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The Problem is not the Problem: It's the Solution

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Abstract

Teaching problem solving starts the moment we choose to let our infant find the pacifier to the day that adult takes the final breath. Problem solving is foundational in learning and life. The ability to solve problems is a basic life skill for day-to-day living, at home, at school, and at work. Problem solving is a process that requires multiple skills. While this article is focused on developing problem-solving skills in children, the same steps can be followed to develop these same skills as adults entering the workforce.

Key Words: Analysis, Creative thinking, Critical Thinking, Decision making, Evaluation, Feedback, Open mindedness, Problem solving, Questions, Solutions

Introduction

The ability to solve problems is an essential and foundational life skill that we use daily as children and adults in school, at work, and at home (15, 25). Even if we are not thinking explicitly about each step, we still follow the same procedures when approaching daily problems and challenges – both small and large – with which we are faced (20). The advantages of developing and utilizing strong problem-solving skills can be seen in all facets of life. Thus, reflecting on how we approach the problem-solving process is a vital step in becoming more effective and efficient problem solvers (9).

Children begin developing their problem-solving skills at a very young age including sorting blocks by shapes as a toddler. They solve simple problems including how to get dressed and how to eat with a fork (30). Our approach to helping children develop effective problem-solving skills is dependent on their stage of cognitive development as the challenges children face grow and evolve over time (Cullins, 2019). As children become adults, the cognitive ability increases as does the degree and nature of the problems and challenges. Thus, some of the same approaches used with children may be used with adults as their cognitive abilities and capabilities are much greater (Goff, 2018).

As noted in the literature, the problem-solving process may include as few as four steps to 13 (Hicks, 2020; Holliday, 22018; Jefery, 2010; Neely, 2017; Polya, 1945; Pursey, 2018; 3, 4, 20). Consistent among the different approaches is the idea that effective and efficient problem solving involves being able to first examine and identify each of the basic components of the problem, leading to a solid understanding of the problem and thus, making it easier to solve (Pursey, 2018, 1) No matter the context in which the problem is situated, the essential process of analyzing and implementing each step of the process separately, giving attention to detail and time, leads to the most effective and efficient solution (6). The purpose of this article is to provide an extensive review of the literature on problem-solving and to outline five steps of the problem-solving process that provide the framework for this article. We begin with the definition of problem solving.

Definition of Problem Solving

According to Poyla (1945), problem solving is an important intelligence trait, as well as an essential aspect of human character, that can be learned by imitation or investigation. Problem solving is a measure of one's capacity to assess situations and analyze important information required to reach a solution (Ashman, 2019). Moreover, problem solving is a process through which problems are identified and solved through a repetitive process of systematically applying skills and strategies to arrive at a desired solution (27, 15, 18, 90, 91, 92). Problem solving is a vital skill across all content areas (29). Doyle (2020c) posits that these necessary skills require efficiently identifying the underlying issue in a timely manner and implementing a solution. Additionally, problem-solving skills are necessary not only in academics but also in real-life situations where problems are defined and resolved systematically and efficiently (15, 18, 19).

Problems always have two common features that include goals and barriers (20). The problem can be described as a situation that is hindering the attainment of one's set goal(s), objective, or desirable outcome (14, 20). Upon review of the literature, problem solving in this article is defined as a skilled process requiring a thorough understanding of what the underlying issues (not the symptoms) of the problem really are, choosing and implementing the best solution, and reflecting on the process of achieving the goals or outcomes set in the initial stage.

Identify and Understand the Problem

The first step in the problem-solving process is to understand the problem (Polya, 1945). Understanding the problem consists of identifying, describing, explaining, and/or outlining the problem (Ashman, 2019, HIcks, 2020, 2, 9, 11, 15, 20, 24, 102). Goff (2018)states the first step is the most difficult to complete since one must first recognize there is a problem that needs to be solved (21) and then identify and deconstruct the problem into component parts (5, 15, 19, 21). An important part of defining the problem is this deconstruction, exploring the context of the problem to ensure you are solving the problem and not just looking at the symptoms of the problem (Jeffrey, 2010). It is also important to understand the complexity of the problem (Goff, 2018) and to determine the root causes – and potential barriers – of the problem (UAPB, 2023; 15, 23) ensuring the right problem is being solved (Pursey, 2018; 15). As defined in this article, problem solving as a skilled process. When analyzing a problem and throughout the problem-solving process you will need the required skills of meaningful questioning and critical and creative thinking.

