PROBLEM SOLVING SKILLS

Authors:

Dr. Jandhyala Narayana Murthy
Director, GRIET

Dr. K.V.S.Raju
Dean Training
GRIET

Dr. T. Jagannadha Swamy
Dean Career Guidance
GRIET

GOKARAJU RANGARAJU
Institute of Engineering and Technology
(Autonomous)

Griet SKILL SERIES

PROBLEM SOLVING SKILLS

Authors:

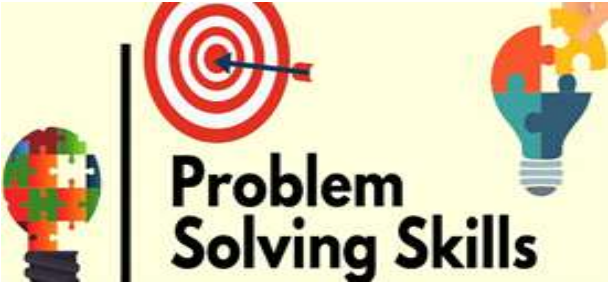
Dr. Jandhyala Narayana Murthy
Director, GRIET

Dr. K.V.S.Raju
Dean Training
GRIET

Dr. T. Jagannadha Swamy
Dean Career Guidance
GRIET

Problem Solving:

In nearly every career sector, problem-solving is one of the key skills that employers seek in job applicants. It is hard to find a blue-collar, administrative, managerial, or professional position that doesn't require problem-solving skills of some kind.



The problem solving process:

A generic description of problem solving that can apply within any academic discipline or context provided that there is a familiarity and fluency with the tools applicable to that context.

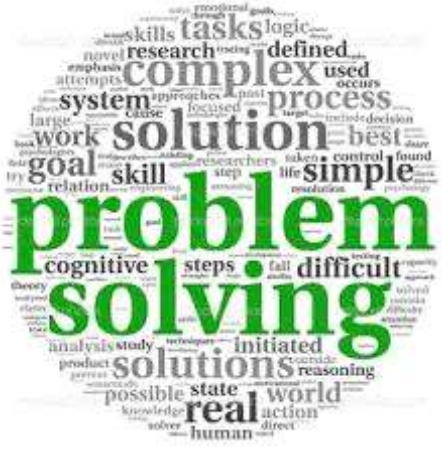
A problem comprises a situation and an objective. The situation can be real or described, and where described, can exist in the real world or in an abstract,

intellectual, world. The situation includes resources, which may be physical objects or information, and constraints or rules. The objective can be a) either to achieve a specific result, (for example a physical change in the situation or a piece of information) or b) may involve producing a proof or explanation.

Both types involve going through a process, but in the first type that process is a means to an end whereas in the second type it is the process itself that is important.

In The problem solving process, for simple problems, involves:

First obtain a clear description of the situation and ensure that it is fully comprehended. This may involve writing down lists and diagrams, re-describing the situation, trying to get a clear mental picture of all the relationships which exist within the situation, of what the resources are and what they can be used for, and of the constraints and their implications. The objective must also be clarified.



Brainstorm and plan solution process:
The brainstorming process involves first looking at the situation and asking what immediate changes can be made, what will be the consequences of these changes, and looking at the objective and asking what would enable the objective to be reached. It also involves considering any similar problems previously solved. The aim is to identify a set of steps that lead from the original situation to the desired objective.

Implement solution:
Once a set of steps has been identified, the solution process proceeds from one step to the next, regularly reviewing progress and checking back to make sure that the steps taken so far are valid and have produced the required result, until the required objective is reached.

Check results:
A final check is then made to verify that the result produced is the required objective. If, at intermediate stages, checks on progress reveal an error, then it is necessary to go back one or more steps and rethink the problem, again looking for a set of steps that leads from the original situation, or from the results of previously verified steps, to the objective.

What makes a problem simple or difficult and why do we need to know?

Understanding what makes a problem simple or difficult allows us to set suitable problems for the level of student and to determine assessment criteria. The difficulty of a problem depends on many factors.

Situation - how simple or complex.

Situation - clear and fully and unambiguously defined, or unclear with many components ill-defined or unknown.

Objective - may be well or ill-defined.

Solution - required number of steps.

Solution - availability and ease of use of tools required

For a simple problem, it should be possible to plan the whole series of steps needed to solve it before starting. This may not be possible for difficult problems, where a number of partial solutions may have to be tried out in a trial and error process, looking to see if any of these produce a problem that is easier to solve.

Analytical skills and creativity

Problem solving involves both analytical and creative skills: analytical in comprehending the problem and the relationships within the original situation, and in checking the results of results of each step, and creative in devising the solution. Imagination plays a large part in both of these skills: problem solving requires the ability to imagine a chain of intermediate steps and their consequences. For example to solve the problem of crossing a river by chopping down a tree and laying it across the river appears to be quite simple. However it would be very difficult to arrive at for someone who has not previously walked along a fallen tree, seen a tree laying across a chasm, knows that they can chop a tree down and knows how to manhandle a felled tree.

