

# ***FCA TOOL MANUAL***

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# DOCUMENTATION

## *BACKGROUND AND PURPOSE*

The FCA Tool (FCA stands for Formal Concept Analysis) has been developed by members of the Cognitive Science Section at the Graz University of Technology in the course of the weSPOT project<sup>1</sup> ([http://wespot.net/en\\_GB/home](http://wespot.net/en_GB/home)). In the context of LEA's BOX, we are aiming to adapt and further develop the features and functionalities to meet the end-users needs of LEA's BOX.

As the acronym suggests, the underlying principles of the FCA Tool is the formal concept analysis which is briefly outlined in Deliverable D3.1 Review article about LA and EDM Approaches (section 8.2). In a nutshell, the FCA allows for structuring a knowledge domain, to visualize its concepts and their relations to each other in form of a concept hierarchy and to assign resources (currently called "learning resources") to concepts.

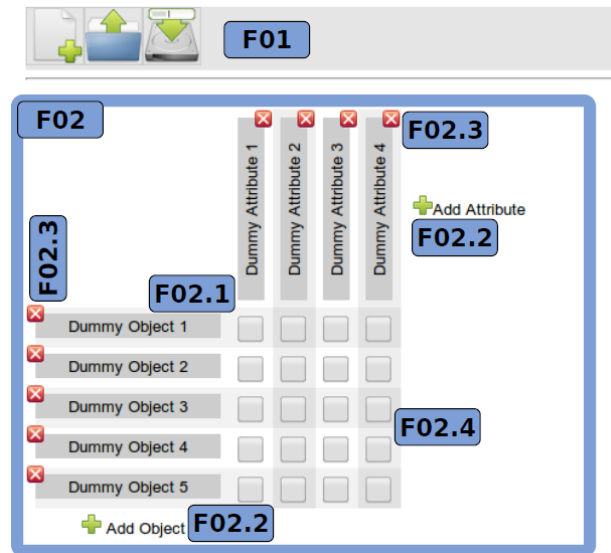
The FCA Tool consists of two main views: the Editor view and the Lattice view. The editor view presents a matrix that allows for the creation of a knowledge domain by defining the domains objects and attributes describing (some) the objects. The lattice view visualizes the knowledge domain as a concept hierarchy (sub- and supra concepts).

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<sup>1</sup> weSPOT Project - IST (FP7/2007-2013) under grant agreement N° 318499.

## USER INTERFACE

When launching the FCA Tool an initial screen as depicted in Figure 1 is presented. It consists of two main parts: the menu bar **[F01]** and the workspace **[F02]**.



**Figure 1: Initial view**

The workspace shows a matrix with objects in rows and attributes in columns **[F02.1]**. New objects and attributes can be added **[F02.2]** or removed **[F02.3]**. Attributes can be assigned to objects by ticking the corresponding checkboxes **[F02.4]**.

In the following we describe how to define and edit attributes. The described principles and functionalities are the same for defining and editing objects.

### Defining Attributes (Objects)

When clicking on an attribute (objects) button a dialogue **[F03.1]** as indicated in Figure 2 opens, enabling to choose from existing attributes (objects) or to create new. A choice can be confirmed or cancelled using the control buttons at the bottom of the dialogue window **[F03.0]**.

