



How to write scientific assignments

Recommendations from the
Department of Industrial Engineering and Management

2009-09-23

Writing an assignment requires proper planning and structure. Spending some time on sorting out your thoughts and motives before you start *will* lead to time savings due to less rework and ‘unnecessary’ data collection.

This is why we want to emphasize that you start by carefully considering the structure of your assignment. You will find a suggestion for the sections required in a complete assignment below.

This is a recommendation and as you gain experience you may deviate from this structure. In the beginning we, however, strongly advise you to follow this structure until you feel confident about the structure which is required in our assignments.

The headlines of the sections below are followed by a description of what each section should contain. In your assignments you can change the proposed headlines to others that are more appropriate for your particular text. At the end of the proposed structure you will find suggestions for how to make references to literature and other sources.

The recommendation ends with a clarification the different focus and requirements of assignments written at basic level or advanced levels.

Assignment structure

Title page

The title page contains the title of the assignment, the date, and the name of the authors (including date of birth and email address). The date is submission date and in revised versions the resubmission date. This makes it easy to identify the different versions of the assignment. The title page includes also the level of the assignment, the name of the course, the examiner, the university and the department.

Summary

The summary gives a one-page overview of the contents of the *whole* assignment, i.e. problem, purpose, method, results and conclusions.

Contents page

The contents page provides a good overview of the contents of the assignment. All headlines from introduction to conclusion are numbered. Only headlines at a maximum of three levels are included in the contents page. Summary, contents page and references should be included but *not* numbered.

Introduction/Background

In the introduction section, the reader gets an overview of the problem, and a justification for a study about the particular subject. Introduce, therefore, the reader to the subject, the overall context and perhaps a research question. Convince the reader that your text is relevant and worth reading. In order to highlight your contribution to the subject you can also provide a quick review of some previous

studies. Write this section so that the purpose of assignment will follow naturally after the introduction/background.

Purpose

The purpose statement should be short, clear and precise. The purpose is to *explore* or *investigate* the problem/question that is the subject of the assignment. The purpose is *not* to write an assignment in a specific course.

The purpose gives such a clear picture that the reader feels confident about the content of the assignment. The purpose is formulated in such way that it can be discussed and a conclusion can be drawn at the end of the assignment. It is usually helpful to also formulate *questions* that specify the purpose. These questions will also provide structure for your analysis and discussion.

Methodology

In the methodology section you outline the approach you used to fulfil your purpose, i.e. how you performed your study. You justify *what* you have done, and *how* you did it. You explain also *why* you have chosen a particular method. The methodology also demonstrates that you are aware of the reasons and the consequences of the choices you have made. The section should thus include a discussion on the quality of your study in terms of reliability, validity and generalisability.

Theoretical Framework

In this section you describe the theories, concepts/philosophies and definitions you have used when analysing the problem. You may also be useful to present an analytical model that explains the terminology you have chosen and/or relationships between your core concepts.

Description/Overview/Results/Findings

In this section you present the main contents of your assignment. In empirical¹ investigations it means both descriptions of the phenomenon of interest as well as the results of the study. In theoretical (based on literature only), it means explaining the views of different authors. It is important not to do any analysis in this section. This means also means that you should avoid all types of evaluations and judgements.

Analysis/Discussion

In this section you will analyse and discuss the previous section according to as well your stated purpose as the questions you may have presented. It may be good to structure the discussion chapter according to these questions. In case you have presented an analytical model, this should be used in this section. The results you have obtained should also be analysed in relation chosen theory and/or literature. You should specify if and how your results contribute to or contradict previous studies.

Conclusions

Your conclusions should be directly related to the purpose of your study and can be seen as a summary of your findings. The questions that you may have asked in the purpose chapter are answered. This section may also contain proposals for future studies based on the 'new' problems or question that arose as result of your study.

References

The sources of all your material and information should be provided through references. References can be made in many different ways, we recommend the following:

Reference in text

Reference is written: *Author year*, e.g. Brown, 1998

¹ "based on , or guided by the results of observations or experiments only" (Shorter Oxford English dictionary)

The reference may be located in the text or in a footnote. Choose one alternative and stick to it throughout your assignment

Alt. 1: Example: “There are many studies of how outsourcing influences companies’ productivity (see e.g. Heshmati, 2000). According to Nutek (2000, p xx) no effects has be revealed.

Alt 2: Example: “There are many studies of how outsourcing influences companies’ productivity ¹. According to Nutek² no effects has be revealed.

Write at the bottom of the page:

¹ See e.g. Heshmati, 2000

² Nutek, 2000, p xx

Page numbers are essential if you use direct quotations of another author. In other cases it is not required but may be advisable

Book:

Author (last name, initials) (year). *Title* (italics). Location of publisher (not print): Publisher

Example:

Utterback, J.M. (1994), *Mastering the Dynamics of Innovation*, Boston, Massachusetts: Harvard Business School Press

Book chapter:

Author (last name, initials) (year). Title of chapter. Name of editors of the book (ed.). *Title of the book* (italics) Location of publisher: Publisher, page number of the chapter.

Example:

Elkjaer, B. (2005), Social Learning Theory: Learning as Participation in Social Processes. Easterby-Smith, M and Lyles M.A. (ed.). *Handbook of Organizational Learning and Knowledge Management*, Oxford, UK: Blackwell Publishing, pp. 38-53

Article in a journal

Author (year). Title. *Name of Journal* (italics), Vol. xx, No. yy, page number.

