

because of it. A useful strategy is to create a separate file for references and each time a publication is cited, it can be added to this list immediately.

Some universities offer their students access to referencing systems, such as Endnote, and while they may initially appear difficult to learn they are worth the effort later in terms of ensuring the reference list is accurate. Remember, the reference list may be a useful source of literature for others who are interested in studying this topic (Coughlan et al, 2007), and, therefore, every effort should be made to ensure it is accurate.

2.3 Types of Sources:

Sources are generally described as primary, secondary, or tertiary [1]. **Primary**. Primary sources are “materials that you are directly writing about, the raw materials of your own research [1].” **Secondary**. Secondary sources are “books and articles in which other researchers report the results of their research based on (their) primary data or sources [1].” **Tertiary**. Tertiary sources are “books and articles based on secondary sources, on the research of others [1].” Tertiary sources synthesize and explain the work of others and might be useful early in your research, but they are generally weak support for your own arguments [1].

Primary. Examples of primary sources are data sets, computer runs, computer programs, scale models, drawings, and engineering notebooks. A well-kept engineering notebook can provide valuable information for later documentation of test conditions and assumptions, materials used, observations as well as measurements, and unusual occurrences that prompted further testing.

Secondary. Examples of secondary sources include conferences, proceedings, journals, and books. Journal articles are often the most current source of information on a topic of study that is new or subject to rapid change. Lists of references at the end of each journal article can provide leads to further sources. Engineering journals are typically field-specific. For a selected list of current journals in agricultural, chemical, civil, computer, electrical, environmental, industrial and mechanical engineering, ask at your facility or university library for specific guides.

Tertiary. Examples of tertiary sources include dictionaries, encyclopedias, guides, and handbooks. “Dictionaries and encyclopedias are excellent starting points for research. They can provide general background information to help narrow or broaden the focus of a topic, define unfamiliar terms, and offer bibliographies of other sources. Some works include an index, which will provide excellent access to a subject [4].” Guides and handbooks cover topics such as tables, formulas, engineering fundamentals, measures and units of conversion, mathematics, statistics, and numerical calculations; these sources are especially useful during the writing phase of your research.

2.4 Library Skills: Reading Skills and Note Taking Skills

A. Reading Skills

1. Critical Reading Skills
2. Pre Reading Strategies
3. KWL Skills
4. SQ3R Skills

- o Brainstorm!
Before looking at the text, think of keywords, terms, or phrases about the topic, either in your class or a study group.
- o Record these in the **K** column of your chart until you cannot think of more.
- o Engage your group in a discussion about what you wrote in the **K** column.
- o Organize the entries into general categories.

W stands for Will or Want

The second stage is to list a series of questions of what you want to know more of the subject, based upon what you listed in **K**.

- o Preview the texts table of contents, headings, pictures, charts etc.
Discuss what you want to learn
- o List some thoughts on what you want, or expect to learn, generally or specifically.
Think in terms of what you will learn, or what do you want to learn about this.
- o Turn all sentences into questions before writing them down.
They will help you focus your attention during reading.
- o List the questions by importance.

L stands for Learned

The final stage is to answer your questions, as well as to list what new information you have learned. Either while reading or after you have finished.

- o List out what you learn as you read, either by section, or after the whole work, whichever is comfortable for you.
- o Check it against the **W** column, what you wanted to learn
- o Create symbols to indicate main ideas, surprising ideas, questionable ideas, and those you don't understand.

Expand this exercise beyond K W L:

Add an H!

Stands for **HOW** you can learn more.

- o Pose new questions about the topic
- o How can I learn more or answer questions not answered in my worksheet
These include other sources of information, including: organizations, experts, tutors, websites, librarians, etc.

5 W's and an H

Another reading strategy is to answer the questions that form the basis of good journalism:

Who What When Where Why and How

- o Who are the main characters?
- o What does the author say happened?
- o Where did the action occur?
- o When did it happen or what is the span of time?
- o Why did this happen?
- o How did it happen?

I keep six honest serving-men

(They taught me all I knew); Their names are What and Why and When And How and Where and Who.

I send them over land and sea, I send them east and west; But after they have worked for me, I give them all a rest.