Meaningful Questioning

One strategy to define and understand the problem is to ask meaningful and compelling questions **(**Ho, 2019; Jeffrey, 2010; Polya, 1945; Pursey, 2018; The Happy Manager, 2023; Zivkovic, 2020; 6, 11, 13, 14). Understanding the problem in mathematics, and other academic disciplines, begins with answering the following questions: What is the unknown? What are the data? What is the condition? (Polya, 1945).

Jeffrey (2010) suggests you begin to define and understand a problem by asking a series of questions in the following categories: what, who, and how. When asking "what" questions, consider what is already known about the problem, what is not known about the problem, what is known about similar problems, and what strategies have been used in the past related to similar problems. Further, one needs to know what the root causes of the problem are and what overall patterns exist (Pursey, 2018; 13, 14, 17, 18, 23).

When asking "who" questions, consider who may be able to provide additional information about the problem or even a possible strategy for solving the problem. Also consider who the problem is impacting and may benefit from the solution. Additionally, "how" questions should focus on how the problem began, how are other problems related to this one, how might the solution impact the field of related study. Deconstructing the problem by answering the above questions leads to a clear definition of the problem (Jeffrey, 2010). Problem solving is a skill that should be practiced, just as developing any other skill, and analyzing and deconstructing the problem is the first important step in this process (15).

Analyze

This is one of the most important stages of problem-solving. Analysis requires a careful balance analyzing ideas, considering different perspectives, creativity, evaluating arguments, logical thinking, organizing facts, reflecting, synthesizing information, and drawing conclusions (Carizal, 2023; Prajapati, Sharma, & Sharma, 2017; Wicklund, 1975; 4).

Analysis is a process of discovery of the facts, finding out what you know about the situation (The Happy Manager, 2023). Analysis involves deconstructing the problem and carefully analyzing how and why it developed in the first place (24).

Good problem-solving abilities need great analytical skills. Enhance your analytical skills by being patient and observant. The information gleaned about the problem will provide a comprehensive picture of goals and barriers providing a deeper understanding of the problem (19, 21). Remember, facts need to be checked (King, 2020; 19, 21).

Be inquisitive and conduct a thorough investigation. Research helps you identify the core cause of the problem. Once the real cause of the problem is known, it becomes easier to solve (3).

Diagnosing the problem requires seeing the problem in context. Define the current situation. Investigate the background and symptoms to discover the implications of the problem, who it affects, and how urgent/important it is to resolve the symptoms (UAPB, 2023). What is the issue? Challenge all aspects of that current process. Identify obstacles to determine why there is a problem and that same list will be used to help you find solutions to the problem that remove said obstacles. Are the barriers actual barriers and what other barriers are there? (The Happy Manager, 2023; 15, 21).

The author stresses that a key to any problem being solved is the people affected. When collecting your information be sure to involve all the people who have any part in the process under investigation.

It should be understood with time and practice, analytical skills can be sharpened so that you can tackle problems with much more authority and proper facts (14).

Reverse Engineer the Problem

There are several ways to analyze a problem. Analyzing using a whole part and whole method is one. Instead of looking at a whole large unit that needs to be fixed you break the problem into parts and move step by step, and part by part to fix the large unit. This way you may solve the problem when attempting to fix the whole problem at once would fail. The small piece of solution will be added to become the solution for the whole unit. With problems within an organization, analyze different aspects or sections of the organization. Select a problem area like communication. When it is fixed, you can go to other problem areas (Ansary, 2021; 3).

