DASIS

Dynamic Addressee Specific Information System

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User Manual

About

DASIS is a package of Moodle [1] extensions to support students in making their individual way through hypermedia learning contents.

Main features are:

- concept map-based navigation between courses
- direct guidance navigation with learning paths
- adaptive navigation support

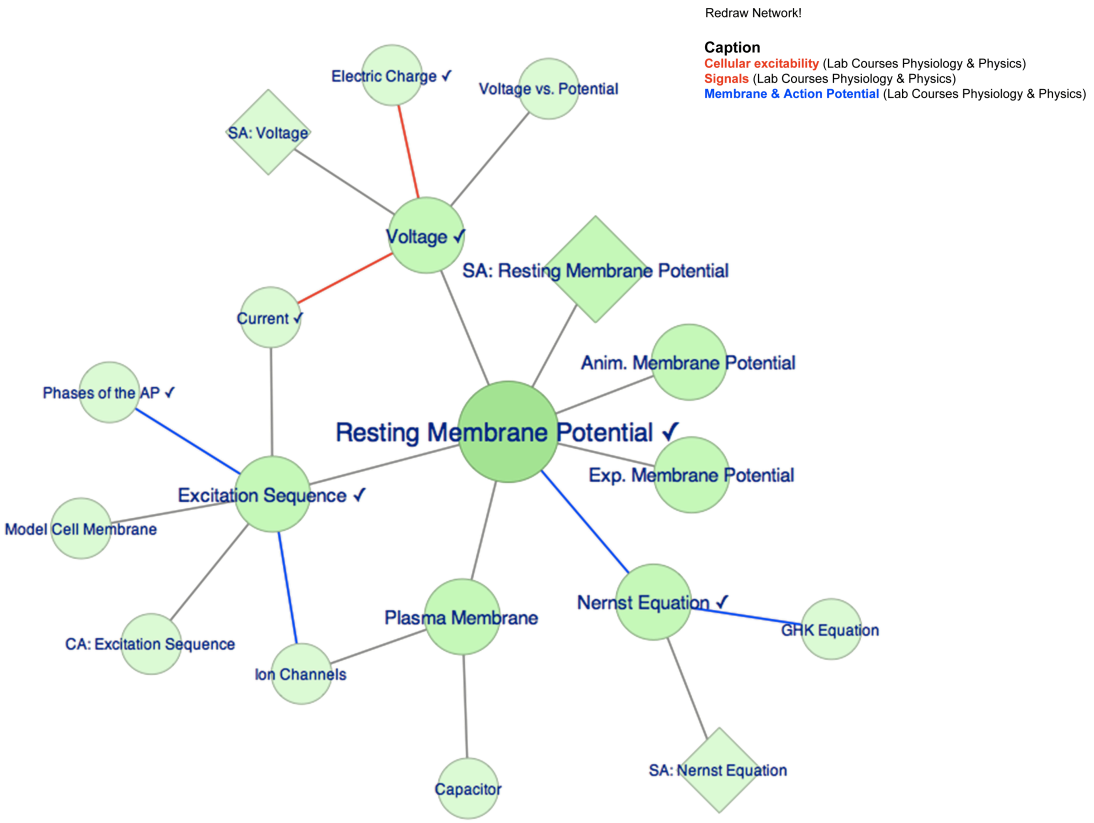

Figure 1. Example of a dynamically generated concept map to navigate between lab courses of physiology and physics.

DASIS contains three essential elements:

1. Block “Navigation Web”
2. Block “Learner Preferences”
3. Block “Learner Adaptation”

Semantic Web is necessary for interdisciplinary navigation and works without adaptation but can be enhanced with adaptive navigation support. Adaptation is realized by the blocks *Learner Adaptation* and *Learner Preferences*. Both blocks were originally developed by Gert Sauerstein [2]. They were ported to Moodle 2.0+ and fitted to the needs of DASIS.

