

Teaching visual literacy in English for Specific Purposes

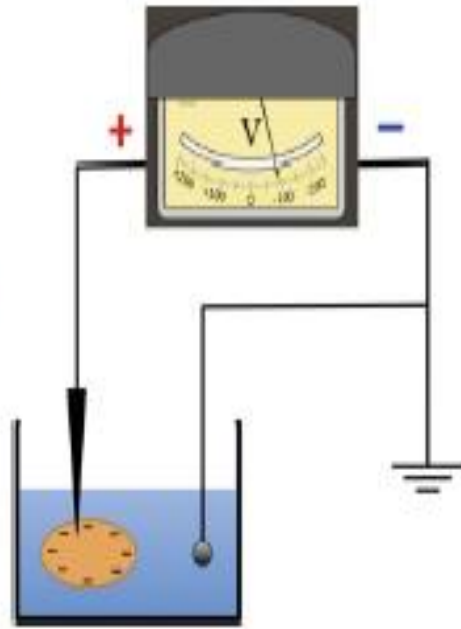
Jean Parkinson

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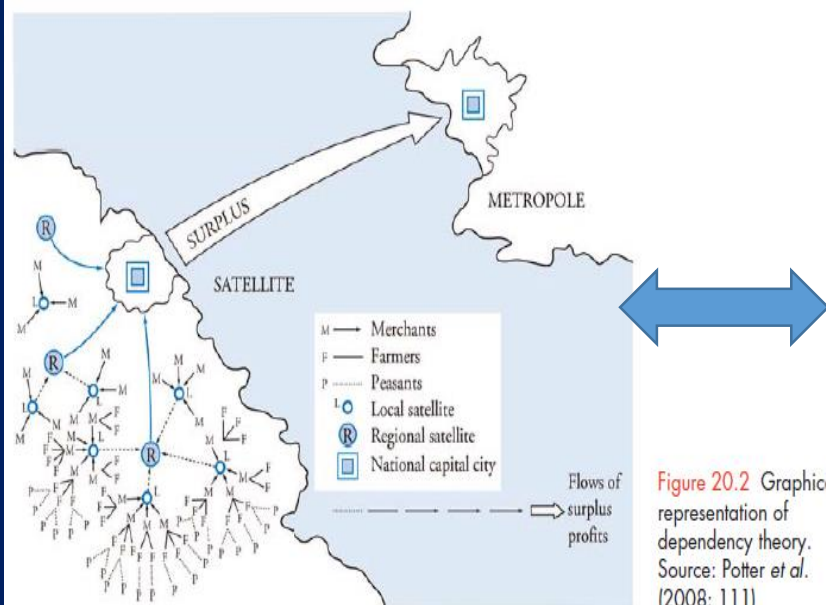
Increasing frequency of images

- **New literacy studies** - Cope and Kalantzis (2000, 2009)
- **Social semiotics** – Bezemer and Kress; Unsworth 2008
- **English language teaching** – Romney (2012); Hill (2003)
- **Science education** - Lee (2010); and Slough, McTigue, Kim, & Jennings (2010); Martins (2002); Metros (2008); Walpole (1999); Dimopoulos, Koulaidis and Sklaveniti (2003)

Fig. 7.6 Measurement of the voltage inside a neuronal cell. The pipette on the left contains an electrode that can penetrate the cell membrane, while the electrode on the right immersed in the extracellular fluid is at ground potential. Under standard resting conditions, a human neuron is at about $V_{rest} = -70$ mV



Examples from tertiary textbooks



There is a strong spatial dimension to Frank's work. He highlighted how the chains of exploitation and dependency run not just from the periphery of Latin America to the core of Europe, but that within Latin America there are unequal relationships between urban and rural groups and between landowners and labourers, such that local-level exploitation and inequality reflects the inequalities on a global scale (see Figure 20.2). Walter Rodney in his work on

trends in fertility, mortality, and immigration patterns. Figure 3.1 is based on the medium variant of these projections and provides a glimpse of the demographic changes that low fertility and aging will bring over the next three decades to many regions of the world.³¹ Between 2010 and 2015 the working-age population of

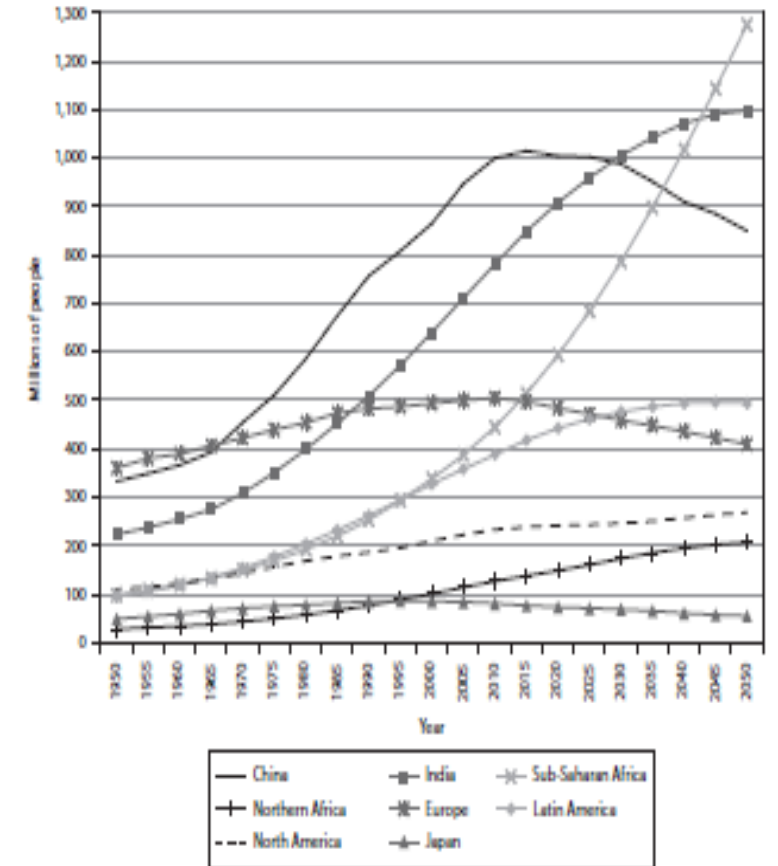
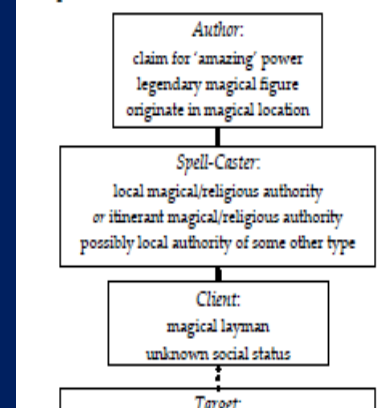


FIGURE 3.1 Estimates and projections of working-age population (ages 15–64). Source: UNDP, World Population Prospects.

Images in university student writing (MICUSP)

- Biology
- Engineering
- Economics
- Education
- English
- History
- Linguistics
- Nursing
- Philosophy
- Physics
- Psychology
- Sociology

or the *author*, the creative force behind a spell, is responsible for their activation.



pecially in the industry where workers have to perform same tasks repeatedly, can be a major factor of MSDs as well as cumulative trauma disorders.



Figure 1: Grip force and push force

use using the model of the open economy, protectionist outward as shown in Fig 1 and leads to a higher real exchange rate.