Another analysis method is to work backwards. You reverse engineer the problems you are facing. If you have a challenge in front of you, you can start deconstructing it! Find the right answers like who are the players? What is required for this problem to happen? What are the circumstances and how they all-together create this problem? (24).

A third method is charting. Use flowcharts to identify the expected steps of a process and cause-and-effect diagrams to define and analyze root causes along with asking what, who, where, when, and how questions to analyze the problem.. Ensure you are focused on the right problem be sure your quick fix is not covering up the problem rather than finding the deeper cause/level.

Critical and Creative Thinking

Critical Thinking

While creative-thinking and critical-thinking are separate and distinct skills. They are being presented in the analysis section of the paper because they are essential in the analysis process. The author sees them like peanut butter and jelly. They go together. Critical thinking is a process of thinking carefully and objectively about a subject or idea, without allowing feelings or opinions to affect you (Cambridge Dictionary, 2023). Critical thinking is thinking that involves evaluation and challenge using knowledge, facts, and data to effectively solve problems.

When you think critically you seek all sides of an argument and question ideas and assumptions rather than seeing them as fact. You recognize or develop an argument, use evidence in support of that argument, draw reasoned conclusions, and use information to solve problems. This doesn't mean you need to have an immediate answer, it means you must be able to think on your feet, assess problems, and find solutions (36).

Critical thinking encompasses both a set of logical skills that can be taught and a disposition toward reflective open inquiry (Cosner, 2023; Doyle, 2022b). The broad set of related skills usually includes:

Acquisition of information, analyze information objectively, comparing and connecting comparing, exploring viewpoints, finding complexity, creativity, critiquing, describing, evaluation, explanation, hypothesizing, identifying assumptions, recognizing generalizations and bias, inference, innovation, interpretation, investigation, reasoned/wise judgment, judging credibility of a source, make good, make objective sound conclusions/decisions, metacognition, be objective, observation, reasoning, reflection, sequencing, structuring arguments, testing, questioning (Australian Curriculum, Assessment and Reporting Authority, 2022; Barahal, 2008; Custom-Writing.org, 2023; Eoghan, 2023; Norris & Ennis, 1989).

Creative thinking

Creative-thinking and critical-thinking skills are essential components of problem solving. Creative thinking is the ability to look at a problem in a kaleidoscope of ways. This might involve seeing a different way to do something, generating new ideas, or using materials in unique ways (35).

Creative thinking is the capacity to generate many kinds of ideas, manipulate ideas in unusual ways, and make unconventional connections to outline novel possibilities that have the potential to elegantly meet a given purpose. A creative thinker must be able to discover certain patterns of information and make abstract connections between seemingly unrelated data to approach a problem or challenge from a new perspective, alternative angle, or with an atypical mindset. Today we are talking about thinking outside of the box, taking techniques from one discipline, and applying them to another, or simply creating space for new ideas and alternative solutions to present themselves through dialogue, experimentation, or reflection (Birt, 2023; Ramalingam, et al, 2020; Smart, 2021).

Creativity is not easy, but it is a gradual process. Wisdom and intuition come into play. Over time, your connection with your inner guide improves and creative problem-solving can become a more spontaneous process. You must become more open to ideas and benefit from the endless possibilities of being more creative.

One misapprehension about creative thinking is that you must be skilled at more traditional creative skills. This isn't true. What's important is that you are open to exploring alternative solutions while employing fresh techniques and creative approaches to what you're working on. Another misconception about creative thinking is that it applies only to the ideation or technically creative parts of the process. All aspects of our lives and interactions with people and challenges can benefit from creative thinking – from the ability to see things differently. (Smart, 2021).

Creativity has no boundaries, and it is one of the most important skills that one can have. When you have that creative edge, problem-solving becomes much easier as creative thinkers can find suitable ways that are out of the box. (Smart, 2021). The author believes everyone can be creative when placed in the proper situation. As the author listed the skills for critical thinking creative thinking has several parts. One is analytical thinking, and another is open mindedness.

