

# **A multi-sensory approach for Higher Education Business Students: Using colour in the reading process to analyse academic writing.**

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## **Abstract**

The paper shows a simple yet effective approach to reading and analysing academic papers and other documents for business students new to researching in higher education. While there is much in the literature about students completing their own academic writing, and support from books and video showing them how to achieve this, there is little published research which outlines or helps students to read, analyse or understand academic resources and use them effectively. This can be particularly problematic for students new to research as academic business journals present a wide range of topics, using different styles, and methods. This article demonstrates how a multi-sensory approach to reading used originally with dyslexic students also helps students highlight, consolidate, and organise information by the careful use of colour. It has proved particularly useful to students doing their first literature review. The multi-sensory method uses visual cues, for example, the use of highlighter colours, to enhance the black and white text found in academic journal articles to be enhanced, using a colour pallet and coding system for better organisation of information. This process highlights words, sentences, figures, and information of significance and helps students to navigate longer or more complicated texts, and helps them to enhance the quality of their own written work. The process of using coloured highlighters as part of a learning style effectively is demonstrated for organising information, and thoughts in preparation for inclusion into a literature review or written assignment.

### **Keywords:**

Colours, coding, journal articles, highlighting, themes, multi-sensory.

## Introduction

This article outlines a method that allows undergraduate business students to engage and build their confidence in using academic literature in the form of journal articles. This is seen as part of the mastery of fundamental academic skills as students commence their university careers (Tinto, 1993). There seems to be a general reluctance amongst business students to begin using academic literature as part of their reading and academic writing process (Mann, 2000). In conversation with students, this reluctance appears to be, because they find the large number of academic journals in business subjects have a broad range of topics, styles and methods that they find it overwhelming (Spahr, 2015). It therefore seems appropriate, in hearing this feedback, to explore pedagogical methods that make the reading of journal articles more accessible for all business students. This article advocates a practical process that will enhance their wider reading, and knowledge of specific subject areas.

By drawing on experiences employed to support dyslexic students this article outlines a method to help navigate complex and text-dense articles. This approach uses colour suggested by Fernando (2018) and is primarily based upon multi-sensory learning processes outlined by Kelly and Phillips (2015). Multi-sensory techniques involve using visual, auditory, and kinesthetic approaches to help support and enrich learning processes involving research. The innovation of introducing colour to navigate journal articles has been particularly useful in preparing students to write Literature Reviews for Dissertations etc. and has helped provide focus for non-dyslexic and dyslexic students. In my classes showing the latter group how to use colour with academic articles was noticed by the non-dyslexic students who expressed an interest in using it.

As a result, the method is now demonstrated to all business students in study skills sessions (see Appendix 1) and presented here as a transformative approach to help build their confidence in reading required academic journals within their sessions and

independent study time (Lillis *et al*, 2016). The session also includes a task to try the concept out with a specific text (see Appendix 2). What this has shown, by introducing and using the method, is that business students can engage more fully with their academic reading (Hardy & Clughen, 2012; Wingate, 2015) as introducing colour results in a more focused approach.

Good reading, whether academic or otherwise, is dependent upon prior experience of the reader's background (Hunt, 2004). Students entering university come from a range of educational backgrounds and need supporting in their initial use of academic materials. A student must be invested in the academic reading process as they commence their undergraduate journey and have an associated outcome with it. Through introducing and asking them to use a method to help interpret the context and the background, environment, and circumstances of the academic articles they are asked to read, this will enrich and enhance their learning and their developing academic writing style.

## **Review of Literature**

A review of the literature shows much written on student academic writing (van Blankenstein *et al.* 2019; Dafouz, 2020) and showing students how to write academically (Jegede, 2020, Bailey, 2021). There is also substantial body of work examining pedagogic teaching techniques teaching academic writing (Coffin *et al.*, 2005; Wallbank, 2018). However, a review of books in the UK Universities combined database system identified few articles or books on how to teach reading at undergraduate level, or how to students should read at undergraduate level. Of the ones listed, (St. Clair-Thompson, 2018), explores the approaches of undergraduate students, but reports the sparsity of their reading with just 14.1 hours per week being dedicated to the academic studies of full-time students.

The use of wider sources on academic reading skills were identified, such as the text on *Studying and Learning at University*, Pritchard (2008: 28) who detailed the 'crucial' need for effective reading by students in higher education.

Various strategies have been trialled to increase the engagement in academic reading through student participation with set weekly journal reading in groups, as authored by Kristinson et al. (2018). This did not however, emphasise techniques for helping to absorb and recall the information, which this article sets out to do. What is fully acknowledged, is that good academic reading from disciplinary or subject experts, who write in academic journals and texts, does help students to immerse themselves into the culture of the subject through its conventions, discourse, skills and knowledge (Erikson *et al*, 2006: 122) and is a necessity to success in higher education. This process of engagement with academic materials, promotes a deep level of learning through higher-order cognitive skills, showing an ability to analyse, synthesise, solve problems and think meta-cognitively, helping student to make connections and signify the meaning of the text (Bowden & Marton, 2000: 49).

