Problem Solving and Analytical Skills

Work readiness skill training
Contents
Problem Solving and Analytical Skills.................................................................2
How to develop and demonstrate your problem-solving skills......................2
Developing your analytical and problem-solving skills.................................3
There are several stages to solving a problem:.............................................4
Problem-solving skills and graduate jobs: what do recruiters want?..............4
How will they assess these skills?.................................................................5
At interview .....................................................................................................6
Through group tasks and discussions at assessment centers .......................8
Problem Solving and Analytical Skills

How to develop and demonstrate your problem-solving skills

We all solve problems on a daily basis, in academic situations, at work and in our day-to-day lives. Some of the problems that are typically faced by students include:

- Putting together an argument for an essay
- Debugging a computer program
- Dealing with an awkward customer when working part-time in a shop or restaurant
- Thinking about how you are going to manage your budget to keep you going until the end of term
- Working out why your printer won’t respond
- Developing a strategy to reach the next level of a computer game.

Any job will also bring problems to be faced. It is important to show to a recruiter that you have the right skills to resolve these problems, and the personal resilience to handle the challenges and pressure they may bring.

You need to be able to:

- Evaluate information or situations
- Break them down into their key components
- Consider various ways of approaching and resolving them
- Decide on the most appropriate of these ways

Solving these problems involves both analytical and creative skills. Which particular skills are needed will vary, depending on the problem and your role in the organization, but the following skills are key to problem-solving:

A large cosmetics company had a problem that some of the soap boxes coming off the production lines were empty. The problem was quickly isolated to the assembly line, which transported the packaged boxes of soap to the delivery department: some soap boxes went through the assembly line empty.

The management asked its engineers to solve the problem. They spent much time and money in devising an X-ray machine with high-res monitors manned by staff to watch all the boxes on the line to make
Analytical Ability
Lateral Thinking
Initiative
Logical Reasoning
Persistence

Analytical and critical thinking skills help you to evaluate the problem and to make decisions. A logical and methodical approach is best in some circumstances: for example, you will need to be able to draw on your academic or subject knowledge to identify solutions of a practical or technical nature.

In other situations, using creativity or lateral thinking will be necessary to come up with ideas for resolving the problem and find fresh approaches.

Not everyone has these two types of skills in equal measure: for this reason, team working is often a key component in problem-solving. Further skills, such as communication, persuasion and negotiation, are important in finding solutions to problems involving people.

Whatever issue you are faced with, some steps are fundamental:

- Identify the problem
- Define the problem
- Examine the options
- Act on a plan
- Look at the consequences

This is the IDEAL model of problem-solving.

The final stage is to put the solution you have decided on into practice and check the results.

Developing your analytical and problem-solving skills

Most problem-solving skills are developed through everyday life and experience. However, the following interests and activities may be useful in demonstrating a high level of these skills - this may be particularly important when applying to employers in areas such as engineering, IT, operational research and some areas of finance.

- 'Mind games' such as cryptic crosswords, Sudoku, chess, bridge, etc;
- Computer games – the best of these can involve strategic planning, critical and statistical analysis and assessing the pros and cons of different courses of action;
- 'Practical' interests such as programming, computer repairs, car maintenance, or DIY;
- Working with sound or lighting equipment for a band, event or show;
- Academic study: evaluating different sources of information for essays, designing and constructing a ‘microshelter’ for an architecture project; setting up a lab experiment.

A workman hearing about this, came up with another solution. He got a powerful industrial fan and pointed it at the assembly line. As each soap box passed the fan, the empty boxes were blown off the line. Moral: the simplest solution is usually the best!
There are several stages to solving a problem:

1) Evaluating the problem
   - **Clarifying** the nature of a problem
   - **Formulating** questions
   - **Gathering** information systematically
   - **Collating** and organizing data
   - **Condensing** and summarizing information
   - **Defining** the desired objective

2) Managing the problem
   - Using the information gathered **effectively**
   - **Breaking down a problem** into smaller, more manageable, parts
   - Using techniques such as **brainstorming** and lateral thinking to consider options
   - **Analyzing these options** in greater depth
   - **Identifying steps that can be taken** to achieve the objective

3) Decision-making
   - deciding between the possible options for what action to take
   - deciding on further information to be gathered before taking action
   - deciding on resources (time, funding, staff etc) to be allocated to this problem

4) Resolving the problem
   - Implementing action
   - Providing information to other stakeholders; delegating tasks
   - Reviewing progress

5) Examining the results
   - Monitoring the outcome of the action taken
   - Reviewing the problem and problem-solving process to avoid similar situations in future

At any stage of this process, it **may be necessary to return to an earlier stage** – for example, if further problems arise or if a solution does not appear to be working as desired.