Analytical Thinking

Analytical thinking and problem-solving abilities are often thought of as the same thing. Analytical thinking is a mechanism that helps solve complex problems, but they are not one and the same. Analytical thinking is the ability to observe, logically evaluate, and conclude about anything. Analytical thinking helps you separate the information that applies to your situation from that which doesn't. In the context of your job, this will often be about solving problems. Analytical thinking is a key component of professional creativity because it's a process that allows you to channel ideas practically (Ariella, 2020; Birt, 2023). Analytical thinking skills include communication, data interpretation, decision-making, prediction, reflection, research (Ariella, 2020).

Open mindedness

Creative thinking skills evolve from having an open mind to all possibilities. Previous education and life experiences leave their mark on a person's ability to objectively evaluate certain situations. By acknowledging these biases, you can improve your critical thinking and overall decision process. Reducing your openness to new ideas only limits your possibility of stumbling on a great one. Open-mindedness can also mean that you aren't opposed to straying from traditional methods. Doing things in a new way can result in improvement from the past (Ariella, 2020; Birt, 2023). Open-mindedness involves availability for discussion, collaboration, critical thinking, flexibility, receptiveness to other's ideas and new information, willingness to learn (Ariella, 2020)

Helpful Hints:

When a problem or challenge is proving difficult, re-phrasing can be a good way to open things up. Re-phrasing the question helps you to focus on generating solutions rather than feeling blocked by the obstacle in your way (Ashman, 2019).

New solutions emerge when you question the assumptions upon which a problem is based (Holliday, 2018; 8).

Creative and Critical Thinking Differences

What is the difference between creative thinking and critical thinking? Both critical and creative thinking involve thinking broadly and deeply using skills, behaviors, and dispositions such as reason, logic, resourcefulness, imagination, and innovation. While many of the skills used are the same, they are employed for different results. Creative thinking tries to create something new, while critical thinking seeks to assess worth or validity of something that already exists. Creative thinking is generative, divergent, while critical thinking is analytical, convergent (Ariella, 2020; 36).

Critical thinking is the process by which one can make a systematic and logical decision. Creative thinking means devising new ways to carry out tasks, solve problems, and meet challenges. It means bringing a fresh, and sometimes unorthodox perspective (Doyle, 2022a).

Solutions

Introduction

Finding solutions is the most important sand complex part of the problem-solving process. Following on from the analysis step it is now time to look at each potential solution and carefully analyze it. Some solutions may not be possible, due to other problems like time constraints or budgets. It is important at this stage to also consider what might happen if nothing was done to solve the problem - sometimes trying to solve a problem leads to many more problems that require some very creative thinking and innovative ideas.

Solutions require a careful balance of creativity and logical thinking. Compare all possible options. This section explains some principles, tools, and techniques to help you do so (13, 20). Finding solutions is a two-part process. The first is the generation of possible alternative solutions. This stage involves careful analysis of the different possible courses of action and then selecting the best solution for implementation. The implementation of the solution selected to solve the problem requires a decision. Both selection and decision making will be discussed further in the article.

Solutions should **f**ix the problem, so it won't happen again and cause other problems (15). Fixing something is often the case of identifying the relationship between what is causing the problem and what is displaying the symptoms. Solutions create new relationships that cause actions that either reduce or counter those effects to achieve the desired outcome. Discovering the relationships may not be easy. Possible options to address your problem may be obvious. At other times, you may need to involve others, or think more laterally to find alternatives The right attitude, combined with the right process is necessary (7).

Generate solutions

From the information gathered in the first two phases of the problem solving framework it is now time to start thinking about possible solutions to the identified problem. In a group situation this stage is often carried out as a brain-storming session, letting each person in the group express their views on possible solutions (or part solutions). In organizations different people will have different expertise in different areas and it is useful to hear the views of each concerned party (14).

Whether alone or with help during this stage you will generate a range of possible courses of action, but with little attempt to evaluate them at this stage (21). Analytical, creative problem solving is about creating a variety of solutions, not just one. Often the most obvious answer is not the most effective solution to the problem.

