How to Write an Effective Discussion & Conclusion

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This final part of your thesis is **a vital one**: it tends to **synthesise and analyse all elements** of the thesis in order to **evaluate and explain the overall significance of the research**, and **readers will often turn to the discussion (or conclusion) chapter fir**st to obtain an overall picture of a study.

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Unfortunately, you may well feel rather **exhausted** by the experience of drafting your thesis by the time you arrive at your discussion chapter(s)

3

In the discussion, you explore the **meaning and relevance** of your research results, explaining **how they fit with existing research and theory**.

4

You delve into the meaning, importance, and relevance of your results.

Focus on explaining and evaluating what you found, showing how it relates to your literature review and paper or dissertation topic, and making an argument in support of your overall conclusion.

It should not be a second results section.

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Discussion section vs Findings/Results section

- **Results** sections should present your **results**, and your **Discussion** section should **subjectively evaluate** them.
- The results chapter or section **simply and objectively reports what you found**, **without speculating** on why you found these results.
- The **discussion** interprets the **meaning of the results**, puts them in **context**, and **explains why they matter**.

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Steps in Writing Discussion (SIILR)

1. **SUMMARY**: A brief recap of your key results
2. **INTERPRETATIONS**: What do your results mean?
3. **IMPLICATIONS**: Why do your results matter?
4. **LIMITATIONS**: What can't your results tell us?
5. **RECOMMENDATIONS**: Avenues for further studies or analyses

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Step1: Summarise your key Findings

- Reiterating your research problem and concisely summarizing your major findings.
- Clear statement of the overall result that directly answers your main research question. This should be no more than one paragraph.

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Examples: Summarization sentence starters

- *The results indicate that…*
- *The study demonstrates a correlation between…*
- *This analysis supports the theory that…*
- *The data suggest that…*

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Step2: Give your Interpretations

- **Interpret** your results and spell out their **significance** for your reader
- Show exactly **how they answer your research question**.
- Some typical approaches to interpreting the data include:
  - *Identifying **correlations, patterns, and relationships** among the data*
  - *Discussing whether the results **met your expectations or supported your hypotheses***
  - ***Contextualizing** your findings within previous research and theory*
  - *Explaining **unexpected results and evaluating** their significance*
  - *Considering possible **alternative explanations** and making an argument for your position*

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Examples: Interpretation sentence starters

- *In line with the hypothesis…*
- *Contrary to the hypothesized association…*
- *The results contradict the claims of Smith (2022) that…*
- *The results might suggest that x. However, based on the findings of similar studies, a more plausible explanation is y.*

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Step3: Discuss the Implications

- **Relate** your results back to **the scholarly work** that you surveyed in the **literature review**.
- The discussion should show how your **findings fit with existing knowledge**, what **new insights** they contribute, and what **consequences** they have for **theory or practice**.
- Ask yourself these questions:
  - *Do your results support or challenge existing theories? If they support existing theories, what new information do they contribute? If they challenge existing theories, why do you think that is?*
  - *Are there any practical implications?*
- Your overall aim is to show the reader exactly **what your research has contributed, and why they should care**.

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Examples: Implication sentence starters

- *These results build on existing evidence of…*
- *The results do not fit with the theory that…*
- *The experiment provides a new insight into the relationship between…*
- *These results should be taken into account when considering how to…*
- *The data contribute a clearer understanding of…*
- *While previous research has focused on x, these results demonstrate that y.*

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Step4: Acknowledge the Limitations

- **Acknowledging limitations** is important to demonstrate your **credibility and scholarship as a scholar**.
- Limitations **aren't about listing your errors**, but about providing an **accurate picture of what can and cannot be concluded** from your study.
- Limitations might be **due** to your overall **research design, specific methodological choices, or unanticipated obstacles that emerged during your research process**.

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Step4: Acknowledge the Limitations

- Here are a few common possibilities:
  - *If your sample size was small or limited to a specific group of people, explain how generalizability is limited.*
  - *If you encountered problems when gathering or analyzing data, explain how these influenced the results.*
  - *If there are potential confounding variables that you were unable to control, acknowledge the effect these may have had.*
  - *After noting the limitations, you can reiterate why the results are nonetheless valid for the purpose of answering your research question.*

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Examples: Limitation sentence starters

- *The generalizability of the results is limited by…*
- *The reliability of these data is impacted by…*
- *Due to the lack of data on x, the results cannot confirm…*
- *The methodological choices were constrained by…*
- *It is beyond the scope of this study to…*

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Step5: Share your Recommendations

- Make **recommendations** for **practical implementation** or further research.
- *Sometimes, the recommendations are saved for the conclusion.*
- Suggestions for **further research** can lead directly from the limitations.
- Don't just state that more studies should be done—give **concrete ideas for how future work can build** on areas that your own research was unable to address.

