READING RESEARCH PAPERS

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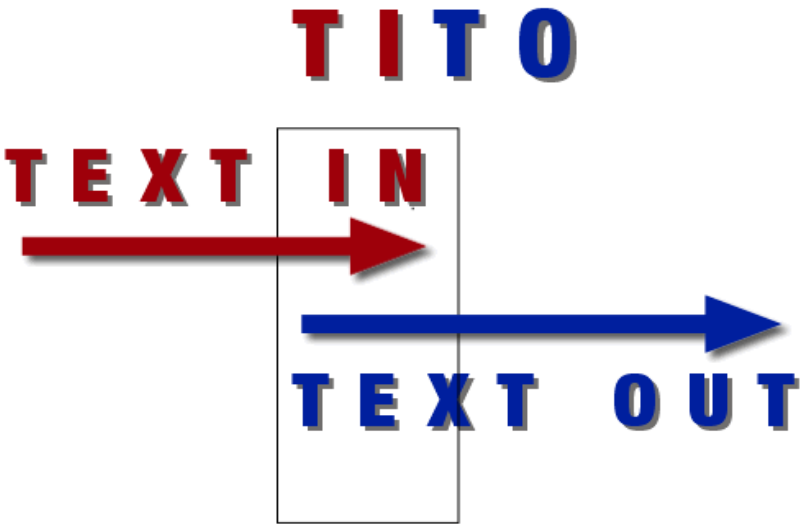
Content: Reading Research Papers

- Traditional view
- The murder mystery method
- Experts vs novices
  - 1. Set a purpose
  - 2. Plan
  - 3. Memory strategies
  - 4. Familiarity first
    - 4a. Structure before detail
    - 4b. Leave out irrelevant info
  - 5. Select main ideas
  - 6. Now go for details
  - 7. Notes/Concept maps
- That's it

Our traditional view of how to read

Von Foerster's
TRIVIAL MACHINE:
Whatever info you put into the brain comes out exactly the same when recalled



Start at the beginning

Read to the end

Learning and Reading

- Learners generally want to read for “gist” and “theme.”
- Why? So they can incorporate the new knowledge within their existing schema framework.

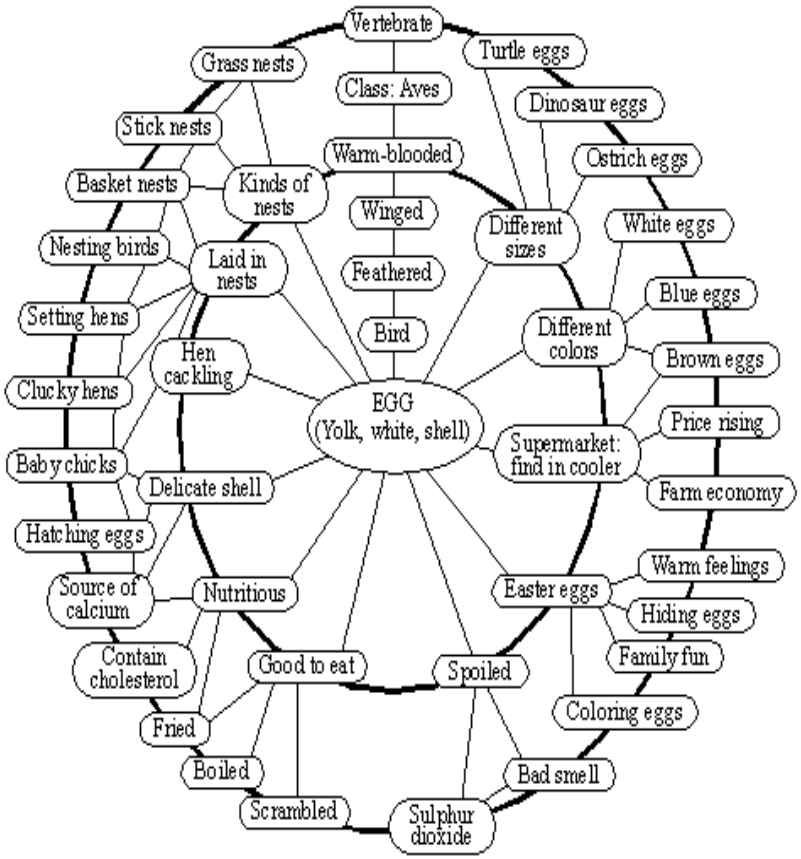
Not the way to read and learn!

http://www.solidstateux.com/interaction-design/learning-theories-for-instructional-designers-2-schema-theory/

"Learning" means different things to different people. Here are the 5 of conceptions held by respondents in an interview-based study:

1. Learning as a **quantitative increase in knowledge.** Learning is acquiring information or "knowing a lot"
2. Learning as **memorizing.** Learning is storing information that can be reproduced.
3. Learning as acquiring facts, skills and methods that can be **retained and used** as necessary.
4. Learning as **making sense** or abstracting meaning. Learning involves relating parts of the subject matter to each other and to the real world.
5. Learning as interpreting and **understanding reality in a different way.** Learning involves comprehending the world by re-interpreting knowledge.

What is a SCHEMA?



A diagram of a someone's possible schema for the concept of "egg."
Source: P. Davis 1991

- Think of a schema as a network of connected facts and concepts into which any newly-formed structures can be fitted.
- Then think of your brain as a bigger network of overlapping schema and sub-schema.
- The schema themselves are a markup language for the brain, cognitive XML if you will.
- http://www.solidstateux.com/interaction-design/learning-theories-for-instructional-designers-2-schema-theory/