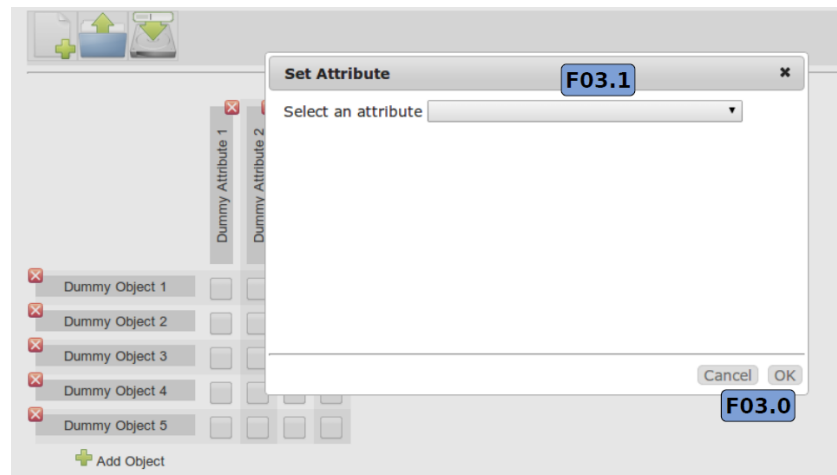


Figure 2: Set attribute (object) dialogue

### Creating New Attributes (Objects)

When creating a new attribute (object) additional elements become available (see Figure 3): Text fields provide the opportunity to enter an attribute (object) name **[F03.2]** and a description **[F03.3]**. The area below **[F03.4]** is reserved for learning resources.

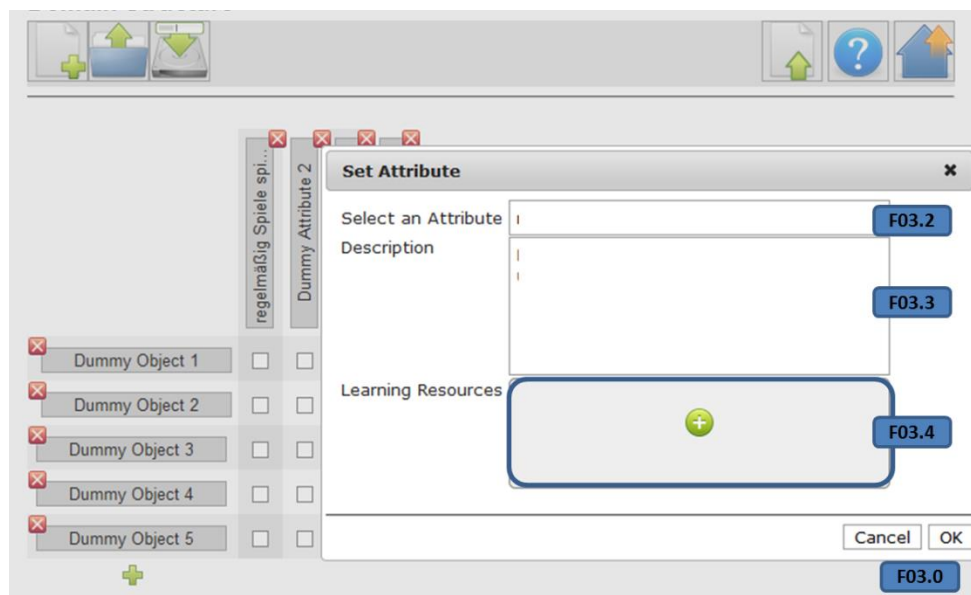
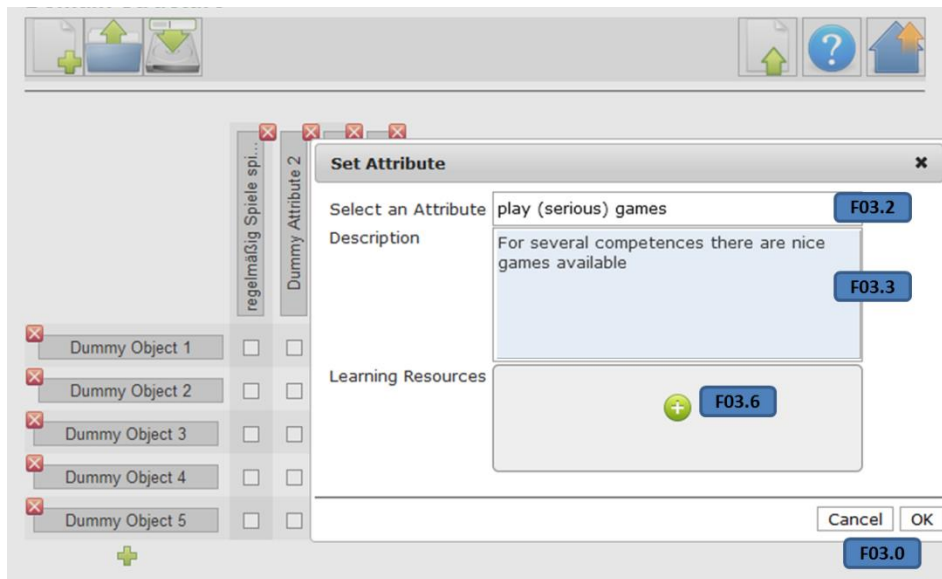