4. SQ3R reading method

SQ3R is a reading strategy formed from its letters:

Survey! Question! Read! Recite! Review!

SQ3R will help you build a framework to understand your reading assignment.

→ **Before you read, Survey the chapter:**

- o the title, headings, and subheadings
- o captions under pictures, charts, graphs or maps
- o review questions or teacher-made study guides
- o introductory and concluding paragraphs
- o summary

→ **Question while you are surveying:**

- o Turn the title, headings, and/or subheadings into questions
- o Read questions at the end of the chapters or after each subheading
- o Ask yourself,
"What did my instructor say about this chapter or subject when it was assigned?"
- o Ask yourself,
"What do I already know about this subject?"

Note: If it is helpful to you, write out these questions for consideration.
This variation is called SQW3R.

→ **When you begin to Read:**

- o Look for answers to the questions you first raised
- o Answer questions at the beginning or end of chapters or study guides
- o Reread captions under pictures, graphs, etc.
- o Note all the underlined, italicized, bold printed words or phrases
- o Study graphic aids
- o Reduce your speed for difficult passages
- o Stop and reread parts which are not clear
- o Read only a section at a time and recite after each section

→ **Recite after you've read a section:**

- o Orally ask yourself questions about what you have just read, or summarize, in your own words, what you read
- o Take notes from the text but write the information in your own words
- o Underline or highlight important points you've just read
- o Reciting:
The more senses you use the more likely you are to remember what you read Triple strength learning: Seeing, saying, hearing
Quadruple strength learning: Seeing, saying, hearing, writing!!!

Review: an ongoing process**Day One**

- o After you have read and recited the entire chapter, write questions in the margins for those points you have highlighted or underlined.
- o If you took notes while reciting, write questions for the notes you have taken in the left hand margins of your notebook.
- o Complete the form for a [critical reading review](#)

Day Two

- o Page through the text and/or your notebook to re-acquaint yourself with the important points.
- o Cover the right hand column of your text/note-book and orally ask yourself the questions in the left hand margins.
- o Orally recite or write the answers from memory.
- o Develop mnemonic devices for material which need to be memorized. Make flash cards for those questions which give you difficulty.

Days Three, Four and Five

- o Alternate between your flash cards and notes and test yourself (orally or in writing) on the questions you formulated.
- o Make additional flash cards if necessary.

Weekend

- o Using the text and notes, make a Table of Contents - list all the topics and sub-topics you need to know from the chapter.
- o From the Table of Contents, make a Study Sheet/ Spatial Map.
- o Recite the information orally and in your own words as you put the Study Sheet/Map together.
- o As you have consolidated all the information you need for this chapter, periodically review the Sheet/Map so that at test time you will not have to cram.

Preview from Notesale.co.uk
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B. Note Taking Skills

Both *Brusaw, Charles T. and Gerald J. Alred and Walter E. Oliu, 1993. Handbook of Technical Writing, Fourth Edition. New York: St. Martins Press.*

and
Booth, Wayne C. and Gregory G. Colomb and Joseph M. Williams, 1995. The Craft of Research. Chicago: The University of Chicago Press. have good advice about notetaking.

Brusaw, Charles T. and Gerald J. Alred and Walter E. Oliu, states that the challenge is to condense others' work without distorting it.

These seven-step process includes:

- i) do not write everything down,
- ii) create your own shortcuts and shorthand,
- iii) use numbers for numerical terms,
- iv) leave out vowels when you can,
- v) record all vital names, dates, and definitions,
- vi) mark items that need further examination, and
- vii) check accuracy before returning or filing the source.

Booth, Wayne C. and Gregory G. Colomb and Joseph M. Williams, 1995. The Craft of Research. Chicago: The University of Chicago Press.:

recommends writing and summarizing as you find sources and has a three-page section called "Quick Tip: Speedy Reading."

It recommends a five-step process:

- i) become familiar with the geography of the source
- ii) locate the point of the argument,
- iii) identify key subpoints,
- iv) identify key themes, and
- v) skim paragraphs.

The book suggests that not all five steps are needed all the time. The main point is speed and efficiency, and focusing on material relevant to your own research without spending time on material that is at best only marginally related. While taking notes and preparing condensed summaries of the work of others, you must be ever mindful of the requirement to eventually cite all "borrowed" work in your final paper. All of the sources mentioned contain discussions about direct quotations, summarizing, and plagiarism. Readers and researchers are advised to locate and carefully read about these topics from any available source in order to avoid trouble while writing.