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Examples: Recommendation sentence starters

- *Further research is needed to establish…*
- *Future studies should take into account…*
- *Avenues for future research include…*

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In this study, understanding the effect of reflection coupled with feedback towards students' performance has implications with regard to how the instructor addresses students' learning needs. The results of this study showed that students receiving reflection treatment showed significant increment in tests ($Z = -3.726$, $p < 0.05$). In other words, reflection and feedback play a crucial role in stimulating students' academic performance when learning Authoring System. Overall test marks were better in the post-test, where all of the students scored just above average and none were in the low achievers' category, with five students recording +3 improvement, six students at +4 improvement and seven students at +5 improvement (refer Table 5.8). This implies that the students were attentive and able to comprehend learning based on the applied teaching and learning approach, thus reflecting good development in the cognitive test.

Summarize

Interpretations

Prior studies have established that active engagement in reflection leads to better conceptual understanding and thus to improved performance (Novakovich, 2016; Tracey et al., 2014). For example, in a quasi-experimental study, Novakovich (2016) found that the pre- and post-tests revealed significant differences, with the reflection-mediated peer feedback increased the learning outcomes of essay writing and outperforming the control group. Drawing from that, the researcher believes that the power of reflection combined with the feedback approach did produce higher test scores for the Authoring System course, as hypothesised in this study. From the social constructivist perspective, the impact of student-student and student-instructor interaction when giving reflection and feedback provides opportunities for students to emulate the same actions, and thus results in changes in test competency. Additionally, increasing the opportunity for peers to view and comment on reflections created by others could enhance their knowledge levels in a test (Yang & Chang, 2012).

Implications

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Lastly, the researcher cannot be certain whether demographic factors such as gender, race and age may affect the test scores' measures as often revealed in previous works (Alturki, 2016). This is because the sample sizes and representation were not appropriate to run statistical analysis and derive meaningful findings. Nevertheless, from general observation of the students' data patterns, it can be seen that it is not necessarily the case that students with higher pre-test marks exhibit greater improvement on the post-test, and vice versa. Instead, what this study might have here, for example, were students who (1) may start the course with little prior knowledge, learnt a great deal, engaged with learning very well and got average/high marks, and (2) may have adequate prior knowledge, learned a little, did not perform well and earned low marks. Consequently, this situation might lead to difficulty detecting any at-risk students from the very beginning of the course. On a positive note, it is good to see that prior knowledge and experience in using authoring software tools did not influence the test scores, as that might have indicated failure to control for the selection-maturation interaction threat.

Limitations

In summary, from a quantitative viewpoint, the Authoring System post-test results typically increased to a significant medium effect as a result of reflection embedded with a feedback strategy. Lack of information on observation means that it is not possible to predict the other possible factors that may dynamically challenge the significant intervention result. For better learning benefits, perhaps the instructor could adhere to a more efficient method of evaluation that can give instant feedback to the students and thus support them to be more focused on the lecture topic before can fully comprehend the relation between reflection and academic performance.

Recommendations

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This study sought to predict students' learning performance (measured as grade increments) based on data patterns of reflection through blogging, which included feedback types and reflective thinking levels. As understood from Figure 5.6, eight learning performance pathways were identified in relation to the respective increment categories. Specifically, three learning patterns were associated with the P3 increment category (DR ⇒ A; DR ⇒ A ⇒ DW; DR ⇒ DR ⇒ DR) and P4 (DR ⇒ A ⇒ DW; DR ⇒ DR ⇒ CR ⇒ OF; DR ⇒ DR ⇒ DR), whereas only two learning patterns were linked to the P5 increment category (DR ⇒ CR; DR ⇒ CR ⇒ OF). Among all variables, DR was noted as the most influential attribute that differentiated all three learning increment categories. Although not all types of reflective thinking and feedback emerged in the learning performance pathways, it was evident that those pathways suggest a clear nexus between an increase in learning performance and students' reflective thinking and feedback ability. In other words, as the increment category improved, so did their reflective thinking and feedback levels, and vice versa for lower increment category (see Table 5.14).