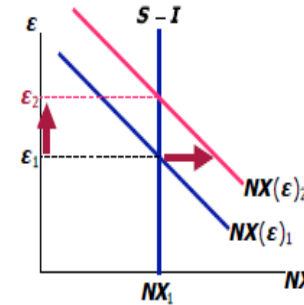


Fig 1

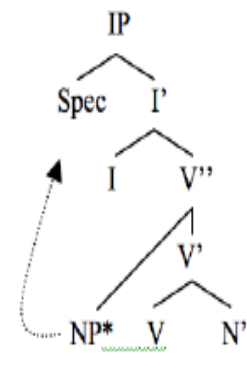
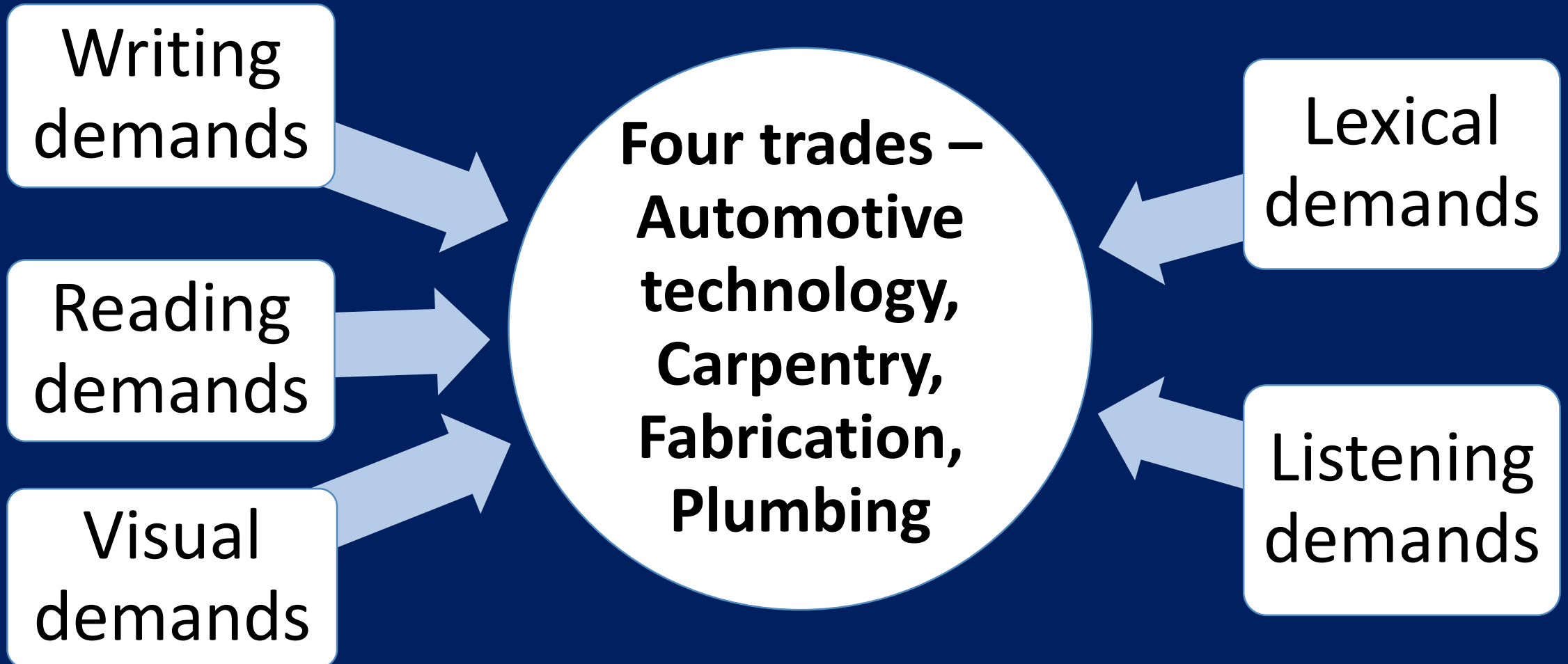


Figure 2

Dundee Wastewater Treatment Plant: A Brief Examination






Study of language use in vocational education: The language in the trades education project (LATTE)



Data collected in the LATTE project

Collected at a polytechnic institute in New Zealand

- Textbook corpus: 1,610,500 words 
- Recorded classroom teaching: 455,000
- Student writing: 229,000 words 
- Interviews with teaching staff and students 

Tutors' reports of trade students' literacy

Many of them have been pushed into the trades by Mum and Dad because they didn't do well in school. So trades students are more likely not to have high level literacy."

"Reading and comprehending is the biggest problem."

Some students find it difficult to put their thoughts on paper; they can verbally tell the answer but find it hard to put it into writing.

Some have trouble reading bigger words and specialist vocabulary... being able to read a paragraph and understand it."

English-background vocational students and literacy

- Bak & O'Maley (2015), found that most vocational teachers reported language and literacy to be a problem for their students (Australia).
- Ryan et al. (2016) - half of all vocational students in Australia have language and literacy skills below the level of the training programme in which they are enrolled.
- Cooper & Baynham (2005) - many construction students at a UK college required language and literacy support.

Studying vocational education in a second or foreign language

- High proportions of vocational students are from non-English backgrounds
 - Tran (2017) - 21% of vocational students in New Zealand are international students.
 - In Australia, Ryan, et al.(2016) - compared to universities, VET has triple the proportion of people from non-English backgrounds.
- Low English proficiency limits job opportunities
 - Non-native-born adults in the US felt that their literacy proficiencies limit their job opportunities (Smith & Smith, 2010) .
 - US immigrants with high skills but limited proficiency are twice as likely to work in unskilled jobs as those with good proficiency (Batalova et al., 2008).
 - Lower language proficiency contributes to being employed at a lower level than their VET qualifications (Annen, 2018) (Canada).
- Technical students in EFL contexts also need to read texts in English.
 - They usually take ESP courses lasting a year or a semester (Ding, 2010).


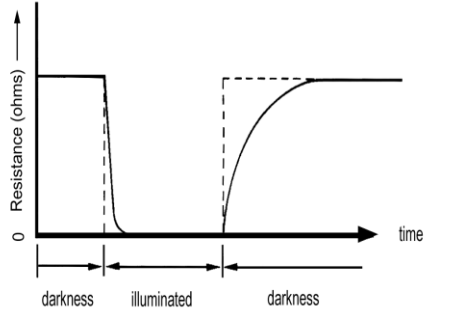
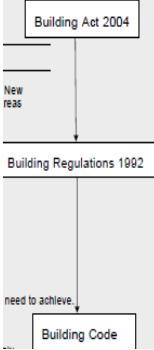
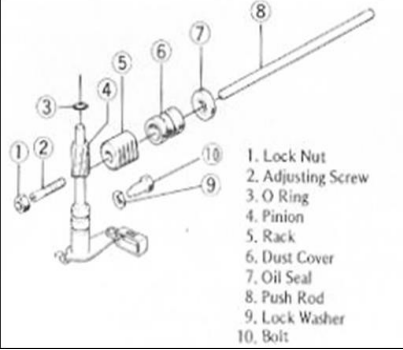
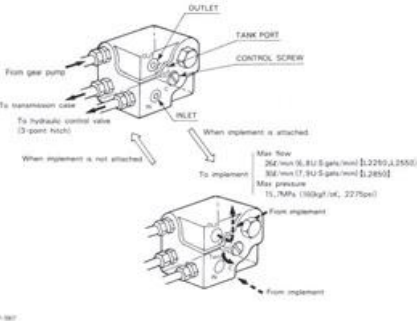

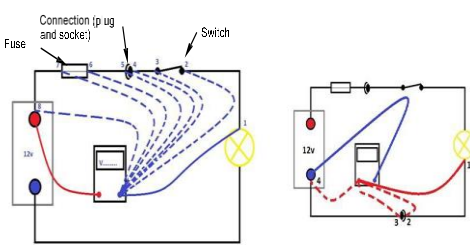
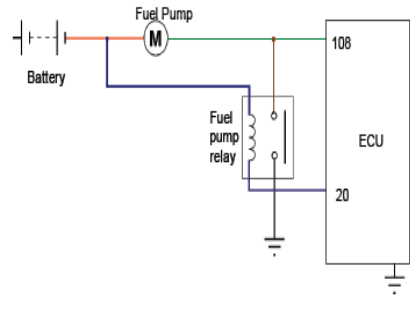
Lexical demands of vocational study in the LATTE project

- Coxhead found that around 30% of the words in the vocational textbooks were technical words (Coxhead et al., 2016; 2018a; 2018b):
 - Automotive technology – 36%
 - Carpentry – 37%
 - Fabrication – 29%
 - Plumbing – 32%
- Chung and Nation (2004) - 30% of words in an Anatomy textbook was technical.
- Ha and Hyland (2017) - 30% of the vocabulary in their Finance corpus was technical.

