Four Tips to Manage Cognitive Overload

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Cognitive overload is something we have all experienced in a learning setting. It occurs when working memory (WM), which has a limited storage capacity, becomes full. The learner is unable to take in more information and becomes frustrated, and, ultimately, learning is hampered. The capacity of WM is a function of prior knowledge and experience. Thus, a novice learner will reach cognitive overload long before an expert will. This can result in problems for the novice when an expert designs or delivers instruction. The purpose of this article is to present four techniques that can be used to manage cognitive overload in an instructional setting.

Chunking Information

Chunking can be described as grouping information into small, manageable units. An example of chunking is teaching joint evaluation by presenting the material in units such as bony palpation, soft-tissue palpation, and range of motion. Each of these units could be seen as a chunk of content. One consideration is the fact that a learner’s manageable chunk size is a function of prior knowledge and experience; a novice learner cannot hold the same amount of information in WM that an experienced (or expert) person can. Subject-matter experts who teach typically deliver information too rapidly in chunks that are too large, resulting in learner overload. In the chunk example above each of these areas might need to be further chunked for novices. For instance, bony palpation could be further divided into medial, lateral, anterior, and posterior structures.

Building in Frequent Practice

The rationale for frequent practice sessions is that it helps clear WM by allowing the student to use (rehearse) the material and helps move the information from WM to long-term memory. Examples of practice activities include:

- Asking questions during class
- Providing short exercises following blocks (chunks) of information
- Providing periodic case studies or projects
- Using small-group activities
- Integrating lab work

The accelerated-learning literature recommends that instructor presentation only account for 30% of classroom time, with practice composing 70%. Practice does not have to be a psychomotor activity. It could involve open- or closed-ended questions or a case study. The key is that the practice allows learners to process the information at a cognitive level if it is necessary for them to know it in order to be successful in a particular skill or task.

Providing Complete Handouts

It seems that in most university academic settings, students spend most of their classroom time taking notes. Most of their energy and attention is focused on getting down on paper what the instructor has said for later use and test preparation. This results in splitting learners’ attention between note taking and attempting to process what the instructor is saying. Requiring novices to “multitask” in this manner distracts them and further drains the storage capacity of WM.

One of the problems novice learners have is determining what is important—separating the “need to know” from the “nice to know.” We believe that one of a teacher’s primary jobs is to help students separate these two types of material. Complete notes help focus them on the “need to know” information versus trying to capture everything the instructor says. An example of this is seen in the pages of the introductory-level professional texts of most practicing athletic trainers and therapists. What is probably found in these books are pages almost completely colored from all the highlighting the learner did while...
reading in order to denote important facts. Because novice learners have difficulty determining what is important, they end up highlighting everything. For this reason, reading assignments should be accompanied by guiding or probing questions to help focus learners’ attention on what is important to avoid cognitive overload.

In addition, notes should be prepared in a structured writing format (see Figure 1 for an example).

One such format is Information Mapping® (www.infomap.com), which was developed by Robert Horn. Information Mapping provides a comprehensive set of tools and techniques for identifying what needs to be communicated, organizing and managing (chunking) large amounts of complex information, and providing information in a consistent format. The sidebar lists several advantages of a structured writing format. Learners should be provided

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**Figure 1** Example of a structured writing format.

**History**

**Introduction**

The comprehensive assessment of injuries to the elbow and forearm includes a careful history that includes questioning the athlete around the areas of mechanism of injury, symptoms, sensations, and previous injuries.

**Mechanism of Injury**

The athlete should be questioned about the mechanism of injury to determine exactly how the injury occurred. Questions that should be included about the mechanism of injury include:

1. Was there a direct blow delivered to the elbow or forearm?
2. If a blow was delivered, was the elbow joint forced in an abnormal direction?
3. Did the athlete fall and land on the elbow, forearm, or outstretched hand?
4. What was the position of the elbow at the time of injury?
5. Did the injury result from throwing or swinging activities?
6. Did the symptoms of this injury, including onset of pain, occur very suddenly, or did they develop over a period of time?

The more information you gain concerning the mechanism of injury and the onset of symptoms, the easier it is for you to accurately assess the nature and severity of the injury and determine the structures that might be involved.

**Symptoms**

Allow the athlete to describe the symptoms associated with the injury. Query the athlete in the following areas:

1. Exactly where are the painful or tender areas?
2. Ask the athlete to localize and describe the pain.
   Pain about the elbow and forearm is normally easy to localize and is seldom diffuse or radiating unless there is neural involvement. On those occasions when a nerve is compressed, as when the ulnar nerve is hit, a burning pain might travel the length of the nerve pathway.
3. Is pain present only during activity? If so, what types of activity or movement cause the pain? You might ask the athlete to demonstrate the painful motions.

**Sensations**

Next question the athlete about any unusual sensations associated with the injury.

1. Did he or she feel anything at the time of injury, such as popping, clicking, or snapping sensations?
2. Does the athlete feel any crepitation?
3. Is there any tightness, tension, or swelling associated with the injury?
4. Does the athlete complain of any numbness, burning, tingling, or weakness in the forearm or hand?
5. Ask the athlete to describe his or her impression concerning the injury.

**Previous Injuries**

Also inquire about previous injuries, such as ...

1. Has the athlete suffered an injury to this area of the body before? If so, obtain as much information as possible concerning the circumstances surrounding previous injuries.
2. When was the athlete injured?
3. What were the nature and severity of previous injuries?
4. Had the athlete fully recovered from prior injuries, or did he or she still experience symptoms?
5. What types of activities could the athlete participate in before the current injury?
6. Was the athlete’s elbow able to function normally?
7. Does the injury appear to be the same as or very similar to previous injuries.