Learning vs. Retention: Implications for Educators

Mahesh Thapa, MD
Seattle Children’s
thapamd@uw.edu

Objectives

By the end of the lecture, the audience will be able to:

• define learning and retention.
• differentiate between rote and elaborative rehearsal.
• apply the principles of Primacy-Recency to his/her teaching episode.

No Disclosures

How The Brain Learns

David A. Sousa
Learning

Differential Diagnosis for an MRI finding

Causes of Nephrocalcinosis

Muscles that make up the quadriceps mechanism

Retention

IN
Short Term Memory

Long Term Memory
Retention:

Learning that can be
• Located
• Identified
• Retrieved

Retention: Factors

Rehearsal

Processing and reprocessing of new learning = working memory to long-term storage
Rehearsal

Repeat again what you hear; for by often hearing and saying the same things, what you have learned comes complete into your memory.

- from the Dialektes

Initial and Secondary Rehearsal

Initial rehearsal occurs when information enters working memory.

Rote and Elaborative Rehearsal

Rote Rehearsal = store information EXACTLY as it is entered into working memory

- Multiplication tables
- Telephone numbers
- Procedural steps

Initial and Secondary Rehearsal

Secondary rehearsal

- Review of information
- Detail elaboration
- Assign value and relevance
Rote and Elaborative Rehearsal

Elaborative Rehearsal = Associate new learning with prior knowledge via relationships
More complex process that assigns meaning to the new information

Rote and Elaborative Rehearsal

A student uses rote rehearsal to memorize the various tendons that attach to the ischial tuberosity. She uses elaborative rehearsal to correctly interpret a hamstring avulsion injury.

Rote and Elaborative Rehearsal

If a student receive insufficient training in elaborative rehearsal, he will resort to rote rehearsal for nearly all processing.

Rote and Elaborative Rehearsal

DDx for child with limp.
Foot, ankle, knee, hip, back, etc.
Does that help a child who comes into the ER with multiple bruises and refusal to bear weight.
Rehearsal and Retention

Rehearsal is necessary but not sufficient for long-term storage. (No long-term retention without rehearsal).

Learning Episode: When does Retention Happen?

Amount of information retained depends on when it is presented during the learning episode.

Simple Activity

Pencil and Paper

1. Item 1
2. Item 2
3. Item 3
4.
5.
6.
7.
8.
9.
10. Item 10

0:15
Simple Activity

List the items in order

1. ________
2. ________
3. ________
4. ________
5. ________
6. ________
7. ________
8. ________
9. ________
10. ________

Most difficult to remember
Primacy-Recency Effect

Remember best = 1st part
Remember 2nd best = Last part
Remember least = just past middle

Known since the 1880’s (Hermann Ebbinghaus)

Primacy-Recency Effect

Remember best = 1st part
Remember 2nd best = Last part
Remember least = just past middle

Known since the 1880’s (Hermann Ebbinghaus)

Primacy-Recency Effect

1st items in working memory – reach functional capacity

Primacy-Recency Effect

Later info exceeds capacity and is lost
Primacy-Recency Effect

At end of learning episode, items in learning memory are sorted or chunked.

Additional processing of arriving final items.

New information should be taught first.

Retention During a Learning Episode

Diagram showing retention over time for different time periods.
Practice or review during down-time.

Closure at Prime-Time-2

Closure: For the next 30 seconds try to recall the important findings of a lateral patellar dislocation. I’ll ask you how those findings relate to the mechanism of injury.

Closure does not necessarily mean review.
Prime Time Misused

- Making announcements
- Asking questions where wrong answers may be given
- Review of old material
- Asking people to introduce themselves

Retention vs. Teaching Episode Length

<table>
<thead>
<tr>
<th>Episode Time</th>
<th>Prime-Times</th>
<th>Down-Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 minutes</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>40 minutes</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>80 minutes</td>
<td>50</td>
<td>30</td>
</tr>
</tbody>
</table>

Approximate Ratio of Prime-Times to Down-Time During a Learning Episode
Retention vs. Teaching Episode Length

Off task activities include:
• Telling a Joke
• A break
• Getting up and moving around

Objectives

By the end of the lecture, the audience will be able to:
• define learning and retention.
• differentiate between rote and elaborative rehearsal.
• apply the principles of Primacy-Recency to his/her teaching episode.

References

• Thomas, E. 1972. The variation of memory with time for information appearing during a lecture. Studies in Adult Education. 57-62.