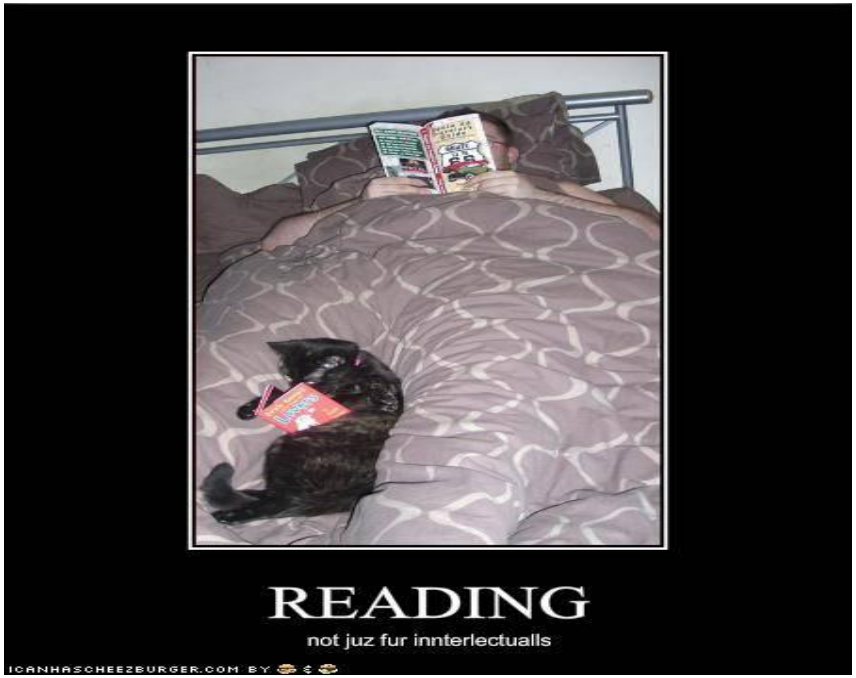
Lack of a Schema

- When learners lack specific schema-based prior knowledge, they tend to apply general problem solving strategies in inefficient, even unsuccessful, ways.

- Worse, a lack of a proper conceptual model can transform learning into the 'rote' memorization of a seemingly arbitrary series of steps.
- While this is an effective method in learning to tie one's shoes or to master the alphabet, it leads to problems when things get more complex – as in, say, learning how to use a modern software application.

http://www.solidstateux.com/interaction-design/learning-theories-for-instructional-designers-2-schema-theory/

- So what does this mean for the astute reader?



Think carefully about this as it affects the way you should be reading!

Beginning to end is out – it's the old way of reading.

The Murder Mystery Method

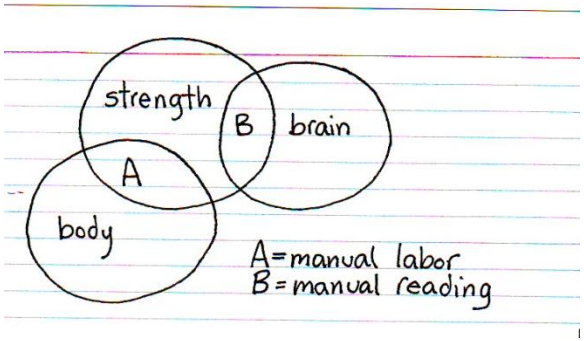
Read as if this is a murder mystery and you need to find out “who done it,” or “why they done it,” or “how they done it” or all 3, as quickly as possible!!!!

Does this change the way you would approach your research article?

It clearly sets a purpose!

Reading a research paper takes work

- and concentration



What do the experts do?

Step by step

Expert and Novice Readers

E= high competency levels

- Make different demands on working memory (STM)
- Break a reading into parts to determine sequence
- Try establish relationships between concepts
- Spend more time planning & analyzing how to read
- Do not proceed unless they have a strategy in mind
- Monitor understanding continually

N= have some knowledge but tend to perform poorly

- Spend time trying to memorize info
- Read/reread
- Look for simple features (facts, details)
- See knowledge of topic as additive rather than relational
- Do not plan – start reading at the beginning and go to the end
- Do not check understanding – wait for feedback

Cognitive Load Theory
(Sweller, 1988)

- Learning: best under conditions aligned with human cognitive architecture
- Difference between an expert and a novice is that a novice hasn't acquired the schema of an expert
- Learning requires a change in the schematic structures of long term memory (LTM) and is demonstrated by performance that progresses from clumsy, error-prone, slow and difficult to smooth and effortless
- Change in performance occurs because the learner becomes increasingly familiar with the material
- The cognitive characteristics associated with the material are altered – so handled more efficiently by working memory (STM)

http://tip.psychology.org/sweller.html

Consider Memory Demands – the goal of this reading strategy

- Short term memory (STM) is limited in the number of elements it can contain simultaneously
- 5+/- 2 chunks
- From an instructional perspective, information contained in instructional material must first be processed by working memory.
- For schema acquisition to occur, learning should be designed to reduce working memory load.
- Cognitive load theory is concerned with techniques for reducing working memory load in order to facilitate the changes in long term memory associated with schema acquisition.

- The contents of long term memory (LTM) are "sophisticated structures that permit us to perceive, think, and solve problems," rather than a group of rote learned facts.
- These structures, known as schemas, are what permit us to treat multiple elements as a single element. They are the cognitive structures that make up the knowledge base (Sweller, 1988).

From short-term (working) memory

To long-term memory storage

http://tip.psychology.org/sweller.html

Ergo . . .

- The reading strategy is designed to create schematic structures that shift information from STM to LTM.
- When something new is learned, the brain physically changes.

1. Set a PURPOSE for Reading

- Expert readers know **why they are reading**!
- "I need to know it" is **not** a purpose.
- Are you reading the research paper because:
  - You need to determine if it is one to keep
  - You need to summarize it for the lit review
  - You need to know the results as they relate to your study
  - You need to know the analysis
  - You need to discuss it in the oral exam
  - All of the above

You should read differently for each purpose.

2. Plan how to read

PLAN FIRST!

- No, you will not remember everything
- Go for the important stuff
- Purpose will determine importance
- Implement your plan (see next slides)
- Plan to reconstruct the logic path of the author

3. Use strategies that don't overload memory

Working (STM) has a very limited amount of space.

If you try and memorize before becoming familiar with the topic and learning the structure, you will quickly overload this space which means recall will not be efficient.

That is . . . You will forget quickly and have to keep reviewing to keep it fresh in memory.

Plan a strategy which makes use of long-term memory schema which have no limit to the amount of information they can hold.

It's not the size of the schema, it's the connections that make the difference.

WHAT IS A CHUNK?

•best be described as "a meaningful unit of information" – for example, 'bite' is easier to remember than 'eibt.'
•number of chunks, not the size that is important for working memory (STM).
(Woolfolk, A. [2001]. *Introduction to Psychology*, p 343)

And a chunk can contain a lot of information as long as it is in meaningful or in schema form.

How many of the following letters can you remember in 30 seconds.

T V F B I J F K Y M C A

How many were you able to recall?

- Normal people can recall between 5 and 9 of the 12 letters.

- If you were able to recall all of them, then you obviously had a strategy for learning them. Remember that chunks are meaningful units. If you could group the letters together then you probably would have remembered all of them.

- ***STRATEGY 1***: You try and remember and recall each letter individually. That means that you have tried to remember 12 chunks because there are 12 letters.