In reality, problem solving rarely involves any really novel steps; it usually involves putting together a set of previously experienced processes. It is the building upon of generic processes allied to subject expertise.

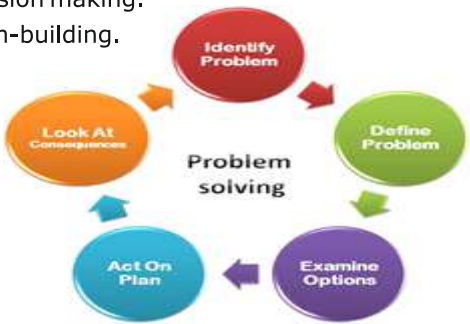
The ability to imagine the individual steps in a solution and their results can only be gained through experience, acquisition of subject specific knowledge and understanding, and practice in using the necessary tools. True creativity in problem solving lies in lateral thinking that is in the ability to imagine the results of processes in different contexts to those previously experienced. This requires the ability to abstract, at least sub-consciously, generalizations, and while such transfer may be possible between different contexts within one academic discipline it is not as easy to achieve between contexts in different disciplines.

What are problem-solving skills?

Problem-solving skills help you determine the source of a problem and find an effective solution. Although problem-solving is often identified as its own separate skill, there are other related skills that contribute to this ability.

In order to be effective at problem solving you are likely to need some other key skills, which include:

- Active listening.
- Analysis.
- Research.
- Creativity.
- Communication.
- Dependability.
- Decision making.
- Team-building.



Creativity. Problems are usually solved either intuitively or systematically. Intuition is used when no new knowledge is needed - you know enough to be able to make a quick decision and solve the problem, or you use common sense or experience to solve the problem. More complex problems or problems that you have not experienced before will likely require a more systematic and logical approach to solve, and for these you will need to use creative thinking.

Researching Skills. Defining and solving problems often requires you to do some research: this may be a simple Google search or a more rigorous research project.

Team Working. Many problems are best defined and solved with the input of other people. Team working may sound like a 'work thing' but it is just as important at home and school as well as in the workplace.

Emotional Intelligence. It is worth considering the impact that a problem and/or its solution has on you and other people. Emotional intelligence, the ability to recognize the emotions of yourself and others, will help guide you to an appropriate solution.

Risk Management. Solving a problem involves a certain amount of risk - this risk needs to be weighed up against not solving the problem.

Decision Making. Problem solving and decision making are closely related skills, and making a decision is an important part of the problem solving process as you will often be faced with various options and alternatives.

How to improve your problem-solving skills:

There are several methods you can use to improve your problem-solving skills. Whether you are searching for a job or currently working, improving your problem-solving skills and associated abilities will help make you a strong candidate and employee.

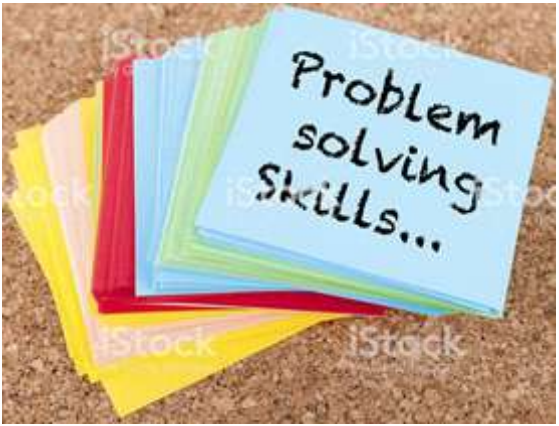
Acquire more technical knowledge in your field. Depending on your industry, it may be easier to solve problems if you have a strong working technical knowledge. You can more technical knowledge through additional coursework, training or practice.

Seek out opportunities to problem solve. By putting yourself into new situations, you are more likely to be exposed to opportunities to problem solve. You may find there are opportunities to volunteer for new projects in your current role, on another team or outside the workplace for another organization.

Do practice problems. Practice and role-play can be useful tools when learning to develop your problem-solving skills. You can find professional practice books for your industry and problem-solving scenarios online. Practice how you might solve those problems and determine if your potential solutions are viable. For example, in customer service you might find a scenario like, "How would you handle an angry customer?" or "How do you respond when a customer asks for a refund?" Practicing how you might handle these or other scenarios common in your industry can help you call upon solutions quickly when they arise on the job.

Observe how others problem solve.

You may have colleagues who are skilled problem solvers. Observing how those colleagues solve problems can help you improve your own skills. If possible, ask one of your more experienced colleagues if you can observe their techniques. Asking relevant questions can be helpful in applying them in your own career.



GOKARAJU RANGARAJU

Institute of Engineering and Technology

(Autonomous)

Bachupally, Kukatpally, Hyderabad - 500 090, INDIA

Ph : 072077 14441 www.griet.ac.in