CANDIDATE GUIDE

COMMUNICATE CLEARLY

OUTCOME 5

TABLE OF CONTENTS

PAGE NO.

CANDIDATE INFORMATION

Details	Please complete details
Name of candidate	
Name of supervisor	
Work Unit	
Name of mentor	
Date started	
Date of completion & Assessment	

COMPETENCY STANDARD REQUIREMENTS

(Direct extract from SAIMechE's Standard of Professional Competency)

LEARNING OUTCOME 5

Communicate clearly with others in the course of his or her engineering activities.

Assessment Criteria:

The Candidate demonstrates effective communication by:

1. Writing clear, concise, effective, technically, legally and editorially correct communication (e.g. letters, emails, reports, memos, specifications, etc.) using a structure and style which meets communication objectives and user/audience requirements;
2. Reading and evaluating technical and legal matter relevant to the function of the Professional Engineer;
3. Receiving instructions, ensuring correct interpretation;
4. Issuing clear instructions to subordinates using appropriate language and communication aids, ensuring that language and other communication barriers are overcome;
5. Making oral presentations using structure, style, language, visual aids and supporting documents appropriate to the audience and purpose.

Range Statement:

Material relates to technical aspects and wider impacts of professional work. Audience includes peers, other disciplines, clients and stakeholder audiences. Appropriate modes of communication must be selected.

KEYS TO ICONS

The following icons are used throughout the study guide to indicate specific functions:

	**DON'T FORGET/NOTE** **This icon indicates information of particular importance**
	**CANDIDATE GUIDE** **This refers to the learning material in this module which is aligned to the SAIMechE Standard**
	**EXERCISES** **Practical activities to do, either individually or in syndicate groups during the training process**
	**BOOKS AND WEBSITES** **Additional resource information for further reading and reference**
	**SELF TEST QUESTIONS** **Self-evaluation for candidates to test understanding of the learning material**
	**QUOTATIONS** **Quotations which offer interesting points of view and statements of wisdom and insight**
	**YOUR NOTE PAD** **Provided for candidate to document notes during presentation of training**

GENERAL GUIDELINES

PURPOSE

This module provides an introduction to the basic concepts that you will need to understand relating to communication during the performance of engineering activities. Easy-to-follow steps, based on the assessment criteria of the competency standard, will equip you with the skills to:

1. Know the definitions and major concepts relating to communication
2. Understand the meaning of communicating while performing complex engineering activities
3. Introduce you to the various media and methods of communicating, and possible barriers to communication
4. Follow the assessment criteria steps when communicating effectively

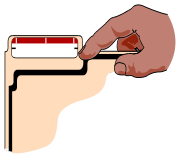
This module introduces you to these communication concepts and criteria. While it may be impossible and impractical to present in this module all the guidelines pertaining to engineering practice, certain issues of relevance will be highlighted and discussed. You, the candidate are expected to expand your awareness of this process through workplace projects and further reading and learning.

Candidates will have the opportunity to discuss and debate communication issues during the workshop, and thereby understand and be better equipped to use these concepts and processes in the workplace.

LEARNING OUTCOME AND RANGE OF LEARNING

This programme uses the basic structure of SAIMechE's Competency Standard and specifically the assessment criteria to take you through the process of learning, as an understanding of the assessment criteria and the range of understanding required is fundamental to professional competence.

CANDIDATE SUPPORT

Resources	Candidate Guide 	The Candidate Guide is a manual covering the theory of the comprehension and development of advanced knowledge, and provides guidance on practical exercises to meet the requirements of the assessment criteria
	Candidate Portfolio of Evidence Guide	This is a separate document which provides guidelines for Candidates on how to compile their portfolio of evidence, and a template to structure their practical task evidence into a file format for assessment by the mentor/referee
	Books and websites 	Refer to references at the end of the Candidate Guide
	Videos 	Refers to any videos that are regarded as relevant to the subject
	Folder enclosures 	This includes all handouts, checklists, etc. the “Engineer’s Code of Conduct”

SECTION 1

COMMUNICATE CLEARLY

LEARNING OUTCOMES:

- Define and describe what is meant by the word, “communicate”
- Understand the context of communication
- Be aware of the media of communication
- Be aware of the barriers to communication

1.0. MANAGE COMPLEX ENGINEERING ACTIVITIES

1.1. Engineering Activities

1.1.1. Activity:

The dictionary definition is “exertion of energy; the state or quality of being active”. This has a wonderful engineering flavour as engineering is about energy, about getting something done or made. So here we are dealing with work, an activity requiring energy and therefore direction and focus. But we are not just talking about any activity: we are talking about engineering activities.

1.1.2. What are engineering activities?

Let us go back to Outcome 2 for the definition we used of engineering and then build on that to formulate a definition of engineering activities.

The American Engineers' Council for Professional Development has defined "engineering" as: “The creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works, utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behaviour under specific operating conditions; all as respects an intended function, economics of operation or safety to life and property.”