2.5 Internet Search: to be taken from external resources

3.2 SOURCES OF THE SELECTION OF PROCESS

Problems can be conceptualized at a number of levels. At one level we are all searching for the answer to the question “why do organisms behave the way they do?” Questions with more specificity could proceed from; why do humans behave the way they do, to how does reinforcement affect behavior, to how does reinforcement affect studying, to how does reinforcement affect studying for tests in university males.

Beginners tend to start with relatively specific research problems focused on the face value of the question, but eventually develop a broad research question with great generality. For example, what started as “how can I help my roommate study more?” evolves into “what controls studying in people?” At the beginning, the roommate’s behavior is at issue for itself. Later the person and the behavior are seen as arbitrary instances of a much more important and challenging question. Career long research problems tend to emerge following several years of specific research topics, and require many specific research studies to solve. This section details some of the sources for an initial, relatively specific, research problem. It is intended to help you come up with research which is manageable, enjoyable, and productive.

In addition to not knowing what unresolved problems remain, is missing the more fundamental broader issue underlying any specific behavior change. When looking at the world, try to see each functional relationship as only an instance of a more general class of relationships.

A. Research Problem from Expert

The simplest source of a problem to solve is to have it given to you as a class assignment, as a directed research project, or as a task while you are an apprentice in someone's lab. You are told what problem to research and how to do it. This is probably an ideal way to assure that your first research topic is a good one.

Example: Students in Experimental Psychology were assigned the task of finding out if social attention made their roommate study more. They were told to measure the amount of time their roommate studied on days during which they expressed interest in their roommate's course material as compared to days when they refrained from talking about academic topics.

B. Research Problem from Folklore

Common beliefs, common sense, or proverbs could be right but on the other hand, they could also be wrong. You must verify that they are true before considering them as a source of knowledge. It is possible that some unverified beliefs have the roots of a better idea and therefore would be a worthy research topic. It is critical to note, however, that the task of research is not to simply validate or invalidate common sense but rather to come to understand nature.

Example: It's commonly believed that studying within the two hours preceding a test will decrease test scores. To research this belief a randomly selected half of a class was told to study immediately before taking a test while the other half was prohibited from studying before the test. This research was intended to determine whether or not studying immediately before a test decreased the points earned.

C. Research Problem From Insight

Sometimes people research an issue simply because it occurred to them and it seemed important. The systematic development of the idea is lacking. This is "intuitive" or good guess research. It is risky because you may not be able to get other researchers to understand why the research is important. It is fun because you get to do what interests you at the moment. Alternatively, it could be the application of a general rule of thumb or guessing that a new problem is actually a well-understood function in disguise.

Example: While feeling especially competent after explaining course material to three friends you realize that orally presenting material may help test performance. You conducted a study in which material was orally presented before the test on a random half of the occasions. The research was based on your insightful realization that oral presentation may increase test performance.

currently behave with respect to the topic, issue or phenomenon under investigation. The emphasis is upon a **description** of current behaviour and attitudes. For instance, the traders would be asked to describe their own modes of operation within the wholesale market as well as those of fellow traders.

Exploration of discussion points: In this phase the discussion moves on to the participants' attitudes, opinions and experiences of existing products, services (or in this case facilities) and on to what they like and dislike about those products/services. With reference to the wholesale markets example, at this stage traders would be invited to comment on the advantages and disadvantages of the facilities within which they currently operate.

Core discussion: This part of the group discussion focuses directly upon the principal purpose of the research. The flow of the session moves on to the participants' perceptions of new concepts, possible developments or innovations. The wholesale traders, for instance, would be guided towards discussing peri-urban wholesale markets and the kinds of facilities which might attract traders like themselves. A common approach is to follow a sequence of first exploring the ideas which participants generate themselves and then to solicit participants' reactions to ideas preconceived by researchers, or their clients, about possible future developments.

Summary: The final phase of the focus groups session allows participants to reflect upon the foregoing discussion and to add any views or information on the topic that they may have previously forgotten or otherwise have omitted. A common tactic is to conclude the session by inviting the group, as well as its individual members, to "advise the manufacturer" (or whoever) on the issue at hand.