Creatively generate a plethora of possible solutions/options before final evaluation (Ashman, 2019; Hicks, 2020; Ho, 2019; Jeffrey, 2010; UAPB, 2023; The Happy Manager, 2023; Zivkovic, 2020; 1, 4, 14, 18, 21, 24). Find as many solutions as possible to the problem, no matter how outlandish they may seem. Look at how each solution relates to the root cause and symptoms of the problem. Decide if different solutions can be merged to give a better answer to the problem. Remember at this stage you are not evaluating purposed solutions. A common mistake in problem solving is that alternatives are evaluated as they are proposed, so the first acceptable solution is chosen, even if it's not the best fit.

Remember for effective problem solving you need to ensure that you are solving the right problem. If we focus on trying to get the results we want, we miss the potential for learning something new that will allow for real improvement in the problem-solving process.

In the analysis step we looked at root causes and barriers. Now is the time to review them and how the possible solutions you have come up with will negate/ameliorate them. While you are deciding on a solution keep in mind different solutions will be more effective in different contexts. The following helpful hints section provides ways to developing a myriad list of solutions.

Helpful Hint

Brainstorming is the simplest example of intentional creative thinking that most people have tried at least once in this stage of problem solving. When brainstorming, state the problem, and then request everyone to independently write down their own individual answers. You're not evaluating or judging the solutions at this time; you're simply generating plenty of ideas. Understand different people will have different expertise in different areas and it is useful to hear the views of each person. This activity creates a myriad of new solutions quickly. Be sure to allow everyone to state ideas. Appreciate all input and avoid criticism. Then, organize solutions into groups around common themes (Baker, n.d.; Carizal, 2023; 6, 11, 12, 20).

Brain-storming sessions serve two purposes. In this section we were looking for possible solutions and in the next section we will be evaluating the solutions generated. Brainstorming can be essential to decide on what solutions maximum effectiveness can be attained.

Other ways of developing dozens of solutions are listed below.

Create visual images. Create "mind pictures" of the problem and potential solutions. The mental imaging allows you to map out many dimensions of a problem and "see" it clearly (27).

Guesstimate. The trial-and-error approaches to problem-solving is one of the most time-honored approaches to problem solving. If nothing else, it will help in gathering some preliminary data. (27).

Create a table. A table is an orderly arrangement of data. A table helps you group and organize most data relative to a problem (27).

Use manipulatives. By moving objects around helps you develop patterns and organize elements of a problem into recognizable and visually satisfying components (27).

Work backward. It's frequently helpful for students to take the data presented at the end of a problem and use a series of computations to arrive at the data presented at the beginning of the problem (27).

Look for a pattern. Looking for patterns is an important problem-solving strategy because many problems are similar and fall into predictable patterns. A pattern, by definition, is a regular, systematic repetition and may be numerical, visual, or behavioral (27).

Create a systematic list. Recording information in list form is a process used quite frequently to map out a plan of attack for defining and solving problems. Encourage students to record their ideas in lists to determine regularities, patterns, or similarities between problem elements (27).

Perhaps the best advice on problem-solving is never to dismiss an idea. Write down every possible solution to a problem you can think of, even if it seems silly. It may lead to a better idea or be something that could be adapted to become a great idea (Pursey, 2018).

Evaluate Generated Solutions

Having generated solutions, you need to decide which one to take, which is where decision-making meets problem-solving. But once decided, there is another step: to deliver on your decision, and then see if your chosen solution works. This page helps you through this process.

Evaluate Every Possible Solution (6, 14). Considering multiple alternatives can significantly enhance the value of your ideal solution. Once you have decided on the "what should be" model, this target standard becomes the basis for developing a road map for investigating alternatives.

