Learning From Textbooks:

A Guide to University Learning

Learning Services | University of Guelph

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STUDENT GUIDE:

Reading and remembering information from textbooks can be one of the most challenging aspects of learning at university. The amount of reading from one course to another can vary widely, as can your professor's expectations for how and what you read. Depending on the course, your professor might expect you to:

- read carefully before lecture in order to participate in discussion and follow the lecture
- read carefully after lecture in order to determine how the textbook complements content from the lecture
- learn detailed information from the textbook
- read for the "big picture"
- use the textbook as a reference.

No matter how your professor expects you to use your textbook, there are many strategies to enhance your learning when you read university textbooks.

Active Reading

"Passive" reading is what students do while they are watching Netflix with their textbooks open. "Active" reading is a more engaged and effective reading strategy that requires:

- interacting with information or creating an "internal dialogue" with the text
- commenting on or asking yourself questions about points in the text
- looking for main points and supporting evidence or examples as you are reading
- processing the material, and therefore using your time more effectively.

Reading Speed + Comprehension

For textbooks that you are required to know thoroughly, try:

- using a slow, careful pace. Although this is time-consuming, it is necessary for comprehension and retention.
- spending an hour on five pages and knowing the material well, rather than spending an hour on fifty pages and remembering nothing
- using a more focused reading style as textbooks require more attention than newspapers or magazines.

Reading + Concentration

To minimize distractions and increase your concentration consider:

- WHEN you are reading
  - students get sleepy while reading if the bulk of it is done early in the morning or late in the evening
  - find times when you are alert and awake, and plan to read then
- WHERE you are reading
  - if you are reading on your bed or in front of a screen (including your cellphone), you may not be really concentrating on your textbook
  - find quiet spots with few distractions
- HOW LONG you are reading
  - work with your concentrationspan, however long or short, and read in short, distributed amounts
  - plan reading sessions for times when your energy and concentration are high as this can make a big difference in how efficiently you read and how much you remember
  - reserve a period of time during the day to deal with personal situations or problems if you find yourself thinking about them while reading.

Reading Strategies

When determining what to highlight or to include in your textbook notes, pay special attention to:

- Visual cues in the text (bold face, colours, borders, layout) that indicate important information.
- Main ideas, often identified through chapter titles and headings.
- The sequence of the main ideas to understand the flow or the relationships between ideas.
- Supporting evidence that the author gives to support any claims or theories.
- Clues to the writer's personal opinion or bias. Bias will be more obvious in some texts and in some disciplinary fields than in others.
- The location and content of the index and glossary (great resources for definitions and terminology).
- The chapter introductions, summaries and review questions to provide an overview of the chapter's most important points.

SQ4R

Many university students find that their readings are complex and packed with information. Using a range of different methods is key to coping with a heavy reading load. One popular method, SQ4R, is a series of steps designed to help you read more actively and to improve your understanding and retention of the material. Try out all the strategies, then use those you find the most effective.

Survey

- Read the preface and introduction to the text, and browse through the table of contents and the index. Get a sense of the "big picture" of the textbook.
- For each chapter, read all the titles and subtitles, study any pictures, charts, or graphs, and if there are any, read the summary and study questions at the end of each chapter.

Question

- Change headings into questions. For example, the heading "Central Tendency" could become "What is central tendency?"
- Create your own questions, based on your knowledge of the material or your lecture notes. For example, you could ask, "Is the textbook's definition of central tendency different from my professor's definition in lecture?"

Read

- Read attentively to find the answers to your questions
- Change your question if you find after reading that your question can't be answered.

Respond

- Close the textbook and answer your question in your own words.
- If you can't answer the question, reread the section until you can.

Record

- Summarize the answer to your question in your own words and record it. Some common methods are to highlight and/or mark the text, or take notes, or some combination of both.

Review

- Review your notes regularly (usually once a week). This is an effective strategy for retaining information.
- Start from the beginning of the course in each review session. Although the volume of material to review increases as the semester progresses, the amount of time needed to review older material decreases as you master it.