5.4: Rating Scales: Types, format and basic guidelines for constructing scale

A **rating scale** is a set of categories designed to elicit information about a quantitative or a qualitative attribute. In the social sciences, common examples are the Likert scale and 1-10 rating scales in which a person selects the number which is considered to reflect the perceived quality of a product.

A rating scale is an instrument that requires the rater to assign the rated object that have numerals assigned to them.

Types of Rating Scales

All the rating scales can be classified into one of the following four classifications:-

1. Some data are measured at the **ordinal level**. Numbers indicate the relative position of items, but not the magnitude of difference. One example is a Likert scale:

Statement: I could not live without my computer.

Response options:

1. Strongly disagree
 2. Disagree
 3. Agree
 4. Strongly agree
2. Some data are measured at the **interval level**. Numbers indicate the magnitude of difference between items, but there is no absolute zero point. Examples are attitude scales and opinion scales.
 3. Some data are measured at the **ratio level**. Numbers indicate magnitude of difference and there is a fixed zero point. Ratios can be calculated. Examples include age, income, price, costs, sales revenue, sales volume and market share.

Likert scaling is a bipolar scaling method, measuring either positive or negative response to a statement. Sometimes a four-point scale is used; this is a forced choice method since the middle option of "Neither agree nor disagree" is not available.

Likert scales may be subject to distortion from several causes. Respondents may avoid using extreme response categories (*central tendency bias*); agree with statements as presented (*acquiescence bias*); or try to portray themselves or their organization in a more favorable light (*social desirability bias*). Designing a scale with balanced keying (an equal number of positive and negative statements) can obviate the problem of acquiescence bias, since acquiescence on positively keyed items will balance acquiescence on negatively keyed items, but central tendency and social desirability are somewhat more problematic.

Scoring and analysis

After the questionnaire is completed, each item may be analyzed separately or in some cases item responses may be summed to create a score for a group of items. Hence, Likert scales are often called summative scales.

Whether individual Likert items can be considered as interval-level data, or whether they should be considered merely ordered-categorical data is the subject of disagreement. Many regard such items only as ordinal data, because, especially when using only five levels, one cannot assume that respondents perceive all pairs of adjacent levels as equidistant. On the other hand, often (as in the example above) the wording of response levels clearly implies a *symmetry* of response levels about a middle category; at the very least, such an item would fall between ordinal- and interval-level measurement; to treat it as merely ordinal would lose information. Further, if the item is accompanied by a visual analog scale, where equal spacing of response levels is clearly indicated, the argument for treating it as interval-level data is even stronger.

When treated as ordinal data, Likert responses can be collated into bar charts, central tendency summarised by the median or the mode (but not the mean), dispersion summarised by the range across quartiles (but not the standard deviation), or analyzed using non-parametric tests, e.g. Chi square test, Mann-Whitney test, Wilcoxon signed-rank test, or Kruskal-Wallis test.^[4]

Responses to several Likert questions may be summed, providing that all questions use the same Likert scale and that the scale is a defensible approximation to an interval scale. In which case they may be treated as interval data measuring a latent variable. If the summed responses fulfils these assumptions, parametric statistical tests such as the analysis of variance can be applied. These can be applied only when the components are more than 5. [Clarify: more than 5 Likert questions or Likert questions of more than 5 levels]

Data from Likert scales are sometimes reduced to the nominal level by combining all agree and disagree responses into two categories of "accept" and "reject".

5.6: Concept of some other tools: format and use of (a) Checklist, (b) Opinionnaire (c) Observation Schedule

(A) Checklist:

A **checklist** is a type of informational job aid used to reduce failure by compensating for potential limits of human memory and attention. It helps to ensure consistency and completeness in carrying out a task. A basic example is the "to do list." A more advanced checklist would be a schedule, which lays out tasks to be done according to time of day or other factors.

Applications

- Aviation checklists aid in aviation safety to ensure that critical items are not forgotten
- use in medical practice to ensure that clinical practice guidelines are followed. An example is the Surgical Safety Checklist developed for the World Health Organization by Dr. Atul Gawande.