Summarize

Based on the description of excerpts in section 6.3, it is perceived that the lower performing students may tend to respond to the reasoned explanation of what had been discussed (DR) by merely (1) generating surface questions (A), and (2) stating the idea/solution/basic knowledge to the problem descriptively from the presented factual information without further elaboration (DW). This finding is in line with Kim's (2005) study, which found that students whose reflective thinking levels were low had poor performance with regard to learning compared to those with high reflective thinking levels. Among the possible explanations for this is that this group of students, which can be labelled as "superficial thinkers", may be inclined to adopt a surface level of reflective thinking and feedback based on what is plainly visible to them at the time. As this study is about a technical course where the majority of the contents deal with step-by-step processes, it was expected that this type of surface description and question would be frequently used by all students (refer Table 5.2) and hence would become the significant predictor for the P3 performance group. Additionally, based on the observation of the discussion threads, conversations that are supposed to be reflective can easily end after the students respond using the DW and A types of thinking and feedback. Though Hatton and Smith (1995) acknowledged that descriptive writing is a starting point for students to shift to other levels of reflective thinking, students may struggle to achieve this if they are not being trained to lessen the spectrum of effortlessly agreeing with other people's opinions/criticisms. From what has been discussed in section 6.3, the researcher believes that this can be done through questioning one's stance, as that might open the blind-spots in one's knowledge and reflective thinking..

Interpretations

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The presence of an individualistic orientation was noted for one student in the P3 category, where the DR type of reflective thinking was repetitive and independent, meaning that it was not associated with other types of reflective thinking skills and feedback (DR ⇒ DR ⇒ DR). It also reached a certain degree of continuity and happened quite frequently (DR ≥ 329.5 times). Although the DR type of reflective thinking was commonly used and easily mastered without requiring any trigger from specific questions/support due to its low level reflective thinking condition (Hatton & Smith, 1998), this pattern might not reflect normal learning progress; moreover, not many students practiced these learning pathways (P3 = 1 student; P4 = 1 student). The difference between students in P3 and P4 is just how frequent they were in repetitively projecting the DR level in reflection (P3 = DR < 329.5 times; P4 = DR ≥ 329.5 times). For future intervention purposes, it is the role of the instructor to break this kind of repetitive chain by asking more questions to model its usage, and to judge whether that can raise students' reflective thinking skills and feedback to a higher level.

Implications

In summary, from a quantitative viewpoint, the Authoring System post-test results typically increased to a significant medium effect as a result of reflection embedded with a feedback strategy. Lack of information on observation means that it is not possible to predict the other possible factors that may dynamically challenge the significant intervention result.

Limitations

For a learning performance pathway to be practical, it can be programmed and embedded in the blogging environment in widget/plugin form. EnquiryBlogger is an example of a learning analytics plugin to track and support learners' awareness and reflection using blogs (Fergusen, Shum & Crick, 2011). Additionally, the Other Sensors recommendation system provides students with recommendation based on their post behaviour (Holanda et al., 2012). Holanda and colleagues also found that by interacting with the recommender system, the percentage of interaction increased up to 83.3%. This kind of intelligent recommender has been implemented in many previous works related to learning analytics for personalised learning, as reviewed by Bodily and Verbert (2017).

