

The art of problem solving and its translation into practice

Dr Janine Brooks MBE discusses effective problem solving in our professional and personal lives, what it is to be a good problem solver and how you can improve your own problem-solving skills

A problem is a gap or difference in what the situation is now and what you would like it to be. This means that problems can be universal – the same situation would be a problem for everyone or it may be specific to us or a group of people. How we develop new, flexible, open-minded approaches or solutions to a problem is the creativity we employ. Critical thinking is how we examine and reflect on ideas and thinking (our own and those of others). Then judgments of the options are made on how best to proceed and a course of action decided upon. By combining critical thinking and observation, the problem is identified, information is gathered, beliefs and ideas are challenged, and different options are examined creatively. Asking questions of ourselves, others and the situation is the way to build critical thinking into problem solving, as shown in Figure 1.

Problem solving is a fundamental human cognitive process. Modern humans have been problem solving for hundreds of thousands of years. Our ability to solve problems is one of the factors that underpin our success as a species. Many of the problems our early ancestors had to solve may be less of an issue to us today, but the process is pretty much the same.

Not every problem is one we have encountered before or one that can be easily

and simply solved. Some problems are not static, they change over time, they allow for multiple valid solutions, and require active exploration before they can be solved, as Figure 2 shows.

Complicated or complex?

At first glance these two words could be describing similar problems. However, there is a very real difference. Complicated problems are ones that have a high level of difficulty involved. Think some restorative treatment plans. The problem is generally easy to predict and therefore complicated problems are usually solvable.

Complex problems are ones that have many components and are difficult to define. Think climate change, drug misuse, terrorism. As well as being difficult to define, complex problems can be hard to understand plus tricky to predict the outcome. Each component may not necessarily be difficult, it is the interplay of factors that gives the complexity. Complex problems can rarely be solved, often they can only be addressed or, to some extent, managed. Think COVID-19 pandemic.

Complex Problem Solving

Complex Problem Solving (CPS) was introduced in the late 1970s by Dietrich Dörner who felt there was an assumed

Fig. 1 Components when solving a problem

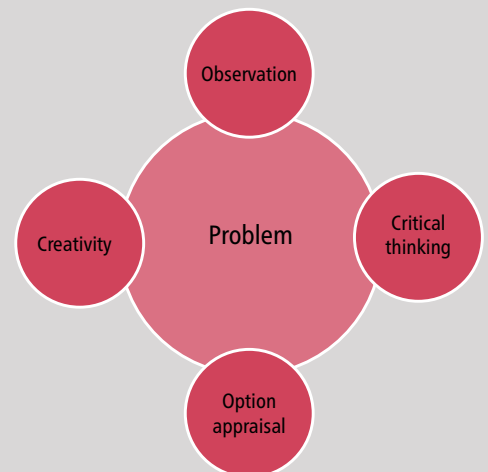


Fig. 2 Factors underpinning a solution

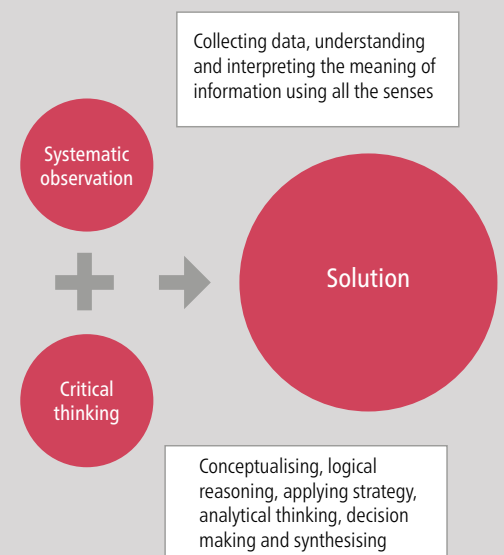
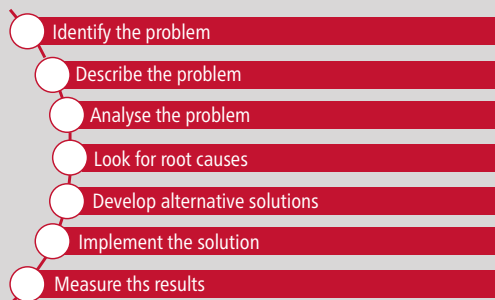