T V F B I J F K Y M C A

- ***STRATEGY 2:*** You can try and group the letters into meaningful units or chunks. If you do this, then you have only four chunks of information taking up space in your STM which means you have anywhere between 1 and 5 chunks left for other information.

TV FBI JFK YMCA

Now you can see why some students can hold great amounts of information in their heads - and it's not because they have better memories, it is because they know how to maximize their memory strategies.

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Slow readers

- Tend to make poor use of memory space
- Need strategies that deal with the limitations of working memory (STM)

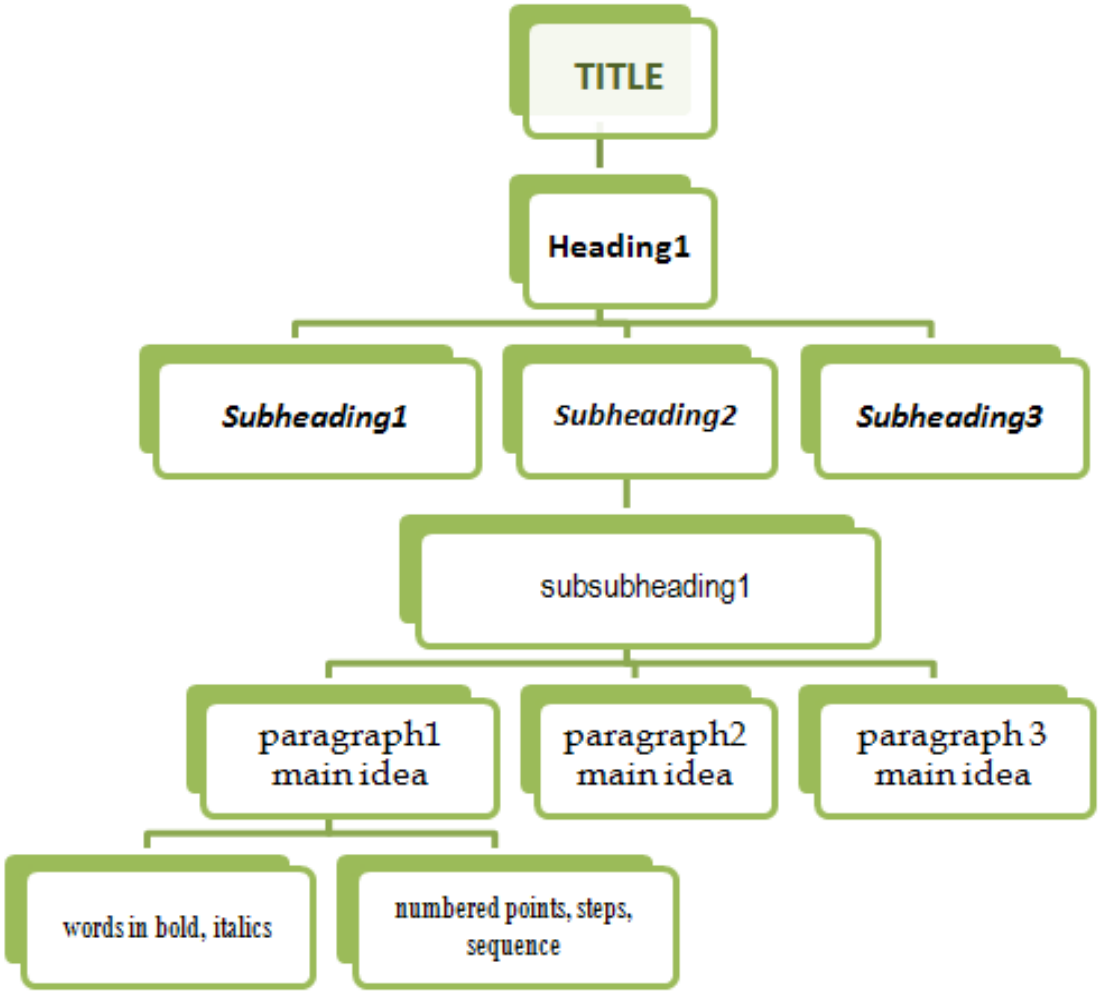
4. Go for familiarity first

- To make use of LTM, go for familiarity first (NOT understanding)
- A mistake to go for understanding when you have no familiarity

Steps

- **Read the title and remember it*******
- Read all the headings and subheadings – remember what they belong to
- Quickly view the diagrams/tables under each heading
- Read the intro – tells you where the author(s) is going
- Read the Results/Summary – tells you where author(s) ended up
- Look for words/phrases that are repeated
- Now you can go and fill in the detailed info

A concept map sets up part of a schema on the topic being studied – this is the order in which you read

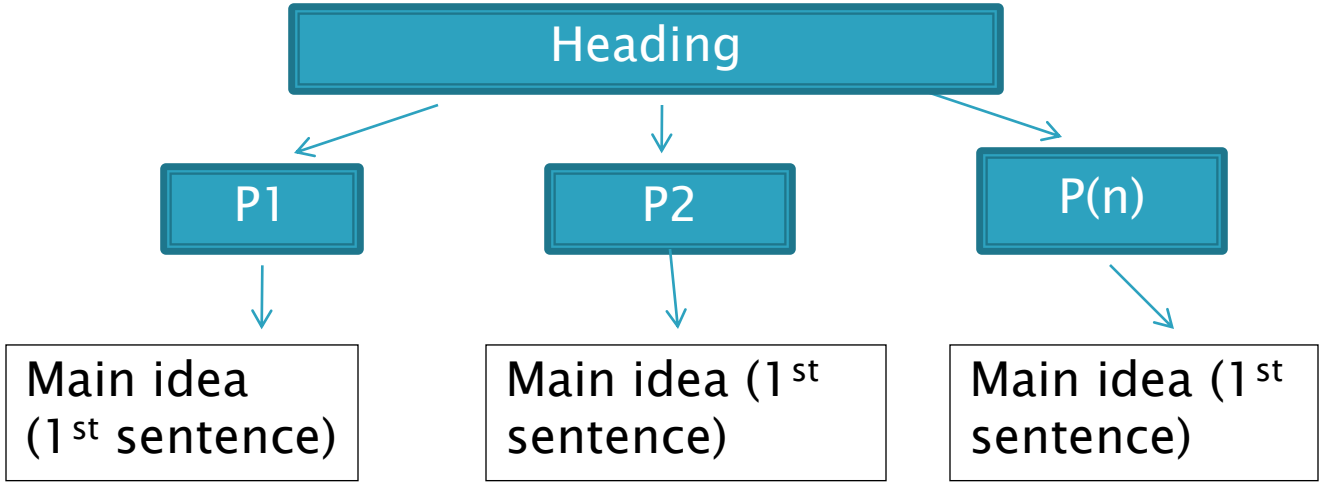


4a. Structure before detail

- Learning is not “additive”
- Learning is “RELATIONAL”
- If you followed the steps in 4. you have begun to create structure
- Easier to remember details if you have structure