Highlighting Pros & Cons

Is it better to highlight your textbook or take notes on paper or your laptop? We've summarized the pros and cons of each method below.

Highlighting Pros

- Less time consuming than note taking
- Convenient when graphs and charts from the text are important to understanding the material

Highlighting Cons

- Easy to do poorly - students usually highlight 70-80% of the text, but experts say highlight 10-15%
- Inefficient when studying for exams - many students end up reading the entire book again rather than just reviewing highlighted phrases
- Restrictive - you are limited to studying the material in the way that it was presented in the textbook
- Studying requires the use of a heavy, clumsy textbook
- Difficult to integrate with lecture notes
- Textbook ends up looking very used and reduces resale value

Note Taking Pros & Cons

Note Taking Pros

- Easier to determine if you've learned the material when you write it in your own words
- Note taking encourages you to be concise and more selective of important information
- Flexible - you can use colours, formats, diagrams and pictures to enhance your understanding of the material
- Useful for combining textbook notes with lecture notes
- Convenient when you're on the go - it's easier to carry around notes than textbooks all day

Note Taking Cons

- Time consuming
- Messy - you can get disorganized when you have many notes for many courses

Handling Difficult Texts

At some point in your university career, you may encounter a textbook which you find difficult to understand or follow. Below are some tips that can help.

Improve Your Knowledge of the Subject's Terminology

- Look up difficult definitions of the special terminology used in the textbook
- Invest in a special dictionary or reference book for the subject
- Check out specialized online dictionaries
- Look for a specialized dictionary in the reference section of the Library.

Assess Your Knowledge of the Basics

It is possible that your text and even the course itself could be "above your head" if you lack an understanding of some basic concepts in the discipline. If you are struggling with an introductory course:

- talk to your instructor to make sure that you have the necessary prerequisites and prior knowledge expected for the course
- check the Library for an introductory book on the subject
- read an overview online to help fill in some gaps.

Read Out Loud

Reading out loud and hearing the words can help to increase your comprehension of difficult material. If you read aloud with a classmate and take turns analyzing, explaining, and summarizing the text, you may also find that another person's perspective helps to clarify meaning.

Try Another Text

The problem may simply be that the text is poorly written, or the author's style is difficult for you. Don't abandon your required text, but it may be helpful to find another book on the same topic in the Library. Sometimes a different explanation of the same topic is all it takes to make an incomprehensible subject more accessible.

TEXTBOOK READINGS TOP TEN TAKEAWAYS

1. Reading and remembering information from textbooks can be challenging and requires your time and attention for optimal learning.

2. Do textbook readings before the class.

3. Interact with textbook readings (i.e., ask yourself questions, make notes) to help you remember the material better.

4. Read your textbooks in a spot with few distractions and at a time when you feel wide awake and alert.

5. Read for short periods of time and take breaks.

6. Try the SQ4R Method (Survey, Question, Read, Respond, Record & Review) to help improve your comprehension of textbook material.

7. Highlighting may take less time than note taking, but most students highlight too much. Aim to mark up only 10-15% of the content.

8. Unlike highlighting, note taking allows you to integrate your textbook notes with your lecture notes, plus notes are more portable than a textbook.

9. You'll understand and remember textbook content better if you write notes in your own words.

10. For difficult texts, use a specialized dictionary, review an introductory book on the topic, read out loud, or try another text.

PRACTICE ACTIVITY

This activity will give you the opportunity to interact with a textbook reading. Ideally, the activity will get you thinking about how you can pick out the key pieces of information and process the content effectively. The subject of this reading is "Statistics for Psychology," from the fictitious course textbook. It represents one of the readings from Week 2 of the course outline.

