws at you. Make good decisions, have a plan in mind problem solving, and consider using some of the techniques you have read in the presentation.

Problem Solving Approaches: Summary

- Problem solving is a series of decisions to resolve a situation
- Problem solving is considered the most complex of all intellectual functions
- There are many approaches to problem solving, depending on the nature of the problem and the people, products, or systems involved in the problem
- Not all problems can be solved using the same approach
- Problem solving is a common human activity and we all use a fairly universal process as we approach problems

End of Presentation