Visual demands of vocational textbooks in the LATTE project

- On average 7.4 images per 1000 words of text (Mackay)
- 7.5 images per 1000 words in secondary science texts (Dimopoulos, Koulaidis and Sklaveniti, 2003)
- ± 2.9 per 1000 words in secondary English/language arts textbooks (Bezemer and Kress, 2009)

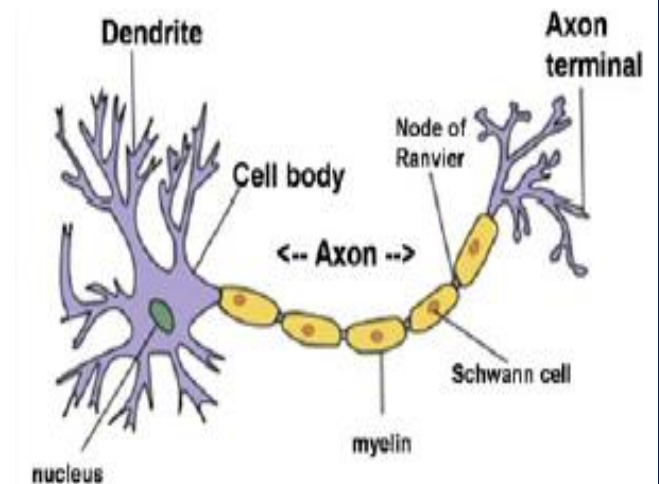
Types of visuals in vocational textbooks

| | | | |
|--|---|--|--|
|  |  |  |  |
| <p>Photographs</p> | <p>Graphs</p> | <p>Charts</p> | <p>Exploded view</p> |
|  |  |  |  |
| <p>Technical drawings</p> | <p>Plans</p> | <p>Circuit diagrams</p> | <p>Wiring diagram</p> |

Meaning redundancy in what students read

- Expressing the same idea in different modes

The neuron may be divided on the basis of its structure and function into three main parts: (1) the cell body, also called the soma; (2) numerous short processes of the soma, called the dendrites; and (3) the single long nerve fibre, the axon. The



- Makes visuals a valuable support to EFL/ESL readers in decoding text

Visual demands of vocational texts

- Automotive Technology course book
- Moving between text, figure, engine part, table

Checking a direct throttle position sensor

Using an ohmmeter, check the throttle position sensor as shown in Figure 38.

In the closed throttle position the Idle Contact and Movable Contact should have continuity and no continuity when the throttle just begins to open.

Above three quarter throttle, there should be continuity through the Power Contact and the Movable Contact.

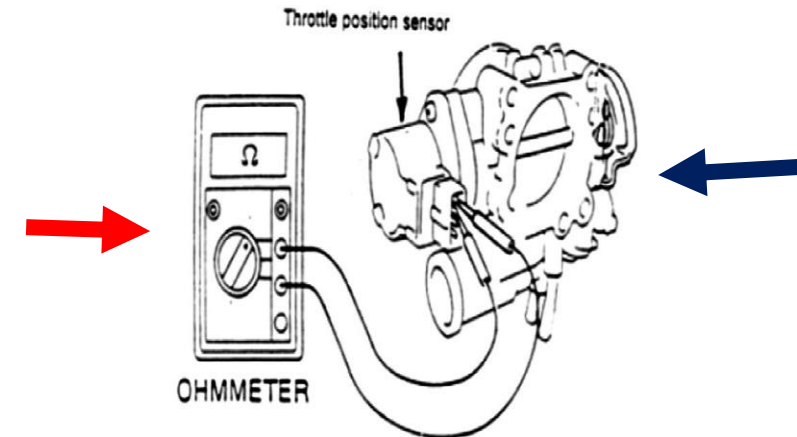


Figure 38 Checking the throttle position sensor

Enter your test readings below.

| Throttle Position | Idle | Off Idle | Wide Open (WOT) |
|-------------------|------|----------|-----------------|
| Ohm Reading | Ω | Ω | Ω |

Does the TPS have a supply voltage?

Dealing with multimodal texts

- How do good readers treat the visual elements of texts?
- How can teachers support reading of visuals
- What demands are placed on student writers to include visuals?
- How can teachers support production of visuals in student writing?

How do good readers read texts containing visuals?

- Eye-tracking studies of readers (Jian, 2016; 2017; Hannus & Hyönä 1999; Mason et al., 2013b, 2015) found that:
 - Good readers used up to 30% of their reading time looking at the diagrams. Poor readers spent only 15%.
 - Good readers fixated on the diagrams for longer periods.
 - They moved between diagram and text more frequently
 - They also moved between images in a text.



Good readers scan back and forth between text and image

Used as an assessment procedure, these examples of task-related language can be translated into a set of criteria by which a learner's language can be assessed. Figure 8-1 is an example of how one child (Mario) was assessed on this task.

If a range of authentic classroom tasks are assessed against task-based criteria, even if only informally, these assessments will contribute to a profile of how learners use language for real purposes in the classroom. The assessment in Figure 8-1 indicates that Mario was able to report what he and his partner did, but did not use the range of modality by which English speakers are likely offer advice: *you could . . . it might be better if . . . maybe you should . . .* and so forth. In future tasks like this, this may be language that needs to be modeled

limited. And, of course, the language points identified here are also

| Criteria | NAME: Mario |
|---|--|
| <i>Was the learner able to . . .</i> | Comments |
| Describe the problem | Was able to do this quite clear |
| Report their solution: <ul style="list-style-type: none">- Use the past tense- Use appropriate vocabulary- Give reasons for actions | Made some past tense mistakes Vocabulary limited but showed was not point at bottom" (flat Not demonstrated |
| Ask appropriate questions | Asked mainly WH questions. Question forms sometimes in a |
| Offer advice appropriately | Used "maybe" throughout—"m (e.g., you could have . . .). Overa |
| Acknowledge advice | Not demonstrated |
| Other comments | Mario participated very actively maybe because he felt he really Focus LANGUAGE AREAS: ten |

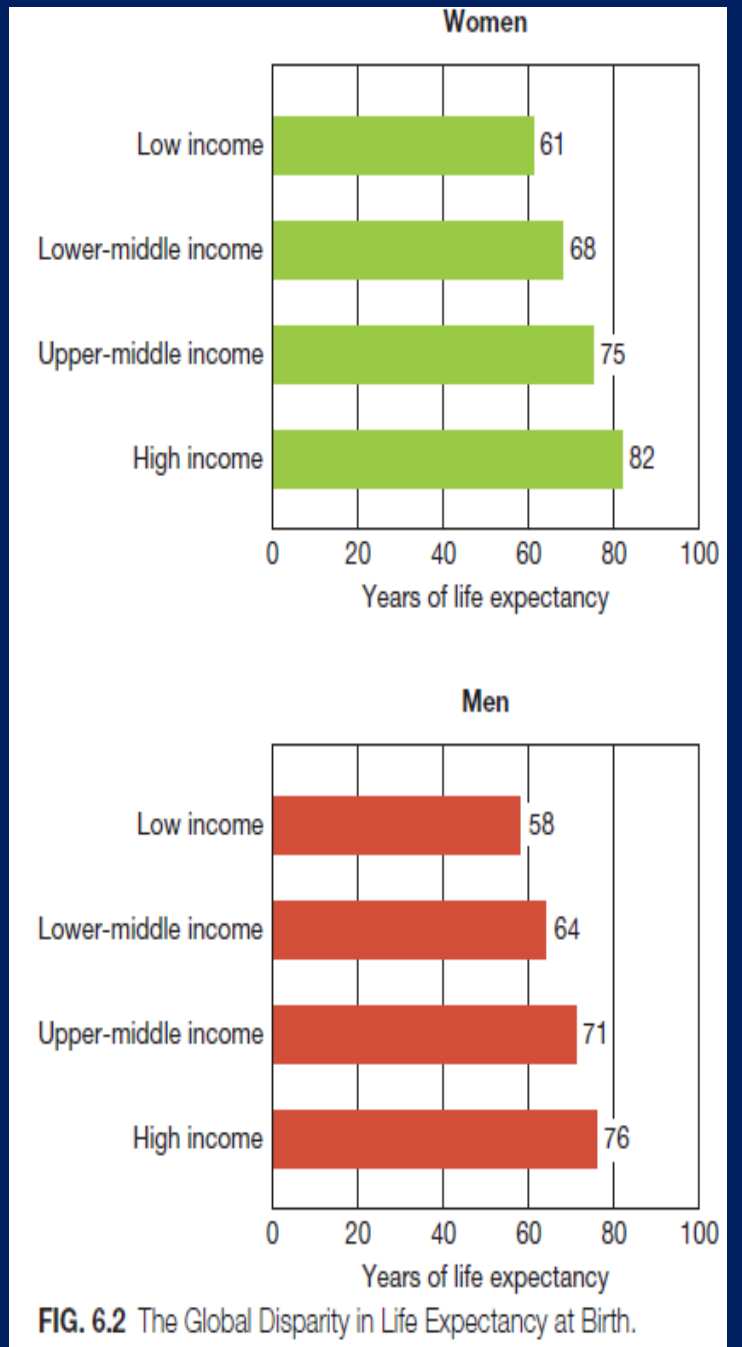
Language teaching textbook

Scanning
back and
forth
between
text and
image

Sociology
textbook:
text and
graph

Life Expectancy

Perhaps the most telling indicator is life expectancy at birth. This measure takes account of deaths at various ages beginning with infancy and of deaths for various reasons. Figure 6.2 shows average life expectancy for the four groups of nations. Women in high-income nations can expect to live 21 years longer on average than women in low-income nations. The corresponding difference for men is 18 years. Combining these two numbers, overall life expectancy in poor nations is almost 20 years shorter than in wealthy nations. The situation is even worse in many African nations, where life expectancy is in the 50s for both