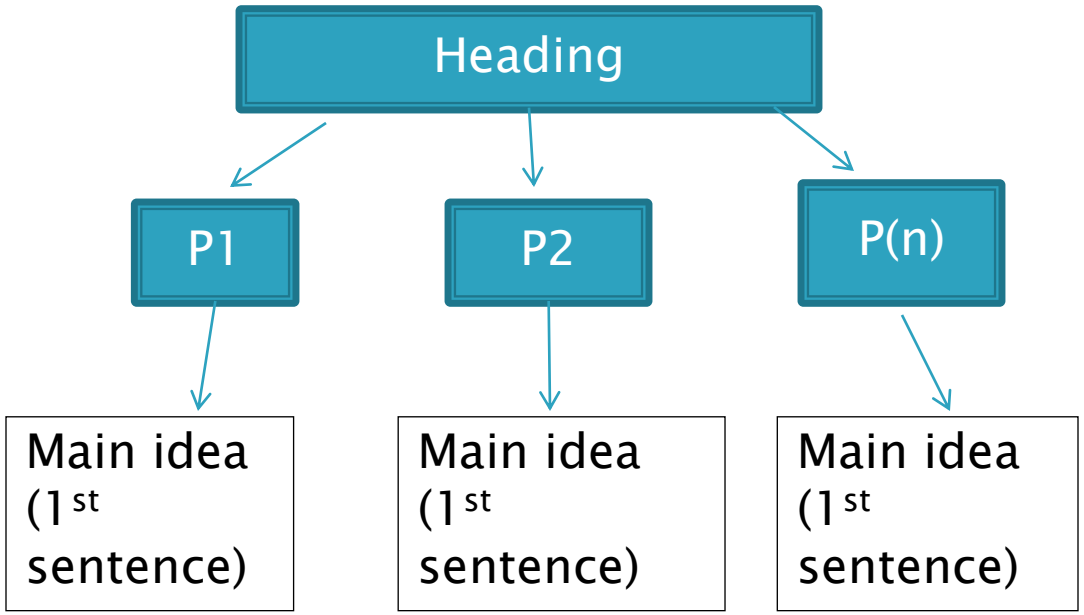
4b. Leave out parts not related to your purpose; keep those that are important

- Important bits:
  - Write out heading (remember)
  - Count paragraphs



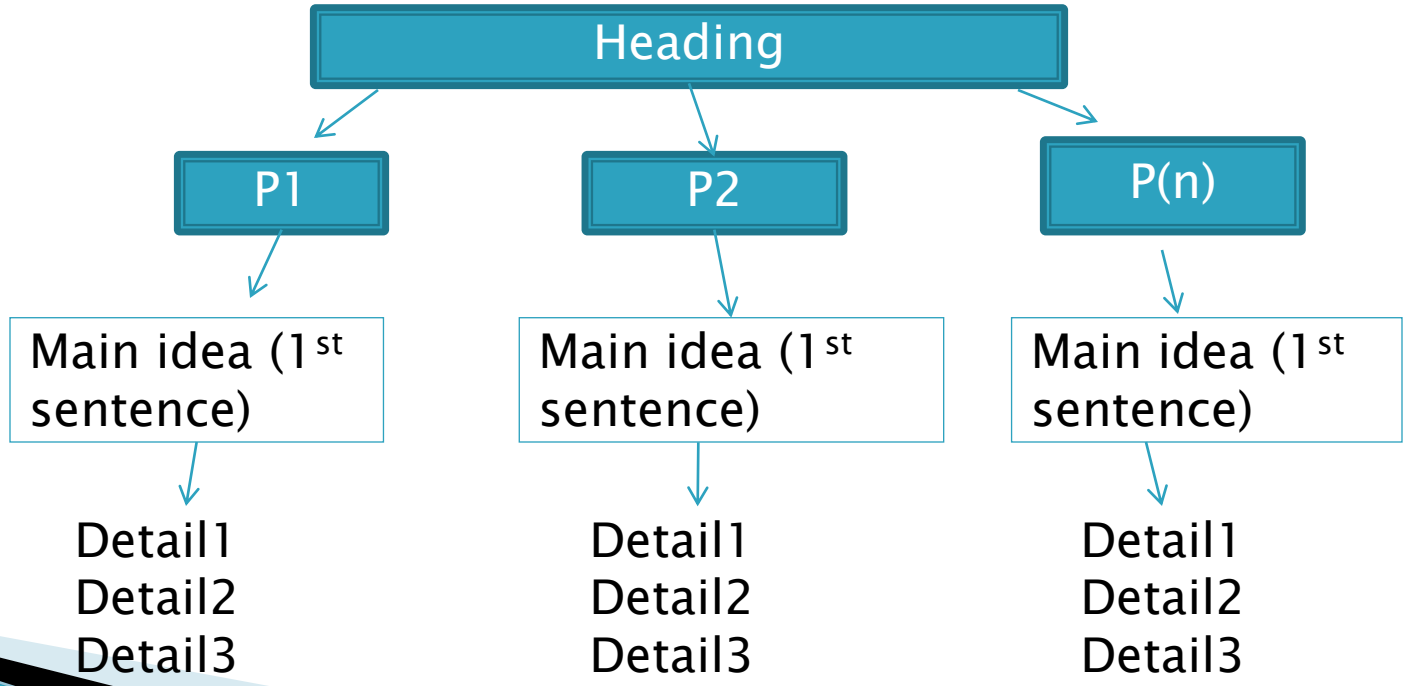
5. After structure, go back to paragraphs and select main ideas

- Main ideas in 1st or 2nd sentence, if that makes no sense, look for repeated words
- If not, don't care, pick something you understand



6. After paragraphs go for the details

- Once you have the main ideas, go into the paragraph and select approximately 3 details that are relevant to what you are doing
- Add them to your structure chart (concept map)