Recommendations

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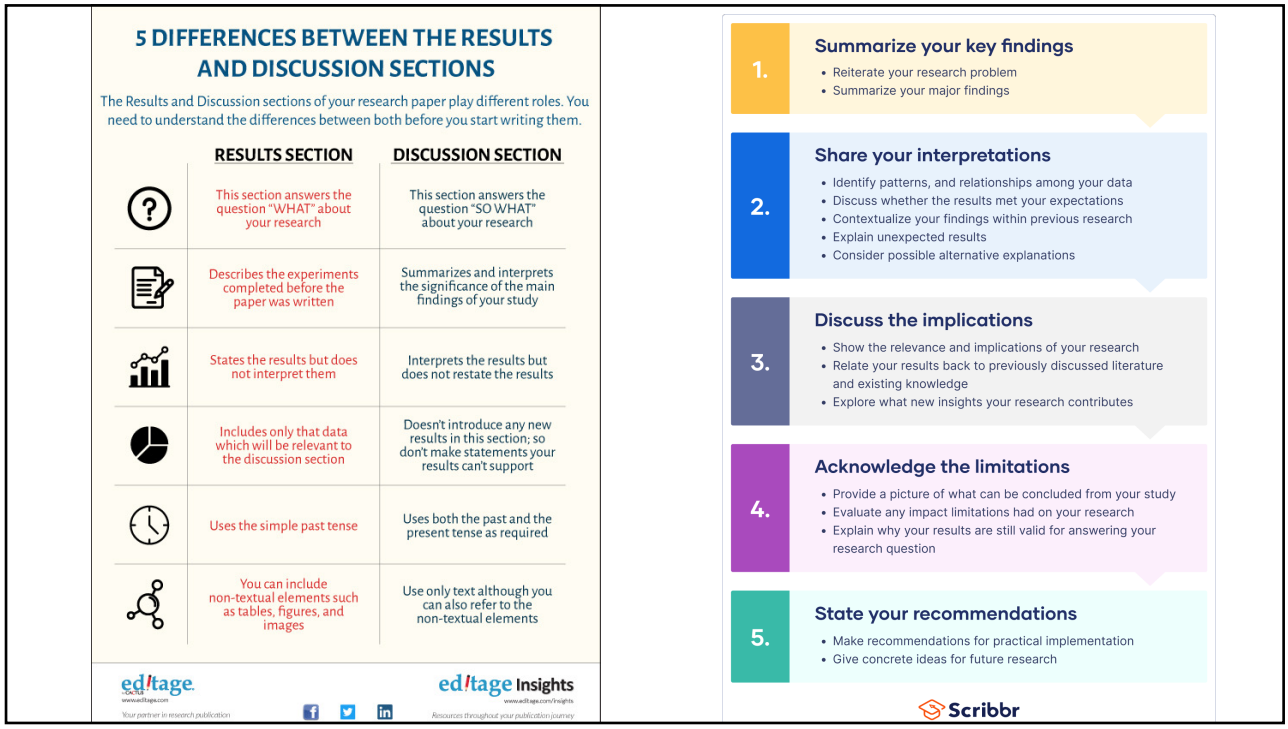
5 DIFFERENCES BETWEEN THE RESULTS AND DISCUSSION SECTIONS
The Results and Discussion sections of your research paper play different roles. You need to understand the differences between both before you start writing them.
RESULTS SECTION
DISCUSSION SECTION
This section answers the question "WHAT" about your research
This section answers the question "SO WHAT" about your research
Describes the experiments completed before the paper was written
Summarizes and interprets the significance of the main findings of your study
States the results but does not interpret them
Interprets the results but does not restate the results
Includes only that data which will be relevant to the discussion section
Doesn't introduce any new results in this section; so don't make statements your results can't support
Uses the simple past tense
Uses both the past and the present tense as required
You can include non-textual elements such as tables, figures, and images
Use only text although you can also refer to the non-textual elements
edtage
Your partner in research publication
edtage Insights
Resources throughout your publication journey
1.
Summarize your key findings
• Reiterate your research problem
• Summarize your major findings
2.