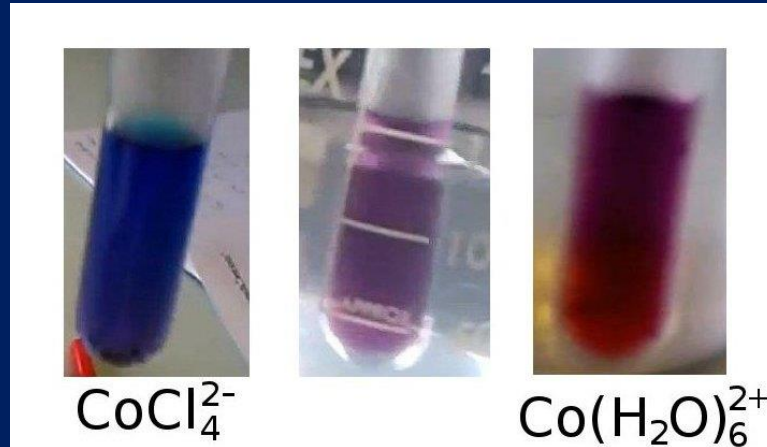


Studies comparing expert and novice readers

Expert readers:

“Heating shifts the equilibrium shown by color change”.

(Kozma, 2003)



Novices:

“Heating causes the color change to get darker”.

- Experts use words and images interchangeably in talking and reasoning about their work (Kozma, 2003)

‘Translating’ between image and text and image and image.

- Meaning expressed in text, realistic drawing, and wave forms on an oscilloscope.
- Readers need to be able to see the linkages between different representations – image and text, or different types of image - and to express the meaning of one representation using another representation.

Testing the Duty Cycle (Hz) of the ISC Valve with an OTC Oscilloscope

The ISC Valve waveforms may have unique shapes such as those shown in

Figure 57 (b) below.

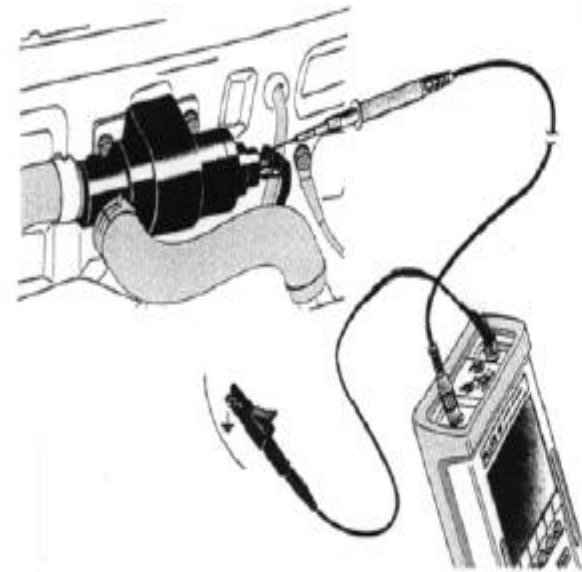


Figure 57 (a). Testing an IAC valve

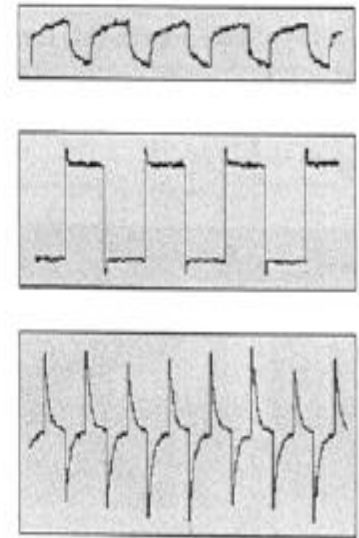


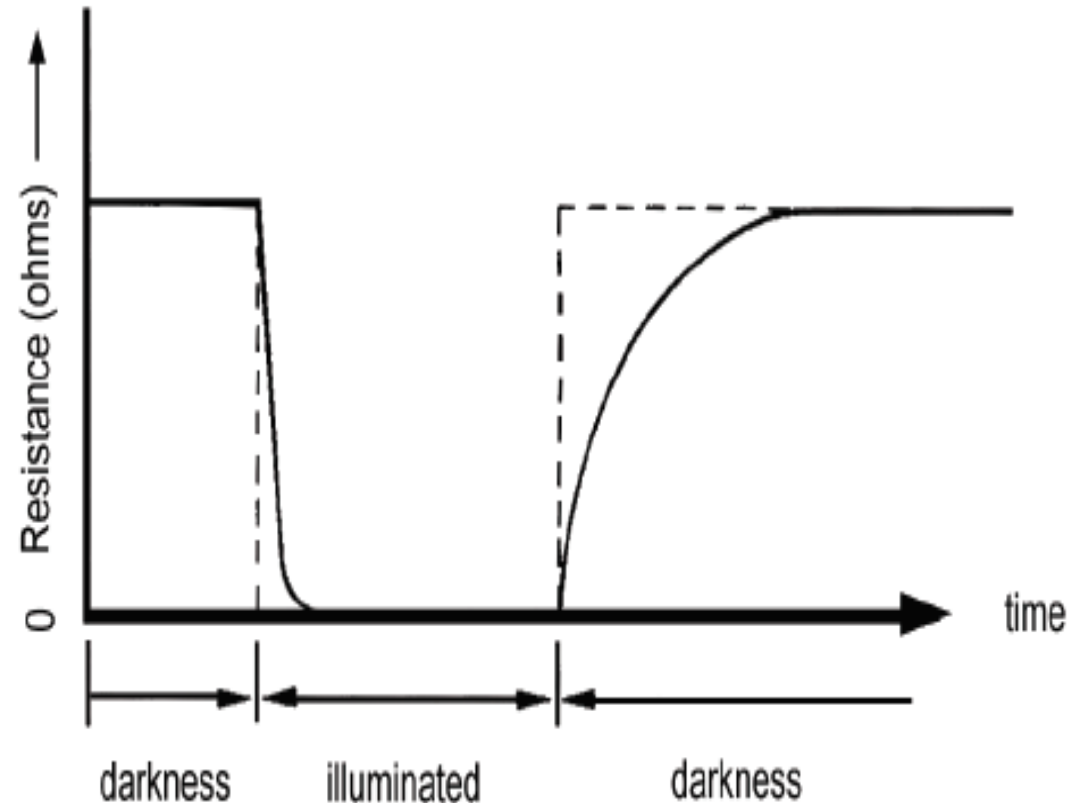
Figure 57(b). IAC waveforms may vary

To perform this test with the oscilloscope, you will have to select “Lab scope” from the Main Menu.

Multimodal texts support acquisition of disciplinary ways of expressing meaning

- Representation of the same ideas in words and as an abstract mathematical representation on a graph

You can see below how the resistance of the LDR alters with changes in the light falling on it. The sharp change of resistance makes it ideal to turn electronic circuits on or off in response to changes of light. Resistance in total darkness is about 10 megohms and in daylight about 50 ohms.



Text and visual modes have different affordances

- Text and image are each functionally specialised (Kress, 2000)
- Text and image have 'distinct ways of conceptualising, thinking and communicating' (Kress 2000)
- Different levels of realism, abstraction, formality

Undergraduate Chemistry

Text → table → diagram → graph

Most of the charge density from the electron distribution is centered about the outermost antinode, and therefore, within a spherical shell of moderate thickness. As a function of n , the lower the value of n , the closer the electron density is centered about the nucleus. In other words, orbital size for a given orbital class increases with increasing n . For a given value of n , the maximum in charge density is further from the nucleus the smaller the value of l . However, the probability of an electron lying close to the nucleus is greatest for small l . Indeed, only for $l = 0$ (s electron) is there any probability of finding the electron at $r = 0$. This means that only s electrons exhibit appreciable interactions with the nucleus, which also means that they are the electrons most susceptible to isotopic shifts. In hydrogenic atoms, these two effects counterbalance each other and the orbital energy depends only on n not l .