## **Techniques**

### **Use of colour in coding in reading and analysing the journal article**

This section outlines techniques which initially were used when helping dyslexic students who rely on multi-sensory techniques in their learning (Dobson, Waters & Torgeson, 2021). These same processes (see Appendix 1) were demonstrated to help first year business students as a foundational skill to navigate and effectively read academic materials. The journal article divided into sections within Appendix 2 is the initial start point to help the students understand the main areas of a paper for example, the Title, the Abstract, the keywords and their meaning. Building from this unpack of a journal article, the process of reading the content and introducing colour to capture and highlight significant information was introduced to help students learn to navigate and utilise the information into their own written work.

Colour is seen as the one of the most important multi-sensory visual experiences we encounter (Adams *et al*, 1973) so after introducing colour highlighting onto printed journal articles and electronic pdf's to help with coding or organising information for dyslexic students I then used them with non-dyslexic students, an approach recommended by Fernando (2018). Colour-coding helps with navigating the information and providing a framework to interpret the textual composition (Chan *et al*, 2015). By using a series of stages from initial skim reading, creating a colour-coded pallet of highlighter colours and organising the key information (or themes) by specific colour students had a series of stages which broke down the body of a text into a series of simple approaches. The demonstration in a teaching session with students would show how they could navigate through a paper to identify key information and themes relevant to their development of for example, a literature review for a submission. In the session this was completed using a pdf document, and the colour highlighter from within the menu, but a physical print out and different colour highlighter pens can achieve the same effect.

The use of colour-coding is organised so each colour represents a different theme or aspects within the text. The process the student would adopt is to skim read the article initially to identify where areas of interest lie and then review to identify the key claims, and then highlight in **green**, key prompts or areas that will be significant for introducing into their written work. They will then repeat a similar process for each highlighter colour and theme. The process helps to break down the text for the student, is visible according to theme and helps to organise the flow of information then drafted into the literature review.

## The Process: Doing it / Using it

The process adopted using this visual multi-sensory technique and a variety of highlighter colours.

Process	Action	Outcome
Review document as Appendix 2 sample	Read the Title, Abstract, Keywords, Headings, Diagrams etc	This provides a good overview of what the document is for and what it covers.
Skim Read	Review the key content through the headings, sub-headings, summaries	This provides an indication that there is material that is relevant to the student
Colour code #1	Re-read the key content and prioritise using Highlighter Pen 1 (ie green) the <b>key claims</b>	This identifies for the student what the author is discussing, arguing and claiming in the document.
Colour code #2	Review the key claims and supporting information and using Highlighter Pen 2 (ie yellow) indicate the reasoning behind the argument being made	This helps the student to identify the background information and why the discussion/argument is significant
Colour code #3	Review the evidence and supporting facts using Highlighter Pen 3 (ie blue)	This provides the student with the evidence to scaffold the development of the discussion and argument and the foundation for the argument in the document
Colour code #4	Review the strengths and weaknesses in the discussion/argument and	This shows the student where the evidence is supportive to the

	evidence to support this using Highlighter Pen 4 (ie pink)	argument and where there are weaknesses or gaps (that can be illustrated)
Colour code #5	Areas of conclusion using Highlighter Pen 5 (ie red)	This helps the student establish what has been found and conclusions made that can then be discussed.

Table 1: Steps in the colour coding process

- Step One requires the student to skim read to identify key information related to themes that are relevant to the development of the literature review. To support this process, students were shown how to break down the key features of the journal article as per the example sourced from “How to Read a Scientific Paper” as an exemplar (see Appendix 2, Slide 1).
- Step Two: Having identified the key component parts to a journal article under review and the most significant features, students were asked to create a colour-key (using different highlighter pens to represent a different theme) see table in.
- Step Three: Once completed the students were advised to check their colour-coding but then set aside the article and return to it later to ensure that the key areas included in the colour-coding had meaning and they understood the context in relation to the subject area being reviewed.



## **Learning Outcomes and Advantages.**

The key advantages of using this process of highlighting with colour are highlighted here and align with the findings of Farley and Grant, (1976). It can help to improve the attention span when reading as the action of colour-coding areas of the text demands greater concentration. The use of the colour-coding process helps in organising text-based information into a format or sequence that makes it easier to review and aids understand on a second or third view. Highlighting features for use on documents has become more commonplace in recent years, as this functionality has been developed as part of the software improvements and can now be found on most modern devices (Fisher *et al*, 1989).

I found the cognitive activity of reading a paragraph, deciding its conceptual significance, and highlighting the relevant words and/or sections, helps students to perform better than those who simply read the material with no highlighting, a method supported by Leutner et al, 2007. When revisiting the article again, the effectiveness and memory, or cued recall and longer-term retention of the article, proved far better amongst students that had used the colour highlighter process, than a non-highlighted version (Yue et al, 2015).

The benefits of it use for students is to help initiate deep learning, that becomes more evaluative, and improves the range of sources and literature used within academic assignments, as opposed to simply passively reading the text (Nist & Hoglebe, 1987; Bowden & Marton, 2000). Further, introducing the process of identification and isolation of information using text marking, as an organisation tool, helps to ensure the material is better understood, connections made and retention of the material for a longer duration of time by students.