Share your interpretations
• Identify patterns, and relationships among your data
• Discuss whether the results met your expectations
• Contextualize your findings within previous research
• Explain unexpected results
• Consider possible alternative explanations
3.
Discuss the implications
• Show the relevance and implications of your research
• Relate your results back to previously discussed literature and existing knowledge
• Explore what new insights your research contributes
4.
Acknowledge the limitations
• Provide a picture of what can be concluded from your study
• Evaluate any impact limitations had on your research
• Explain why your results are still valid for answering your research question
5.
State your recommendations
• Make recommendations for practical implementation
• Give concrete ideas for future research
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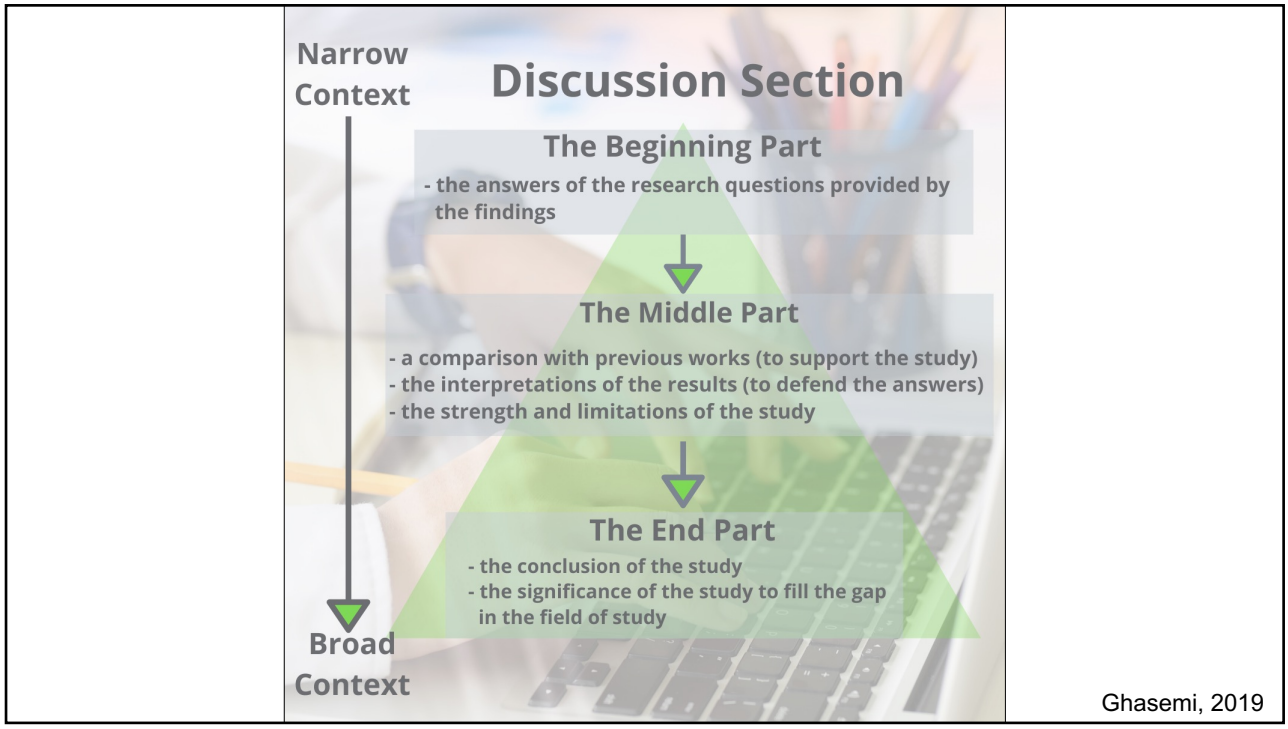
Narrow Context
Discussion Section
The Beginning Part
- the answers of the research questions provided by the findings
The Middle Part
- a comparison with previous works (to support the study)
- the interpretations of the results (to defend the answers)
- the strength and limitations of the study
The End Part
- the conclusion of the study
- the significance of the study to fill the gap in the field of study
Broad Context
Ghasemi, 2019