Table 22.5 Number of orbitals and designations of half-filled and closed subshells for the most commonly encountered subshells. The value of orbital angular momentum l is synonymous with a letter that designates the subshell.

| Subshell | l | # of orbitals = $2l + 1$ | Half-filled subshell | Closed subshell |
|----------|-----|--------------------------|----------------------|-----------------|
| s | 0 | 1 | s | s^2 |
| p | 1 | 3 | p^3 | p^6 |
| d | 2 | 5 | d^5 | d^{10} |
| f | 3 | 7 | f^7 | f^{14} |
| g | 4 | 9 | g^9 | g^{18} |

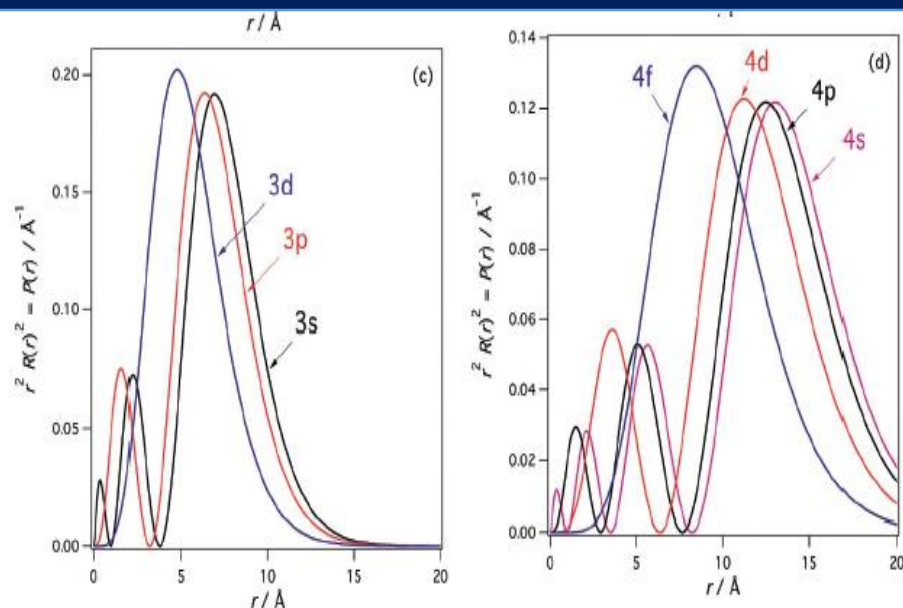
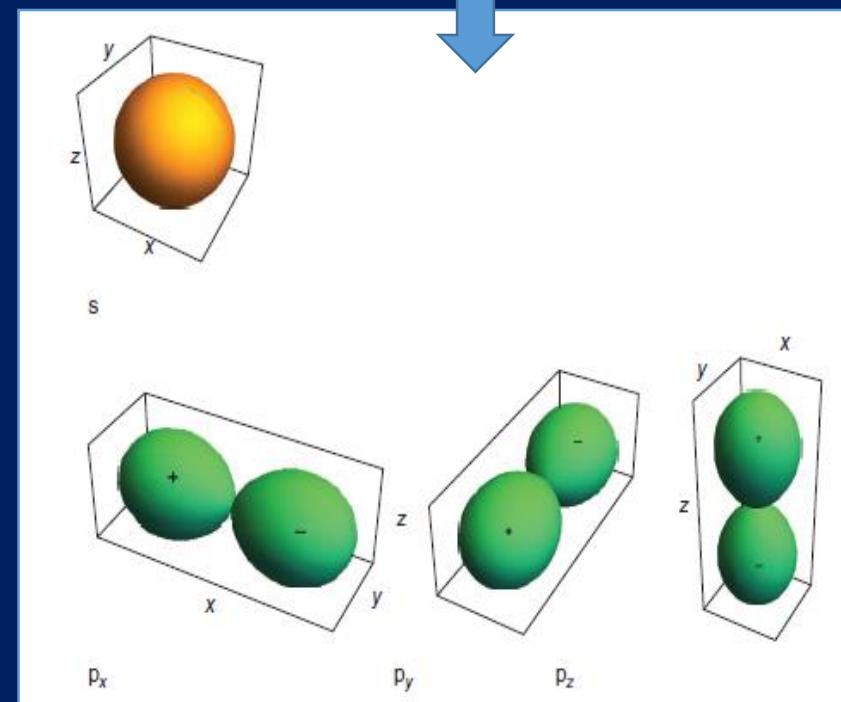
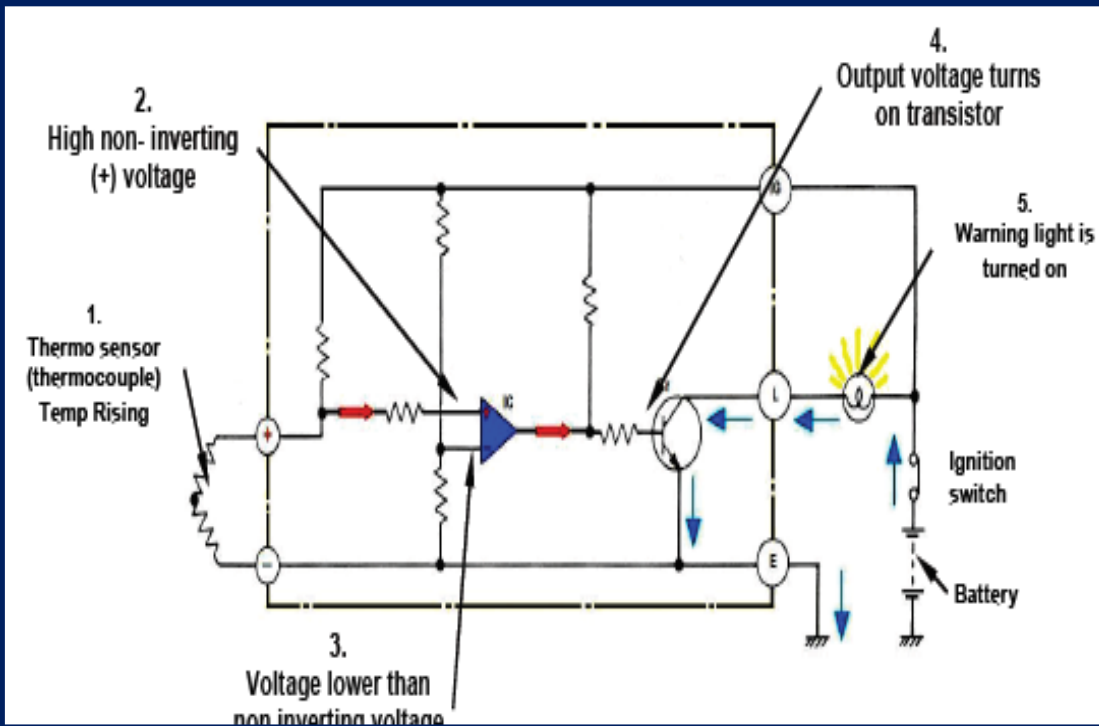


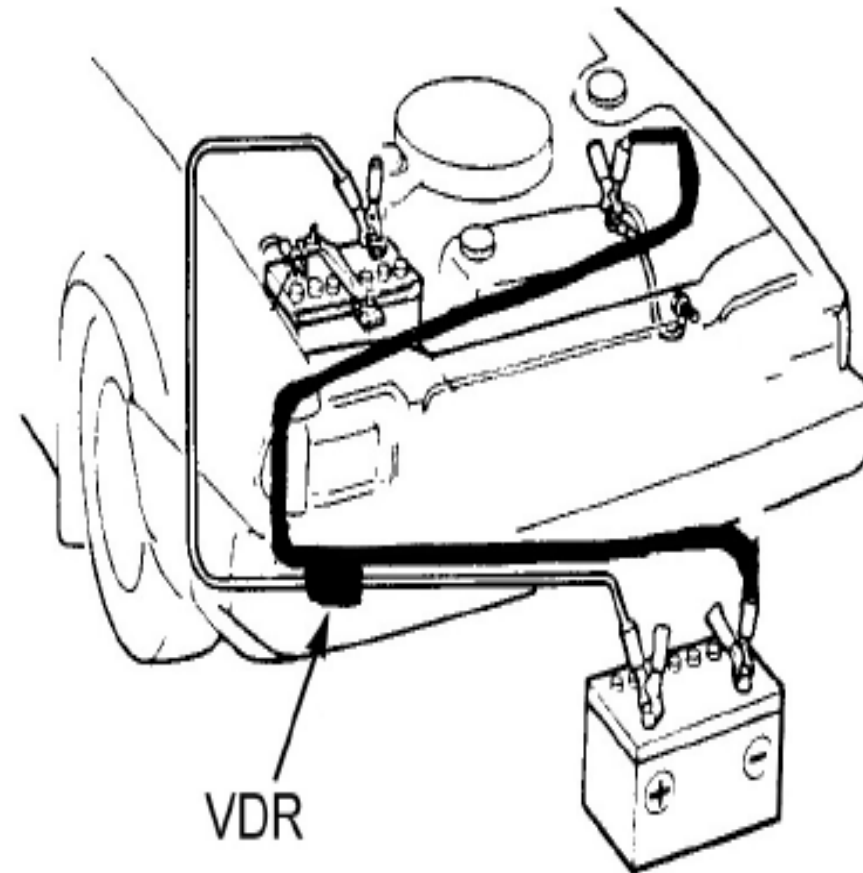
Figure 22.5 Radial distribution function $[P_{nl}(r)]$ for the lowest energy states of the H atom. (a) Comparing the first four of the s orbitals, we see how the maximum in the probability distribution shifts to longer radial distances with increases in the principal quantum number n . The number of radial nodes (points at which the probability distribution goes to zero) also increases as $n - 1$ because there are no angular nodes in the s function. (b) The L shell



Different images can be more or less formal, abstract or realistic



An automotive application of the VDR can be found in the spike protected battery leads designed for jump starting vehicles equipped with electronic components (see below). The VDR absorbs any voltage spikes that may occur when disconnecting the jumper leads.