So what activities can we identify that relate to the above definition? Here we turn once again to the Competency Standard, as all the activities identified in the Standard are *primary engineering activities.* These are:

- Define, investigate and analyse
- Design or develop solutions
- Comprehend and apply advanced knowledge
- Manage (the subject of this workshop)
- Communicate clearly
- Recognise social, cultural and environmental effects
- Meet all legal and regulatory requirements
- Act ethically
- Exercise sound judgement
- Be responsible
- Undertake professional development activities

The above activities will form the framework within which many sub-activities can be placed, and it is to these as well that we will refer when speaking of engineering activities. Activities include but are not limited to: design, planning, investigation and problem resolution (Outcome 2); improvement of materials, components, systems or processes; manufacturing or construction; maintenance; project management; and research and development. Further activities include computer-aided design, modelling for theoretical development, and machine shop fabrication. In relation to this specific Outcome, activities may include writing emails or letters, speaking, presenting, giving and receiving instructions within the context, the environment, the situation, of one or many of the activities mentioned above. The context of the communication activity will influence the format, medium and methods of communication used.

1.1.3. The context

Within this context of “Engineering Activities” we need to ensure clear and appropriate communication. It is while you are designing, problem-solving or gathering and sharing knowledge that clear communication needs to take place. During the course of your activities you may be attending or participating in seminars or workshops and within this context clear

communication must take place. You may be fully focused within you own specific practice area and working with a computer when you need to communicate clearly. You may be writing or speaking to one person or communicating to a small group or a large audience where you will need to communicate clearly. The context, the circumstance, is that of “Engineering Activities”.

The Competent Engineer operates in many spheres during the course of his life but the focus of this workshop is on communication during the course of his/her Engineering Activities. There is no doubt that the skills obtained operating in this context will be of benefit to the Engineer in all other spheres of his life.

1.2. Communicate With Others

1.2.1. Others

During our engineering activities we do not communicate within a vacuum. When we are communicating there are always other people involved. It may be one-on-one communication, or communication with a small group, your team, or a large audience. But there are always other people involved and therefore a relationship or relationships. The concept of relationship raises many challenges and factors which need to be taken into account when attempting to communicate clearly.

If there is no relationship, there is no communication. Even when you meet a person for the first time a relationship comes into being and the communication takes place within that context. And the nature of that relationship determines the quality of the communication. The fact is that the better the relationship, the better the communication.

Establishing a good relationship with a person or group of people therefore becomes a fundamental requirement for effective communication. Relationships are about the way in

which people talk to and behave towards each other. Talk is the doorway to communication, and behaviour defines the interaction between people. How we talk and behave defines the outwardly visible actions that we can observe and evaluate as people are relating. The quality of these actions determines whether the relationship is effective, and it needs to be effective if meaningful communication is to take place. The quality of our relationships is the most important factor in determining the effectiveness of our communication, and the effectiveness of our engineering activities. Barriers in relationships result in barriers to communication. Developing skills in relationship building will contribute towards your skill as a communicator. It is here that we see once again how the various Outcomes in the SAIMechE Standard of Competency are circular in nature and form part of a total system. In Outcome 4 a lot of emphasis is placed on the building of good relationships in order to be an effective manager, and this feeds into this Outcome about communication. In effect, all the Outcomes communicate with each other.

This alerts us the concept of barriers to communication. We will deal with these in greater detail in 1.4.2.

1.3. Communication

1.3.1. The definition of communication

According to the Concise Oxford Dictionary, communication is “the science and practise of transmitting information”. Information needs to be moved from one person to another: it needs to be transmitted. This is a common term used in the electronic media with which we are all familiar. The news is transmitted from a radio studio via the airwaves to a receiver. The information is transmitted, or moved, from one place to another. So communication is the science and practise of doing this. The mention of the word “science” indicates that there is a lot to know about communication: theories, experiments, evidence and techniques. The mention of the word “practise” means that the science is taken beyond theory to practical use

of the ideas and concepts. And this opens us up to the reality that this business of communicating is not that easy or simple. There is a lot to learn about it. The reality is that communicating effectively is very complex. There are a lot of barriers to effective communication, and a lot of media and methods to be considered before it becomes effective. And effective it must be in the life of a competent engineer otherwise the very competency of the engineer will come into question. It is vital that an engineer communicates effectively while performing engineering activities.

1.3.2. Types of communication

According to Stephen Covey (Covey, 1989) there are four basic types of communication. They are reading, writing, speaking and listening. In the example above, the radio announcer is speaking and the person who has the radio is listening. This introduces us to the concept of "media". In this case the medium (singular of media) of the communication is the radio transmitter with all its technical and administrative setup. We also introduce the concept of "barriers to communication" as we consider the possibility of poor reception or the announcer speaking in a language that the person listening does not understand. We will consider the communication media and the barriers to communication in 1.4.

1.3.2.1. Listening

We believe that the cornerstone of effective communication is listening. And not only listening, but listening with understanding. "Seek first to understand" (Covey, 1989). If you listen and understand what a person wants then the communication will have been effective and as an engineer you stand a very good chance of producing what the client requires. If you do not truly understand and you impose your own perception onto the situation, then there is a very good chance that the communication will not have been effective and what you produce may be off the mark as far as the client requirements are concerned.

> "Listening is a skill you acquire naturally, but can improve upon if you're motivated to do so"
>
> *O'Rouke, 2009*

Make the effort to pay attention to what people are saying. On a regular basis pay attention with total awareness to what another person is saying until it becomes an unconscious habit. As a regular practice, let other people complete what they are saying, then repeat back what they have said in your own words and confirm that they agree that you have understood what they are saying.

There is more to listening than just hearing a person's words.