Installation

1. Download the files from github by using the link …
2. Unzip the package if necessary
3. Copy the directories "semantic_web", "user_preferences", and "case_repository" into the directory "blocks" of your moodle directory
4. Paste the following lines of code at the end of the file /admin/settings/plugins.php

```
/**
 * Settings for block user_preferences via external page
 *
 * @package DASIS, Andre Scherl
 */
if ($hassiteconfig) {
      $ADMIN->add('blocksettings', new
admin_externalpage('dasis_user_preferences', get_string('pluginname',
'block_user_preferences'), $CFG-
>wwwroot.'/blocks/user_preferences/global_config.php'));
      $ADMIN->add('blocksettings', new
admin_externalpage('dasis_case_repository', get_string('pluginname',
'block_case_repository'), $CFG-
>wwwroot.'/blocks/case_repository/settings_case_repository.php'));
}
```

5. Go to your Moodle site and choose "Messages" within the administration menu. The plugin installation process should start.
6. If installation is finished, navigate to *Plugins* ➔ *Blocks* ➔ *Learner Preferences* to trigger final settings. After the page loaded completely, the installation is complete.

Admin's Tasks

The block case_repository needs the regularly execution of Moodle's cron job [3] to keep the database of reference cases up to date. This way case based reasoning could work more precise. The cron job can be triggered by requesting the URL www.yourdomain.edu/yourmoodledir/admin/cron.php

Teacher's Tasks

Provide the Blocks

First, turn editing on by clicking the menu item of course administration settings (see Figure 2 (a)). Afterwards the block shown in Figure 2 (b) should appear. Choose each of the blocks *Learner Adaptation*, *Learner Preferences*, and *Navigation Web*. The blocks should appear on left or right side of the course overview page. The blocks are shown by Figure 2 (c) – (e).

Next, you should define the pages where the blocks should appear. Click the symbol  to enter the preferences of the block. Figure 3 shows the corresponding setting interface. The navigation web should appear on *any page* while it is sufficient to see the learner preferences and learner adaptation just on *any course page*.