Visuals express some ideas better than text can

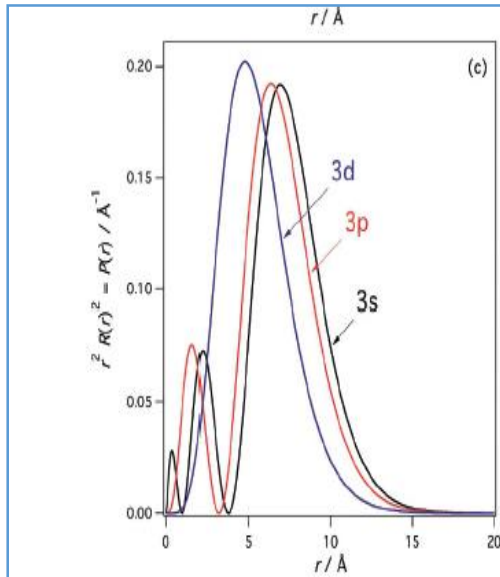
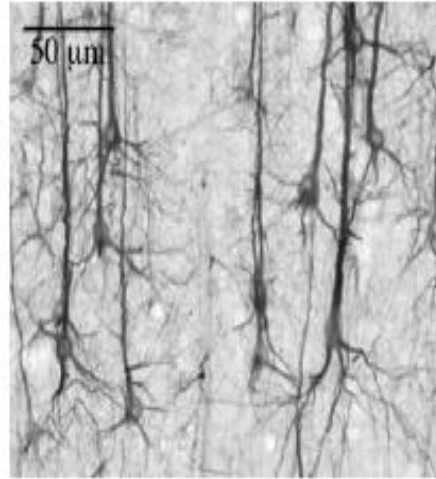
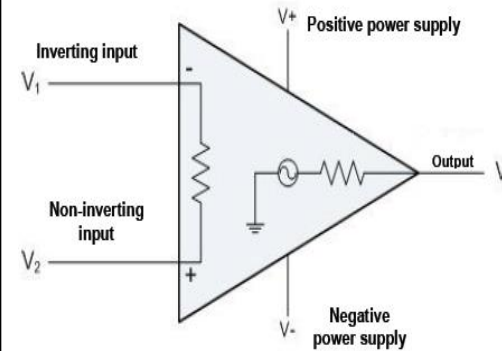


Figure 22.5 Radial distribution function $[P_{nl}(r)]$ for the lowest energy states maximum in the probability distribution shifts to longer radial distances with increasing n (points at which the probability distribution goes to zero) also increases as n

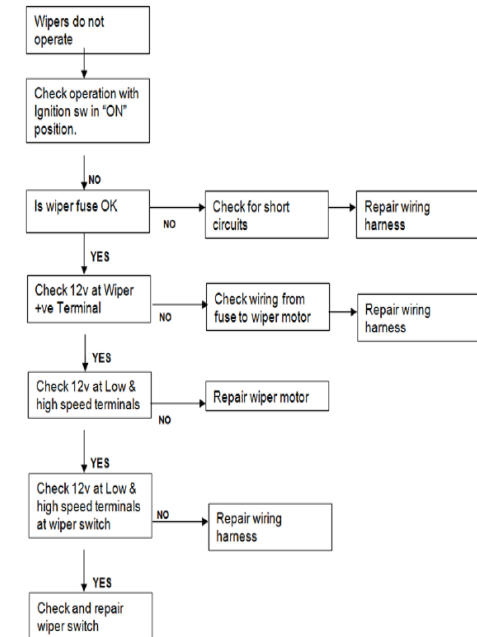
Mathematical expression of ideas



Microscopic detail



Expression of ideas in ways conventional to a discipline



Visual ways of sequencing

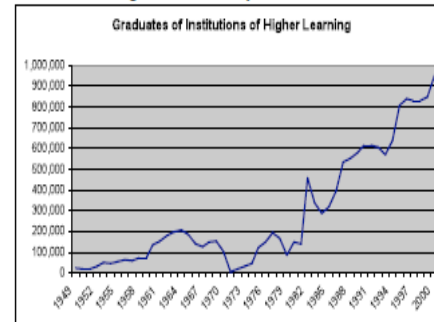
Images in student writing

- 30% of student texts in MICUSP include images (compiled 2004-2009)

Visual demands of student writing(MICUSP)

- Graphs
- Photographs
- Models
- Flow charts
- Maps
- Tree diagrams
- Tables
- Plans
- Etc.

Figure 1: Number of Degrees Awarded by Year (2000 Census)



"Egalitarianism" won out in the Cultural Revolution of 1966-76, as education was discredited as a job credential in favor of political loyalty. Most higher education was discontinued.

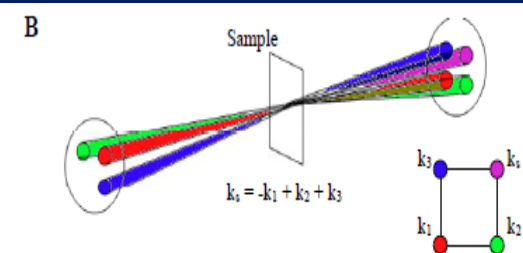
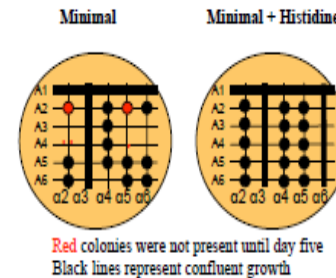


Figure 1. (A) This shows the pulse sequence in the 2DES experiments. The first two pulses are our "pump" pulses, while the third pulse is the "probe". The reference pulse which interferes with the signal is not shown but occurs before the relevant exciting pulse train. (B) The boxcar geometry of the pulses with the phase matching condition for a positive τ scan. Pulses 1 and 2 are the first and second pump pulses, respectively, and pulse 3 is the probe.

Figure 1: Results of A and α matings on minimal and minimal plus histidine medium plates

should grow on the control plate because auxotrophic strain A and α would be the diploid state. Pure matings were



Red colonies were not present until day five
Black lines represent confluent growth

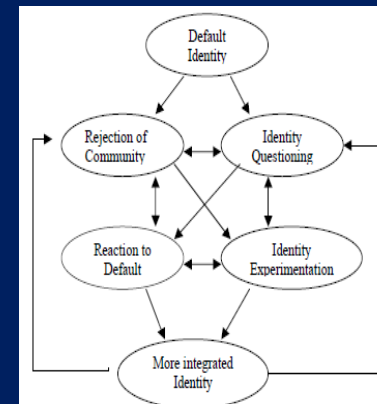


Figure 1: Proposed Identity Formation Model



Collection of Native American arrowheads and other stone tools that were found on the property of the Farm by Levi Ivan Reed. The slug, shown in the center of the collection, is significant because it was used to kill Levi Ivan Reed's first deer. (Picture taken by Patrick G. Reed (author's uncle with similar name) on April 17, 2008)