Figure 3: Creating and editing a new attribute

### Choosing Existing Attributes (Objects)

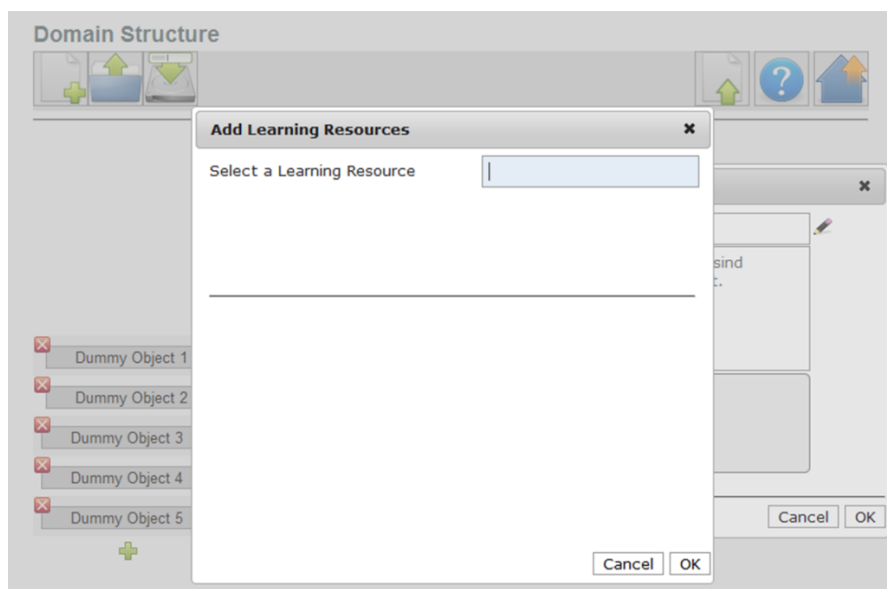
When selecting an existing attribute (object) through the combo box **[F03.1]** its description and learning resources assigned to it are displayed (see Figure 3). Furthermore, a button to edit the attribute's (object's) name and description **[F03.5]** is available. Editing is performed using the same controls used to create a new attribute (object) (see Figure 4). Another button **[F03.6]** allows for assigning learning resources to the current attribute (object).