**Problem-solving skills and graduate jobs: what do recruiters want?**

Analytical ability, problem solving skills and using initiative are among the top ten skills for recruiters of graduates. They want people who will take the personal responsibility to make sure targets are met; who can see that there might be a better way
of doing something and who are prepared to research and implement change; people who don’t panic or give up when things go wrong but who will seek a way around the problem.

These problems may be similar to academic problems (e.g. in scientific research) or may be more “practical” problems such as those involved in people management.

These skills can be asked for in a variety of ways. Many job ads will simply ask for candidates who "can take the initiative" or "have the ability to resolve problems"; others, however, may not make it so clear. You have to learn to interpret phrases like:

- "Someone keen to take responsibility and with the confidence to challenge established practices and come up with new ways of working…"
- "An enquiring mind and the ability to understand and solve complex challenges are necessary…"
- "We are looking for innovative minds and creative spirits …”
- "We need ambitious graduates who will respond with enthusiasm to every issue they face…”

These quotes from employers’ job adverts on graduate websites are all asking for essentially the same two things:

- The ability to use your own initiative, to think for yourself, to be creative and proactive.
- The ability to resolve problems, to think logically and/or laterally, to use ingenuity to overcome difficulties and to research and implement solutions.

These qualities help graduates to make a difference to their employer, whether that employer provides a service or manufactures a product.

How will they assess these skills?

On application forms

If analytical or problem-solving skills are a key part of the job, there is likely to be a question on the application form which asks you to give evidence of your competency in these areas, such as:

- Describe a situation in which you analyzed data and solved a complex problem;
- Describe a complex problem you have faced and the steps that you took to solve it;
- Describe a setback in your life and say what you did to overcome it. What lessons did you learn from this?
- Describe a time when you demonstrated creativity in solving a difficult problem;
- Describe a time when you provided a new or different solution to a problem;
- Give me a specific example of a time when you used good judgment and logic in solving a problem;
- Describe a difficult problem that you have solved. State how you decided which the critical issues were, say what you did and what your solution was. What other approaches could you have taken?
- Give an example of a problem you have solved that required analysis. What methods did you use and what conclusions did you reach?
When answering these questions, **cover the process you used to solve the problem rather than just outlining the problem itself.** Give examples of how you used initiative/creativity, or **made effective use of resources**, in solving the problem. It is also useful to say **what you learned from this process**, especially if the problem was not resolved to your complete satisfaction.

Employers may follow up on your answers to these questions at interview: see below. There is further information about **competency-based questions** such as this at

Evidence you could give to an employer to convince them that you have problem-solving skills
Examples could come from your course, extra-curricular activities such as student societies, school, work or work experience, year-in-industry placements, travel or other sources.

EXAMPLES:

- Analyzing data from a project or experiment
- Working as a "troubleshooter" on a computer helpdesk
- Implementing a new filing system in an office job
- Acting as a student rep
- Dealing with staff problems or unexpected staff shortages in a part-time job
- Coping with living on a limited student budget

At interview

Further questioning on the answers given on your application form
If your application form has included competency-based questions such as the ones above, you can expect the employer to ask for more detail about the problem or the situation and the way that you went about finding a solution. Be prepared to be asked about alternative ways in which you might have gone about tackling this problem and what you would have done if things hadn’t worked out.

Hypothetical questions
Competency-based questions ask you about actions that you **have taken** in the past: hypothetical questions ask you about the course of action you **might take** in the event of some fictional situation, often work-related.