> "Communication experts estimate, in fact, that only 10% of our communication is represented by the words we say. Another 30% is represented by sounds, and 60% by our body language"
>
> *Covey, 1989*

So, if 60% comes from body language then if we are to communicate effectively as competent engineers we need to become proficient in understanding this aspect of listening, such as hand gestures, the crossing of arms or a more blatant action such as turning and walking away. The need for this skill is not to be taken lightly and it needs to be handled with care as it is very easy to misinterpret what you see if you do not follow up with questions to clarify a situation.

http://www.mindtools.com/pages/article/Body_Language.htm
http://www.skillsyouneed.com/ips/listening-skills.html

1.3.2.2. Speaking

The second basic type of communication is speaking. Language is one of the things that separate humans from animals. We have developed sounds that have meanings that enable us to communicate with greater range and depth. There are however many different languages and dialects around the world which unfortunately complicates the process. Language is also embedded in culture which adds other dimensions and further barriers to communication. In order for a competent engineer to communicate effectively, these factors need to be taken into account and all barriers eliminated, or at least adjusted for, to ensure effective communication.

Speaking can take the form of addressing a single person, perhaps a subordinate or colleague; a small group, perhaps your work team or a group of clients; or a large group in the form of an audience. Each situation requires specific skills that need to be mastered by the competent engineer.

When engaging in one-on-one spoken communication, it may be useful on occasion to ask the person to whom you are speaking to repeat back to you what you have said. This will enable you to determine whether you have clearly conveyed the message to them. It will also help you clarify whether they have understood the information as you intended it.

Public speaking may be considered one of the most stressful activities that a person will undertake but it must become an important skill in the competent engineer's toolbox. Below are some of the important points to note when you are required to speak to large groups of people.

Thorough preparation is the cornerstone of good public speaking. Determine first of all what the main message is that you want to convey, the purpose of your presentation, and then do all the research you can and prepare well. Having done the preparation, construct an outline and include the main points that you want to get across. From here on it is all about rehearsal and practise. The more you practise the more confidence you will have in your ability to

deliver your message. The best speakers are able to stand up and deliver their presentations extemporaneously (speaking without notes at any moment) only because they know their subject well and have rehearsed and practised a lot.

http://www.toastmasters.org/tips.asp
http://www.ucdmc.ucdavis.edu/hr/hrdepts/asap/Documents/Communication_Skills.pdf
http://www.wikihow.com/Develop-Good-Communication-Skills

1.3.2.3. Writing

Writing was invented by a number of civilizations at different times from between 4500BC to 300BC. These included the Sumerians, the Chinese, the Egyptians and the Mayans. We use writing today as one of the fundamental means of communication. During the course of your engineering activities you will come across numerous examples of written communication and will have to deal with it competently. These communications will vary from a cell phone sms to a comprehensive written report full of technical jargon and legalese. Whether you are writing by hand with a pen or pencil or typing on a tablet, phone or computer, this is communication by writing. It is a very important skill for a competent professional engineer. Clear, legible writing is very important as poor indecipherable writing is not only a waste of time but may lead to lack of clarity and miscommunication. Writing skills in all their many forms need to be developed and used competently. This process will be detailed in Section 2, where a practical process will be introduced to help develop your skill. For now, let us look at a few points of general interest which will highlight the importance of effective writing.

(a) Hand writing

There is a lot to be said about maintaining the skill of writing things down by hand.

"A couple of studies, though, substantiate why the physical act of writing really does boost learning and goal achievement. Hoping to provide actual scientific proof on the efficacy of writing down and sharing goals (to make up for an often-quoted mythical Harvard/Yale study of goals (the class of '53)), a psych professor at Dominican University of California found that people who wrote down their goals, shared them with others, and maintained accountability for their goals were 33% more likely to achieve them, versus those who just formulated goals."

Lifehacker

(b) Journaling

Writing in a journal on a daily basis can also be a powerful tool on the journey of becoming more competent in all areas of our lives.

"The discipline of putting thoughts into writing is gruelling, but powerful and clarifying"

Covey, 2004

Journaling can make you aware of patterns in your life and raise awareness as to areas where you may be developing self-defeating patterns or behaviours. Noticing and taking action to change behaviour can contribute to a greater awareness of not only your own behaviour, but the way in which it impacts on your ability to communicate and influence events and activities.

(c) Typing

Because so much communication is done today using a computer keyboard or other devices which use keyboards in one form or another, it would be of great benefit to you to learn how to type efficiently and not remain a one or two finger typist who cannot take your eyes off the keyboard. Writing reports and other activities that require a lot of written material can be done

efficiently by typing into an electronic device where they can be stored, transferred and accessed for later editing or retrieval. Online courses are available to help you improve your skill.

http://www.youtube.com/watch?v=CN1BdvzyMPU
http://www.visualnews.com/2013/05/28/how-does-the-act-of-writing-affect-your-brain/
http://lifehacker.com/5738093/why-you-learn-more-effectively-by-writing-than-typing
http://www.goodtyping.com/

1.3.2.4. Reading

A lot of information is absorbed by reading. You may enhance your knowledge of a subject by reading a book, a webpage or a report on a subject of interest to you. Reading, writing and arithmetic have become the fundamentals to an adequate education. Once the basic skill of reading is mastered, it is used to open the door to ever-increasing quantities of knowledge. Outcome 3 spells out how important it is to comprehend and apply advanced knowledge of principles. One of the ways this knowledge is acquired is through reading. A competent engineer will need to continue reading throughout his career in order to obtain and advance his knowledge and skill. This may be done by reading books, magazines, journals, papers or the many sites now available on the internet.

