The purpose of the course is to learn basic cognitive multimedia design principles to reduce working memory overload. The target audience includes mostly beginning as well as more experienced instructional designers or teachers with various degrees of awareness of research based multimedia instructional design principles.

**Version for stakeholders:** Upon completion of this learning object, learners will be able to consciously and comfortably *implement* multimedia design principles to reduce cognitive load.

**Version shown to learners:** Upon completion of this learning object, you will be able to apply multimedia design principles to reduce cognitive load.

After breaking down and prioritizing the course content and objectives I identified the following three objectives\(^1\) as critical:

1. **Understand the human working memory concept and its three assumptions** (a Know\(^2\) - type)
2. **Differentiate principles to reduce unnecessary cognitive load in learners** (a Decide - type)
3. **Apply a job aid (calculator) with worthwhile (easy but useful) effort** (a Decide type)

Drag and drop, multiple choices, rhetoric questions with show answer option. Assessments are interspersed with content and can be taken infinitely. Assessments double as Absorb activity to keep learners active.

---

\(^1\) For a complete breakdown of the learning objectives see the hierarchy of learning objectives in the appendix.

\(^2\) As suggested in [Horton2012] I use “so what?” and “is it relevant for me?” (Andragogy criteria) to eliminate unnecessary objectives but include at least one “Feel”- type and also minimize the “Know” types.
Before unlocking the badge, learners will need to pass all activities and view all chapters.

Reusable Learning Object (RLO) to be imported into Learning Management System or stand alone on CD or web. SCORM 1.2 compliant. HTML and HTML5 version available.

Interactive tutorial with the following alignment of suitable learning activities with enabling objectives. I try to maximize Connect, very little Old (stimulation of prior knowledge) and minimize New (no unnecessary new knowledge).

<table>
<thead>
<tr>
<th>Page 2 of 12</th>
<th>Enabling Objectives</th>
<th>Assessment</th>
<th>Absorb Activity</th>
<th>Do Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulate prior knowledge</td>
<td>Built into DO</td>
<td>Minimal – built into DO.</td>
<td>Old: drag &amp; drop/ multiple choice involving traditional long and short term memory concepts. Preparing for working memory.</td>
<td></td>
</tr>
</tbody>
</table>

3 For more info on my approach to DO and Absorb activities and the distinction between Old/New and Connect - see my note in the appendix.
| Understand the human working memory concept and its three assumptions | Built into DO | 1) New: Charts and short paragraphs, advance organizer  
- overview  
- three assumptions  
- charts illustrating the evolution of the memory model based on assumptions  
- summary & outlook to next chapter  
2) Connect: Rhetoric questions & video  
- video of example for working memory in action | New/Connect: interactive charts, quizzes, interactive markers  
- Charts responding to user interaction (button) showing changes in memory model due to the three assumptions.  
- Interactive Charts responding to user interaction (button) showing changes markers (hot words) showing answers to rhetoric questions. Questions include practical examples and inquiries about the inner works of the working memory  
- Completion of the working memory chart by the user through drag and drop |
| Differentiate principles to reduce cognitive load in learners | Built into DO | New: Rhetoric questions, advance organizer  
- overview  
- sorted (differentiation) into 3 categories  
- rhetoric questions about the 13 design principles  
- summary & intro to next chapter | New/Connect: interactive markers  
- optional (blue info-balls) responses to Absorb  
- one obligatory response (red-info balls) |
| Do: Apply job aid with worthwhile effort | Built into DO | None | New/Connect: Apply calculator, Compare results  
- learner selects (Do/reflect) applied principles and calculates score  
- Learner compares (Do/reflect) score with my result |
Note: quizzes require a response, rhetorical questions do not (or are optional). Quizzes and rhetorical questions will be interspersed with absorb activities (Alessi 2001, p94)

**MEDIA USED**

Video, narration, hypermedia (links, hot words), text, graphics, little or no animation.

**508 ACCOMMODATIONS**

White space, intuitive consistent navigation, high contrast color choices, simplified terminology and language, simple chart, screen readable pdf file covering most of the content.

**COURSE STRUCTURE DESCRIPTION**

Three units corresponding to the three enabling objectives. Each unit has about two distinct activities (Absorb, Do). I may add an example unit to facilitate the “believe” objectives (see Appendix)

**SEAT TIME OF COURSE**

Between 10 min and 2 hours depending on pre-existing knowledge and individual interest level.

**PROJECT SCOPE**

Depending on the capabilities of the authoring tool used, I will try to cover at least all three enabling objectives that represent the critical path. The critical path is shown in the hierarchy of learning objectives in the appendix.

