

Practice Quiz 2 Self-assessment guide

Only one response is permitted for each question. Add the scores for the first response to each question.

Q1: An engineer who achieved higher grades at university tends to perform better in engineering work.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
0	0	10	0	0

Research (though limited) shows that performance of recently graduated engineers as evaluated by their workplace supervisors is unrelated to their university grades. The only significant correlation observed with workplace performance was their ability to build collaborative relationships with more experienced engineers. University grades are determined by many factors unrelated to academic ability, including motivation, economic circumstances, extra-curricular interests and so on. Further, as explained in the book, workplace performance is strongly influenced by understanding ideas that are seldom if ever mentioned in engineering education programmes. Data accumulated by British and European researchers provides evidence that, across all academic disciplines, university grades account for only 10% of observed differences in career performance.

Q2: As an engineer, it is critical that you accumulate sufficient technical knowledge by yourself to solve any problem that you are likely to be confronted with.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
10	10	10	2	0

Research helps to demonstrate that, in engineering, you can never entirely anticipate what you need to know to find solutions that will help in situations that you will encounter. Further, technical knowledge alone is unlikely to be sufficient: all engineering challenges have human, social, and economic aspects, sometimes others. Therefore, it is more critical to build a network of knowledgeable people who can help you. While your own knowledge is essential, you don't need to waste time learning everything for yourself. The essence of engineering practice lies in effective collaboration.

Q3: Engineering is a hands-on practical occupation.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
10	10	3	0	0

Research shows that while some hands-on knowledge can be useful, engineers spend hardly any time with their hands on tools or hardware. Their work is almost entirely intellectual and social, ascertaining needs, conceiving and developing plans, organising the necessary people, finance, materials, components; and supervising the work to ensure that the original intentions materialise.

Q4: In engineering, many decisions are made on the basis of perceptions that can be inaccurate or incorrect.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
0	0	0	10	10

Engineers always work with limited information: getting more takes extra time, adding to the cost. Engineers are nearly always reliant on the knowledge and perceptions of other people as well, relayed by human communication processes that involve reinterpretation and a degree of translation. It is relatively uncommon for engineers to work with entirely precise and unambiguous information.

Q5: Being a successful engineer depends primarily on your technical expertise.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
10	10	7	3	0

While technical expertise is what distinguishes an engineer, success in engineering primarily depends on effective collaboration: helping other people successfully implement ideas based on the application of technical knowledge.

Q6: Facts are more objective and unbiased when stated in terms of numbers rather than words.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
10	10	0	0	0

Numbers are meaningless without words to describe what they signify. Therefore, a description (in words) lies behind every number, and assumptions about a physical process lie behind every measurement. While the interpretation of words relies on each individual's prior knowledge, and therefore is always different to a degree, we are all reliant on ideas expressed in words. Engineering is no less dependent than any other intellectual discipline.

Q7: The ability to build collaborative relationships with more experienced engineers, suppliers, and site supervisors has more of an effect on workplace performance in engineering than academic ability.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
0	0	10	10	10

While this may be uncomfortable for engineers who feel that their social skills need further development, it is supported by research evidence that shows most engineers spending most of their time on collaboration activities. Of course, there are many different ways to collaborate: not everyone can be a brilliant writer, or a brilliant negotiator. As explained in the book, anyone can master collaboration expertise with sufficient effort and special kinds of practice.

Q8: Most of what an engineer needs to know is learnt in the workplace.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
2	7	7	10	7

Engineers are learning all the time: aside from developments in science and technology, research shows that they learn about how their workplace peers perform, client and end-user needs, performance of engineered artefacts and systems, in-service failures, competing firm capabilities, and many others. Much of this learning takes place subconsciously: it is informal or incidental learning. Since learning is occurring all the time, at any stage in their career, most engineers will have learned more in the work place than in their formal education.

However, one could also argue that all of life's experience, including formal education from kindergarten to high school, even current experience outside the work place, has been a learning experience in which case one could disagree with the proposition above. Engineers exchange "war

stories" at social gatherings from which they pick up ideas and experience that is valuable in their work.

Q9: You can only learn communication skills by practice; they cannot be taught.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
10	7	0	0	0

Research shows that communication skills, like any others, can be taught, and that teaching is highly effective if structured appropriately. It is surprising that so many students and engineers think otherwise, despite have been taught to read and write in school for many years, and few would disagree with the benefits of education for their own children.

Q10: In engineering, decisions are almost always based on technical facts, computation, analysis, results, and logic.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
0	10	10	0	0

While technical logic plays a major part in most decisions, many other factors also exert strong influences.

First, "facts" can only be framed with words which are reinterpreted by everyone who reads them on the basis of personal prior knowledge, and even the author may see them differently afterwards. Assumptions which are often unstated lie behind every step: measurements, stored data, analysis methods, and drawing conclusions.

Second, economic factors particularly, and often factors such as the technical knowledge and capability of the people who have to implement technical ideas influence decisions. For example, technical safety factors often depend on the degree of skill involved in manufacturing and assembly processes.

Third, the time available to make decisions may limit the ability of the decision maker to become familiar with all the relevant technical factors that, ideally, should be taken into account.

Q11: Engineers often have to work with vague verbal statements of requirements from their clients.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
0	0	0	10	10

For many (but not all) engineers, it is rare to work from a comprehensive and detailed written statement of client requirements. Many clients are not engineers and don't know how to describe their requirements in the form of detailed technical specifications or statements of requirements. Clients who can afford to employ their own engineers are usually the only ones who can provide detailed specifications, and often these leave out much of the necessary detail. The gaps in detail then need to be filled in through discussions with the client, usually with their own engineers if they employ them.

Q12: Graduate engineers, on average, spend just as much time interacting with other people as senior engineers, who often have management responsibilities.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
0	0	0	10	10

Research shows that the proportion of time spent interacting with other people in an engineering work place does not change with career advancement, experience or level of responsibility. This was a surprise because it was, and still is widely thought that early career engineers spend much more of their time on engineering analysis and design work, compared with more senior engineers who have supervision and management responsibilities. The amount of time on individual aspects of engineering work is highly variable, even for the same person from one day to the next. However, the proportion time spent on interactions with other people (including through written documents and email) is much more consistent from day to day and between individuals.

In a research survey performed among Australian engineers with 1 to 25 years experience, the average score was 54/120 and there was no relationship between experience and score, providing evidence that the misconceptions in this quiz are persistent and do not change with exposure to engineering practice.