Reading is also required to achieve Outcome 11, which deals with “Ongoing Professional Development”. This encourages competent engineers to continue reading on a wide variety of subjects in order to keep up to date with developments in the profession. This may include attending workshops where manuals and presentations will have to be read. The principle of on-going learning is supported by regular reading patterns which enhance the competency of the engineer.

http://www.liveink.com/whatis/history.htm

1.4. Clear Communication

In order to ensure that the intended communication has taken place and that the message is clear and unambiguous (not obscure or having double meanings), we need to consider two important issues: the media of communication and barriers to communication.

1.4.1. Media of communication

The communication medium, or channel, refers to the mechanism by which communication takes place. We are all familiar with the term mass media, the plural of medium, which refers to those mechanisms which can be used to communicate information to a lot of people at once, such as newspapers and television. Is it written or spoken communication? Does the communication take place using a cell phone sms or a computer generated email? Or in a desperate situation do you have to resort to smoke signals!

http://adventure.howstuffworks.com/survival/wilderness/how-to-send-smoke-signal.htm

Choose your medium carefully so as to ensure its effectiveness, in terms of effort, cost and understanding. The correct medium is often the least complex.

http://www.communicationtoolbox.com/types_of_communication_medium.html
http://en.wikipedia.org/wiki/Media_(communication)

1.4.2. Barriers to communication

There are many things that can get in the way of effective communication. One of the most obvious is that of language difference. It is not easy for two people to communicate if they speak and understand two different languages. There are, however, many other barriers to effective communication, from the obvious to the more subtle. A simple sms message may not

reach its destination because one digit of the phone number was typed in incorrectly. Cultural differences may also make it difficult to transfer information because of different meanings given to the information by different cultures. These differences must be taken into account when attempting to communicate, and steps must be taken to eliminate these barriers to understanding.

http://everydaylife.globalpost.com/examples-barriers-communication-4294.html

GROUP DISCUSSION

Select one of the following topics:

1. Ineffective communication is the fault of the sender. Discuss and decide either yes or no, and justify your position.
2. List at least 5 different communication media and 5 situations in which each of the media would be most appropriate.
3. Debate the value of face-to-face communication within an office context where there is the possibility of communicating using only email or sms facilities.
4. What are the most serious barriers to communication that you have personally encountered in the course of your life and how could you reduce or eliminate them?

INITIAL TEST

Complete the Initial Test in Appendix 1 (10 minutes are allocated for this).

SECTION 2

A PRACTICAL COMMUNICATION MODEL

LEARNING OUTCOMES:

- Understand the practical steps to be taken when communicating
- Be competent in using the steps to communicate
- Be prepared to apply this process within the workplace on a regular and routine basis

2.0. A PRACTICAL COMMUNICATION MODEL

2.1. Introduction

This section will take you through the assessment criteria which form the basis of a practical model which can be effectively used on an on-going basis when communicating in your work environment.

The introductory statement of the Assessment Criteria is “The Candidate demonstrates effective communication…”

Let us first take a moment and look at the word effective. This is what the process is all about. Effective means “it comes into operation, it happens”. The intention of the communication has the intended outcome, not something else. Energy and time are not wasted and what was intended in fact takes place. The goal and the objective is achieved when communication is effective. A competent engineer will make every effort to ensure that communication is effective.

2.2 Steps in communicating effectively

Step 1: Writing clear, concise, effective, technically, legally and editorially correct communication (e.g. letters, emails, reports, memos, specifications, etc.) using a structure and style which meets communication objectives and user/audience requirements

a. Writing

> "Very few people think writing is easy. Good writing, that is writing with power, grace, dignity and impact, takes time, careful thought, and revision."
>
> *O'Rourke, 2009*

Writing, for the practising engineer, may mean a simple note scribbled on a piece of paper, a handwritten instruction, an e-mail typed on a computer or a full and extensive typed report both submitted electronically and presented in hard copy. Whatever the nature of the written material, it needs to be effective. In some instances the hastily-written message scribbled on a scrap of paper may be the most effective way of communicating the required information, but then the writing must be legible, the content clear and unambiguous, and the note delivered in time.

b. Clear, concise, effective, technically, legally and editorially correct

There are seven powerful and important words here that must be kept in mind when any written communication is undertaken. We will attach a brief explanation to each in an attempt to focus our attention on the essence of the word and make it easy to remember in practical situations.

Clear: When clearing a forest the ground becomes visible. There is nothing hidden. Clear writing ensures that what needs to be communicated is communicated without any hidden meanings or ambiguity (more than one meaning).

Concise: According to the Oxford Concise Dictionary (1976), concise means "brief but comprehensive in expression". Write what needs to be written as briefly as possible, but ensure that all that needs to be conveyed is included. Do not use words just to fill up space.

Effective: Effective means it comes into operation, it happens. The communication gets the intended point across and the objective is achieved.

Technically: Engineering is about technical matters and any information communicated must be technically correct. If a piece of stainless steel of a specific grade is required in a project the information conveyed must be correct, otherwise the success of a major project and objective may not be achieved. Careful attention to detail is therefore required in communicating technical information.