Example:

Berggren, C and Bengtsson, L. (2004). Rethinking outsourcing in manufacturing: A tale of two telecom firms. *European Management Journal*, Vol. 22, No. 2, 2111-223.

Report are referenced in the same manner as books

Internet:

Author (if applicable), title, www.domain.com, access date

Example

Accenture, *The forgotten supply chain*, www.accenture.com, Access 2007-08-22

Interviewed people:

Peter Andersson, production manager, Ericsson Radio Systems, interviewed 2007-04-23, during 2 hours

What is the difference between basic and advanced level?

It is useful to know the difference between basic level and advanced level assignments. This will be explained in this section.

A basic level assignment deals with basic knowledge of a subject, whereas advanced levels are more in-depth. Figure 1 below illustrates the differences in focus between basic and advanced levels. A basic level assignment is primarily aimed at *solving a particular problem or task in its context*. Advanced level assignment has a stronger theoretical connection, where *the literature base and the theoretical insights and contributions in focus*.

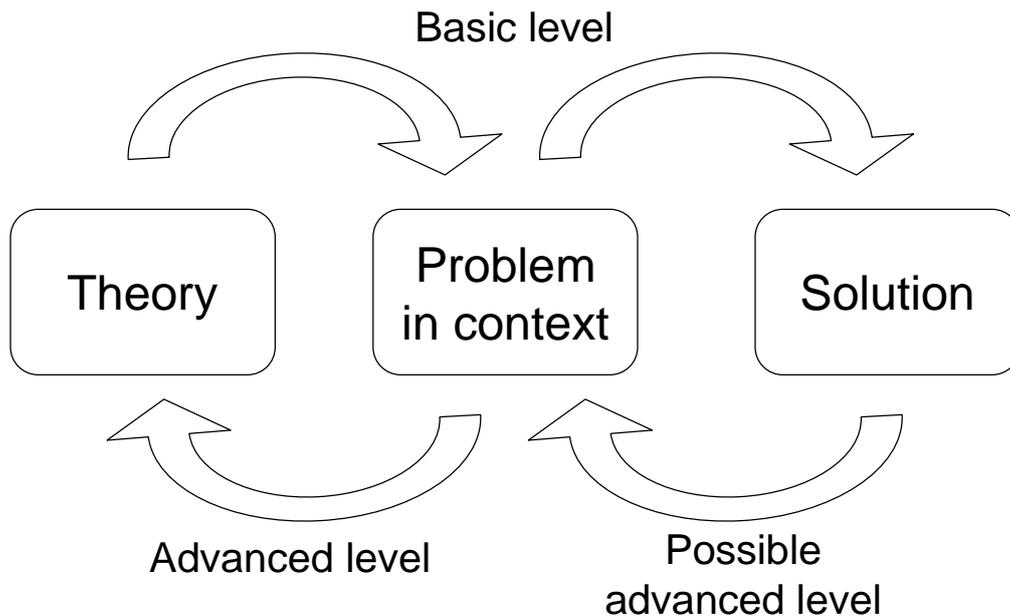


Figure 1: The difference between basic and advanced level

Another possibility, for an advanced level assignment, is to propose a solution and then link it to the context and the theory. As an example, compare the following two:

1. *The purpose of this assignment is to, from process-based view, provide suggestions for changes/ improvements and to justify how quality control can be improved and costs reduced.*
2. *The purpose of this assignment is to evaluate the impact of the process-based view on the profitability of a middle sized enterprise.*

What is the difference between the two? In the first example you can detect a clear focus on solving a problem and proposing a solution, i.e. it is a basic level assignment. The second is aimed at evaluating the process-based view, i.e. there is no specific problem to be solved, but the result will be used to improve the theory within the field. It is thus an advanced level assignment.

Examples of typical subjects for advanced level assignments are:

- *Comparing* different theories/concepts/philosophies
- *Evaluating* different contexts by using theories/concepts/philosophies
- *Evaluating* different theories/concepts/philosophies in a specific context
- *Developing* new theories/concepts/philosophies

Examples from different subjects are:

Industrials environmental economics

- Basic level: *The purpose of this assignment is to map the handling of chemicals from an environmental point of view, and to suggest improvements.*
- Advanced level: *The purpose of this assignment is to evaluate how the product life-cycle analysis is conducted in new product development in a middle-size enterprise*

Logistics

- Basic level: *The purpose of this assignment is to map, analyse and suggest improvements for the flow of information in two specific contexts: industrialisation (TTM) and mass production (TTC) in company AB*
- Advanced level: *The purpose of this assignment is to investigate how the flow of information should be managed in two specific contexts: industrialisation (TTM) and mass production (TTC)*

Industrial organisation and management

- Basic level: *The purpose of this assignment is to evaluate and suggest improvements for the outsourcing strategy of company A.*
- Advanced level: *The purpose of this assignment is to evaluate the ability of a matrix organisation to handle the distribution of manager responsibility at different levels of customer focus.*

Quality management

- Basic level: *The purpose of this assignment is to, from a process-based view, suggest changes/improvements and to justify how quality management can be improved and costs reduced.*
- Advanced level: *The purpose of this assignment is to, from a TQM perspective, with particular focus on continuous improvements and process management, analyse the contents of APQP and evaluate its usefulness as a tool in pro-active quality management*

If you have any questions, please do not hesitate to contact the Department of Industrial Engineering and Management

Good luck with your future writing of assignments!