CAES 9541
Technical English for Electrical and Electronic Engineering

Unit Four
Explaining methodologies, justifying engineering choices, and improving pronunciations

OVERVIEW

The findings or results of your study may not appear valid if others do not understand how you obtained them. The majority of studies in this discipline is experimental. For instance, testing a newly designed system (e.g. LLC Convertors, Real-time Transport Location Database) or existing hardware's properties (e.g. OLED). This unit will help you identify the relevant language features in describing your approach and methods for studies common in electrical and electronic engineering. Explaining the rationale behind engineering solutions in a concise and cohesive fashion is also an important element of effective technical writing. This session also helps you identify the main elements in the justification of technical designs, related language use and evaluative expressions. To facilitate your presentation in general, useful online resources and strategies on learning international phonetic symbols (IPA), and intonation will also be introduced.

LEARNING OUTCOMES

By the end of this unit, you will be able to

- identify the main components and language features in the methodology section
- identify the main components in justifying engineering choices
- justify engineering choices with appropriate language and evaluative expressions
- improve your pronunciation with various online resources with practice on IPA and intonation

METHODOLOGY

(Warm-up)   Brainstorm the main components of a methodology section (5 mins)

Work with a partner. Brainstorm and write as many as possible main components of an approach or methodology section.

Hint: Think of your project plan and presentation. Examples are data to collect, variables to monitor, materials and equipment to use, etc.

METHODOLOGY – THE 'HOW'

*It provides the details on **'exactly how'** you approach and assess a **problem/requirement**, obtain your results, and generate a **solution** that specifically solves/alleviates a problem, or **satisfy** a requirement.*

WHAT IS YOUR PROJECT TYPE?

- Spend a few minutes to think about your project type

- Is it the same as your classmates next to you?

- What are their project types?

The aspects of methodology are many and varied dependent on the type of discipline and underlying nature of the project, such as experimental research (e.g., designing and evaluating a new technique or product) or case studies (e.g., reviewing a new or existing phenomenon and providing recommendations). While the 'method' presented in experimental research focuses on the setup, samples, and conditions of the experimental design, the 'method' in case studies is generally driven by context and applications relevant to the situation. The former seems to dominate the types of in Electronic and Electrical engineering discipline

METHODOLOGY — SUGGESTED COMPONENTS

Some generic components in presenting your methodology are suggested in Table 1 below. You should emphasize your 'considerations' and 'approach' in your report.

Experimental Research	Developmental e.g., a new aerial design	Theme-based e.g., literature/model comparison
- overview of the experiment setup - variables selection - sample types - sampling techniques - location - materials/equipment and setup - procedures - data treatment - restriction/limiting conditions - algorithm applied	- theoretical basis - hardware/product design - materials selection - construction procedure - experiment design (see experimental research)/simulation procedure	- definition/explanation of main concepts or constructs - criteria and process of model selection - parameters, criteria and process for comparing model (e.g. weighting factors or comparison matrix) Items from experiments and development also apply.

METHODOLOGY

TASK 4.1   Identify the components in a methodology section   (10 mins)

Below is a description of the method or experimental section of a report on investigating of *"Where do we go from here? An assessment of navigation performance using a compass versus a GPS unit"*. Identify as many components of a methodology section as possible. Is this section clear to you? Is this a good description of the experiment? Discuss your answers and comments with your partner.

Hint: You may find components not listed in the table and some components in the table may not be present in the text.