Legally: A competent engineer often has to perform within the context of a legal environment. All countries, provinces and municipalities have laws that have to be complied with, and a competent engineer cannot make assumptions about the legal requirements. Any legal statements must be correct and accurate when stated in writing. The input of a lawyer may be required to ensure that written legal statements are correct.

Editorially: According to Wikipedia, editing is “the process of correcting or revising text”. There are appropriate ways of spelling words, using grammar, writing sentences and forming paragraphs that are accepted norms and ensure a consistent understanding of the meaning of written documents. In order to be concise, effective and easily understood, it is important to produce a well-edited document. Once again a competent engineer may call upon the services of a specialist to ensure the editorial correctness of an important document.

Correct: The Oxford Concise Dictionary (1976) defines correct as “true, accurate...in accordance with a good standard”. The work of a competent engineer must be true, accurate and in accordance with a good standard to be considered effective, reliable and useful. The effectiveness of the work will be measured by how well it is communicated.

c. Reports

Writing reports is often a major activity for a competent engineer. Reports communicate the response of the engineer to the requirements of the client. The solutions to problems, as would be undertaken in Outcome 2, are often presented in the form of reports. These reports contain the nature of the brief regarding the problem, the basic assumptions made, technical information gathered and calculations made. Conclusions and recommendations are also contained in such reports.

http://www.mech.utah.edu/~rusmeeha/references/Writing.pdf
http://www.coe.montana.edu/StudentWritingAid/IECommunications/Reports/report%20template.html

d. Structure and style

Every type of writing has its own appropriate structure and style. When writing an engineering report you would not use the structure or style of a romance novel or that of a script for a film. Each time you produce some form of written communication, ask what the purpose is and select the most appropriate style and structure. If you are sending a request to a client asking for a meeting, a short email written in simple language would most likely be sufficient. However, if you were writing to a supplier who had failed to meet your expectations on a number of issues, a detailed message which included a list of carefully indicated items and a strong statement of your dissatisfaction in an assertive style would be appropriate.

http://www.reading.ac.uk/internal/studyadvice/StudyResources/Writing/sta-style.aspx

e. Audience requirements

The audience, or user, who will be receiving and using the written communication, must be taken into account. To use a ridiculous example, it would be pointless writing a handwritten letter in English to a Chinese car maker outlining the design of a nuclear power plant. There are just too many barriers to communication. The requirements and the circumstances of the audience must be established. What language do they speak? Are there any cultural differences that may need to be taken into account? Do they have the same type of communication technology as you do?

If a competent engineer were asked to submit a design for an air-conditioning plant for a South African building, the report would be written in the language requested by the client, perhaps English, Afrikaans or Zulu, and submitted by email or hard copy. The report would include written information as well as technical drawings in a format that the client can access. The competent engineer would have established beforehand what the format would need to be. All these steps speak to the requirement of taking the client's needs into account and accommodating all their requests as far as is reasonably possible.

Step 2: Reading and evaluating technical and legal matter relevant to the function of the Professional Engineer

a. Reading

Right now you are reading this material. By reading it you will gain an understanding of the material and be able to use it in your workplace. As a competent engineer you will also have to read technical and legal documents to gain understanding of their content and therefore be able to make use of that information in the project to which it relates.

Technical and legal documents have a language of their own and the competent engineer needs to gain knowledge of this language. This is only done by reading information on such documents and reading the documents themselves. Never pass over a word or a concept that you do not understand. Find out immediately what it means.

For example, if when reading a technical document, you come across the formula "*F* = *m* x *a*", do not just pass it over. Find out what it means. Discover that *F* = force, *m* = mass and *a* = acceleration. Now you know that "Force = mass times acceleration", Newton's second law of motion.

The same applies to a legal document. For example, you come across the words "*force majeure*". "The term *force majeure* relates to the law of insurance and is frequently used in construction contracts to protect the parties in the event that a segment of the contract cannot be performed due to causes that are outside the control of the parties" (http://legal-dictionary.thefreedictionary.com/Force+Majeure). You have taken the time to find out what it means and can now use it correctly in a report.

The above examples are simple and were specifically chosen because you probably know what they mean already. But the same principle of establishing meaning and correct use applies to any technical or legal terms. Find out what they mean and how they must be used as you will be required to use them during the course of your professional career. There is no substitute for reading and thus searching for the correct meaning and appropriate use.

http://www.evergreen.edu/writingcenter/handouts/science/Technical%20language.pdf
http://www.labour.gov.za/DOL/downloads/legislation/acts/occupational-health-and-safety/amendments/Amended%20Act%20-20Occupational%20Health%20and%20Safety.pdf

Step 3: Receiving instructions, ensuring correct interpretation

During the course of an engineer's career he will receive numerous instructions from superiors, clients and colleagues. It is vital that he understands the instruction as it was intended by the person giving the instruction. Even though the sender carries the bulk of the responsibility to ensure that effective communication takes place, the person receiving the instruction must make every effort to participate in the process effectively and not become a barrier to communication.