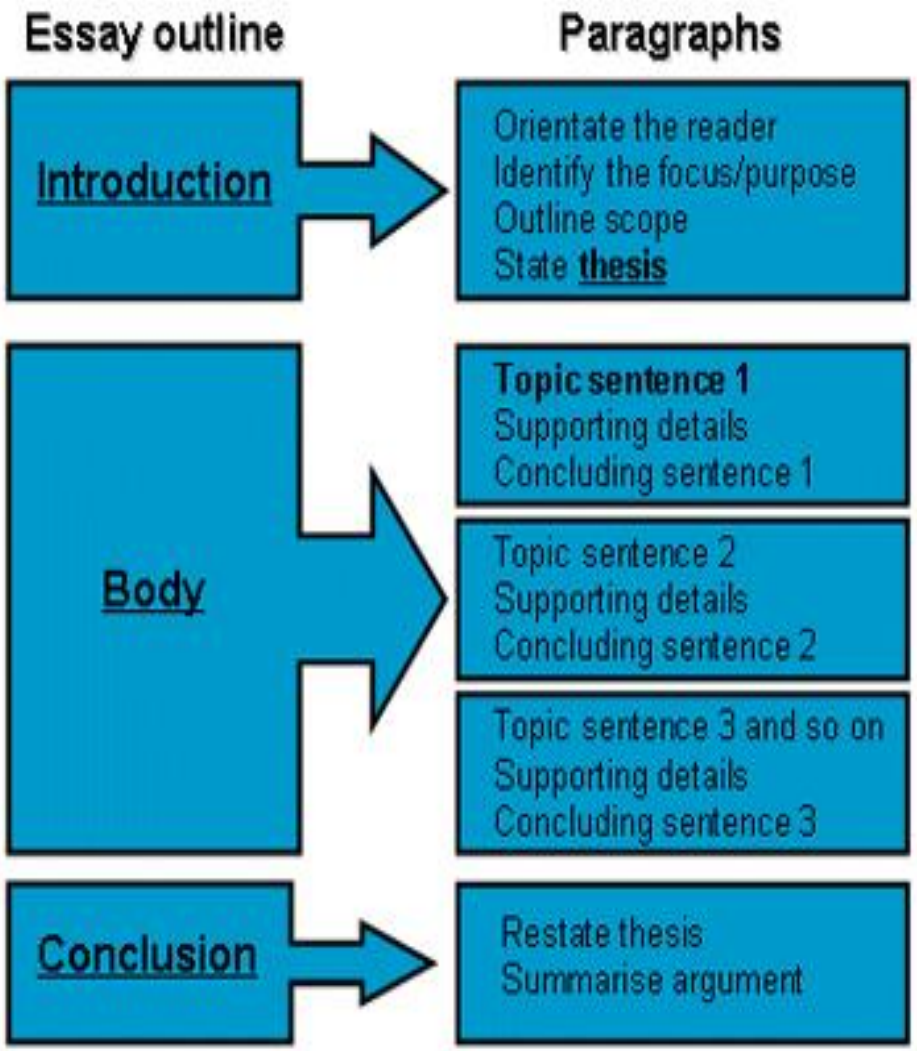


7. Make notes/concept maps as you go

- Maps tell your memory where to store information since they form schema
- Maps create links to topics/concepts
- Shows RELATIONSHIPS amongst or between ideas
- Shows the way in which complex info is usually structured

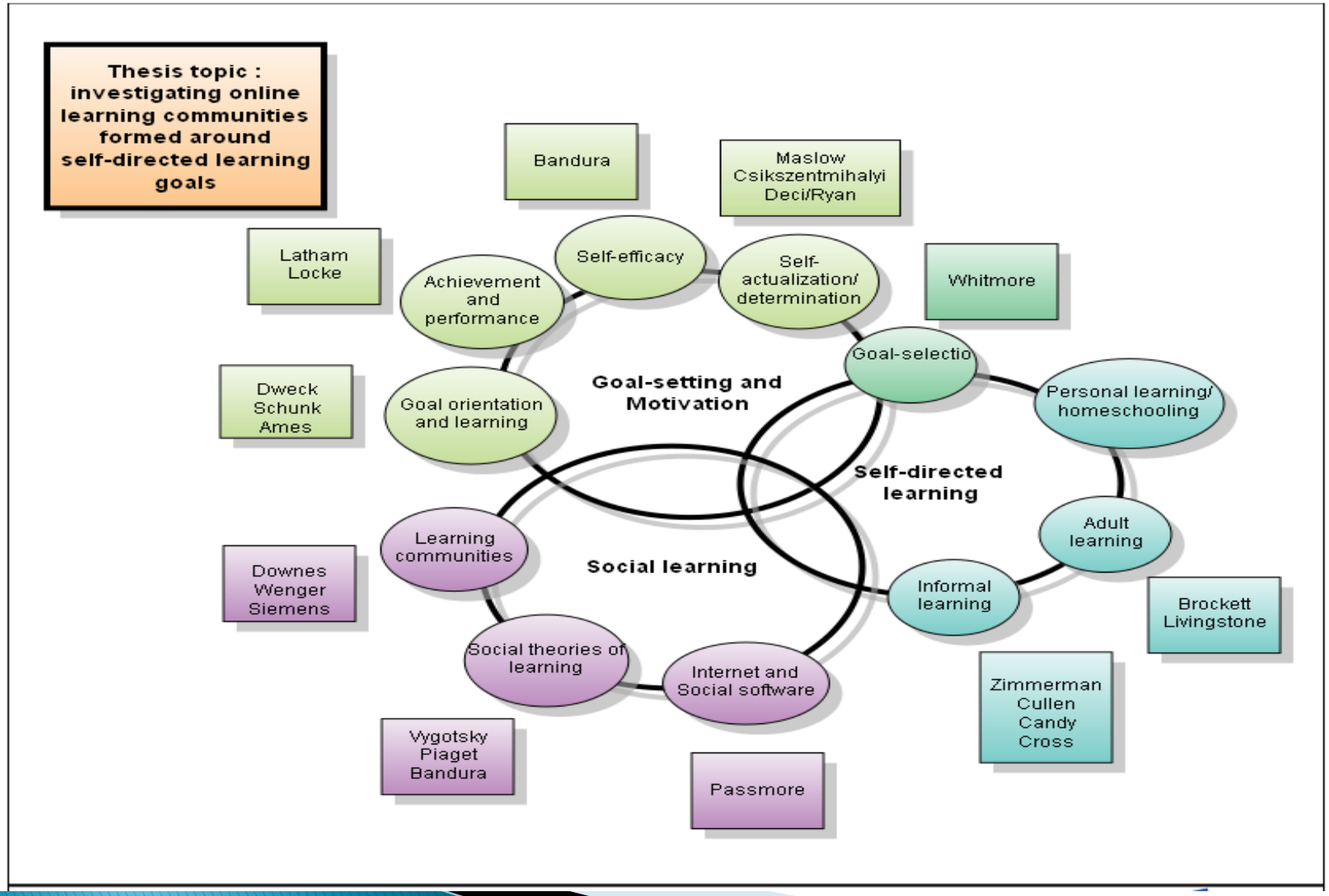
8. There you have it!