Instructions

1. Do the reading "Statistics for Psychology" found in **Appendix A**.
2. From the reading, pull out all the key pieces of information. Note or record each piece of information in the manner you feel would be most helpful to you. For example, you can make notes on a piece of paper or your laptop, or you could print the reading and highlight the key pieces of information.
3. Compare the information you've noted to that of an experienced student. In **Appendix B,** you will find a sample of highlighting from an experienced student. In **Appendix C,** you will find a sample of the textbook notes that an experienced student wrote.

Statistics for Psychology

Much of psychological research involves measuring observations of particular characteristics of either a *population*, or a *sample* taken from a population. These measurements yield a set of values or *scores*, and this set represents the findings of the research, or *data*. Often, it is impractical to completely measure the characteristics of a given population, known as *parameters*, directly. Thus, psychologists often focus on the characteristics of samples taken from a population. These characteristics are called *statistics*. The psychologist then uses these sample statistics to make inferences about population parameters.

In this section we will focus on a type of statistics known as *descriptive statistics*. We will begin with an examination of three methods of describing a set of data using scores that seem to be typical of those found in the set. We will then look at three methods of describing how scores within the set vary from these typical scores.

Descriptive Statistics

Descriptive statistics is the name given to procedures used to collect, classify, summarize, and present data. The methods used by psychologists to collect, classify, and present data are beyond the scope of this discussion. For the remainder of this section, we will be focusing on statistical methods used to summarize psychological research data.

Measures of Central Tendency

Often, data tends to group itself around some central value. This value may, in turn, be used to describe or represent the data set as a whole. Methods of determining these central values are called measures of central tendency. There are three main measures of central tendency used by psychologists. They are the *mean*, the *median*, and the *mode*.

Mean

When people talk about averages, they're often referring to the **mean**, which is the arithmetic average of a set of scores. You have probably calculated the mean of a set of Psychology score many times in the past. Every time you sum a set of scores and divide that sum by the total number of scores you have calculated the arithmetic mean of those scores.

As you probably know from experience, the mean can be affected by extreme scores. For example, if a student were to receive five test marks over 90% and one test mark less than 20%, (let us say marks of 98%, 96%, 94%, 94%, 92%, and 18%), the mean of the test scores would be (98 + 96 + 94 + 94 + 92 + 18) / 6 = 82. Obviously, the mean in this case has been pulled in the direction of the score of under 20%. For this reason, the mean can be very misleading description of a set of scores with a heavily skewed distribution.

Median

The **median** is the middle score in a set of scores that have been ranked in numerical order. In cases where there are an even number of scores, the median lies between the two middle scores, and is given the value of the midpoint between those scores. Of course, if the middle two scores in an even number of scores are the same, the median has the same value as the two scores themselves. There is no formula for quickly calculating the median without doing some initial data analysis. Typically, when dealing with large data sets, researchers construct a *frequency distribution* representing all the scores in the data set. This allows them to use a formula to calculate each measure of central tendency using the information provided by the frequency distribution.

Unlike the mean, the median is a good measure of central tendency to use when describing a heavily skewed set of scores. Returning to our example from above, our student's median test score would be 94%, which is a much better indication of the student's overall performance. Thus, the median is a better representation of the scores within a skewed data set than is the mean. In fact, the median is the best method of central tendency to use when describing skewed data.

Mode

The **mode** is simply the most frequently occurring score in a data set. Returning once again to the test scores of our sample student, the mode for this data set is would be 94%, as it occurs twice within the data set. If two scores occur equally often within a data set, the set has two modes and is termed *bimodal*. Any data set that has two or more modes can be referred to as *multimodal*.

Like the median, there is no formula for calculating the mode without conducting at least some preliminary data analysis. For small data sets the mode may simply be determined by comparing the number of times the most popular scores appear in the set.

Measures of Variability

Almost all data sets demonstrate some degree of *variability*. In other words, data sets usually contain scores which differ from one another. Only under very rare circumstances to researchers encounter data sets which have no variability. Needless to say, of the few sets of data which demonstrate no variability, fewer still will be of any interest to psychological researchers. The truly interesting observations are those of characteristics which vary within a population or sample.