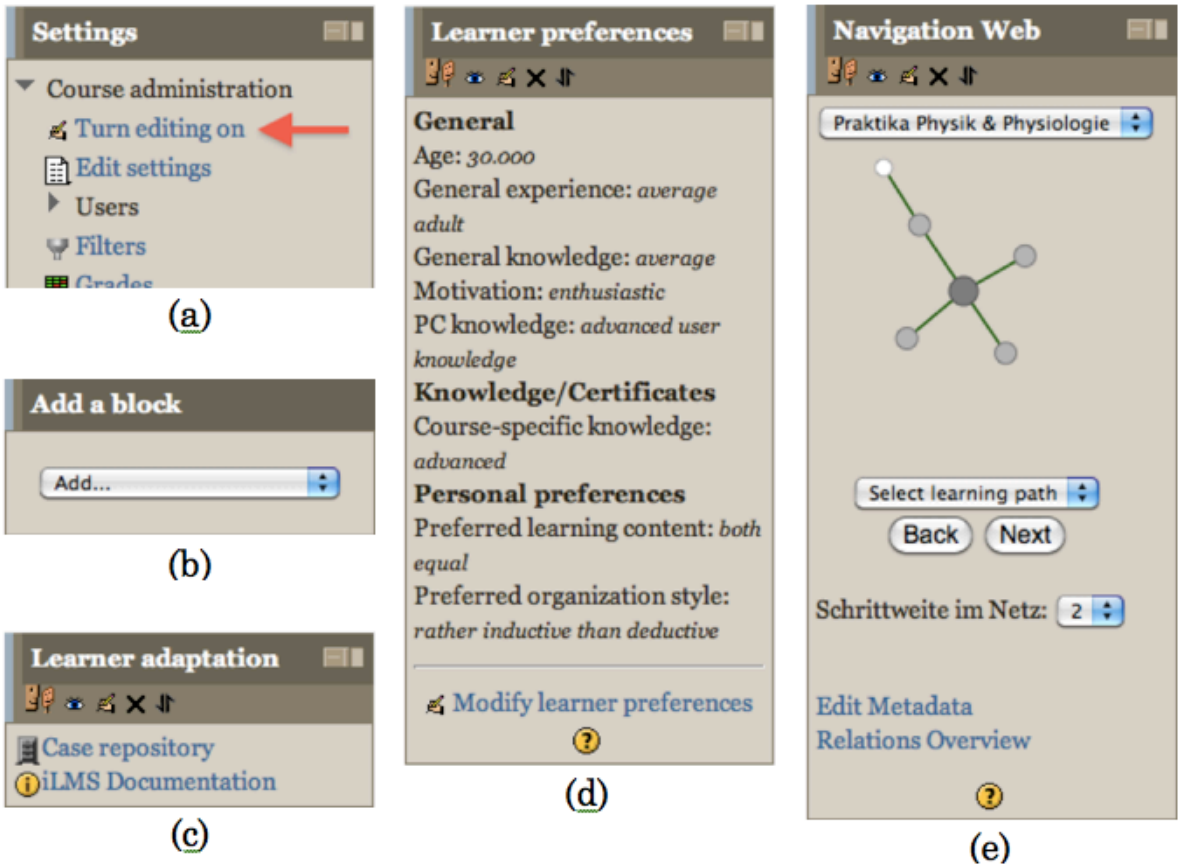

Figure 2. (a) Course administration settings. Turn editing on. (b) Block to add a block. (c) Lerner adaptation [block_case_repository]. (d) Learner preferences [block_user_preferences]. (e) Navigation Web [block_semantic_web]

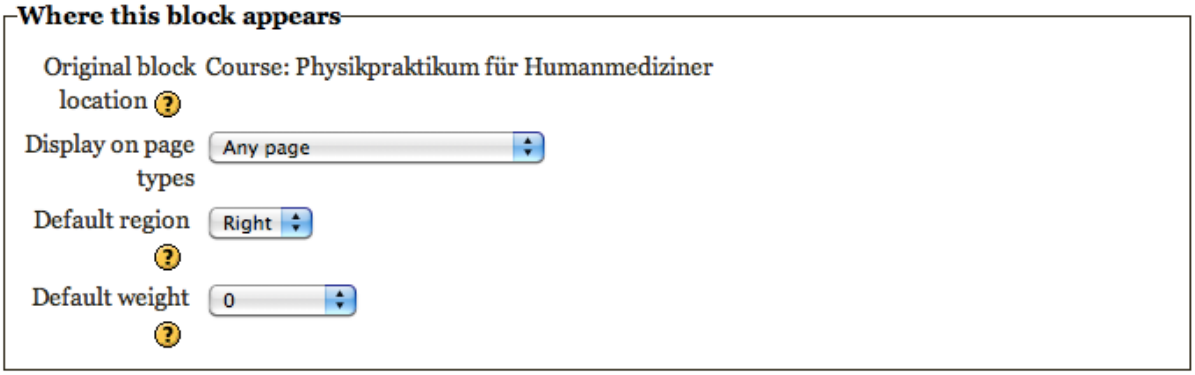

Figure 3. Block appearance definition.

Adaptation Settings

The adaptation technique is case-based reasoning [4]. Every navigation decision is seen as a problem for which a solution is sought. A case contains the problem, the solution, the learner's preferences, the learner's navigation history, and the success of the solution (e.g. assessment score). A new problem could be solved by the original or manipulated solution of an old case. To examine the reusability of old cases to solve new problems a similarity value is calculated. The factors' weight of this calculation can be arranged at *Settings* ➔ *Site administration* ➔

Plugins ➔ *Blocks* ➔ *Learner adaptation*. These global settings will be used for every adaptive course of your Moodle platform.

Concept Map Settings

The settings of the concept map can differ for every course that contains a *Navigation Web* block. Click the edit icon  to open the preferences page of the block.

