Writing Scientific Research Articles

Using suggested material and methods from Cargill & O’Connor (2009)

Task: Country to city in Stage 1
• Look at the Introduction of your selected PEA. What is the country? The province? The city?
• What tense is used?
• How is the literature cited?

Britton-Simmons & Abbott (2008)
What is the country? Biological invasions
The province? Factors controlling the invasion process
The city? The interaction of the factors and processes

Five stages of an introduction
1. Context for the problem to be investigated and claim to centrality or importance.
2. More specific statements about the aspects of the problem already studied by other researchers,
3. Statements that indicate the need for more investigation.
4. Purpose/objectives of the writer’s study or outlining its main activity or findings.
5. Optional statement(s) that give a positive value or justification for carrying out the study.

Highlighting gaps
• X remains a major challenge
• X has rarely been manipulated experimentally
• The interaction of X with Y is not well understood
• It is presently unclear how ....
• Moreover, most of what we know about X comes from Y
• The mechanisms involved in X have been investigated at the Y level

Purpose/objectives
• In this study we used X to better understand the effects of Y
• In an A experiment we manipulated both B and C to examine how these factors independently and interactively influence D
• We supplement the experimental results with a F model which we use to examine how G influences H in the long term
• Although a successful invasion requires both establishment and spread of the invader most studies have looked at just one of these processes (...). We take an integrative approach by employing both short and long term ... allowing us to examine the effects of B and C on the entire invasion process
Some astonishing questions about the nature of the universe

So much matter compressed into so little volume changes the

A black hole is created by the collapse of a dead star into a

if we cross out all the noun phrases (specific content chunks) that relate specifically to this study, we have a series of frameworks for sentences or sentence templates that can be adapted for a purpose statement in a suitable context.

Legumes form symbiotic associations with N\textsubscript{2}-fixing soil-borne bacteria of the Rhizobium family. The symbiosis begins when compatible bacteria invade legume root hairs, signalling the division of inner cortical root cells and the formation of a nodule. Invading bacteria migrate to the developing nodule by way of an infection thread, comprised of an imagined cell wall. In the inner cortex, bacteria are released into the cell cytosol, enveloped in a modified plasma membrane (the peribacteroid membrane (PBM)), to form an organelle-like structure called the symbiosome, which consists of bacteroid, PBM and the intervening peribacteroid space (PBS;Whitehead and Day, 1997). The bacteria, subsequently, differentiate into the N\textsubscript{2}-fixing bacteroid form. The symbiosis allows the access of legumes to atmospheric N\textsubscript{2}, which is reduced to NH\textsubscript{3} by the bacteroid enzyme nitrogenase. In exchange for reduced N, the plant provides carbon to the nodules to support bacterial respiration, a low-oxygen environment in the nodule suitable for bacteroid nitrogenase activity, and all the essential nutritional elements necessary for bacteroid activity. Consequently, nutrient transport across the PBM is an important control mechanism in the promotion and regulation of the symbiosis.
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Using citation to develop your own argument

1. Information prominent citation

**Topic sentence**

Shrinking markets are also evident in other areas. The wool industry is experiencing difficulties related to falling demand worldwide since the development of high-quality synthetic fibres (Smith, 2000).

This is the default method in many areas of science and you’ll notice that the Introductions of the two PEA use only this method.

Using citation to develop your own argument

2. Author prominent citation style 1

Shrinking markets are also evident in other areas. As Smith (2000) pointed out, the wool industry is experiencing difficulties related to falling demand worldwide since the development of high-quality synthetic fibres.

or

Author prominent citation style 2

Shrinking markets are also evident in other areas. As Smith (2000) argued that the wool industry was experiencing difficulties related to falling demand worldwide since the development of high-quality synthetic fibres. However, Jones et al. (2004) found that industry difficulties were more related to quality of supply than to demand issues. It is clear that considerable disagreement exists about the underlying sources of these problems.

3. Weak author prominent citation style

Several authors have reported that the wool industry is experiencing difficulties related to falling demand since the development of high-quality synthetic fibres (Nguyen, 2005; Smith, 2000; Wilson, 2003). For example, Smith (2000) highlighted...

Writers choose their citation method to fit with the way their paragraph is advancing their argument.

From Introduction to McNeill et al. (2003)

<table>
<thead>
<tr>
<th>Introduction text</th>
<th>Citation method</th>
<th>Author’s evaluation</th>
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<td>Foliar feeding does not disturb the system and has the additional advantage that shoots tolerate higher concentrations of N than roots (Wittwer et al., 1963). Spray application of 1\textsuperscript{5}N-labelled urea has been successfully used to label legumes in situ under field conditions (Zabarkh et al., 1991) but runoff of the labelled solutions from fieldage to the soil complicate interpretation of root-soil dynamics. Russell and Fillery (1996), using a stem-feeding technique, have shown that in situ 1\textsuperscript{5}N-labelling of lupin plants growing in soil cores enabled total below-ground N to be estimated under relatively undisturbed conditions, but they indicated that the technique was not adaptable to all plants, particularly pasture species. Feeding of individual leaves with a solution containing 1\textsuperscript{5}N-leaf-feeding in a study of 1\textsuperscript{5}N is a technique that has been widely used for physiological studies in wheat (Palta et al., 1991) and legumes (Ogbonnaya and Pate, 1972). Pate (1973). The potential of the technique for investigating soil-nodule N dynamics was noted as long as 15 years ago by Saddler et al. (1985) following the use of 1\textsuperscript{4}C leaf-feeding in a study of N transfer from legume to associated grass.</td>
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The Discussion

1. Check if it is separate from results and if there is a conclusion
2. Check the use of subheadings
3. As you redraft the discussion check the title still fits
4. Make sure that it fits clearly with the introduction, particularly the ‘country’ you began at, the gap and your purpose
5. Look out for unnecessary repetition with the introduction
What’s in the discussion?

- Reference to the main purpose
- A restatement of the most important findings, in order of significance and
- Explanation for findings-ref to literature
- Implications (in broader context)
- Recommendations (future research/applications)
  - Whether they support the hypothesis
  - Whether they agree with the findings of other researchers
  - Task from article

Strength of claim

- Make sure the strength of the sentences matches the strength of the data and the arguments presented

Strength of claim

The findings

May well  Demonstrate  regulates
Show       *should regulate.../when
Indicate    can regulate

Indicate  that X

Suggests  Y

Imply  that X

regulates

It appears  that X

* Caution should be exercised when extrapolating the short term findings to long term ...

Task