- Easy as π
- Think of it this way

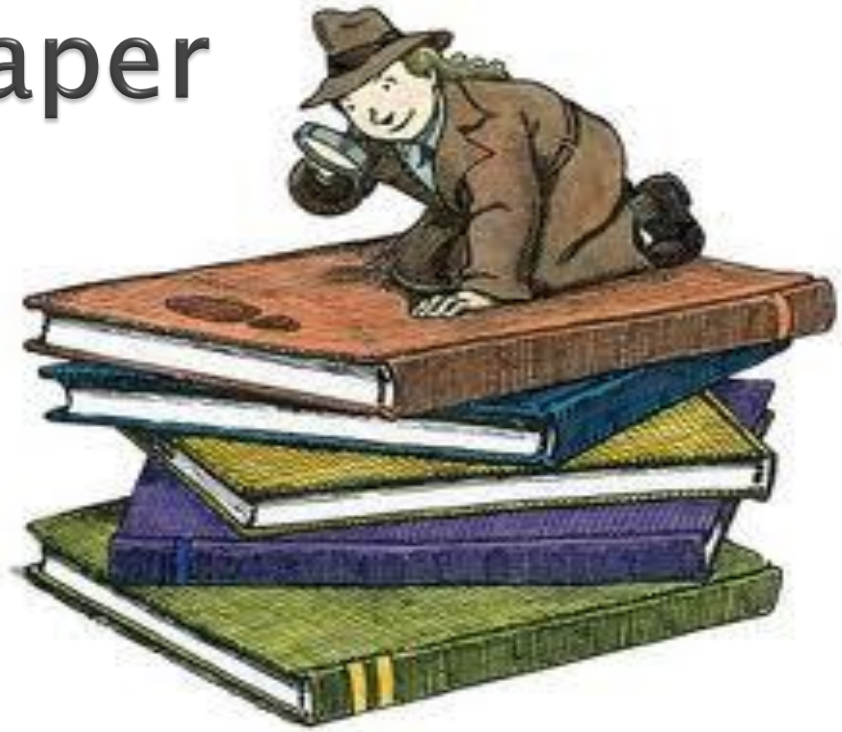


You can organize your thesis with a concept map or some form of organization structure

http://mchabib.com/2006/07/17/online-learning-communities-thesis-concept-map-by-jeremy-hiebert/



Let’s take a closer look at the technique using an actual research paper



Plan, then Implement

- Read the title and remember it
- It is the 1st thing you need to create a schema or structure
- Read the abstract
- Look at how the paper is divided into sections

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Contemporary Educational Psychology 30 (2005) 96–116

Contemporary Educational Psychology

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Why study time does not predict grade point average across college students: Implications of deliberate practice for academic performance

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Available online 14 August 2004

Abstract

The current work draws upon the theoretical framework of deliberate practice in order to clarify why the amount of study by college students is a poor predictor of academic performance. A model was proposed where performance in college, both cumulatively and for a current semester, was jointly determined by previous knowledge and skills as well as factors indicating quality (e.g., study environment) and quantity of study. The findings support the proposed model and indicate that the amount of study only emerged as a significant predictor of cumulative GPA when the quality of study and previously attained performance were taken into consideration. The findings are discussed in terms of the insights provided by applying the framework of deliberate practice to academic performance in a university setting.

Keywords: Grade point average; Study time; Academic performance; Deliberate practice; Study habits

How to select main ideas:

1. First sent of para
2. Look for 2 to 3 details that support the first sent

1. Introduction

The total amount of time that students report studying has often been examined as a potential predictor of success in school. It might seem that the more time that students spend studying, the better grades they should receive. Although students should increase their personal knowledge and skills by increasing the amount of time that they spend on relevant study activities, the relationship between the amount of study and achievement across students is less clear. Indeed researchers have consistently found a weak or unreliable relationship between the weekly amount of reported study time and grade point average (GPA) for college students (Allen, Lerner, & Hinrichsen, 1972; Beer & Beer, 1992; Gortner Lahmers & Zulauf, 2000; Hinrichsen, 1972; Michaels & Miethe, 1989; Schuman, Walsh, Olson, & Etheridge, 1985; Wagstaff & Mahmoudi, 1976).[1]

The most extensive study conducted on the issue, by Schuman et al. (1985) provides compelling evidence that "there is at best only a very small relationship between amount of studying and grades" (p. 945). In one of their studies, they found a weak, yet reliable relationship between reported study time and grades in the corresponding semester, but this relationship disappeared when students' SAT scores were statistically controlled. Schuman et al. (1985) argued that grades in college are primarily determined by aptitude measures, such as SAT, and attendance at lectures and classes.

Subsequent investigators largely accepted the findings of Schuman et al. (1985) but questioned the generalizability of the findings across educational contexts (Michaels & Miethe, 1989) and student populations (Rau & Durand, 2000). In their study, Michaels and Miethe (1989) found a small ($r = .18$, $p < .01$) relationship between reported study and GPA, which remained after controlling for a number of background variables, such as high school rank, attendance, and reported study habits. They also found that studying "without listening to radio and television (no noise)" predicted higher GPA. Rau and Durand (2000) argued that Schuman et al.'s (1985) findings were the result of their sample of undergraduates from the University of Michigan, which they posited are not representative of students in most large state universities. For example, they found that the students at University

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This section belongs to 1. Intro

1.1. Deliberate practice and performance

In trying to understand the small or unreliable relationship between study time and GPA, it may be helpful to consider the emerging literature on deliberate practice. Research into deliberate practice indicates that the amount of high quality practice accumulated during individuals' careers is closely related to their attained performance in a wide range of domains (e.g., Ericsson, 2002; Ericsson & Lehmann, 1996). Studies of the acquisition of expert performance have shown that extensive experience is necessary for individuals to attain high levels of reproducibly superior performance in the domain of expertise (Ericsson & Lehmann, 1996; Simon & Chase, 1973). However, all experiences are not equally helpful and there are qualitative differences between activities loosely referred to as "practice" in their ability to improve performance.