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Below is a list of questions to guide you when organizing the structure of your discussion section (Viera et al., 2018):

- What experiments did you conduct and what were the results?
- What do the results mean?
- What were the important results from your study?
- How did the results answer your research questions?
- Did your results support your hypothesis or reject your hypothesis?
- What are the variables or factors that might affect your results?
- What were the strengths and limitations of your study?
- What other published works support your findings?
- What other published works contradict your findings?
- What possible factors might cause your findings different from other findings?
- What is the significance of your research?
- What are new research questions to explore based on your findings?

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What not to include in your discussion section?

- **Don't introduce new results.**
- **Don't make inflated claims.** Avoid overinterpretation and speculation that isn't directly supported by your data.
- **Don't undermine your research.** The discussion of limitations should aim to strengthen your credibility, not emphasize weaknesses or failures.

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Frequent mistakes

- The discussions are **too static and mechanical** – Avoid having same ways of discussion across RQs
- Discussing **findings** that **weren't included** in the results chapter
- **Poor linkage** to the **research aims, objectives and research questions**.
- **Poor linkage** to **existing research** and/or the **theoretical framework**.
- Only answering **what**. **Not answering Why?** If your research is quantitative, how to answer why?
- When the **findings are contradicting** with the literature, the discussion **underate the findings**!
- **Too perfect discussions** of findings!
- **False Citations!**
- Use **irrelevant** previous research findings to support yours.
- **Incorrect** Interpretation
- The "Bully Pulpit"

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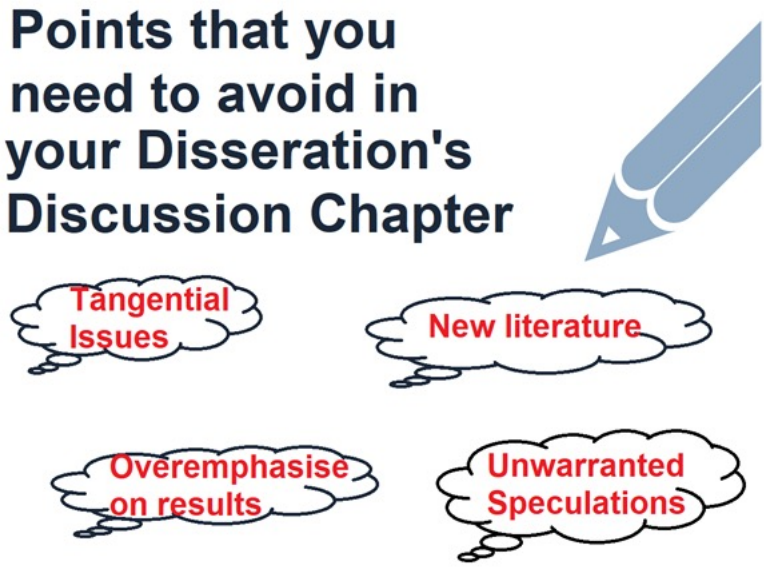

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Tools

MANCHESTER 1824 The University of Manchester Academic Phrasebank

- https://www.phrasebank.manchester.ac.uk/compare-and-contrast/
- https://nnkt.ueh.edu.vn/wp-content/uploads/2019/06/Academiv-Phrase-Bank.pdf
- https://apastyle.apa.org/instructional-aids/discussion-phrases-guide.pdf
- https://www.ref-n-write.com/blog/research-paper-example-writing-results-discussion-section-academic-phrasebank-vocabulary/

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Discussion section vs Conclusion section

- The discussion is an in-depth exploration of the results, going into detail about the meaning of your findings and citing relevant sources to put them in context.
- The conclusion is more shorter and more general: it concisely answers your main research question and makes recommendations based on your overall findings.

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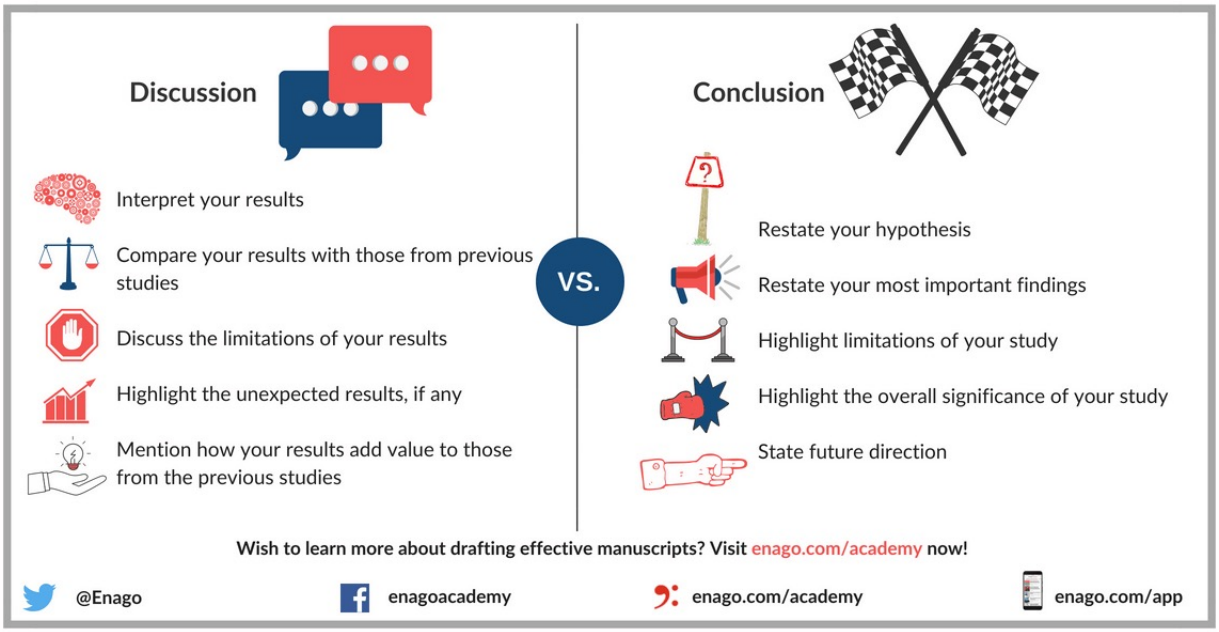