How do you select the best solution? Once a good number of options have been gathered, the next step is to go through the alternatives and narrow down the ones that are most viable. Analyze how best the top choices would lead to the desired results (11). Identify the advantages and disadvantages of the top choices. Evaluate these ideas and select the most efficient and effective option with accurate actions, timelines, and prioritization (Ashman, 2019; 17). Skilled problem solvers use a series of considerations when selecting the best alternative. They consider the extent to which:

- A particular alternative will solve the problem without causing other unanticipated problems.
- All the individuals involved will accept the alternative.
- Implementation of the alternative is likely.
- The alternative fits within the situation constraints [root causes and barriers] (18).
- The problem has been encountered elsewhere. There is an old saying do not reinvent the wheel. Wise advice. Learn from others who have solved similar problems (11).

Mistakes can only be evaluated from a hindsight perspective. Errors that occur should be part of a growth and development strategy. You should use these mistakes to improve your overall approach, process, and implementation plan. The most important thing about solutions is that they should be continuously improved upon over time (17).

Decision Making Process

Introduction

This stage is perhaps the most complex part of the problem-solving process. Yet it involves careful analysis of the different possible courses of action followed by selecting the best solution for implementation. Make sure to choose the best option in the balance or to "bundle" a few options together for a more satisfactory solution (21, 102).

A caution needs to be presented at this time. How long has it been since you started this process? Be sure that the relevant information gathered is not outdated. You need relevant up-to-date, accurate information on which to make the right decision (20).

In the wider process of problem-solving, decision-making involves choosing between possible solutions to a problem. Decisions can be made through either an intuitive or reasoned process, or a combination of the two (20). It is of utmost importance to consider all the options and then pick the one which can offer a win-win. People who confine themselves to a single technique or option very quickly don't become great problem solvers. Once you're sure of a strategy, you can move to the next stage.

Once you're done scrutinizing the problem and end up with some considerable options to solve it, it's time for decision making.

Decision Making

In its simplest sense, decision-making is the act of choosing between two or more courses of action. Whenever possible it is better to agree formally who is responsible for a decision (20). This idea of responsibility highlights the need to keep a record of how any decision was made, what information it was based on and who was involved. Enough information needs to be kept justifying that decision in the future so that, if something does go wrong, it is possible to show that your decision was reasonable in the circumstance and given the knowledge you held at the time (12, 20).

This stage involves careful analysis of the different possible courses of action and then selecting the best solution for implementation (5, 21). This is perhaps the most complex part of the problem solving process. Following on from the previous step it is now time to look at each potential solution and carefully analyze it. Some solutions may not be possible due to circumstance like time constraints, budget, complexity etc. Evaluate all pros and cons and decide – which course of action do you want to take? (19). It is important at this stage to also consider what might happen if nothing was done to solve the problem - sometimes trying to solve a problem that leads to many more problems requires some very creative thinking and innovative ideas (5).

CAUTION: Never make a permanent decision based on a temporary emotion. No quick decisions when emotions are involved. Take a breath and step back. This rule is founded on principles of emotional intelligence, the ability to understand and manage emotions, because it leverages what we know about the brain and the way we make decisions (Bariso, 2022).

Finally, it's time to make the decision. Make the decision on which course of action to take. Once a decision has been made, don't waste your time thinking about 'what ifs'. If something does go wrong, and you need to revisit the decision, then do. But otherwise, accept the decision and move on (20).

Select the Best Solution

At this stage it is not about finding one solution but eliminating the options that will prove less effective at dealing with both the symptoms and the root cause. Weigh the pros and cons paring the solutions down and wind up picking out the one which you believe will resolve the problem (23).

It's likely that more than one will be viable so how do you decide which solution to select? There will be constraints restricting what you can do, issues about whether solutions fit within what is currently done, and various stakeholders views to consider. Solutions therefore need to be evaluated (The Happy Manager, 2023).

Evaluate all the selected, potential solutions, and narrow it down to one by answering the following questions:

Which solution is most feasible?
Which solution is favored by those who will implement and use it?
Can be implemented within an acceptable timeframe?
Is cost effective, reliable, and realistic?
Will make resource usage more effective?
Can adapt to conditions as they evolve and change?
Its risks are manageable?
Will benefit the organization/
What solution is most likely going to provide a long-term fix?
What risk is involved with each solution? (5, 6).