There are clear limits on the benefits of experience. For example, many people know recreational golf and tennis players whose performance has not improved in spite of 20–30 years of active participation. The mere act of regularly engaging in an activity for years and even decades does not appear to lead to improvements in performance, once an acceptable level of performance has been attained (Ericsson, 2002). For example, if someone misses a backhand volley during a tennis game, there may be a long time before the same person gets another chance at that same type of shot. When the chance finally comes, they are not prepared and are likely to miss a similar shot again. In contrast, a tennis coach can give tennis players repeated opportunities to hit backhand volleys that are progressively more challenging and eventually integrated into representative match play. However, unlike recreational play, such deliberate practice requires high levels of concentration with few outside distractions and is not typically spontaneous but carefully scheduled (Ericsson, 1996, 2002). A tennis player who takes advantage of this instruction and then engages in particular practice activities recommended by the teacher for a couple of hours in deeply focused manner (deliberate practice), may improve specific aspects of his or her game more than he or she otherwise might experience after many years of recreational play.

and performance across a wide range of academic subjects (e.g., prior knowledge of subject, skills, and cognitive abilities). Therefore, our approach focuses on measuring a wide range of factors important for academic performance, so that we can statistically control for these factors and eventually estimate the relationship between study time and academic performance.

1.2. Toward a model of factors that determine grades during a semester in college

Common measures of performance in college are the cumulated GPA or the GPA for a given semester. These measures are averages of course grades, which are likely determined by two types of factors. The first type can be measured prior to the start of a targeted semester, such as the knowledge, abilities, and skills that had been acquired prior to the start of the semester. The second group of factors consists of the concurrent study and the learning and non-learning activities that take place during the semester. We consider each of these types of factors in turn.

1.2.1. Factors reflecting conditions prior to the start of a semester

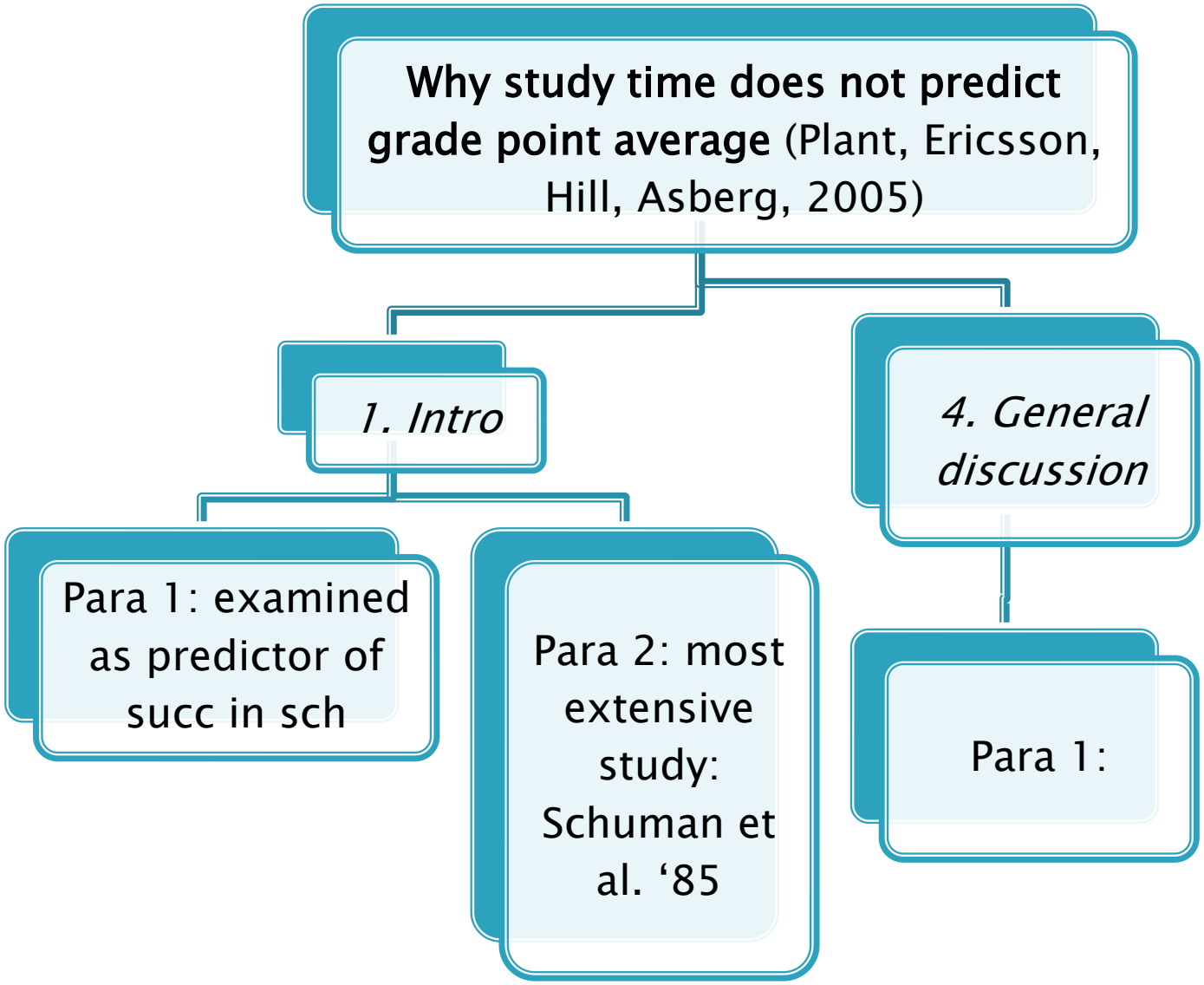
Previously acquired knowledge, skills, and stable abilities relevant to a given course will directly affect performance on tests and the final examination. These factors will also have an indirect impact by influencing the amount and type of new learning that is necessary during the semester for a student to reach a given level of mastery. Based on a large body of research, the best measures of basic cognitive skills and abilities and prior learning are SAT scores, high-school GPA, and prior grades in college (e.g., Allen et al., 1972; Gortner Lahmers & Zulauf, 2000; Hinrichsen, 1972; Schuman et al., 1985). Allen et al. (1972), for example, found that high school rank was a better predictor of GPA than study time or test anxiety. Standard-

4. General discussion

The current work drew upon the theoretical frameworks of deliberate practice and self-regulated academic learning in order to examine why the amount of study by college students has been found to have no, or a negligible, relationship to academic performance in a university setting. Previous research on the acquisition of expert performance has shown that the level of expertise in a domain is closely related to the amount of high quality, focused practice, termed deliberate practice, that individuals have accumulated during many years of committed training (Ericsson, 1996, 2002, 2003a; Ericsson et al., 1993). In applying this approach to performance in college, we sought to determine which characteristics of studying would help to identify people likely to be engaging in the type of high quality study, which would qualify as deliberate practice. We proposed a model where performance in college (GPA) was jointly determined by previously acquired knowledge, skills, and abilities (high-school GPA and SAT) as well as factors regulating the available time and resources for consistent well-planned studying and class attendance. Based on the tenets of deliberate practice and self-regulated learning, those who engage in deliberate studying take active steps to ensure their practice time will be of high quality and encourage the improvement of performance.