Fig. 3 Seven steps to effective problem solving Source: <https://crestcom.com>²



lack of realism in existing problem-solving approaches. Dörner criticised the classical approach to problem solving as being too static. He noted that real problems usually neither have a single valid solution, nor do they reveal all the information necessary for their solution from the beginning. To reduce this discrepancy between problems in reality and existing problem-solving approaches, he defined CPS. Funke states there are five typical attributes to a complex problem.¹ These are:

1. Complexity – a large number of variables make up the problem
2. Connectivity – the variables are connected and there are mutual dependencies
3. Dynamics – development of variables over time and across a system
4. Intransparency (difficult to see) – between variables and their values
5. Polytelic (many goals) – there are goal conflicts on different levels of analysis.

The current NHS Dental Contract and how to find a solution seems to me to fit into the category of a complex problem. It may also be a wicked problem, see later.

The steps in Figure 3 give a map to the stages of solving most problems. Probably the most important is the first step – identifying exactly what the problem is.

All too often we think we know what the problem is and then go about putting in solutions, only to find that we have solved the wrong problem. The first stage of identification should take time and investigation. As dentists we are trained to look more deeply, so for example when a patient comes in with pain, it's not always the most obvious problem. Jumping to the first conclusion is not always the right one. The seven steps are very akin to good treatment planning. However, we can use these same steps in many of the problems we face outside the clinical environment. Effective problem solving is one of the key attributes that separate great leaders (and indeed, great clinicians) from average ones.

Wicked problems

Wicked problems are social or cultural problems that are difficult or impossible to solve because: incomplete or contradictory knowledge; the number of people and opinions involved; the large economic burden, and the interconnected nature of these problems with other problems. Rittel and Webber first introduced wicked problems into planning in 1973. Conklin *et al* stated that wicked problems 'were a problem type and not a new way of solving complex problems. Problem wickedness is not about a higher degree of complexity, it's a fundamentally different kind of challenge to the design process, one that makes solution secondary and understanding the problem central'.³

Improving oral health in society is a wicked problem, it involves cultural, social, economic, nutrition and equality issues. The issues constantly change which impact on the solutions, it is a constantly dynamic and fluid situation. Solutions which may have been successful cease to be as the factors change in ways that were not obvious when a solution was first implemented. I hinted above that the dental contact may be a wicked problem. I'll leave that to you to ponder.

Being a good problem solver

I believe that dental professionals are generally good at problem solving, it is part of our training, however, we can always improve and, as noted above, factors change and solutions that worked in the past may not work now. A good problem solver needs to constantly re-evaluate and not rely on past experience alone. Here are a few steps that can improve your problem solving.

- **Take a breath:** A good problem solver stays calm, even in stressful situations.
- **Keep on track:** Having an overview of the situation and the context helps good problem solvers prioritise tasks and reduce vast amounts of information to the most important points.
- **Work strategically, if possible:** Good problem solvers aim to identify and analyse the important variables and try to gain control over the complex situation by using adequate strategies. Don't be knocked off track by minutiae.
- **Evaluate actions and adapt:** Possible sudden changes of the situation and the relationship of variables should be considered. Hence, interactions within the situation should be evaluated and, if applicable, the problem solver's internal representation of the model should be updated. Keep your eye on the ball and be flexible.

Some strategies to solve problems

Brain storming/Thought shower

The term brain storming got some politically correct bad press in the early part of the 21st century. Thought shower was a term developed to replace it. I leave it to readers to decide which term they wish to use.

Often used by groups, but can also be used by individuals. Used to create as many possible solutions to a problem as possible. To be effective, the ideas must not be judged or evaluated in any way as they are being

Table 1 Six thinking hats⁴

White - The white hat is neutral. Facts, figures, and information are examined. It helps to decide if more information is needed.	Red - The red hat is for feelings, hunches, and intuition. There is no need to explain your feelings.	Yellow - The yellow hat is for optimism and a logical, positive view of things. It looks at the benefits. It also helps during the evaluation of ideas.
Black - The black hat is the logical negative. It uses caution and judgement. It does not encourage creativity. It helps during the valuation of ideas. It is usually better to use the yellow hat before the black one, to look at the benefits first.	Green - The green hat is for creative thinking and new ideas.	Blue - The blue hat is used to think about the problem-solving process. It ensures the process is being followed. It helps to decide what should be done next.

developed, no matter how bizarre they seem. Wild and whacky ideas are welcomed. Ideas can build on other ideas. New ideas can be created by changing ideas already mentioned.