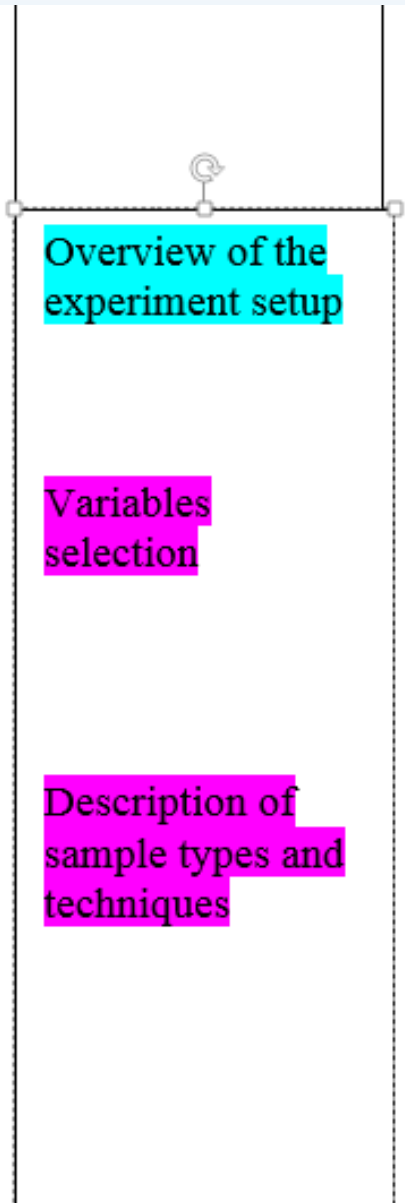|	
Title: *Where do we go from here? An assessment of navigation performance using a compass versus a GPS unit* 2 Method 2.1 Design and procedure This study investigates the two principal methods of navigation used within the British Army—navigation with a standard compass, and navigation with the aid of a GPS unit. Both methods are used in conjunction with standard Ordnance Survey maps. In the British Army, GPS units are only issued to commanders from section level upwards. If there are clear benefits of GPS units, though, particularly for novice users, there may be justification for replacing the compass across the ranks. Thus we also manipulated navigator skill in a mixed within- and between-subjects design, with level of expertise as the between-subjects independent variable (two levels), and product type the within-subjects variable (GPS vs. compass). Task time and errors were the dependent variables.	

2 Method

2.1 Design and procedure

This study investigates the two principal methods of navigation used within the British Army—navigation with a standard compass, and navigation with the aid of a GPS unit. Both methods are used in conjunction with standard Ordnance Survey maps. In the British Army, GPS units are only issued to commanders from section level upwards. If there are clear benefits of GPS units, though, particularly for novice users, there may be justification for replacing the compass across the ranks. Thus we also manipulated navigator skill in a mixed within- and between-subjects design, with level of expertise as the between-subjects independent variable (two levels), and product type the within- subjects variable (GPS vs. compass). Task time and errors were the dependent variables.

In a related study on vehicle navigation (Antin et al. 1990), the task was divided into route preparation, and actual navigation. In the present experiment, the task was similarly divided into preparation and waypoint plotting. Preparing the compass involved the sub-tasks of validating the compass, orientating the map to the ground, determining current position, and marking the destination on the map. Preparing the GPS entailed acquisition of the satellite signals, accessing the 'setup' option, and adjusting settings to reflect current location (i.e., 24 h clock to GMT, British grid, Ordnance Survey GB, metric units and magnetic north). Although the task execution method was very different between the two tools, dividing the task in this way allows us to make more relevant comparisons on a common set of goals for each group— the performance measures are goal-based rather than task-based.

Overview of the experiment setup

Variables selection

Description of sample types and techniques

Given the logistical and ethical implications of conducting the study in a realistic military environment, the task itself was conducted as a desktop problem rather than a real-world exercise. This decision had the added benefit of facilitating experimental control—not only are we limiting environmental effects, but by holding task and environment constant, we can focus on the effects of user skill. Participants were required to evaluate a series of waypoints on a map using traditional compass methods or the relevant function with the GPS. With the compass, this divided into deciding a suitable route marking the waypoints on the map, measuring distance of next leg using scales, taking a map bearing for the next leg, and translating the map bearing into a real world bearing. The GPS equivalent tasks were deciding the route and entering the waypoint into the GPS unit, creating a route in the GPS unit, activating the GPS route, and accessing the navigation page.

Participants were given 15 min teaching and practice time with instruction manuals prior to the experimental tasks. Two experimental trials with each method were then conducted, with the order of conditions (GPS or compass) counterbalanced across participants.

Restriction and limiting conditions

Procedures

Procedures

2.2 Apparatus

The products under test in this study are equivalent to the standard military issue. The magnetic compass was the Silva type 4 model. The GPS units currently used by the

British Army are made by Garmin, and the model used here was the Geko 201. This is a model styled for civilian use, so details such as colour will be different from military models, but it has the same number of controls and the same menu systems as the military version. The map used was the Ordnance Survey Landranger 186, Aldershot and Guildford, 1:50,000 scale.

Materials
Equipment and setup

2.3 Participants

Ideally the experiment would have used actual soldiers as participants, but the practical difficulties in gaining access to serving military meant we recruited civilians instead. Nonetheless, the sample was stratified to be representative of an infantry population—that is, an exclusively young male sample (N = 23, aged 16–24). Of these, 15 participants were classified as non-expert, and eight as expert users. For the purposes of this study, "expertise" was defined in terms of formal instruction in methods of navigation, and some familiarity with the products under test.