Figure 4 shows the navigation web settings:

- Linkage Depth: The number of nodes starting from the center node
- Learner Adaptation: Turn adaptation on/off
- Collect Cases: Turn case collection on/off
- Animate Web: Turn web animation on/off

If the case repository is empty or contains only a small amount of cases, case-based reasoning could hardly be precise. In this situation leave "Learner Adaptation" unchecked and turn "Collect Cases" on. So the adaptation will build up a repository without giving wrong solutions to the users.

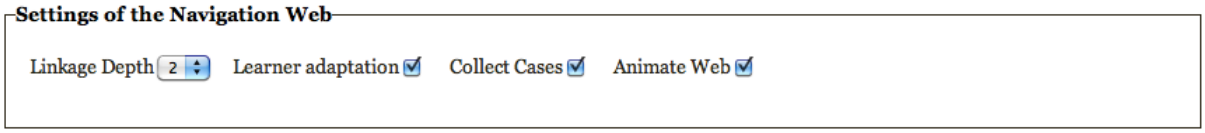

Figure 4. Navigation web settings.

A great advantage of *DASIS* is the possibility to navigate interdisciplinary between different courses. These courses are managed with course bundles. One bundle can contain several courses. The use of bundles ensures that only the desired learning activity connections are shown in the concept map and not all known connections of the whole Moodle platform.
The course bundle settings controls are shown in Figure 5. It shows the courses of one bundle as well as the bundles containing the course. You can create a new bundle by setting its name and description. Thereafter all courses of your Moodle platform can be added to this bundle.

To create and provide learning paths we added the controls shown in Figure 6. First you have to choose a course bundle that contains the path you want to create. Afterwards you can define the name, color, and description of the path. This information will appear in the concept map and direct guidance controls. Finally you can add the nodes (learning activities) to the path in predefined order.