This takes us back to section 1.3.2.1 and that powerful word: listening. Listening forms a fundamental component in the effective receiving of instructions. If a receiver cannot listen well, there is a great risk of instructions not being given correctly. Listen and understand. If there is any doubt about what is being said or written, ask for clarification. Cultural and or status issues must not be allowed to deter a receiver from asking for clarification. The famous theory regarding Korean airline accidents put forward by Malcolm Gladwell in "Outliers" is an example of how such factors can influence the effective receiving of instructions: http://www.publicspeakingtoolkit.com/ethnic-theory-of-plane-crashes.html

When receiving instructions, evaluate what you are receiving by using the following words to question the information:

What is being received? **What** must I do with it?
Who is sending the information? **Who** must it be sent to?
When was it sent? **When** does it need to be passed on?
Where does it need to go? **Where** does it come from?
Why was it sent?
How was it sent and/or **how** must it be responded to?

Asking these questions using the 5 W's and an H will often help to clarify what was received, what has to be done with it, and helps to ensure correct understanding. This will go a long

way in ensuring that the information being received is correctly interpreted and ready to be acted upon.

Interpret means to bring out the meaning of something, the intended meaning of the sender and not some perceived meaning of the receiver. Asking questions will clear away any misunderstanding and get the sender and the receiver to a common understanding. This applies no matter what media is being used to convey the message. The objective is to ensure that the message is correctly received regardless of how it is sent.

The most important secret to the accurate interpretation of any instruction is to ask questions to clarify issues and to continue asking questions until you are completely satisfied that the instructions are clearly understood. Do not assume anything and pursue the clarification of instructions until all ambiguity has been eliminated. Look, listen and understand - nothing less.

http://toolboxes.flexiblelearning.net.au/demosites/series5/501/shared/resources/catalogue/communication/receiving/receive.htm

GROUP DISCUSSION

Select for discussion one of the topics listed below.

1. Discuss which of the four types of communication (listening, speaking, reading or writing) is the most important.
2. What role does body language play in communication?
3. What do you believe has had the most impact on communication over the last 100 years?

Step 4: Issuing clear instructions to subordinates using appropriate language and communication aids, ensuring that language and other communication barriers are overcome

The first step in giving instructions is to evaluate potential communication barriers. What is likely to prevent communication from taking place? Again use the 5W's and an H to establish these factors. **What** language does the receiver speak? **What** is the appropriate language and at what level of complexity can it be used? It is not appropriate to issue a technical report to an accountant who may have no understanding of the terms used. **When** does the receiver need this information? **How** can I get feedback to ensure that the information has been received and understood?

Other questions will also help to eliminate any barriers that are identified. Can the receiver read? Does the receiver have an email address or does the instruction need to be verbal? Can the receiver hear me?

Having checked these factors, eliminated any barriers to communication as far as possible, checked what language and at what level it is appropriate, it is now important to ensure that the communication is clear and given with the use of suitable communication aids.

A communication aid helps people communicate more effectively with those around them. Cell phones have enabled many people who previously had no way of keeping in touch with each other to communicate at any time of day. Computers and the internet have revolutionised communication over the last 20 years and, when used appropriately, are powerful tools that save time, money and confusion.

This is a vast subject that can and should be explored to great depth so as to get the best out of all communication aids in the context of engineering activities. Select from your experience and the advice of experts what communication aid may best suit your purpose and circumstances. If you are setting up the equipment for a new mine in an arid and isolated part

of the country, a satellite telephone may be just what you need. A note written on the back of a business card may be all that is needed during a presentation when you are not able to speak. Each situation has its own appropriate communication aid.

By checking for communication barriers, selecting the appropriate language and communication aid, you are more likely to be able to issue clear and unambiguous instructions to the receiver and ensure that clear and effective communication has taken place.

http://management.about.com/od/people/a/GiveOrders0206.htm

Step 5: Make oral presentations using structure, style, language, visual aids and supporting documents appropriate to the audience and purpose

Making oral presentations, or as it is more generally called, “public speaking” can be a very stressful activity and especially so if you have never done it before.

> “The words “public speaking” strike fear and anxiety into the minds of otherwise competent and confident people. Does the thought of speaking in front of a group evoke fear, make you sweat, start your heart pounding? It's likely you have glossophobia - the fear of public speaking.”
>
> *http://sbinformation.about.com/od/marketingsales/a/speaking.htm*

The competent engineer will need to get over this fear, if he has it, as making oral presentations will be necessary. There are a number of tactics which can be learned along the way to reduce the stress and enhance your level of skill. Experience is, however, the greatest teacher and if you want to become competent, take the first steps by addressing a small group of people you know well and then work your way up to that boardroom of business acquaintances and after that the auditorium of public strangers.

To further reduce the stress and develop your skill and effectiveness take note of the following aspects of public speaking.

a. Purpose

Why are you speaking? The first step in communicating through the medium of an oral presentation is to know why you are going to speak. Ask yourself what the purpose of the oral presentation is. What do you want to achieve?

> "If you can't come up with a reason for speaking, then don't speak!"
>
> *James O'Rourke,2009*

Public speaking is not a very efficient way of transmitting information, as listeners do not easily retain all the information that is presented. Every effort must therefore be made to eliminate any barriers to communication and make the message as clear as possible and easy to absorb. Be clear what you purpose is, know what it is that is important to get across and direct your efforts at this objective.

b. Audience

Find out as much as you can about your audience. Mould your presentation to fit your audience and their requirements and expectations. Basic things like what language they can understand and levels of education are vitally important. Your audience will determine to a large extent the nature of your oral presentation.

