

WikiBook Group Design Rationale

Metacognition and Self-Regulated Learning

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Cognition and Instruction/Metacognition and Self-Regulated Learning

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Introduction

Our group have worked on the improvement of the chapter: Metacognition and Self-regulated Learning (SRL). This chapter deals with defining those two concepts, presenting major theories and models, as well as describing methods, strategies and technologies that may be used in the research of this field and in promoting related skills to the students. The decision to work on this chapter was mainly based on the fact that our group members have previous experience with this field, or genuine interest to study it, so we can make our contributions as strong as possible.

The topic of this chapter is considered advanced, as it deals with the concepts connected in ways that are not clearly defined by relevant theories. Meanwhile, it introduces many new concepts and terminologies that also need to be defined in an adequate way, in order for the students to fully comprehend their meanings and their implications in learning.

There are five distinct categories of improvements to the chapter that our design addressed. *Organization and structure* refers to improvements on the different sections of the chapter and the order they are presented. *Missing content* includes sections or content that need to be added, in order for the chapter to completely and adequately cover the topic. *Grammar and writing style* involves the improvement of the linguistic aspect of the text. *Visualizations and other instructional aids* includes all the images, diagrams, tables and concept maps that have been added to the chapter. *Citations and references* includes reorganization and assessment of all the references provided with the text, as well as the adequate handling of the citations. We have

approached these categories in the above order as well. At first, the structure of the chapter was updated and the different sections were re-organized. Then, the content was divided into three parts and each team member worked individually on editing, rewriting and reference checking for each part. Last, when a clear picture of the whole chapter has been formed, the group decided on the instructional aids to be included in the chapter.

Organization and structure

The major problem of the previous structure of the chapter was its lack of functionality, which in some cases causes confusion to the readers. The most prominent reason for this is that the chapter has been compiled by integrating contributions from many different authors, without a single editor coordinating and organizing these contributions. The order and organization of the different sections doesn't reflect any integral reasoning, or a predetermined line of thought that can lead the students gradually to the more complex concepts and ideas, making the presentation of the content seems random. Sections that belong together, as they are closely connected, in the chapter appear far apart. For example, section 1.4 (metacognition through a developmental lens) appears near the end of the chapter, totally isolated from all the other metacognition related subtopics, which are included in the very first section of the chapter. This clearly violates the spatial contiguity principle, which suggests that all the related objects or pieces of text need to be physically close to each other (Halpern, Graesser, & Hakel, 2007; Mayer, 2002). Other sections, usually short in length and with a focus on a very specific concept, appear detached from the rest of the chapter, as their relation to the general topic is not entirely obvious. An example of this is section 1.3.2 (cultural differences), where it is not clear how this topic is related to the concepts of metacognition and self-regulated learning. Finally, concepts have been revisited throughout the chapter, without any apparent reason that prevents them from being organized in the same section. For example, the concept of metacognition was examined in four different parts of the chapter.

In order to deal with the problem, our group redesigned the structure of the chapter, to abide the coherence effect principle, which dictates that students should have a coherent presentation of the main ideas to be learned (Halpern et al, 2007). Also, we decided on an order of presentation of the various subtopics of the chapter, to reflect a specific reasoning that can lead the students,

as they study the chapter. The chapter begins with the definitions of metacognition and self-regulated learning, along with some other basic concepts that are important for this domain. The second section includes all the different models that have been suggested by experts to describe the process of SRL. This section prepares the students to delve into more advanced topics of metacognition and self-regulation, by encouraging them to construct their own image of the SRL process, in order to apply it later on in the discussion of how SRL theory is connected to education. The next section deals with issues in SRL research and discusses how the different theories have been formed by observing the learning activities and performance of learners in various contexts. The final section brings the theories discussed in the previous section to the educational reality, presenting applications in technology and in the teaching practice. From the above description, it is obvious that the structure of the chapter follows a build-up strategy, where the student is given the necessary knowledge blocks to continue further on in more advanced topics of the chapter.

Another aspect of the chapter structure that needed improvement was the paragraph layout and structure (Leacock, & Nesbit, 2007; Nesbit, Belfer, & Leacock, 2009). Certain sections contained very long paragraphs, which contain two or more topics. Also, these paragraphs lack any internal structure, moving from one topic to another without particular reasoning. The layout of these sections doesn't help the students to access the required information or organize the extracted information in a meaningful way. These sections have been reorganized and divided into shorter paragraphs that discussed a single topic or concept and didn't expand in multiple areas.