Take your time answering these questions. It is also useful to consider what the risk of the worst possible outcome occurring might be, and to decide if the risk is acceptable. The choice can be between going 'all out for success' or taking a safe decision (20). Especially if the problem is of organizational significance and its solution could impact the direction the business or unit takes (The Happy Manager, 2023). Acceptance by those involved in the use and implement the solution is key to success.

Solution implementation

This stage involves accepting and carrying out the chosen course of action. Once a solution has been agreed on act on it in a timely manner **(**Ashman, 2019; Weber, 2019; 20**).**

Strong decision-making is essential at this stage. After carefully considering all your options, you must select the best strategy for your problem and stick with your choice. Employees who waver or struggle to commit to a single plan don't make good problem solvers because they get stuck at this essential point in the process.

The final step of problem-solving is all about implementing the solution that you evaluated. But before implementing try to scrutinize the solution well so that there are no loopholes left and create more problems. After implementation is done monitor the status of the solution that you have decided to push through. If it does not work well then try the other ones that you have in hand and keep on searching for the positive results (14).

Implementation involves accepting and carrying out the chosen course of action. Implementation implies that you need to act based on the chosen solution (Hicks, 2020; UAPB, 2023; 6, 20, 21). Implementation stage may bring some unexpected surprises/problems normally due to inadequate analysis of the problem (20).

Implementation itself can be a complex process which may require its own methods and tools to work through successfully **(**Bransford & Stein, 1993; Hicks, 2020; 5, 23). Write down the final solution and come up with a plan of action for implementing it. Share it with the appropriate staff and follow through with the solution you choose (4, 13).

To accomplish the desired objectives, assemble and distribute needed resources and be available to answer clarifying questions that come up. Outline the actions that need to be done, determine who needs to do what, how much time is available, establish timelines, deadlines and gauges or ways to show if the results are being achieved. Break down the solution into smaller manageable steps. The number of steps would typically vary in proportion to the complexity of a problem where generally the more complex the problem the more steps would be required to address it and vice versa. Keep the desired results or end-goal firmly in your mind then proceed to work on one step at a time. Think about possible unexpected emergencies and risks then highlight a plan for addressing them. As you work, periodically check your progress against the action plan to ensure that you are making strides in the right direction (Holliday, 2018; 11). This is evaluation to verify that your solution worked (6). Monitoring and feedback should be in each step of the implementation plan.

Evaluation: Monitoring/Seeking Feedback

Evaluation is the tool to determine if the problem is corrected. The evaluation stage of problem solving is concerned with the monitoring and feedback to check that the chosen solution was successful. Monitoring and feedback channels have built into the implementation plan. Review over frequently seeking feedback from people affected by any changes that occurred to gain insight. Record progress and outcomes of each stage of implementation and any problems that occurred testing actual events against expectations (SkillsYouNeed, 2022; Weber, 2019; 6, 11, 12, 19-21, 23).

A few questions that you can ask when monitoring and evaluating results include the following:

- How much progress has been made so far?
- What amount of work is remaining?
- What challenges have we encountered so far?
- What recommended changes are needed at this point?
- What are the next milestones?
    - Does everyone know what they are supposed to be doing?
    - Are we within schedule?
    - Are we within budget?
    - Have we met initial milestones or targets?
    - Did we resolve the problem within our earlier planned schedule, timeline, or deadline?
    - Did we eliminate the problem within budget?
- Did we understand the causes of problems
- Did we overcome short-term crises
- Did we create strategies to solve long-term problems
- Did we turn problems into opportunities
    - Is there anything that has not been completed?
    - Are there any lessons learned?