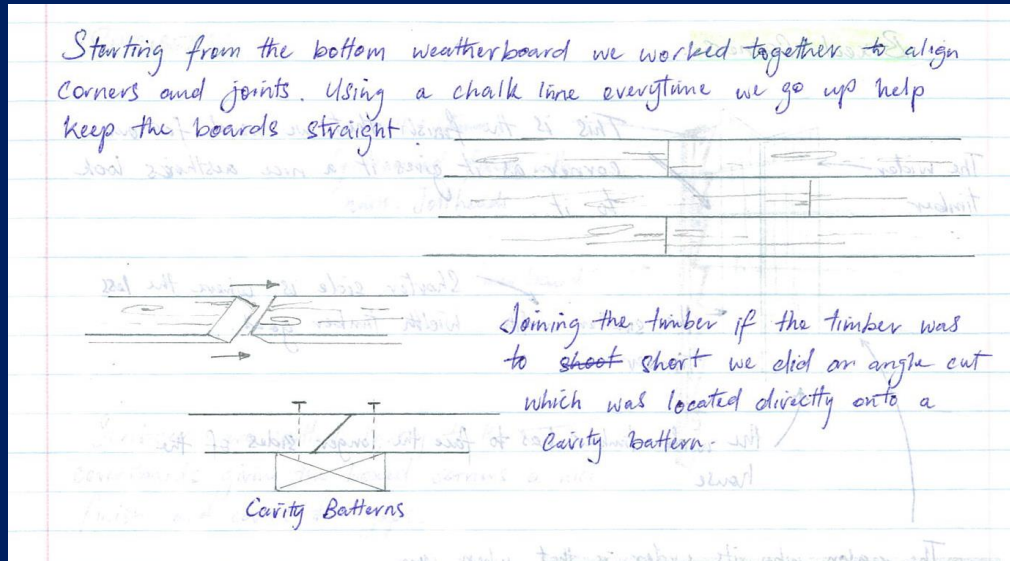
There is nearby evidence of "Indian" mounds and campsites in Sections 7 and 34 of the County (Catherine Reed 2006), no landscape features are readily identifiable due to the American habitation directly on the Farm (Site Visit 2008). As such, I will only briefly

Student writing in vocational education: Multimodal diaries and journals

- Mauroux et al. (2014) report on an online learning journal, containing both written text and photographs, kept by **apprentice bakers**. (Switzerland)
- Kicken et al. (2009) report on the use of a multimodal development portfolios with **hairstressing apprentices**. (Netherlands)
- Boldrini and Cattaneo (2014) - reflective writing journals of **apprentice office workers** (Switzerland).
- Edwards, Minty and Miller (2013) - written **logbooks of child observations in childcare** (UK)

Our data:

The builder's diary in carpentry education



Dug out footing for front half of garage and for block retaining wall.
Bank Shaved back on slight angle to stop slipping
Pipe & Services All moved out of way.



Once window was installed we used level to run across to the other window to see if it was level to make flashing easier to put on



Then I measured flashing in between windows, silicon top of shadow clad before attaching flashing to cladding and tuck up tight with head flashing,

The builder's diary: our data set

- A daily journal of work done on the building site
- Daily entries were about 75 words long
- 43 diaries
- We included 2,000 words from each diary = 86,000 words
- 1,739 images
- 810 drawings, 929 photographs
- 20 images per 1000 words

(see Parkinson et al. 2016; 2018; in press)

How meaning in images in the student builder's diary relates to meaning in written text

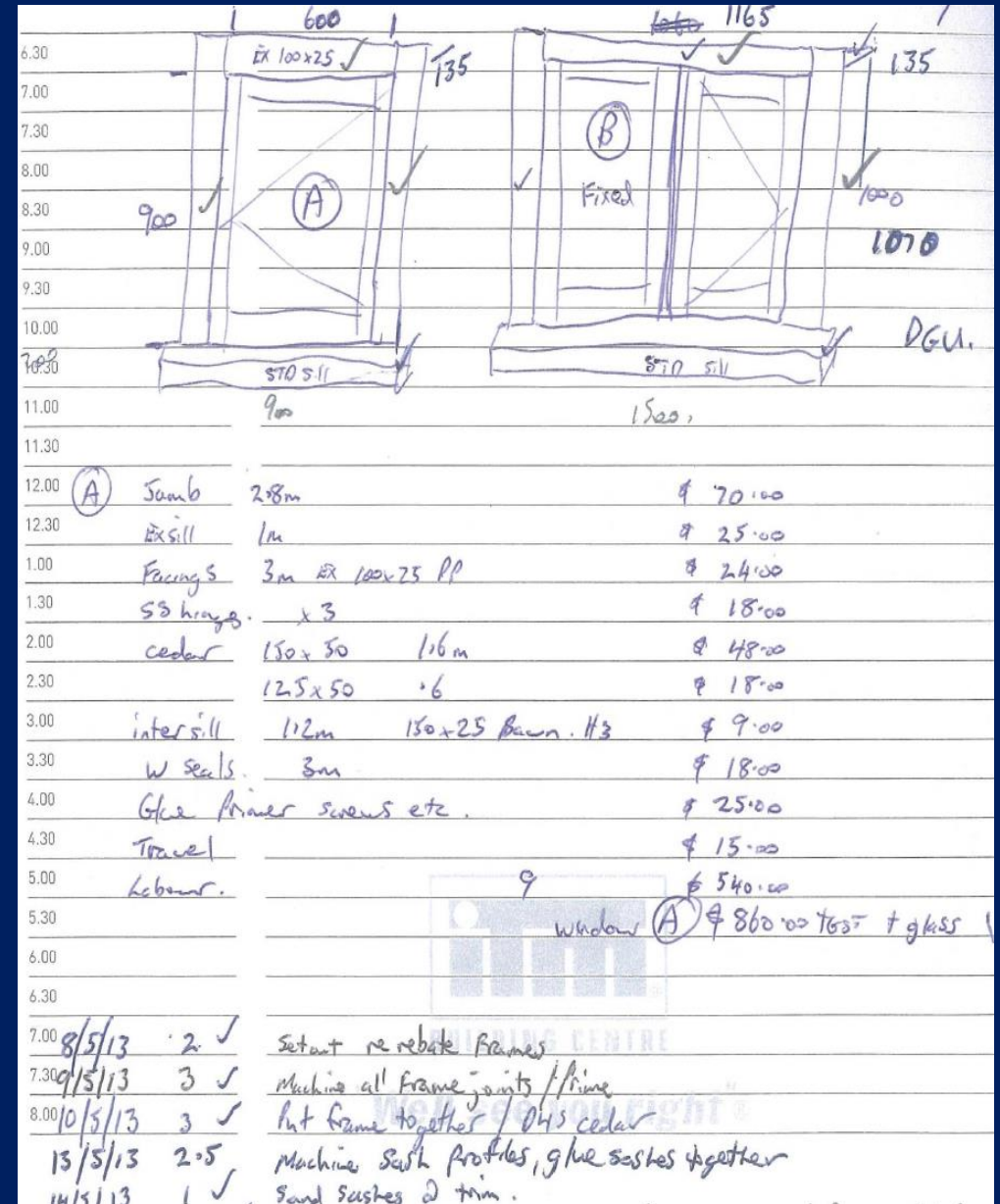
Day 87

- Started working on the wall insulation.
- We used Pink Batts
- The wall insulation is different from the ceiling insulation, so we weren't allowed to use any leftover pieces from yesterday's work.
- Did the same steps as the ceiling insulation, measure, cut and fit.
- We used all the same PPE as the ceiling insulation



An experienced builder's diary

- Little overlap between drawing and written text



Our findings: Regularities in the placement of images



✓

✓

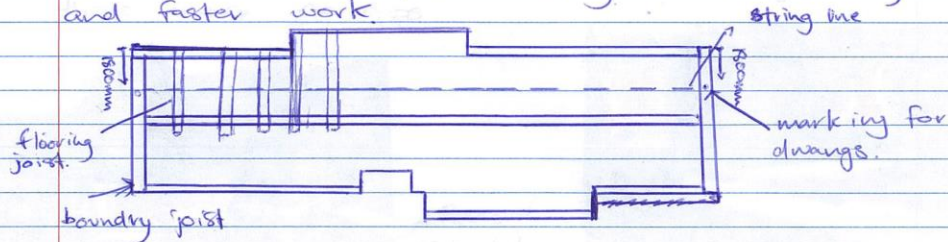
Dug out footing for front half
of garage and for block
retaining wall.

Bank Shaved back on slight angle
to stop slipping

Pipe & Services All moved out of way.

Our findings: Rhetorical conventions

- * Finish nailing off joist
- * Started putting down dwangs measured 1800mm from outside of joist do the same on the other side and pin a string line for accuracy and faster work.



Monday 12th May

- Finished doing dwangs through out the whole house
3 lines of dwangs along the floor of the joist floor
of the house 2 on each ends coming in 1800mm
from the end of boundary joist and one line of
dwangs along the middle where the lapped joint
of the inside joist are. Just so the joist could be straight.