**Figure 4: Selecting and editing an existing attribute (objects)**

### Managing learning resources

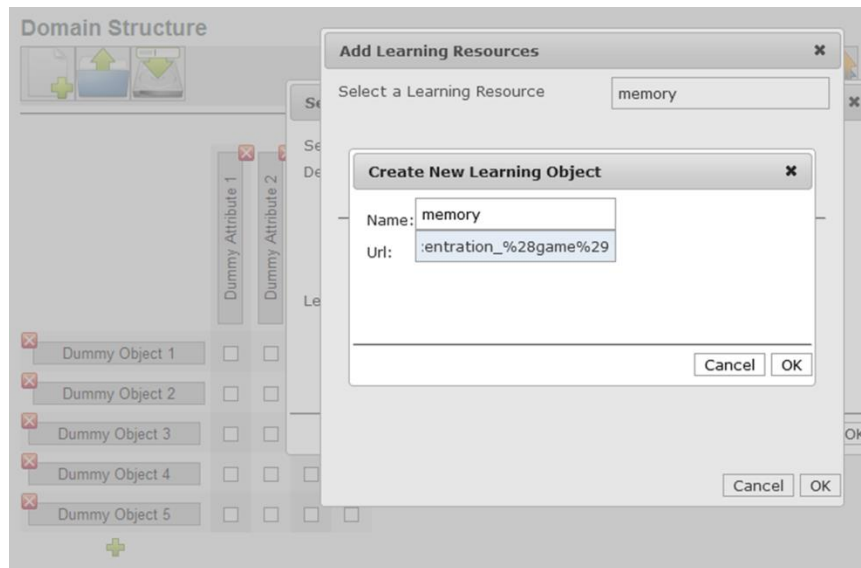
Assigning learning resources to attributes (objects) is initiated by using button **[F03.6]**. This opens another dialogue (see Figure 5) which is similar to the already discussed attribute (object) dialogue shown in Figure 2 and Figure 3. It allows for selecting existing learning resources or creating new ones in the same manner as described above.



**Figure 5: Adding learning resource dialogue**

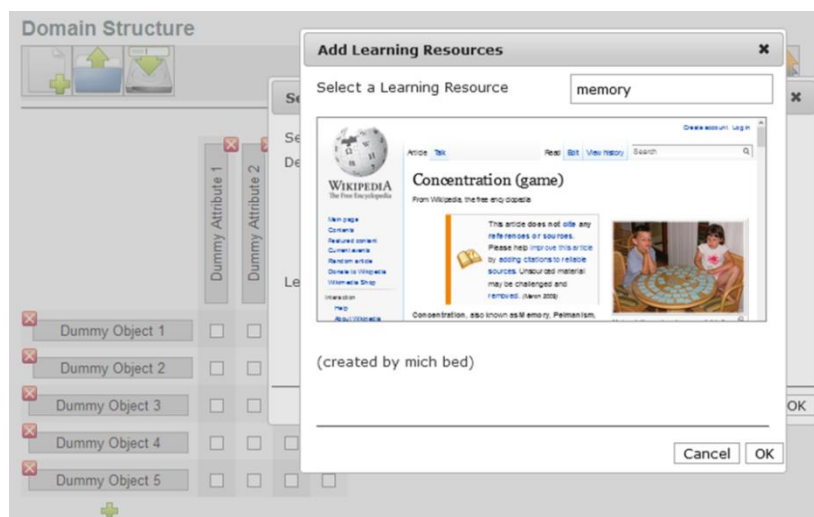
## Creating Learning resources

When creating a learning resource, a name and a URL to a learning resource (currently only websites are supported) need to be entered. Afterwards the learning resource can be saved and assigned to the currently active attribute/object. When a choice was made the learning resource appears as an interactive element **[F03.7]** (see Figure 6). Learning resources (i.e. websites) can be examined in a new browser tab by clicking on the interactive element.



**Figure 6: Create new learning resources**

When adding an URL, a snippet of the learning resource is shown in preview frame (see Figure 7).



**Figure 7: Interactive learning resources can be embedded**

Back to the workspace, the menu bar buttons (from left to right) allows for creating a new domain **[F01.1]**, to create a new domain by starting from the existing one **[F01.2]**, opening existing domains **[F01.3]**, saving the current domain **[F01.4]**, and to publish the current domain (i.e. sharing it with others) **[F01.5]**. On the right-hand side, there are additional buttons for adding learning resources (which opens a similar menu as shown in Figure 5 and Figure 6) which are stored locally (e.g. pdf-files or locally stored pictures) **[F01.6]**. Clicking on **[F01.7]** opens a help-menu and finally, **[F01.8]** closes the FCA-tool.