The more solutions that can be created, the more likely you are to find an effective one. Also, the more variety there is in the solutions, the more likely you are to find an effective one. Once all possible ideas have been created, they are considered for possible consequences. A solution is then selected.

Thinking Hats

The Thinking Hats model was developed by Edward de Bono in 1985. The model can be used in groups or by individuals. There are six imaginary hats. Each hat stands for a different way of thinking about a problem or issue. Using all of the hats will help to consider the problem more creatively.

The model, shown in Table 1, helps to think about a problem from different viewpoints. If it is being used in a group, all members have on the same-coloured hat at the same time. First all the group is one colour thinking hat, then they move to another colour until all coloured hats have been 'worn'.

Problem reversal

Sometimes, you will get a different view of a problem if you look at it from the opposite direction. This means stating the problem in reverse. Change a positive statement into a negative one. For example, if there is a problem with a member of staff and you want to improve the situation, consider what would make the situation worse, reverse the problem. Strangely, negative ideas can be easier to generate than positive ideas. Problem reversal can seem rather an alien technique at first. Here's how it's done.

For example, if you have a receptionist who is not very good with patients and you want to improve the situation, reverse the problem – ask 'How can I reduce patient satisfaction with reception? Some of the answers might be:

- Not answering the phone when patients call
- Not returning phone calls
- Have receptionists who know nothing about the practice answering the phone
- Use rude reception staff
- Give patients the wrong information.

This has flipped the problem and you can now think how you would like to address those issues. What you would probably do is set up a training programme for your receptionists to make sure they are answering

the phones in the way you want them to, pleasantly and quickly and giving patients accurate information. You can then evaluate if the training has improved the initial problem.

SWOT

This is a problem-solving and strategic planning technique that I'm sure many people are familiar with. The technique is also called a situational assessment or situational analysis. SWOT (Strengths, Weaknesses, Opportunities, Threats) can be used in so many different personal, professional or organisational settings. When writing your Personal Development Plan, you have probably used SWOT to think about your development and what continuing professional development to undertake. It is also a useful tool when planning business or organisational developments. As a general guide strengths and weaknesses are internal to us, whilst opportunities and threats are external to us.

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SWOT can be helpful when evaluating solutions. What are the possible benefits? What strengths are present? What are the weaknesses? What new opportunities or situations can be created? How can we take advantage of these opportunities? What is the possible harm in the problem? What is the possible harm in the solution? The primary goal with SWOT is to grow a picture of areas you are good at – your strengths. These are areas you need to maintain and maybe get even better at. These are your advantage areas, build on them. Your weaknesses are generally areas you would like to improve, minimise or eliminate. For example, if you are not very good at a particular area of dentistry you can either get better at it or you can decide to refer to someone else who is already better at it. Opportunities are things that can help you to improve yourself or your practice. Think about how you can capitalise opportunities. Threats are things that can get in the way of improvement. Alternatively identifying what the threats or obstacles are

can turn them into opportunities as you find ways to overcome them.

Role playing

Role-playing helps to consider the problem from another person's point of view. To do this, adopt the roles of other people who are involved in the problem. Coaches encourage the people they work with to swap chairs to 'become' the other person. The technique can also be described as 'walking in their shoes'. Role play can be used where you have a specific problem that you are grappling with. In that case think about being 'in' the situation you want to resolve. Role play helps you develop a new perspective on the issue or problem.

An alternative use of role play is to choose a fictional character, or even a superhero and imagine how they would deal with a problem. Sometimes being completely whacky can allow a solution to develop that you may not have thought of otherwise.

Whilst it is possible to role play as an individual it is best undertaken between two or more people, each acting out a role to explore a specific scenario. Role play can be particularly useful in preparing for a difficult situation, for example interviews, presentations or emotionally difficult conversation, for example when resolving conflict.

In conclusion, you are probably much better at solving problems that you think you are. The problems you solve easily you tend to forget about, the difficult ones stick in your mind. When you come across a difficult or novel problem then think about tools to help you solve it. Old methods and ways that worked before don't always work; things change. There can be tremendous satisfaction when a thorny problem has been resolved successfully. Problem solvers are always in demand – they bring solutions and everyone loves a solution. ♦

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