- "How would you deal with a staff member who persistently arrives late and takes regular, unauthorized, breaks from work for a cigarette?"
- "You are working on the till in a retail store when a customer’s credit card is refused. The cardholder is a regular customer who is trying to buy a present for their mother’s birthday the following day. How would you deal with this situation?"
- "Your manager regularly leaves you in charge of a small office in his absence. The other staff regularly complain to you about the way he runs things, and how irritated they are by his interference in their day-to-day work - what do you do?"
- "You work in a company that manufactures meat pies and pasties. Sales have been falling for several years and you are asked to come up with ideas to revive the company"

There is usually no right or wrong answer to these questions: the interviewers are seeking to assess your logical thinking and common sense. You may need to ask questions to clarify the situation and
gather more information. You can expect your answers to be challenged, the interviewers asking questions such as:

- “Yes, but what if ...?”
- “Have you thought about ....?”
- “Why would you do that ...?”

This doesn’t mean that there is anything wrong with the answer you have given – just that the interviewers are trying to find out how you have arrived at your solution to the problem. They may also be testing you out to see how you cope with pressure and how well you can argue a point.

Although the situation is hypothetical, if you have been faced with any similar situation in real life you can use this, and the way that you handled it then, to support your answer. **For further information on handling hypothetical questions, see**

**Technical questions**

These are most commonly asked at interviews for science, engineering and IT posts. They may relate to your previous relevant work experience or to a student project, or may relate to hypothetical situations as in the examples below:

- “The scenario was that we were in charge of lighting a theatre. We were given different conditions as to what type of problem could be caused by various faults in the lighting plan and who this problem would affect e.g. lighting technician, stage manager or director. There was only ever one problem with the lighting plan. It got harder as different conditions were added to the original ones and you had to take more and more information into consideration, such as: certain lights need to always be turned on first; some lights need to be warmed up in the breaks; different lights create different effects”
- “I was asked to suggest a route to synthesise ethylene glycol – one of the company’s products” (Chemistry graduate interviewed by petrochemicals company)
- “If I were organising a national cancer screening campaign, what standards/ precautions/ feasibility/ practicality checks would I do before implementing the scheme?” (Medical physicist)
- “They asked technical questions mainly to work out my thought process on problem solving, there was no correct answer as long as they were logical and eventually you had to come to a point where you gave up and admitted defeat!” (Graduate interviewed for IT support post with NHS trust)

**Ethical questions**

These are particularly common in interviews for medicine and law. Some typical examples may include:

- Should all class C drugs be legalized?
- Should doctors be authorized to remove organs from a dead person without obtaining consent from their relatives?
- A patient urgently requires a bone marrow transplant but the only suitable donor is her brother, who has severe physical and mental disabilities. Can this brother donate?
- Should conjoined twins be separated even if it is almost certain that one of them will die in the process?
- Since the victims in rape cases have anonymity, should the same anonymity be granted to the accused?
Again, there is often no right or wrong answer, although you should be aware of the legal and regulatory framework behind these questions. You will be expected to put both sides of the argument before giving your opinion and can expect to be challenged and asked to justify your opinion.

**Through group tasks and discussions at assessment centers**

Almost all assessment centers will involve a strong element of group work. These tasks may involve the group sitting around a table discussing a problem or may (as in the final two examples) be more active and practical:

- "We were asked to come up with a business proposal for building a computer network between an imaginary group of islands, to be presented to the islands government”
- Candidates for a place at medical school were given background information on ten patients and asked to select five of them who would receive a kidney transplant
- "We were provided with information on four sites that were possible locations for the construction of a nuclear power station. This information included material on the environment, the local economy, transport links and the estimated costs of construction. We had to select one and recommend it to the Secretary of State for Energy, giving the reasons for our decision."
- "We were given a task involving Lego bricks - we had to work out how many bricks we wanted to use to build the tallest tower possible at the lowest cost”
- "A large part of the Army Officer selection process takes place outdoors – the teams of candidates have to negotiate an obstacle course using ladders, ropes, poles and planks”

The decision reached by the group is likely to be less important than the way in which the group works together to reach its decision – these tasks aim to test your teamworking and negotiation, as well as your problem-solving, skills.

There is more information about assessment centres,