Finally, there were certain sections in the chapter that seemed completely out of place, as their connection to the main topic of metacognition and SRL was quite "loose". For example, section 1.3.3 (concept of learning) refers to the learning process in general, without relating it to the basic concepts of the chapter. To avoid increasing the students cognitive load, by trying to figure out which information is relevant and which isn't, all these irrelevant sections have been removed and sent to the chapters that they are most connected (Halpern et al, 2007).

Missing content

After getting familiar with the content of the chapter, we found certain important sections or ideas that were missing from the original document and should be added, either now or in the future.

One of the problems that was addressed was the lack of a functional summary at the beginning of the chapter (Leacock et al,2007; Nesbit et al, 2009). The original summary of the chapter introduces the student to the central concepts of the chapter but fails to pinpoint the main points of the chapter which should be one of its main purposes, according to Reder and Anderson (1980). These two researchers suggested that summaries containing the main points of a chapter in the form of bullet points allow the students to navigate easily through the content and support identification of the major concepts, as it is harder for the readers to isolate the important points when embedded in detailed texts. Our group organized a specific format for this particular summary, including an introductory part and a bullet point section. The introductory part gives a brief account of the contents and how those sections are interconnected. The bullet point section gives an outline of the most important points of the chapter in the form of learning objectives that can be reached by the students when they study this chapter.

In addition, there were aspects of metacognition and SRL that had not been covered adequately or had been absent from the chapter. For example, in the SRL models section only the Zimmerman's model had been included. Therefore, the relevant subsections were added into the structure, e.g., Boekaerts' three layer model and Winne's phase model, to be developed and analyzed in the future. Also, there are sections of the chapter that were based on a single study or theoretical approach, thus giving a very narrow perspective of the topic to be discussed. For example, section 3.1 (cultural differences in self-regulated learning) used the conclusions of a single study in order to discuss this topic. It is evident that the theoretical scope of that specific section was extremely narrow. This is in direct opposition to the cognitive flexibility principle, which dictates the presence of multiple viewpoints and perspectives about a particular phenomenon (Halpern et al, 2007). Unfortunately, embellishing these sections with more theoretical perspectives was outside the scope of our design. Hence, this issue should be addressed in the future. There are three other sections (3.3 Learning analytics and SRL research, 4.4 Incorporating technology, and 4.5 Facilitating and encouraging SRL) that were not

elaborated adequately or were absent from the chapter, and these problems have been addressed by the group as each member's individual contributions.

Grammar and writing style

One of the necessary elements of the chapter that needed improvement was the grammar and syntax. In particular, there were certain sentences or whole parts of the text that were written in an ill-structured way (in terms of grammatical correctness), that made the meaning of these sections difficult to comprehend, thus increasing the cognitive load of the students reading the material (Halpern et al, 2007). Also, at some points the structure of some sentences were so distorted that they didn't convey the meaning intended by the author, adding to the confusion of the students who are trying to decipher this meaning. Therefore, all the problematic textual data had to be re-written in a way that would be compatible with the knowledge and skill level of undergraduate students who don't have any prior knowledge in this area.

The problem of a coherent writing style was a more complex one. The multiple authors who contributed for the compilation of this chapter had not an unified writing style that the whole chapter should follow (Leacock et al,2007; Nesbit et al, 2009). In particular, some sections were written in a highly academic style that may be inappropriate for undergraduate students, while others had a somewhat informal style that did not meet the requirements of a university level textbook. Our group didn't address this particular problem due to the limited time. However, it is necessary to have an individual editor who will provide a unified writing style for this chapter and the whole WikiBook as well.

Visualizations and other instructional aids

The issue of instructional aids that needed to be added to the chapter was addressed by the group after the individual editing of the distinctive parts, when each group member had a clear idea of the chapter characteristics and of how certain visualizations would lead to improvements (Leacock et al2007; Mayer, 2001; Nesbit et al, 2009). Our main concern was not to include visual aids just for the sake of including them in the chapter. Their appearance in the content should be justified and established by an actual need of the students. As a result, several types of

different visual aids have been added to the chapter: concept maps, images, diagrams, software screenshots and tables. The graphics editing tools we have employed for designing visualization include: PHOTOSHOP, XMIND, PAGES, and GIMP.

Concept maps were provided for each different section and the whole chapter to visually represent the major concepts and elements that were discussed in it, using dual code (verbal and pictorial modes) to communicate the major ideas of the chapter to the students (Halpern et al, 2007; Pass & Kester, 2006). Concept maps supply the students with a clear image of how the different components of the chapter relate to each other. Each concept map is located at the beginning of each section, functioning as a summary that the student can refer to, and also foreshadowing the different sub-topics that will be discussed further down that specific section (Halpern et al, 2007).