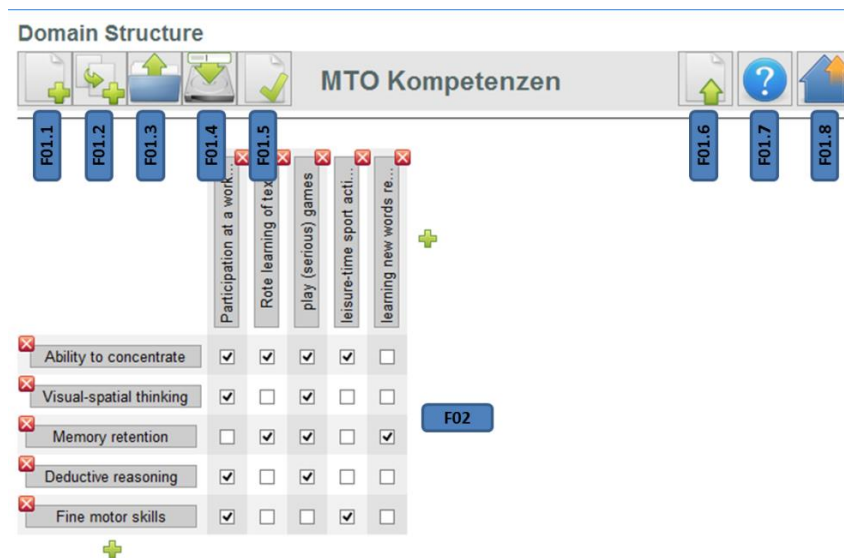


Figure 8: Finalizing the formal context

### Lattice View

After saving or opening a domain, a dialogue containing the lattice view is presented which enables to interact with a graph representation of the domain (see Figure 9 and Figure 10). The lattice view itself has two parts: A graph section **[F04]** and a side pane **[F05]**. The top left check box **[F04.1]** allows for switching between a simplified taxonomy (see Figure 9) and a complete lattice (see Figure 10).