Sample types
Sampling
techniques

METHODOLOGY - TENSE

The tense used in methodology depends on the nature of the methods described:

- Standard methods used in the field or industry – <u>Simple Present</u>

- Specific methods to be proposed – <u>Simple Future</u>

- Specific methods already administered – <u>Simple Past</u>

- The use of passive voice: with a focus on the procedures rather than the administrator though the use of 'we' may be possible for emphasis on team work

METHODOLOGY - TENSE

TASK 4.2   Identify the use of tense for various methods   (10 mins)

Read the texts of the previous task (see below). Identify the tense usage and explain the occurrence of various types. Which tense is predominantly used?

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JUSTIFYING ENGINEERING CHOICES

WHY JUSTIFY? DON'T DATA/EVIDENCE SPEAK FOR THEMSELVES?

4.3 Justifying Engineering Choices

TASK (Warm-up)   Perceiving justification

Watch a short video clip about the comments on the release of iPhone 5 by the public in a TV talk show. Do you think the public and the host of the talk show have strong opinions about iPhone 5? Why?

iPhone 5

Loving it is easy.
That's why so many people do.

Video URL: http://www.youtube.com/watch?v=cQJh6ln2Xsc

Justifying Engineering Choice – 3 Components

1. **Introducing** your choice

2. **Describing** your choice

3. Offering **comments** on your choice

TASK 4.3   Identify the three components of justification   (10 mins)

Use the GPS text and identify the three components of choice justification. Does the writer convey a sense that s/he is putting in-depth considerations into the choices? Why?

Text 1 [1]

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JUSTIFYING ENGINEERING CHOICE —
3 COMPONENTS

TASK 4.4   Identify the three components of justification in a student report (10 mins)

Now read the justification by a previous student on a project titled "*LED lighting system for bus stations*" on justifying the type of switching mode power supply. Identify the three components of justification, list the justifications, and explain whether you are convinced by the student's choice and why.

type of switching mode power supply

Since solar plant produce DC voltage, a DC-DC convertor is needed. In fact, two DC-DC convertors are needed. For the first one, it helps the solar power charge into battery which is called "battery-side-convertor". For another one, it helps the solar power in battery output as a power source for LED set which is called "LED-side-convertor".

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- Since solar plant produce DC voltage, a DC-DC convertor is needed

- WHY? Need to explain / justify

For battery-side-convertor, it has the following details:

V_{in} : 18V (minimum)

V_{out} : 15V

I_{out} : 2A

For LED-side-convertor, it has the following details:

V_{in} : 11V (minimum)

V_{out} : 7.2V

I_{out} : 3A

Since it is needed to step down the voltage, so buck convertor is needed. Type of LED use LUXEON K2 from Philips is chosen. Two types of LEDs have been brought and tested. It is found that K2 has better performance than another one does. Therefore, K2 is chosen. Details are mentioned by the manufacturer.

- Good justification?
- Think of the order

JUSTIFYING ENGINEERING CHOICE – Evaluative Language

> **TASK 4.5   Identify evaluative language through listening   (10 mins)**
>
> Watch a video on robot demo and write down any vocabulary or expressions which signal the attitude of the speaker on the design presented.

http://www.youtube.com/watch?v=qsRsrMQy64k&feature=relmfu

TASK 4.6   Apply your knowledge in justifying your engineering choices   (10 mins)

Read the draft of your project report and identify the three components of justification and evaluative vocabulary and expressions. Try to visually highlight them so that you can see how frequently you are justifying your solution.   Will you see them more frequently in some sections than in others?

IMPROVING PRONUNCIATION

IMPROVING PRONUNCIATION

- Correct or Not?

- Work as a pair. Say the following phrases aloud to the classmate next to you. Notice whether you have the same pronunciation as your classmate ☺

Algorithms

Mechanism

Maintenance

Prototypes

Application and applicable

ONLINE RESOURCES ON PRONUNCIATION

Online resources on pronunciation

http://caes.hku.hk/ipast This is an interactive pronunciation website developed by the Centre for Applied English Studies (CAES), the University of Hong Kong. The site is divided into several sections that focus on different aspects of pronunciation including explanations, examples, practice tasks and a facility to record your own speech to compare with the virtual tutor.

http://international.ouc.bc.ca/pronunciation This has some really useful minimal pair exercises. For example, if you still have problems with /r/ and /l/ you can hear and practise words with them in. There are also dictation exercises. Have fun with the tongue twisters to practise the sounds.