According to dual code and multimedia effects principle (Halpern et al, 2007), Information is encoded and remembered better when it is delivered in multiple modes or sensory modalities. In order to enhance learning and promote efficient mental processing, we added some well designed images and diagrams to the chapter, expressing the content more intuitively and illustrate the concepts more thoroughly (Nesbit et al, 2009). We also provided some extra reading and video resources at the end of the chapter.

Reference to educational software tools that are used in SRL research or implementation is a very important aspect of the chapter, as it is directly connected to the educational technologies. The single verbal description of the features is not adequate to provide a complete understanding of a tool's layout and interface. Thus, we included several screenshots of these software tools that complement the text illustrating the softwares, providing the visual information to enhance the discussion of the topics (Mayer, 2001; Leacock et al,2007; Nesbit et al, 2009).

Tables can present detailed information clearly and concisely, and enhance the readers' understanding of the learning contents (Prudue, n.d.). In order to give a comparative picture of the different types of SRL strategies that can be implemented by the students, a table has been

provided in section 4.5.2 (Self-regulated learning strategies for students), along with specific examples for each type of SRL strategies (Halpern, Graesser, & Hakel, 2007).

Citations and references

The last type of improvements that has been addressed is the references used in the chapter. In particular, there have been multiple references to the same study without any need to do so. Additionally, there were parts of the text that did not refer to the original article or study, but were from the secondary sources. These references have been replaced by the proper ones. Also, citation conventions were not kept in the chapter. For example, when an exact citation appeared in the text, no reference to the specific page that includes the excerpt had been made. These page numbers were provided by the group member responsible for that particular section. Finally, some quotes did not include the original text of the referenced article, but an altered version of it. These deviations from the original text have been eliminated.

Table 1. shows the the major problems of the original document, and the improvements we have made to the chapter.

Table 1. Problems and improvements

Problems	Improvements
Organization and structure	Restructure whole chapter; delete Irrelevant sections; rewrite meaningful headings.
Missing content	Add necessary content; rewrite some sections; list outlines of missing parts.
Grammar and writing style	Add visual modalities; provide extra video resources; separate long paragraphs.
Content layout and presentation	Add visual modalities; provide extra video resources; separate long paragraphs.
Citation and reference	Delete repeated ones; replace mismatched ones; revise incorrect ones.

Contribution of each group member

During the whole project, each team member did approximately the same amount of work and thereby we have all made important contributions. Although we all worked through each step of

the project, from identifying problem to share thoughts on how to solve the problem, each team member played his or her own unique role in revision processing.

We made major decisions together during our meetings in class:

- Each member read through the whole chapter and got familiarized with it, identify its main points and get a clear picture of the improvements that needed to be done.
- Based on due date, we draw down a timeline for each member to follow and track on progressing.
- We identified the major problems of the original chapter and discussed suggested solutions on how to fix those problems.

Each group member in this project also has her/his own contributions, which is listed in Table 2.

Table 2. Each member’s own contributions

Belinda	Dionysios	Ling
Recorded each meeting, Created timeline, and organizing meetings	Developed a new structure for the chapter	Did research and found relevant resources for chapter development
Edited Chapter Part 1: Defining the concepts and Part 4: From Theory to Practice (Include Grammar editing, add/delete section, multimedia using for content and etc.)	Edited Chapter Part 3: Issues and Topics of Research and Part 4: From Theory to Practice (Include Grammar editing, add/delete section, multimedia using for content and etc.)	Edited Chapter Part 2: Models of Self-Regulated Learning and Part 4: From Theory to Practice (Include Grammar editing, add/delete section, multimedia using for content and etc.)
Incorporated Individual contribution assignment to Chapter Part 4 Incorporating Technology	Incorporated Individual contribution assignment to Chapter Part 3 Learning analytics and SRL Research	Incorporated Individual contribution assignment to Chapter Part 4 Facilitating and Encouraging SRL
Designed concept maps, gave credit to images, created tables, and etc. Revised Glossary Upload revised WiKi Book to Website and double check references	Compiling, organizing and editing the rationale	Final checked the revised whole chapter. (Include revise structure outline, editing grammar, organize writing style, re-organize the chapter summary, and visualization, etc.)
Final Rational editing PPT slides editing References checking	Final Rational writing	Final Rational writing & editing Created PPT slides for Presentation

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