As has been demonstrated and tested here with the Year 1 Business Students, all students as part of their academic skills development should be taught the process

to understand how to navigate an article or book chapter, read and mark (or highlight) their academic readings effectively to ensure that they can be fully engaged and competent academic readers. The strength of this then translates to their academic writing.

## **Concluding Statements.**

The process does need careful application. When demonstrating this with all students, care must be taken to ensure that by using the skim reading approach, recommended as a multi-sensory approach, that they do colour-code with purpose to identify key links and patterns in the text that is meaningful.

Since introducing the technique in the trial using a range of colour highlighter pens, students have adopted other strategies themselves using a photocopied version of the article to an A3 size. They suggested this gave the option to also write items in the margins to help assimilate the text even further. More recently with use of technology, students have opted to download pdf articles, save them and colour-code and enhance the materials using the same technique but in an electronic format. Both versions have proved successful. For the dyslexic students involved in the initial trials of this process, it has proved useful in helping to break down large amounts of text so that they can develop a mental picture of the information and how to include it in their writing.

What this staged process has proved for **all** students, is that it makes reading more accessible and much easier for the student, by breaking it down, and making it very visually appealing, albeit, with purpose. Students using this process felt their reading time became more productive, using the initial skim reading concept and then organising the key areas with the colour-coding process and they could see something for their effort. The main comments supplied, were that these staged approaches and the use of colour-coding, made their reading more relatable and understandable both on initial read through and subsequent re-reads.

The literature has reported a low level of reading of academic journals by undergraduate students in general. This process is transitional, and not simply remedial, to support dyslexic students (Chen et al, 2015), but could be used by all. Those that have tried it, like it! A broader dissemination of the technique through a wider research project could help all students in learning simple techniques to break down the journal articles into sections that embeds deeper learning.

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## APPENDIX ONE:

### Outline Lesson PLAN

**Learning objectives:** *by end of session student will be able to:*

1. What is the importance of meeting academic standards when engaging with literature?
2. What are simple processes to begin engaging and reading the relevant literature?
3. What learning styles can be applied to catalogue and store the important information for use in submissions?
4. Checking systems to ensure that statements are all fully supported.
5. What forms of technology can be used and samples and examples to help.
6. Independent Study: Putting these techniques into practice using a Journal Article from a session this week.

## APPENDIX TWO:

### What are simple processes to begin engaging and reading the relevant literature?

#### Slide One:

S = Survey text

S = Skim the material.

#### Look at

- the contents,
- blurb,
- introduction,
- summaries.

Examine the structure of the material.

What have you learned?

**Case study: Reading a Primary Research Article from *Plant Physiology***

This case study examines a recent article published in the journal *Plant Physiology*. The full article is appended to this PDF. Because of space constraints, only the major points from the paper are covered in the case study, and the biochemical pathway is presented in simplified form.

**Title:** The *b* Gene of Pea Encodes a Defective Flavonoid 3',5'-Hydroxylase, and Confers Pink Flower Color<sup>1</sup>

**Authors and author information:** Carl Mumm, Mike J. Ambrose, Lynette Turner, Lionel Hill, T.H. Neal Ellis, and Julia M.J. Baker<sup>1</sup>

**Abstract:** A summary written by the authors

**Introduction:** Not all journals mark it with a subheading

**Footnotes:** including contact information for corresponding author and funding sources

**Citation for this paper:**

**In-text citation:** Full citation is found at the end of the article

**Indicates footnotes:** (indicated by superscript 1)

**Indicates footnotes:** (indicated by superscript 2)

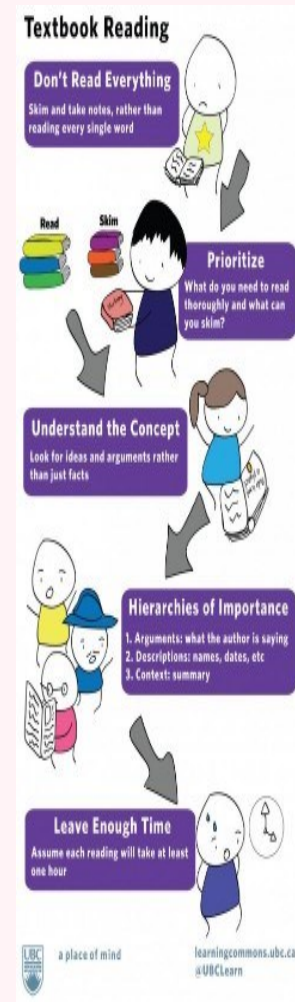
The first page of a typical article from *Plant Physiology*. (See text for more information about each section)

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Slide Two:

# Top Tips?

1. **Be critical about what you read from the start** – read the overview to evaluate its suitability.
2. **Be selective** – how much do you need to read in the journal article? Learn to scan the article to find the relevant information:
  - Abstract
  - Introduction
  - Discussion & Conclusion
3. **Look for clues/signposts**– pick out key elements and colour code.



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