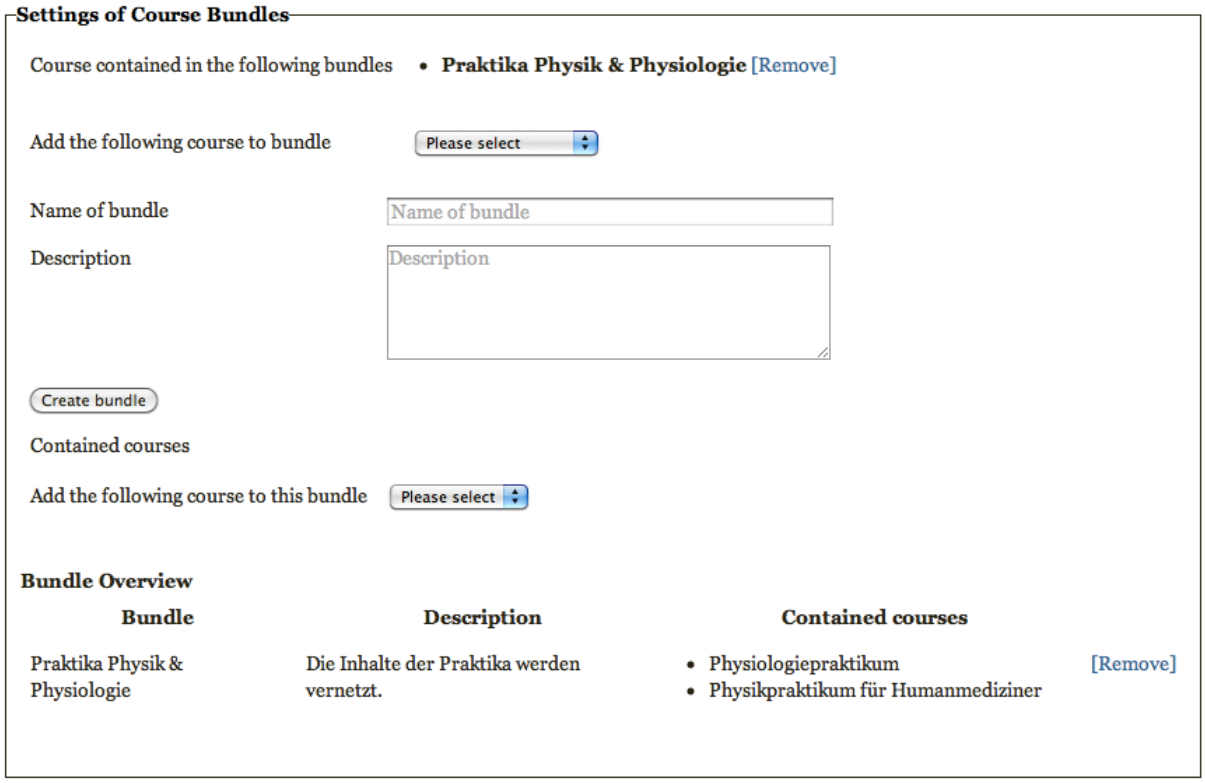

Figure 5. Course bundle settings.

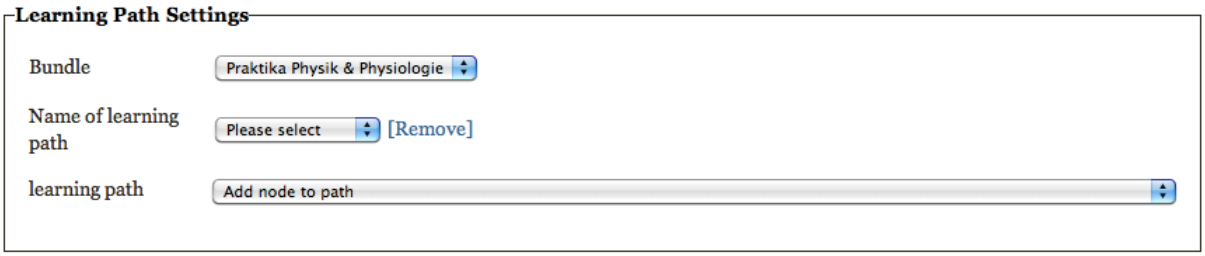

Figure 6. Learning path settings.

Metadata of Learning Objects

At least the semantic relations of the learning objects have to be set. Without this information a concept map for navigation could not be generated. To do this, click "Edit Metadata" within the *Navigation Web* block. The form shown in Figure 7 will appear, in which you have to define "Semantic Relations". To keep the concept map clear we recommend to enter a short name of learning objects. "Description", "Keywords", "Learning Tasks", and "Taxonomy" are currently not necessary to execute case-based reasoning or to draw the concept map. The remaining metadata are optional but the more you fill in the more precise the learner adaptation can work.