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Conclusions

- **Summarizing** the main points of your findings,
- Do something more **thought-provoking**.
- What **new questions** are raised by your investigation
- What other issues does your topic relate to or cast light on
- What are the consequences if the situation you have analyzed persists.
- **The climax of your thesis**.

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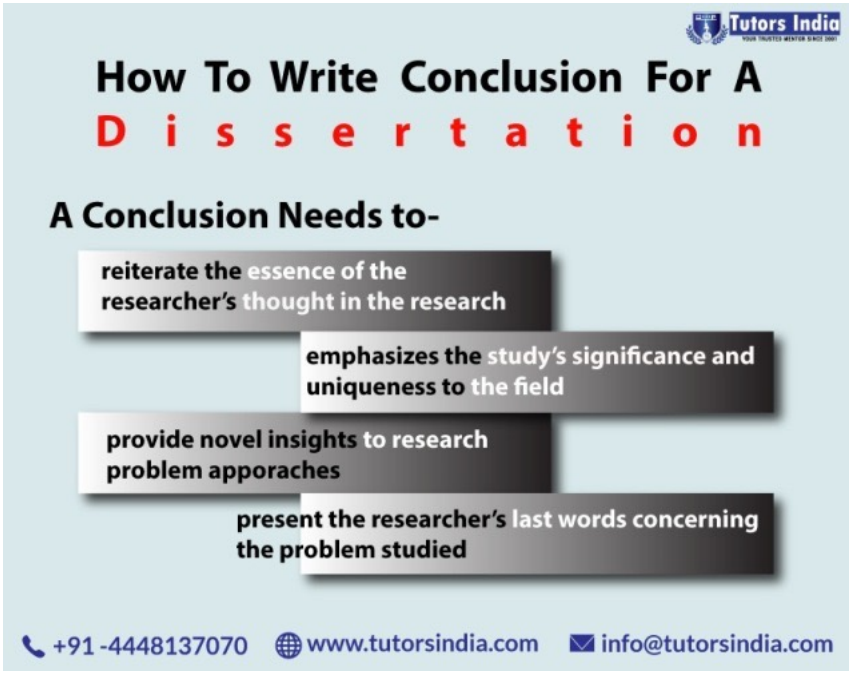
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How To Write Conclusion For A
Dissertation
A Conclusion Needs to-
reiterate the essence of the researcher's thought in the research
emphasizes the study's significance and uniqueness to the field
provide novel insights to research problem apporaches
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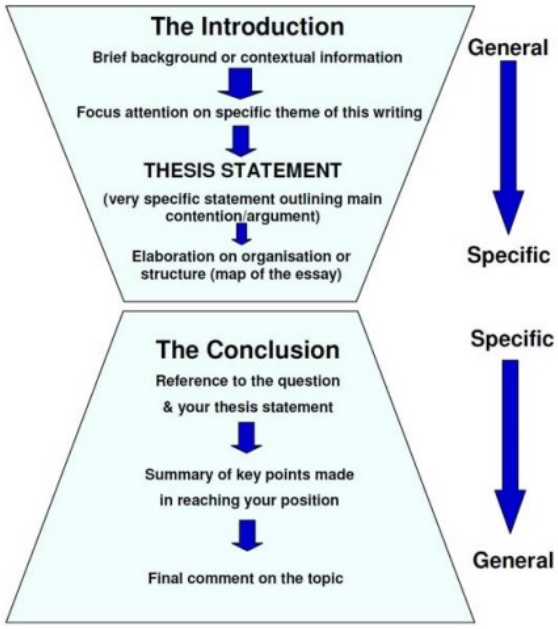
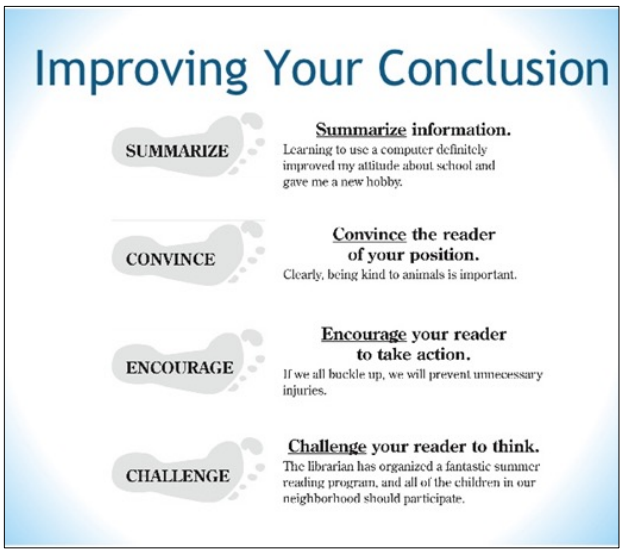