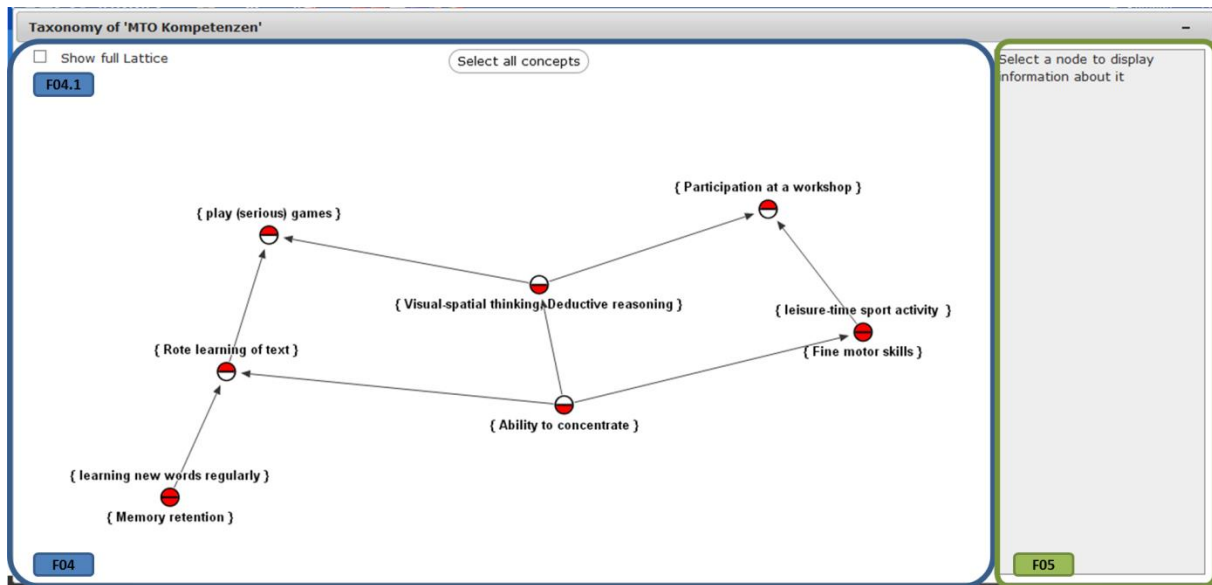


Figure 9: Taxonomy

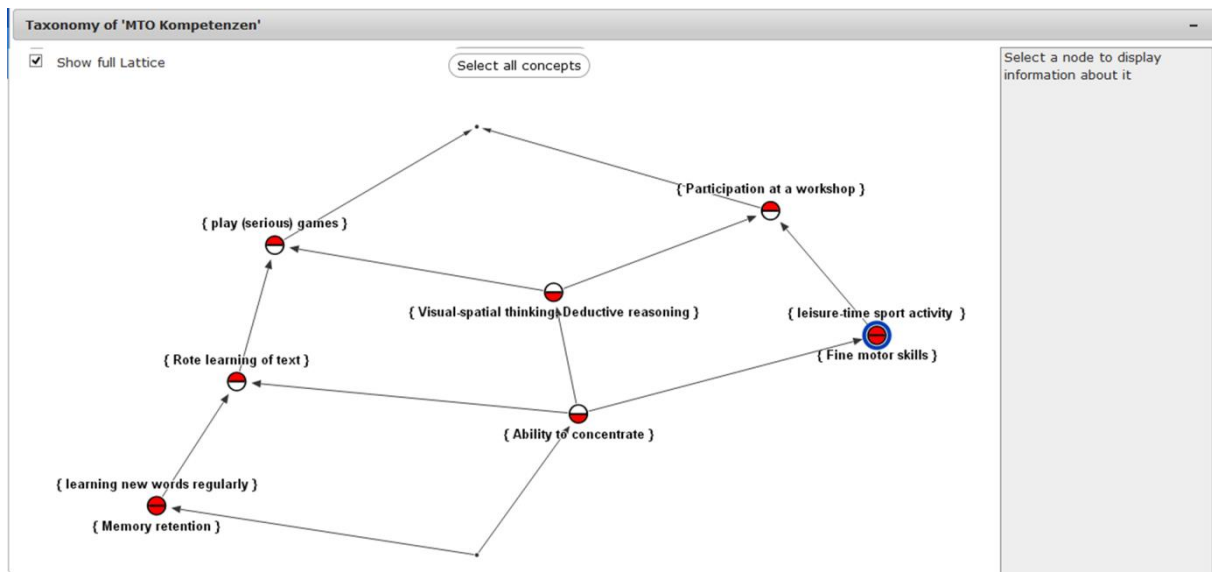


Figure 10: Complete lattice

The individual concepts of the lattice can be dragged and rearranged at the graph section. When clicking on one of the nodes (formal concepts), labels are displayed and the side pane is populated (see Figure 11). The side pane features text fields with the attribute label **[F05.1]** and an object label of the selected concept **[F05.2]**. These labels can be edited by clicking on the pencil icon. Below is a section containing a list of objects and attributes the concept consists of **[F05.3]**, i.e. the formal concepts extension and its intension.