A technically aware audience will respond very differently to a presentation full of graphs and formulae than will an illiterate group of manual workers! The audience sets the context within which your presentation will be made and to a large extent determines whether or not it will be successful.

Are your audience a group of people who just need information in order to better perform their tasks related a specific project, or are they final decision makers who may need different information in order to make critical decisions which may impact on the lives of other people? A little time spent in establishing this information may make all the difference to the effectiveness of your oral presentation.

c. Presentation

Once the purpose and context is established, the following details need to be considered before the actual work starts on preparing your oral presentation.

Language: Make a decision as to what language you will be using to make your presentation. Your audience and your own proficiency in various languages will to a large extent determine what language you will use. Making an oral presentation is a big enough challenge in itself, so always select a language that you are comfortable with unless circumstances determine otherwise.

Style: Once the language has been selected, then the style can be chosen. Different styles need to be used for different audiences. As you would by now know what your purpose is and who your audience is, the style of presentation can be selected. Will it be formal or informal? Will it be a lecture style with little or no audience participation or will you encourage engagement with the audience? Will your language be formal or colloquial and will you be totally serious or will you inject humour into the situation? Choose the style that is appropriate to your audience and your purpose.

Structure: It is at this point that the process of putting your presentation together can start. Apply the 80:20 Rule. Spend 80% of your time researching what you need to include, having established what your purpose is. Ensure that your knowledge of the subject is sound and establish the main points that you want to convey.

Consider the order in which you will present your information. The rule of thumb is that there are always three parts to a good presentation. A beginning a middle and an end! More precisely, these are called an introduction, the body of the speech and the conclusion. The body may have two or three subsections. Do not have too many, and ensure they are well related so as to maintain subject flow. Then spend 20% of your time rehearsing.

Visual aids: The following statement may be hard to accept but I believe it to be substantially true. The best oral presentations are those given from a base of extensive experience and knowledge of a subject and delivered through direct engagement with the audience without any visual aids. However, the careful use of appropriate visual aids can enhance a presentation, as long as it is remembered that they are aids and not the media of communication. Aids such as PowerPoint presentations, flip charts, videos and whiteboards can assist in making a presentation effective.

https://www.osha.gov/doc/outreachtraining/htmlfiles/traintec.html
http://www.skillsyouneed.com/present/visual-aids.html

Supporting documents: Supporting documents may be presented, if necessary, to achieve the purpose, but must not detract from audience participation during the presentation. They may be in the form of hand-outs given to participants after the presentation is completed or documents that must be read during the presentation, which means that the presenter must allow time for them to be read if it is necessary. Documents may be presented on a screen via a projector if they need to be referred to on a number of occasions, as this enables a seamless flow in the presentation. Documents must be kept concise and related to the subject at hand.

http://www.forbes.com/sites/jacquelynsmith/2013/08/13/how-to-give-a-great-speech-3/

To conclude, let us have a brief look at the range statement related to this Outcome.

The ***Range Statement*** reads as follows: Material relates to technical aspects and wider impacts of professional work. Audience includes peers, other disciplines, clients and stakeholder audiences. Appropriate modes of communication must be selected.

This statement is a reminder of the context and the nature of the communication which must take place. It serves to remind us that the correct media and techniques and methods must be used when communicating. We must be aware of our audience. Are they peers and/or colleagues? Are they from other disciplines, such as civil engineers or electrical engineers? If so, have we taken their different needs and technology into account as we prepare our information and the way in which we are going to convey it? If we are going to be addressing clients and other stakeholders, have we taken into account the level of knowledge they have of the subject and the depth of their engagement in any given project? These issues set the boundaries of our communication endeavours and need to be used as guides and pointers in the process.

ASSESSMENT TEST

Complete the Assessment Test in Appendix 1 (30 minutes are allocated for this).

GROUP ACTIVITY

Report and 10 minute presentation evaluation.

CLASS DISCUSSION

Discuss Case Studies (Appendix 2) and Programme administration.

SECTION 3

GENERIC GUIDING PRINCIPLES

GENERIC GUIDING PRINCIPLES

1. Competency Standard

The SAIMechE Competency Standard is the fundamental document underpinning the journey to Professional Competence. It is the foundation document informing all aspects of the training programme that relates the requirements of competency to the working environment of the developing engineer. It is the standard of practice against which all activities of a competent and professional engineer are measured.

2. Outcomes

The eleven outcomes are the fundamental building blocks on the path to competency. A demonstration of understanding of these outcomes as they relate to the day-to-day working environment will indicate that a level of competency has been reached which will enable the candidate to function at a professional level within the commercial and business environment.

3. Assessment Criteria

The assessment criteria are the requirements against which the candidate is evaluated in order to determine understanding and competency. These are objective criteria which will ensure capability and transparency and set a standard that ensures a proficient level of competency and professionalism as required by industry and in the interests of public health and safety.

4. Range Statements

The range statements set the boundaries of the requirements of each outcome and determine the limits of competency as required for professional practice.

APPENDICES

APPENDIX 1

APPENDIX 1: ASSESSMENTS/TESTS

INITIAL TEST (SECTION 1)

1. List 5 activities that can be termed “engineering activities”.

2. What is the context of the requirement to communicate?

3. What needs to be in place first, in order to communicate effectively with “others”?

4. What is the basic definition of communication in this workshop’s text?

5. What are the four basic types of communication?

6. What has been suggested as the cornerstone of effective communication?

7. What is an important part of effective “listening”?

8. In a general sense, what activities can be termed communication activities?

9. When giving an oral presentation or doing a speech, what should be the ratio of time spent preparing, and time spent rehearsing?