→ line of dwangs

Abstract

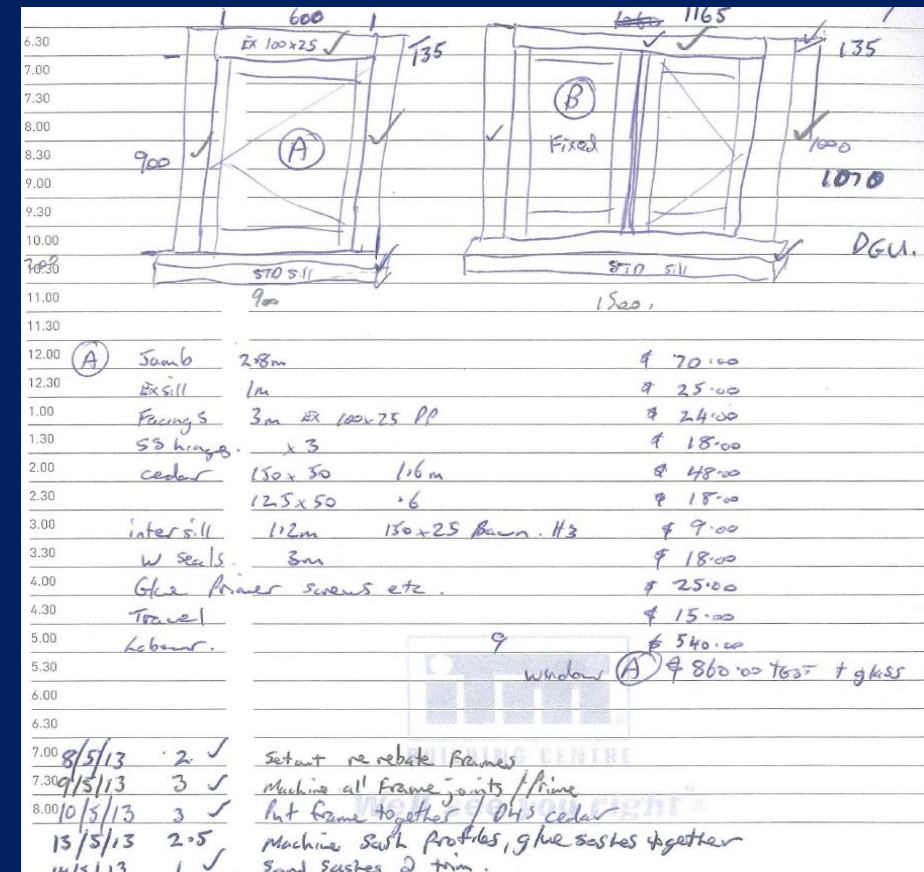


Concrete

Ideal



Real



Our findings: Developmental changes during training



| | Photographs that include people | Photographs with no people |
|---|------------------------------------|-------------------------------|
| Mean number of photographs in the diaries of novice carpentry students | 17.5 | 5.5 |
| Mean number of photographs in the writing of experienced apprentices | 1.6 | 15.6 |

Implications and suggestions for pedagogy

- Teachers can model interpretation of images.
- Have students read images in order to get information from them (Roberts et al, 2013)
- Assessing diagrams – e.g. getting students to label a diagram – enables assessment of whether the students understand.

Developing a sense of the author's purpose

Have students consider:

- What the main idea of the visual representation is
- What the author's purpose is for incorporating a visual representation
- How the title of the visual representation connects to the words on the page
- Why they think the author selected this particular type of visual representation
- How they read the visual representation.
- What they learned from the visual representations that they didn't learn from the words.

'Translate' back and forth between text and image

- Create their own appropriate image based on a piece of text
- 'Translate' an image into words

Raising awareness of rhetorical conventions

- (Western) visual rhetorical conventions:

‘Given’ information at the left,
and ‘new’ information at right
(Kress & van Leeuwen, 1996)

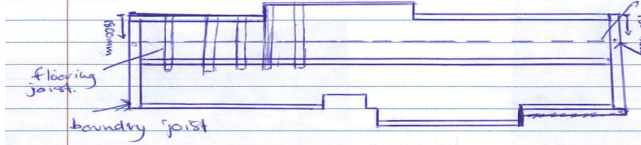
14 freeling st / Islandbay, Steel footing Work.



Dug out footing for front half
of garage and for block
retaining wall.
Bank Shaved back on slight angle
to stop slipping
Pipe & Services All moved out of way.

‘Ideal’ information at the top
and ‘real’ information below

* Finish nailing off joist
* Started putting down dwangs measured 1800mm
from outside of joist do the same on the
other side and pin a string line for accuracy
and faster work



Monday 12th May

- Finished doing dwangs through out the whole house
3 lines of dwangs along the floor of the joist floor
of the house 2 on each end coming in 1800mm
from the end of boundary joist and one line of
dwangs along the middle where the lapped joint
of the inside joist are. Just so the joist could be straight.


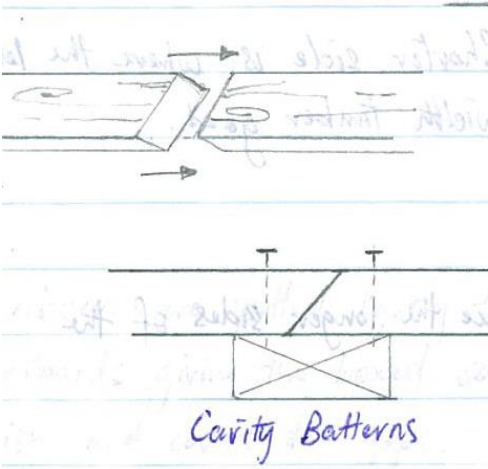
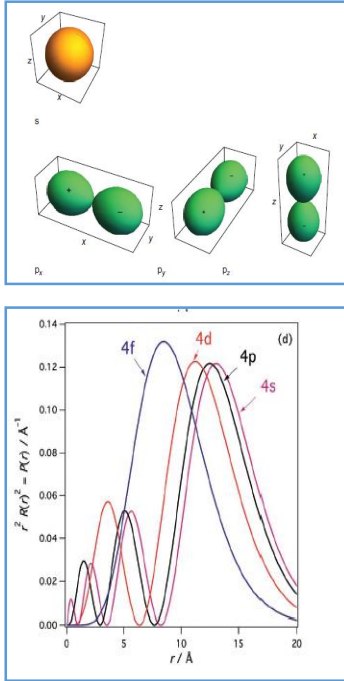
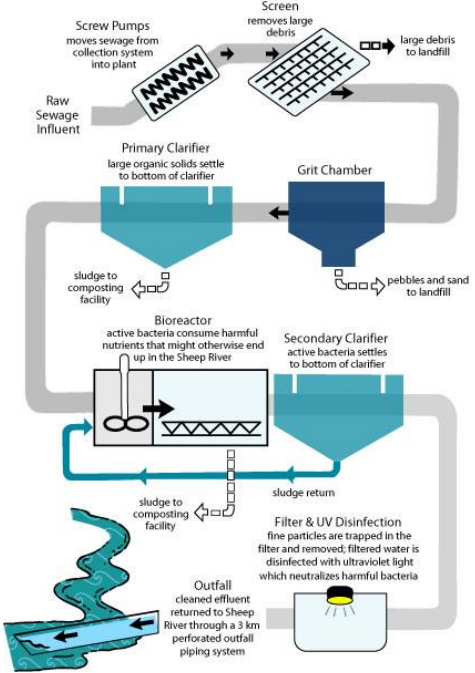


line of dwangs

Need for coherence between visual and written meaning

- Meaning redundancy is necessary
- This goes beyond explicit titles and labels
- Ensure adequate explanations in words of tables and particularly of more abstract representations like graphs.

Classroom discussion of patterns of meaning relations between images or image and text

| | | | |
|--|--|--|--|
|  |  |  |  |
| Temporal relations | Spatial relations | Mathematical expression (e.g. graph) and drawing or photograph | Images with a unifying / overseeing function (Kress, 2000) |

Promoting visual competency

- Create their own image of a process aimed at a particular audience (Eilam, 2015)
- Use peer feedback activities so that students assess each other's visual representations (Eilam, 2015)
- Creating their own diagrams helps students understand the conventions associated with the diagrams, like arrows, labels (McTigue & Flowers, 2011)

Conclusion

Reading:

Visual images are a key part of texts that students read

Students need to read them in conjunction with written text

Meaning redundancy

Additional information and different perspectives

Writing:

The conventions of visual literacy

Explicit written discussion of images

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