The results from the current study were generally consistent with predictions and previous findings. First, performance attained prior to college reliably predicted cumulative GPA and GPA in one semester, consistent with many previous investigators (e.g., Allen et al., 1972; Elliot, McGregor, & Gable, 1999; Gortner Lahmers & Zulauf, 2000; Hinrichsen, 1972; Schuman et al., 1985). Specifically, high-school GPA and SAT scores were both positively related to the cumulative university GPA, and SAT scores accounted for variability independent of all other variables. In addition, GPA in previous semesters of college appeared to capture the relevant variability associated with performance prior to entry in college when predicting GPA for a single semester.

- Stick to 4 words per line/box
- Pick words you understand
- Look at how the ideas are connected
- Can read up or down the hierarchy

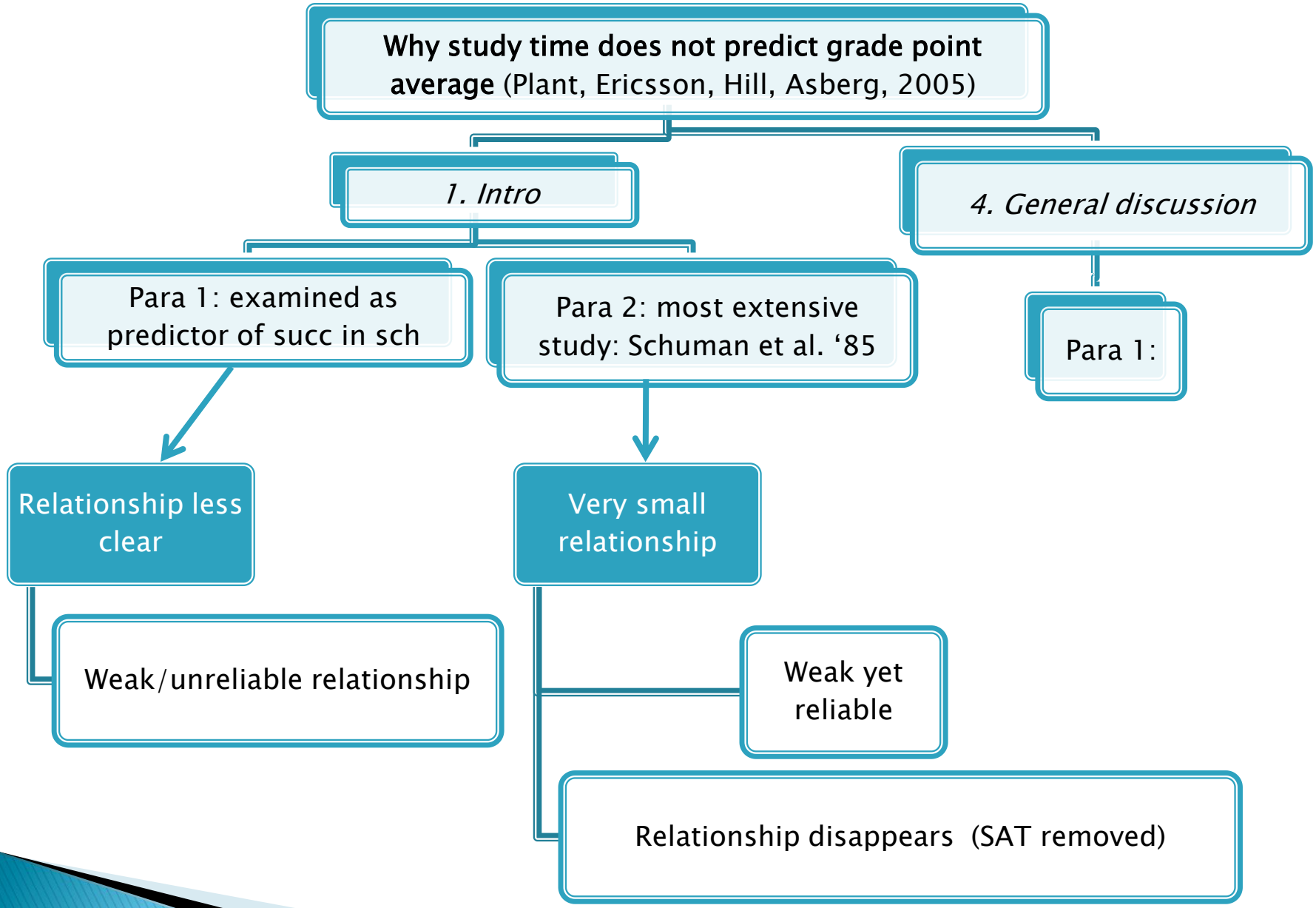


From para 1: examined as a predictor of success in school

- Relationship less clear
- Weak/unreliable relationship

Para 2: Most extensive study (Schuman, '85)

- Very small relationship
- Weak yet reliable
- Relationship disappears (SAT removed)


Why study time does not predict grade point average (Plant, Ericsson, Hill, Asberg, 2005)
1. Intro
4. General discussion
Para 1: examined as predictor of succ in sch
Para 2: most extensive study: Schuman et al. '85
Para 1:
Relationship less clear
Very small relationship
Weak/unreliable relationship
Weak yet reliable
Relationship disappears (SAT removed)

QUESTIONS?

This has been a overview of the research paper reading process.

It works better than any other strategy – but you need to take time to get the hang of it.

You will encounter some questions while learning the strategy.

Careful if you use the internet to help you develop a concept map – it's inaccurate in terms of schema creation

With meta-analyses: read the complete article

QUESTIONS ?