10. What could you do to enable you to use the medium of written communication more effectively if you have not done so already?

11. List 5 media of communication.

12. List 5 possible barriers to communication.

ASSESSMENT TEST (SECTION 2)

1. Write a one page (A4) report in handwritten longhand entitled, “What I have observed of an engineering nature since I arrived at this workshop up until this time today.” Comment on such matters as the lighting conditions, the air-conditioning, environmental noise factors and other aspects that could be evaluated by engineering techniques and equipment. Include any comments on matters that could be measured if you had the equipment and time. You have 15 minutes in which to complete this "report”.

2. When the time is up hand your “report” to the candidate on your left. Review the report from the candidate on your right and produce a 10 line summary (A4) of what your colleague has written. This must be done in 10 minutes.

3. Now hand both documents to the candidate on your left. Evaluate the two documents you have received and decide whether the summary accurately reflects in a concise way the contents of the initial report. This should take no longer than 5 minutes. A mark out of 100 should be indicated.

APPENDIX 2: CASE STUDIES

REFERENCES

Websites:

http://www.mindtools.com/pages/article/Body_Language.htm
http://www.skillsyouneed.com/ips/listening-skills.html
http://www.toastmasters.org/tips.asp
http://www.ucdmc.ucdavis.edu/hr/hrdepts/asap/Documents/Communication_Skills.pdf
http://www.wikihow.com/Develop-Good-Communication-Skills
http://www.youtube.com/watch?v=CN1BdvzyMPU
http://www.visualnews.com/2013/05/28/how-does-the-act-of-writing-affect-your-brain/
http://lifehacker.com/5738093/why-you-learn-more-effectively-by-writing-than-typing
http://www.goodtyping.com/
http://www.liveink.com/whatis/history.htm
http://adventure.howstuffworks.com/survival/wilderness/how-to-send-smoke-signal.htm
http://www.communicationtoolbox.com/types_of_communication_medium.html
http://en.wikipedia.org/wiki/Media_(communication)
http://everydaylife.globalpost.com/examples-barriers-communication-4294.html
http://www.mech.utah.edu/~rusmeeha/references/Writing.pdf
http://www.coe.montana.edu/StudentWritingAid/IECommunications/Reports/report%20template.html
http://www.reading.ac.uk/internal/studyadvice/StudyResources/Writing/sta-style.aspx
http://legal-dictionary.thefreedictionary.com/Force+Majeure
http://www.evergreen.edu/writingcenter/handouts/science/Technical%20language.pdf
http://www.labour.gov.za/DOL/downloads/legislation/acts/occupational-health-and-safety/amendments/Amended%20Act%20-%20Occupational%20Health%20and%20Safety.pdf
http://toolboxes.flexiblelearning.net.au/demosites/series5/501/shared/resources/catalogue/communication/receiving/receive.htm
http://management.about.com/od/people/a/GiveOrders0206.htm
http://sbinformation.about.com/od/marketingsales/a/speaking.htm

https://www.osha.gov/doc/outreachtraining/htmlfiles/traintec.html
http://www.skillsyouneed.com/present/visual-aids.html
http://www.forbes.com/sites/jacquelynsmith/2013/08/13/how-to-give-a-great-speech-3/

Books:

The Seven Habits of Highly Effective People, **Stephen R. Covey** (1989), Simon & Schuster

Effective Communication, **O'Rourke** (2009), DK Essential Communication

The 8th Habit, **Stephen R. Covey** (2004), Simon & Schuster

Management by Coaching, **Lauron Buys** (2007), Knowres Publishing

The Concise Oxford Dictionary, Oxford Press 1976

RECORDING OF REPORTS

Formats for recording the portfolio of evidence

During the course of the candidate phase training, the Candidate will accumulate a portfolio of evidence comprising the reports supporting the various exercises covered in these guidelines for each Outcome.

Note that the PDP Administration will provide a web site document system that will allow the candidate to store all the PDP documents created as a back-up facility and will enable the candidate to allow access by the Mentor for any reviews that are required.

ASSESSMENT PROCESS

Guide to the Candidate

You will be assessed against Outcome 5.

In order to determine your level of competence you will be tested by:

- Tests done during the workshop and evaluated by fellow candidates and your mentor
- Written assignments (practical tasks given to demonstrate understanding of this outcome through application in a work setting)
- Knowledge assessment and presentation (i.e. 10 minutes oral presentation using Power Point). Please Note: Oral presentations may need to be taped for moderation and re-assessment procedures.

You will need to prepare yourself in the following ways:

- Familiarise yourself with the contents of this guideline
- Familiarise yourself with the reporting formats required
- Familiarise yourself with the references listed
- Do the written assignments as required by this workshop
- For oral presentations of reports, a ten minute presentation is required to summarise the exercise performed

Note:

A detailed briefing on the exact requirements was given to you by the Mentor/Assessor at the Introductory Workshop in order for you to prepare for the assessment process.

The evidence you will be judged on includes:

- Your proven competence in all areas questioned in the presentation (Competent or Not Yet Competent)
- The practical tasks compiled in your Portfolio of Evidence

Good luck, and remember, the mentor/assessor is there to help you.