- Milestones are met
- Costs are contained
- Necessary work is completed
- The effectiveness of the solution you implemented
- Did it deliver the outcomes you expected?
- The collection of data
- Accurate, defined reporting mechanisms
- Regular updates from the Project Manager
- Challenging progress and actions when necessary

The last question is always "Did we fully fix/resolve problem?" (The Happy Manager, 2023; 5, 11, 12, 18).

In addition, some items to document include the date when the problem was fixed, who ascertained that the problem was resolved and how the problem was handled or resolved (11).

Problem solving, and the techniques used to gain clarity, are most effective if the solution remains in place and is updated to respond to future changes. If the chosen solution doesn't work, you have documented results of the tried solution to analyze to see if the original solution can be fixed. If not, then go back to the beginning and start fresh using other solutions as starting point. **(**Weber, 2019; 6).

CAUTION: The best work of mice and men still may not work! What should you do if the monitoring and evaluation show the solution does not work? The simple reality is that some solutions work, and others don't. Some solutions can address part of a problem and conversely some solutions can even magnify the problem or reveal an even bigger problem. When a solution does not work out as expected, of course time and resources would have gone down the drain, nonetheless, go back to the drawing board and figure out another solution. Other remedies could consist of more time needed to allow a solution to work, more resources required, more funds or more expertise.

It is also important to analyze why the original solution did not work out to not only learn from mistakes but also to prevent repeating the same errors.

CAUTION: This is important. Once you implement a solution, you need to follow through with that solution to make sure it worked. If not, you may need to go back and consider one of your other potential solutions that was identified in step three (23).

It's vitally important that students have multiple opportunities to assess their own problem-solving skills and the solutions they generate from using those skills. Frequently, students are overly dependent upon teachers to evaluate their performance in the classroom. The process of self-assessment is not easy, however. It involves risk-taking, self-assurance, and a certain level of independence. But it can be effectively promoted by asking students questions such as "How do you feel about your progress so far?" "Are you satisfied with the results you obtained?" and "Why do you believe this is an appropriate response to the problem?" (27).

Review/extend

It's always important to take the time to reflect on what you have done, what worked, and what didn't that will enable you to better predict which strategy to use to solve future problems. Based on your movement through the problem solving process and the results of your evaluation you should ask what you are now able to do, or what you could do next, now that you have improved things by solving the problem. What further opportunities can you now realize that you couldn't do before? (Ashman, 2019; The Happy Manager, 2023).

Conclusion

Learning is a continuous procedure involving many stages. Developing problem-solving skills requires a teaching and learning process in which speed in the acquisition of new knowledge is combined with respect for age and the developmental stage of the problem solver. Problem solvers are people who can come up with creative and effective solutions to identified problems, recognizing what needs to be done before acting.

The problem-solving process is self-directed and involves the generation of solutions. After defining the problem, a situation is presented that requires a response to be effectively managed because the solution is not obvious or readily available. Solutions are the response to a problem and the outcome of the process.

Effective problem solving usually involves working through several steps or stages. It is the ability to identify and define the problem, create alternative solutions, evaluate, and select the best option and apply the selected solution. Receiving a response and responding appropriately is also an essential aspect of problem solving skills (13).

Structuring the problem involves a period of observation, careful inspection, fact-finding and developing a clear picture of the problem (5). Following on from problem identification, structuring the problem is all about gaining more information about the problem and increasing understanding. This phase is all about fact finding and analysis, building a more comprehensive picture of both the goal(s) and the barrier(s). This stage may not be necessary for very simple problems but is essential for problems of a more complex nature.

This stage involves accepting and carrying out the chosen course of action **(**5). Implementation means acting on the chosen solution. During implementation more problems may arise especially if identification or structuring of the original problem was not carried out fully. While evaluation is the last step in the decision making process it is being carried out throughout the process.

By following the whole process provided above, you will be able to enhance your problem-solving skills and increase your patience. Keep in mind that effective problem solving does take some time and attention. You must always be ready to hit the brakes and slow down. A problem is like a bumpy road. Take it right and you'll find yourself in good shape for the straightaway that follows. Take it too fast and you may not be in as good shape.

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