http://esl.about.com/cs/pronunciation Despite the intrusive advertising this site has some useful features. It highlights differences between American and British pronunciation, has some advice on stress and intonation and even includes some complete texts in phonetic script.

http://www.m-w.com With this Webster's on-line dictionary you can listen to the pronunciation of new words while you read the meaning.

http://www.yorku.ca/earmstro/ipa/index.html This is a site for advanced learners who would like to learn IPA. You will be able to listen to the pronunciation of all consonants and vowels of not only English but all existing languages.

http://www.uiowa.edu/~acadtech/phonetics/ This site introduces how individual phonetic symbols are pronounced. You can even see the production of each individual sound via the animation provided. The resource is useful for those who want to learn/are learning American English, Spanish or German.

INTERNATIONAL PHONETIC ALPHABETS (IPAS)

Vowels

Long vowels		Short vowels			
iː	deep	ɪ	dip	e	bed
ɑː	dark	æ	bad	ə	above
uː	boot	ʊ	full		
ɔː	raw	ɒ	rock (UK)		
ɜː	bird	ʌ	nun		

Diphthongs

eɪ	say	oʊ	nose (US)
aɪ	fly	ɪə	year(UK)
ɔɪ	joy	eə	hair (UK)
aʊ	cow	ʊə	pure (UK)
əʊ	nose (UK)		

Consonants

Voiced		Voiceless	
b	bend	p	pen
d	desk	t	test
g	get	k	cat
v	very	f	ferry
ð	the	θ	think
z	zest	s	set
ʒ	vision	ʃ	she
dʒ	judge	tʃ	church
l	land		
r	rent		
j	university		
w	which		
m	man		
n	new		
ŋ	sing		

Illustration of English short and long vowels

(Pls also see the notes of the slide)

RULE-GOVERNED PRONUNCIATION [PAST-TENSE (-ED)]

1. state, quote, rate, duplicate, negotiate
   [verbs end with / t / sound]

2. amend, depend, protrude, record, load

   [verbs end with / d / sound]

   ▪ *How would you pronounce their past tense (-ed) form?*

STRESSED SYLLABLES

Notice that the stress changes from one form of a word to another.

In **pho**tograph the first syllable still receives the primary stress.

In pho**to**graphy, the second syllable is stressed.

In photo**gra**phic the third syllable is stressed.

Practice by saying the following words to yourself, deciding how many syllables each one has and marking the stressed syllable.

Mechanism, Maintenance, Contribute, Constituency

STRESS

- Mechanism
  - 'Mechanism

- Maintenance
  - 'Maintenance

- Contribute
  - 'Contribute / Con'tribute

- Constituency
  - Con'stituency

PAUSING AND INTONATION

Try the following monologue (↑ indicates rising tone while ↓ falling tone; // indicates a longer pause while / shorter pause):

Text 4 [5]

Identifying the readers' needs ↑ and interests // turns out to be one of the most important parts of writing. ↓// Science and engineering are problem oriented ↑, and stating problems clearly ↑// helps focus resources on answerable questions. // To keep problems from existing in purely abstract terms ↑//, a writer needs to identify the constituency interested in the problem. ↓

PRACTICE ON PAUSING AND INTONATION

TASK 4.9   Practise pausing and intonation   (5 mins)

Now try to identify the appropriate places to pause in the following text. Then read it to your classmate with correct pausing and intonation.

Text 5 [5]

"Writing requires planning, drafting, revising, editing, and producing – activities that are usually sequential. Novice writers often equate writing with drafting and proceed without much of a plan. Trying to write without a plan, however, can lead to false starts, confusing introductions, bloated documents, in appropriate material, wordiness, and incoherent organization. Think of planning as part of the writing process."

KEY POINTS TO REMEMBER

- Methodologies are presented differently in experimental versus developmental projects.
- Use different tenses to illustrate methods standard in the field (Simple Present), proposed methods (Simple Future), or those already specifically administered (Simple Past).
- Generally use passive voice to focus on the procedures.
- In justifying your choices, introduce, describe, and comment on your justification
- DO NOT be afraid to use evaluative expressions such as adjectives
- Keep a good record of the online resources; speak ALOUD with the help of online resource such as iPast and vary your stress and intonation.   Think of doing a drama at the beginning – yes you are ACTING it out!

REMINDER

- Review your writing and check whether you justify your engineering choices sufficiently and have the three steps ☺