Encyclopedia of Educational Psychology

Metacognition and Learning

Contributors: Edited by: Neil J. Salkind
Edited by: Neil J. Salkind
Book Title: Encyclopedia of Educational Psychology
Chapter Title: "Metacognition and Learning"
Pub. Date: 2008
Access Date: December 11, 2015
Publishing Company: SAGE Publications, Inc.
City: Thousand Oaks
Print ISBN: 9781412916882
Online ISBN: 9781412963848

DOI: http://dx.doi.org/10.4135/9781412963848.n178
Print pages: 674-676

Psychologists interested in how individuals learn have devoted much attention to the cognitive processes involved in encoding, storing, and retrieving information of all types, as well as comprehending the complex information with which they are confronted daily. Investigators have examined a variety of cognitive processes, with particular attention to memory and language comprehension. Such investigations have led to an understanding of the factors that lead to enhanced comprehension and recall during learning.

During the past couple of decades, researchers have also gotten keenly interested in metacognition. The term *metacognition* refers to the knowledge of *and* monitoring of cognitive processes. Because there is more than one cognitive process involved in learning, it is not surprising that researchers use more specific terms to denote the knowledge of and monitoring of different cognitive processes. For example the terms *metamemory* and *metacomprehension* are used to refer to individuals' knowledge of and monitoring of memory and comprehension, respectively. Most research on metacognition has been on metamemory or metacomprehension, although the metacognitive processes involved in performing other tasks, such as problem solving, have also been studied. Additionally, researchers have begun to explore metacognition outside of the laboratory, extending research paradigms to the classroom and other applied settings. There has also been an increase in attention paid to the role of social influences on metacognition.

Although the literatures on metamemory and meta-comprehension are similar in many ways (e.g., the issues investigators are examining in the two literatures have much in common, and there are some similarities in the research paradigms employed), researchers examining metamemory have tended to use lists of isolated words as learning materials, whereas researchers examining metacomprehension have tended to use texts as learning materials. The present entry focuses on the role of metacomprehension in learning, as the text materials used in metacomprehension research are quite similar to the types of information typically encountered in learning in the classroom as well as other real-world settings.

Knowledge about Cognition

As individuals develop, they accumulate a great deal of knowledge as a result of life experiences. This knowledge can be thought of as “knowing that” knowledge (for example, knowing that a dog is a type of animal), also referred to as *declarative knowledge*, or “knowing how” knowledge (for example, knowing the procedures involved in typing), referred to as *procedural knowledge*. One of the types of declarative knowledge that individuals acquire is knowledge about their own and others' cognitive processes.

Psychologists have primarily studied three components of metacognitive knowledge. These are *person* knowledge, *task* knowledge, and *strategy* knowledge. An example of person knowledge would be knowing that sixth graders are more likely to understand information about global warming than are second graders. An example of task knowledge would be the knowledge that it is easier to understand a passage when one is familiar with the topic than when one is unfamiliar. And, finally, an example of strategy knowledge would be the knowledge that rereading is a useful strategy when confronted with material not understood.

People acquire knowledge of cognitive processes, including person, task, and strategy knowledge, from a variety of sources. An individual may receive some instruction about person, task, and strategy knowledge from parents and teachers, but may primarily obtain such knowledge through a multitude of personal and informal learning experiences, including the observations of others as they attempt to learn.

Assessing Knowledge about Comprehension

The most direct way to assess individuals' knowledge about comprehension is through questionnaires or interviews. Several questionnaires have been developed to assess individuals' knowledge about comprehension, including person, task, and strategy knowledge, and questionnaires about comprehension have been developed to examine knowledge in children as well as adults. Although the data gathered from such questionnaires are interesting in their own right (for example, to reveal developmental changes in children's or adults' knowledge), what is of most interest to researchers is the relationship between individuals' knowledge and their performance on comprehension tasks or academic achievement.

Research on knowledge of comprehension in children reveals that such knowledge is related to both children's reading ability and age. Although these results are not terribly unexpected, an interesting finding in the literature is that adults' knowledge of comprehension processes has also been found to predict their comprehension performance and academic achievement. Thus, adults who have acquired more general knowledge about comprehension (regardless of the source of that knowledge) have been found to perform better on measures of comprehension and to be more successful academically. Some researchers have found that strategy knowledge, in particular, is consistently related to comprehension performance. Thus, systematic rather than haphazard instruction in comprehension processes may be helpful to students.

Monitoring Cognition

During learning, it is important for individuals to both assess how well they are doing on a task, and initiate a plan to correct any problems they may be experiencing. These combined activities are referred to as *monitoring* cognition. Thus, while one is listening to a lecture or reading a book, it is important to both evaluate one's level of understanding (with perhaps a simple question such as “Do I understand what has been said/read up to this point?”) as well as regulate understanding with one or more strategies if one is aware of a comprehension difficulty (for example, asking a question of an instructor or rereading a section of a paragraph not understood). Thus, monitoring of cognition really has two components. The first is *evaluation* of progress toward a cognitive goal, and the second is a *regulation* of activities through the use of appropriate strategies. If a student is regulating his or her cognition, then he or she has already attempted to evaluate progress. However, it is possible for a student to fail to evaluate progress, or also possible to evaluate progress (and find progress deficient in some way) but then fail to use one or more regulation strategies. Many fail to use strategies to repair comprehension problems simply because they lack the time or motivation to do so.

Unfortunately, the failure to evaluate one's progress and/or use strategies to aid progress toward goals is an all too common occurrence in students' efforts at learning.