**FLOWCHART**

See appendix
PROJECT OUTLINE

- **Introduction**
  - Splash screen with title, estimated time and number of screens
  - Course goal, target audience, prerequisites
  - Input screen for learner name
  - Menu

- **Chapter 1 - Warm-Up**
  - Absorb and Do activities

- **Chapter 2 - Memory Theory**
  - Absorb and Do activities

- **Chapter 3 - Optimize Content**
  - Absorb and Do activities

- **Chapter 4 – Calculate It!**
  - Absorb and Do activities

- **Appendix – References**
  - Academic terminology
  - Academic literature

- **Unlock Badge**
  - Final Quiz

SCREENS/PAGES IN PROJECT

- About 40

KNOWLEDGE CHECKS OR OTHER ASSESSMENTS OR PRACTICES

- Dichotomous (T/F, Y/N) : 0
- Multiple Choice: 5
- Multiple Select: 2
- Drag and Drop: 4
- Other: rhetoric question with show answer option (using interactive markers): 35
The “back”, “next” and submit button are visible on all relevant screens at the same place. When this is not possible for technical reasons a screen button is shown on the screen. Sometimes “back” or “next” buttons are removed to ensure the learner cannot bypass a quiz question.

“Cognitive Load Calculator (Job Aid)”, “Menu” & “Exit” screen is accessible with one click through the player from all screens.

SCREEN LAYOUTS
See appendix.

DEVELOPMENT TOOLS
Articulate Storyline, PowerPoint, yEd graph editor, Paint Shop Pro

OWNERSHIP
The course designer, Klaus Petritsch will develop, maintain and own the course.

DEVELOPMENT TIME
2-4 weeks after design is finished.

SUPPORT REQUIREMENTS
Designer serves as SME with some feedback by a peer and the instructor.

PROJECT SIGN-OFF [OPTIONAL]
Please sign below indicating agreement with the proposed course plan and approving start-up of the storyboard and development phases.

________________________________________________________________________________________
Instructional Designer Date

________________________________________________________________________________________
Project Manager/Sponsor Date
**APPENDIX**

### OBJECTIVES

Instructional objectives are organized into a logically progressive hierarchy of five different types (Do, Know, Decide, Feel, Believe). I have reduced the number of low level domain objectives - in particular “Know” but included at least one “Feel” objective. [Horton 2012, p28]

**Hierarchy and Types of instructional objectives**

```
*principles commonly require Know, Decide & Do secondary i.e. enabling objectives (Horton 2012, p24)
```
Provided the software permits the implementation I will make it game-like, require the learner to collect various small junk of information “balls”. Info balls will be counted but most will be optional to unlock a “badge”. By making most information optional\(^4\), I aim to keep the interest level, self-motivation and retention high – following the Finnish constructivist/experiential learning approach. I will also use some of Alessi’s [Alessi 2001] suggestions including:

- Provide the opportunity of a top down approach if learners prefer. The learner can chose in which order to do the different chapters
- Use graphics to describe content where possible [Alessi p104]
- Avoid a “boring” linear structure. Instead aim for hierarchical (pre-requisites) and learner level dependent [Alessi p126-127]
- Use “hints” in feedback.
- Give error dependent constructive feedback during or immediately after the activity / question
- Use of hot words (interactive markers that open upon clicking) as a method to “guide” the learner when necessary.

\(^4\) The number of optional information balls has been increased after some preliminary testing and feedback from fellow instructors. Too many obligatory balls turned out to trigger collecting/clicking of cookies without reading the content.
Much of my approach to eLearning is based on the Horton’s book E-Learning by Design [Horton 2010]. I do, however, prefer a less ambiguous categorization and more awareness of prior (OLD) and new (NEW) knowledge. To achieve this, I only distinguish two major activity groups:

1. **DO** (mentally & physically active)

2. **ABS** (mentally but not physically active)

I assume that “Do” involves skeletal muscle movements (if only a mouse click) whereas “Absorb” doesn’t. Both activity types have the potential to do one (or several) of three things:

- activate prior knowledge (OLD)
- introduce new knowledge (NEW)
- connect new with prior knowledge (CON)

This adapted model combines some of the strengths of both Alessi’s (distinguishes OLD & NEW) and Horton’s (DO vs ABS vs CON) approach to eLearning design.

**FLOW CHART**

Below is a (level 2) flow chart to demonstrate the main structure and sequence of the course. I have included information about the type of activity using all caps (DO, ABS) including its focus using old (OLD), new (NEW) or connect (CON).

The “more” screen will include information facilitating the “believe” and “feel” objectives. A legend of the chart symbols is in the chart.
Here are some possible ideas/themes to indicate the learner’s progress:

- graphics and verbs showing level of expertise from multimedia “rookie” (pre-test) progressing to “expert” (memory model), “wizard” (principles) and “god” (job aid application) [chosen]
- evolution theme 1: progress from crawling animal, walking monkey, walking human to .. flying human!
- evolution theme 2: crawling baby, small child, big child, adult
- collection theme: each level is associated with a particular food category like fat, carbo-hydrates, protein.
- construction theme: a food pyramid can be used (wheat, diary, fruit, sweets..) or the construction of a building, house, rocket..

REFERENCES