This variability cannot be captured or shown by measures of central tendency. For example, if two data sets have the same mean, there is no guarantee that the two sets are very similar at all. What is needed are *measures of variability* which allow the researcher to determine the degree of variation within a population or sample, and thus to determine just how representative a particular score is of the data set as a whole. This in turn allows the researcher to determine the scope and validity of any generalizations he or she wishes to make based on his or her observations. The measures of variability used by researchers include the *range*, the *variance*, and the *standard deviation*.

Range

The **range** is simply the difference between the highest and lowest scores in a distribution, and is found by subtracting the lowest score from the highest score. This measure of variability gives the researcher only a limited amount of information, as data sets which are skewed towards a low score can have the same range as data sets which are skewed towards a high score, or those which cluster around some central score. The range is, however, useful as a rough guide to the variability demonstrated by a data set, as it tells the researcher how a particular score compares to the highest and lowest scores within a data set. For example, a student might find it useful to know whether his or her score was near the best or worst on an exam.

Variance

A more informative measure of variability is the **variance**, which represents the degree to which scores tend to vary from their mean. This tends to be more informative because, unlike the range, the variance takes into account every score in the data set. Technically speaking, the variance is the average of the squared deviations from the mean.

To calculate the variance for a set of quiz scores:
1. Find the mean score.
2. Find the *deviation* of each raw score from the mean. To do this,
3. Subtract the mean from each raw score. (Note that deviation scores will be negative for scores that are below the mean.) To check your calculations sum the deviation scores. This sum should be equal to zero.
4. Square the deviation scores. By squaring the scores, negative scores are made positive and extreme scores are given relatively more weight.
5. Find the sum of the squared deviation scores.
6. Divide the sum by the number of scores. This yields the average of the squared deviations from the mean, or the variance.

Standard Deviation

More informative still is the **standard deviation**, which is simply the square root of the variance. You may be asking yourself 'Why not simply use the variance?' One reason is that, unlike the variance, the standard deviation is in the same units as the raw scores themselves. This is what makes the standard deviation more meaningful. For example, it would make more sense to discuss the variability of a set of IQ scores in IQ points than in squared IQ points.

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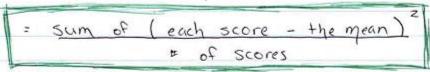
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Statistics for Psychology

★ Research Characteristics of Population ★

Characteristics of Pop. = |Parameters|

Often use |Samples| from Pop.

Characteristics of Sample = |Statistics|

Research findings are |Data|

Descriptive Statistics

~ Procedures to collect, classify, |Summarize|, and present data

Focus of chapter

measures of central tendency

measures of variability

Measures of Central Tendency

~ measures of scores typical of those found in set ⟶ scores |tend| toward them

~ 3 of them
   ↳ mean, median, mode

① Mean = average = $\dfrac{\text{Sum of scores}}{\text{total \# of scores}}$ (arithmetic average)

• affected by extreme scores
• misleading desc. of skewed data sets.

② Median = middle score = (no formula)

- if even # of scores, is midpoint
- best for skewed data

③ Mode = most common score = (no formula)

- 2 modes → bimodal
- 2 + modes → multimodal

Measures of Variability

~ measures degree to which scores vary from one another or from typical score

** The research is mostly concerned with characteristics that vary because they're most interesting **

Measures of Variability
  ↳ degree of variation within pop. or sample
    ↳ how representative a score is
      * ↳ scope & validity of generalizations *

- 3 of them → range, variance, standard deviation

① <u>Range</u> = difference between = |highest - lowest|
highest + lowest scores

- limited amount of information
- rough guide to variability of set

② <u>Variance</u> = degree to which scores vary from mean

$$= \frac{\text{Sum of } (\text{each score} - \text{the mean})^2}{\text{\# of scores}}$$

- more informative
- takes into account every score

③ <u>Standard Deviation</u> = same units as raw scores

$$= \sqrt{\text{variance}}$$

- even more informative
- same units as raw scores