Furthermore, these types of monitoring activities (much like knowledge of comprehension processes) are of ten not taught directly, and, for this reason, students' learning and their ability to know how to learn may be hindered.

Assessing Monitoring of Comprehension

The majority of investigations of students' monitoring abilities have focused on students' ability to evaluate rather than regulate comprehension during reading. Most investigators have conducted studies using college students as research participants, but some have examined children's ability to evaluate their comprehension.

Investigators have primarily used two research paradigms to examine students' ability to evaluate their comprehension during reading. One of these paradigms is the *error detection paradigm*. In this paradigm, students are given passages to read. Some of the passages contain an error, such as a nonsense word, false information, or a pair of inconsistent sentences. What is of interest is whether students notice the errors during reading. If not, investigators conclude that students may not be adequately evaluating their understanding during reading.

Linda Baker has argued that the ability to evaluate understanding during reading is not a unitary process, but rather is multidimensional, as individuals must really evaluate what they are reading using different standards of evaluation. Some standards of evaluation may be more difficult to use than others. Karen Zabrucky and DeWayne Moore, for example, found that children were better able to use a lexical standard or an external consistency standard (that is, they were better at evaluating their understanding of the individual words in a passage or whether the information fit with their own prior knowledge) than an internal consistency standard (evaluating whether information within a text was internally consistent). Researchers have generally found that children's ability to evaluate their comprehension, as measured by the error detection paradigm, develops with age. However, even college students frequently fail to use an internal consistency standard of evaluation during reading tasks. In fact, it appears as if evaluation skills continue to develop in college and graduate school, as students have more and more experience knowing how to learn.

Another, more widely used, research tool is the *calibration of comprehension paradigm*. In this paradigm, students are presented with several passages to read. Generally speaking, the passages are either unaltered or minimally altered, and they are obtained from textbooks or other reading materials. In the calibration of comprehension paradigm, students are asked to read each passage, one at a time, and provide ratings regarding their level of passage understanding or their readiness to be tested over the material. The similarity between the calibration of comprehension paradigm and the types of self-questioning activities in which students engage (or should engage) during everyday learning is strikingly apparent.

After students provide ratings of their understanding and/or test readiness, they are given a test over the passage information. What is of interest to psychologists is the relationship between students' ratings and their actual comprehension performance. This relationship is referred to as *calibration of comprehension*. Students who rate their comprehension high or indicate that they are ready for the test, and who perform well on the test, are said to be well calibrated. Similarly, students who rate their comprehension low or indicate that they are not ready for the test, and who perform

poorly on the test, are also well calibrated (despite their poor comprehension performance!). Poor calibration is said to occur when there is a mismatch between one's self-assessment (or evaluation of understanding) and one's comprehension performance. The most common type of mismatch is an *illusion of knowing*, that is, believing that one understands something or is ready for a test when one is not. The implications of illusion of knowing for studying and learning are profound. If students exhibit an illusion of knowing, and research suggests that they frequently do, they will fail to continue the critical studying needed to understand and remember lecture or book material.

Several factors seem to influence calibration of comprehension. Students seem to be better able to calibrate their comprehension of text material when they are required to process a text more deeply, or when they reread passage information. Researchers are continuing to examine factors that are related to and may improve calibration ability. Research findings suggest that providing students with tasks during reading that contribute to more thoughtful and deeper processing would be highly beneficial. Also, practice at calibrating (for example, requiring students to assess their readiness and then providing them feedback on actual performance) might be helpful in reducing the illusion of knowing that so often accompanies students' decisions to discontinue their efforts during learning.

Karen M. Zabrucky, and Lin-Miao L. Agler

- comprehension
- calibration
- metacognition
- cognitive processes
- paradigms
- illusions
- cognition

http://dx.doi.org/10.4135/9781412963848.n178

See also

- Cognitive View of Learning
- Reading Comprehension Strategies

Further Readings

Baker, L. (1985). How do we know when we don't understand? Standards for evaluating comprehension. In D. L. Forest, G. E. MacKinnon, & T. G. Waller (Eds.), Metacognition, cognition, and human performance (pp. 155–205). New York: Academic Press.

Karabenick, S. A. Social influences on metacognition: Effects of colearner questioning on comprehension monitoring. Journal of Educational Psychology 88 (4) (1996). 689–703 http://dx.doi.org/10.1037/0022-0663.88.4.689

Lin, L., and Zabrucky, K. M. Calibration of comprehension: Research and implications for education and instruction. Contemporary Educational Psychology 23 (1998). 345–391 http://dx.doi.org/10.1006/ceps.1998.0972

Moore, D., Zabrucky, K., and Commander, N. E. Validation of the Metacomprehension Scale. Contemporary Educational Psychology 22 (1997). 457–471 http://dx.doi.org/10.1006/ceps.1997.0946

Nietfeld, J. L., Cao, L., and Osborne, J. W. Metacognitive monitoring accuracy and

student performance in the postsecondary classroom. Journal of Experimental Education 74 (1) (2005). 7–28
Veenman, M. V. J., Van Hout-Wolters, B. H. A. M., and Afflerbach, P. Metacognition and learning: Conceptual and methodological considerations. Metacognition and Learning 1 (2006). 3–14 http://dx.doi.org/10.1007/s11409-006-6893-0
Zabrucky, K., and Moore, D. Children's ability to use three standards to evaluate their comprehension of text. Reading Research Quarterly 24 (1989). 336–352 http://dx.doi.org/10.2307/747773