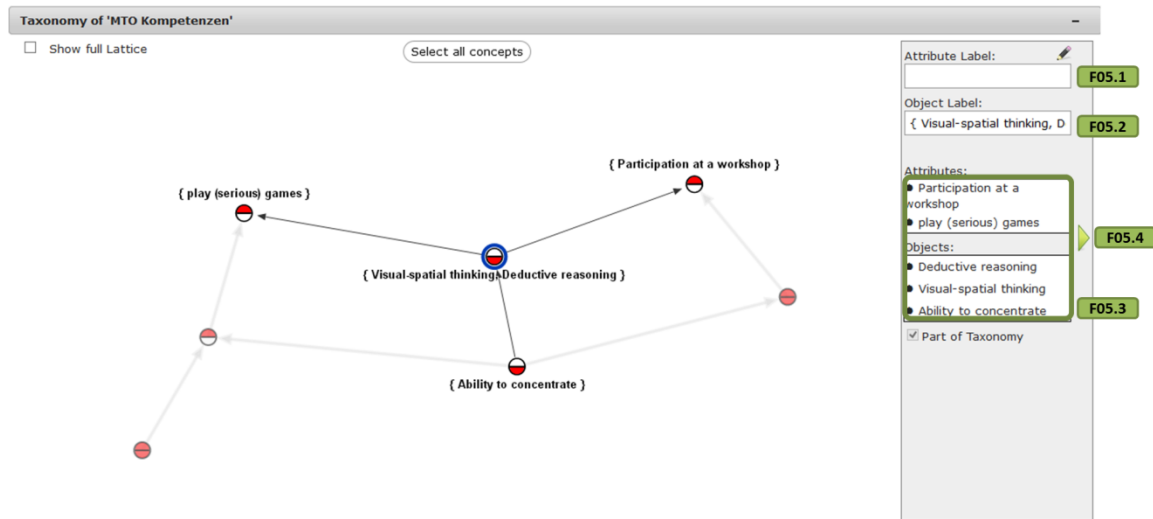


Figure 11: Examining a formal concept

Clicking the triangular button **[F05.4]** displays the concept's learning resources and the list of objects and attributes is extended into a matrix **[F05.5]** showing which learning resources are associated with which objects and attributes (see Figure 12).

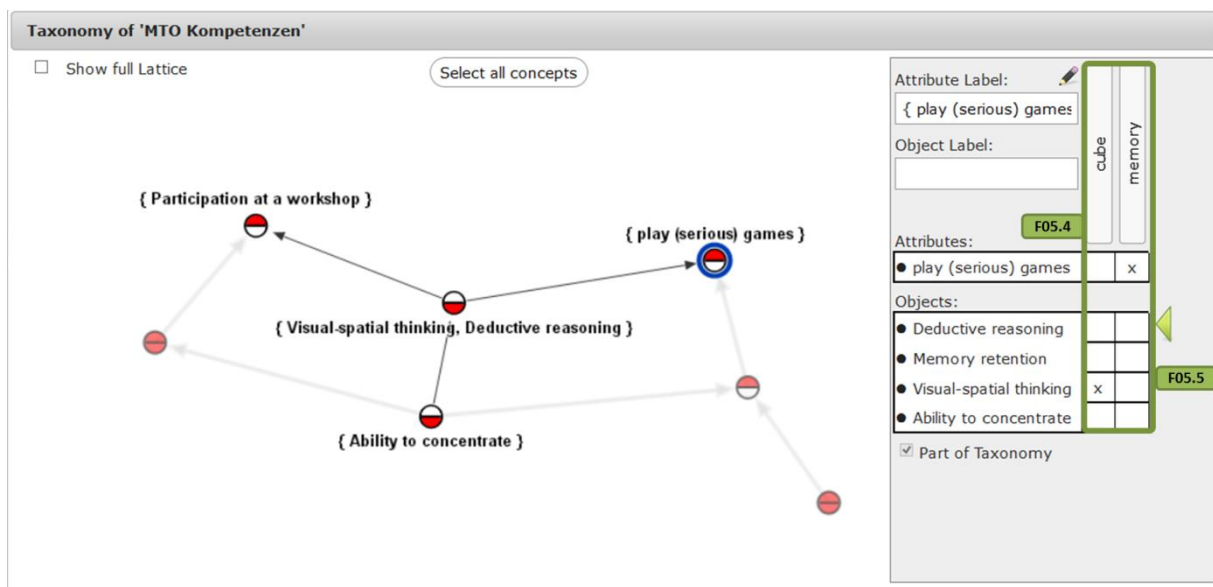


Figure 12: Concept learning resources

Learning resources can be examined in a new browser tab by clicking on the according button [F05.6] (see Figure 13).



Figure 13: Examining learning resources