The Introduction
Brief background or contextual information
Focus attention on specific theme of this writing
THESIS STATEMENT
(very specific statement outlining main contention/argument)
Elaboration on organisation or structure (map of the essay)
General
Specific
The Conclusion
Reference to the question & your thesis statement
Summary of key points made in reaching your position
Final comment on the topic
Specific
General


Improving Your Conclusion
SUMMARIZE
Summarize information.
Learning to use a computer definitely improved my attitude about school and gave me a new hobby.
CONVINCE
Convince the reader of your position.
Clearly, being kind to animals is important.
ENCOURAGE
Encourage your reader to take action.
If we all buckle up, we will prevent unnecessary injuries.
CHALLENGE
Challenge your reader to think.
The librarian has organized a fantastic summer reading program, and all of the children in our neighborhood should participate.

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1. **Do not summarize too much**

- Summarizing is a key part of your conclusion, but it should not be the only part.
- Explaining how to apply the information covered in the paper is just as important as summarizing the key parts.
- The reader should be left with a sense of resolution.

2. Be careful when introducing new information

- It can happen that you introduce new information in your conclusion, especially when you're trying to give the reader a sense of how the information can be applied in a broader sense.
- While you can pose questions or explain how the information is relevant, make sure to not introduce new key points.

3. Do not use your conclusion to make up for inadequacies in the body of your paper

- You might be tempted to add whatever you have missed to include in the chapters before to the conclusion.
- If you do that, the conclusion will not conclude anything but just raise more questions.
- If you find yourself in that situation, your topic might be too broad.

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First, from the implementation of two types of blogging environment, namely course blogs and individual blogs, the researcher learned that the dominant reflective thinking skills were merely description of tasks or experiences that took place (this is equivalent to the first and second levels, i.e. DW and DR). Students were seen to make hardly any attempt to engage in critical or in-depth reflections. Fourth, this study has presented some key associations to model how feedback through questioning may manipulate the direction of reflective thinking skills through association rules analysis.

….

Fifth, reflection and feedback play a key role in stimulating students' learning performance when learning Authoring System, as evident in the overall post-test marks, where all of the students scored just above average and none were in the low achievers' category.

Finally, eight learning performance pathways were identified in relation to the respective increment categories. This also points to the notion that there is no one-size-fits-all concept for reflection in the learning process. Among all variables, DR was acknowledged as the most influential attribute that differentiated all three learning increment categories. Although not all types of reflective thinking and feedback emerged in the learning performance pathways, it was evident that those pathways suggest a clear nexus between an increase in learning performance and students' reflective thinking and feedback ability. To put it another way, as the increment categories improved, so did their reflective thinking and feedback levels, while the converse was true for the lower increment category. In fact, by manipulating the usage of other reflective thinking and feedback types instead of sticking to the same level of reflection and feedback most of the time. **These learning performance pathways further highlight the potential advantage of a recommender system for future adoption, which can assist in developing a more systematic reflective thinking process through a personalised approach by identifying the possible at-risk students based on the frequency value gained.**

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THANK YOU

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