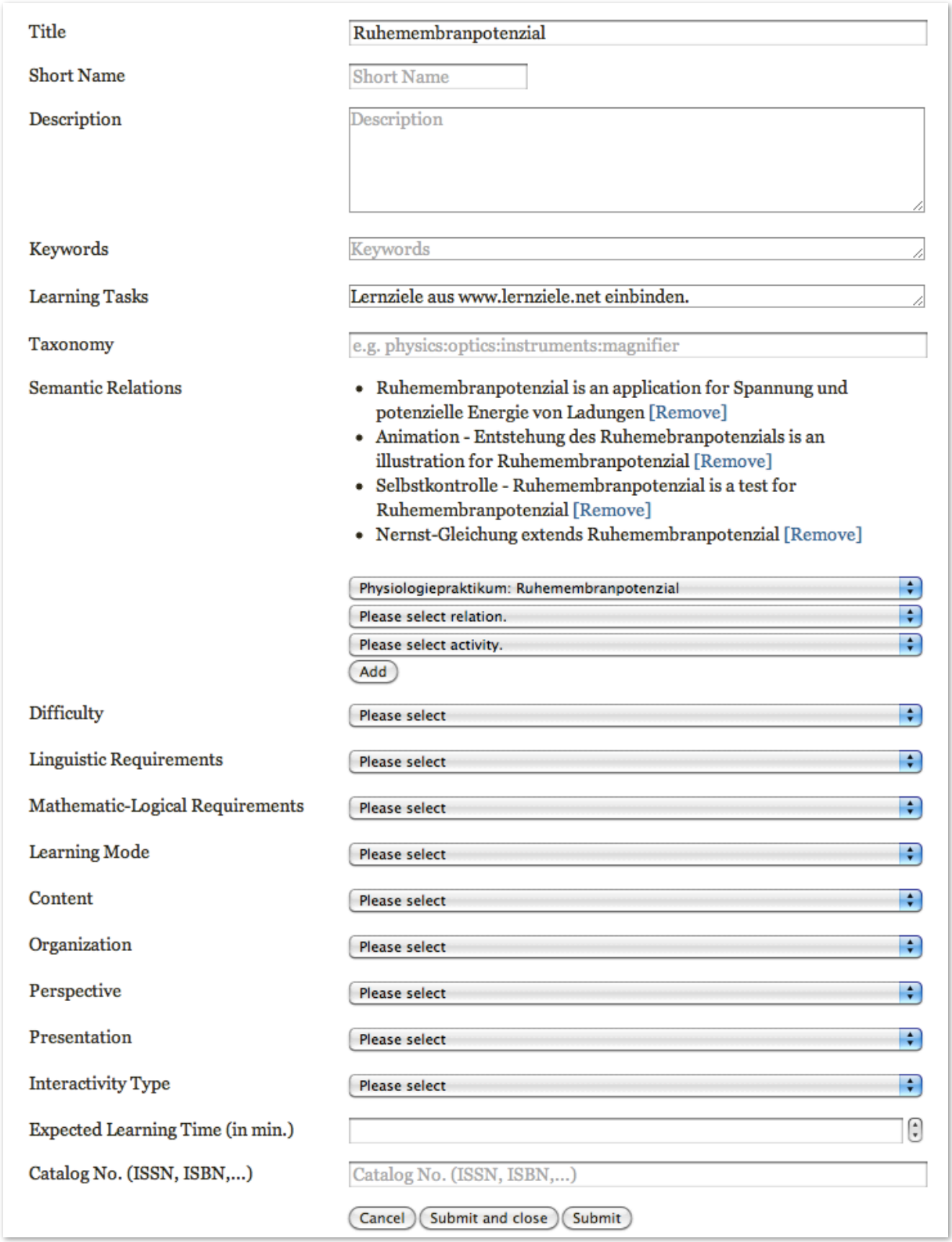

Figure 7. Metadata settings of learning objects.

Learners Tasks

Metadata of Learners

Learners can describe themselves with metadata stored in a so-called user model. To access the learner's metadata form the link "Modify learner preferences" (cf. Figure 2 (d)) of the *Learner Preferences* block has to be clicked. The form shown in Figure 8 holds this information. It can be edited by the corresponding learner and also by the teacher. Again, the more attributes are specified the more precise are the results of case-based reasoning.
The learning style dimensions "Preferred learning content", "Preferred organization style", "Perception", "Preferred perspective", and "Thinking style" are part of the model developed by Felder and Silverman [5] and can be assessed by an online questionnaire [6].

Navigation Without Adaptive Support

As mentioned above the adaptation can be turned off. In this case the learner can use the concept map or learning path navigation. Both navigation types are included into the block Navigation Web (see Figure 2 (e)).
The learners can choose a bundle with the select element on the top of the block. If a bundle got learning paths, a select element will appear below the mini map to choose a learning path. Learners can navigate along the chosen learning path by clicking the next or back button.
To open the concept map (cf. Figure 1) the learner has to click on the mini map of the block. In this map nodes represent the learning activities and their semantic relations are visualized as links between the nodes. Learning paths are drawn as colored links. A caption in the upper right corner holds information of the learning paths. Already visited learning activities show a check mark.

Adaptive Navigation Support

If adaptation is turned on, there are two more features than with non-adaptive navigation. First, the learner can choose to walk along an adaptive path, means that a click on the next button brings him to the individual calculated best next learning activity. Second, the nodes of the concept map are colored in traffic light metaphor to denote which learning activities are suited well to his current navigation problem. If there is not enough information about the suitability of one learning activity, the node is colored grey.

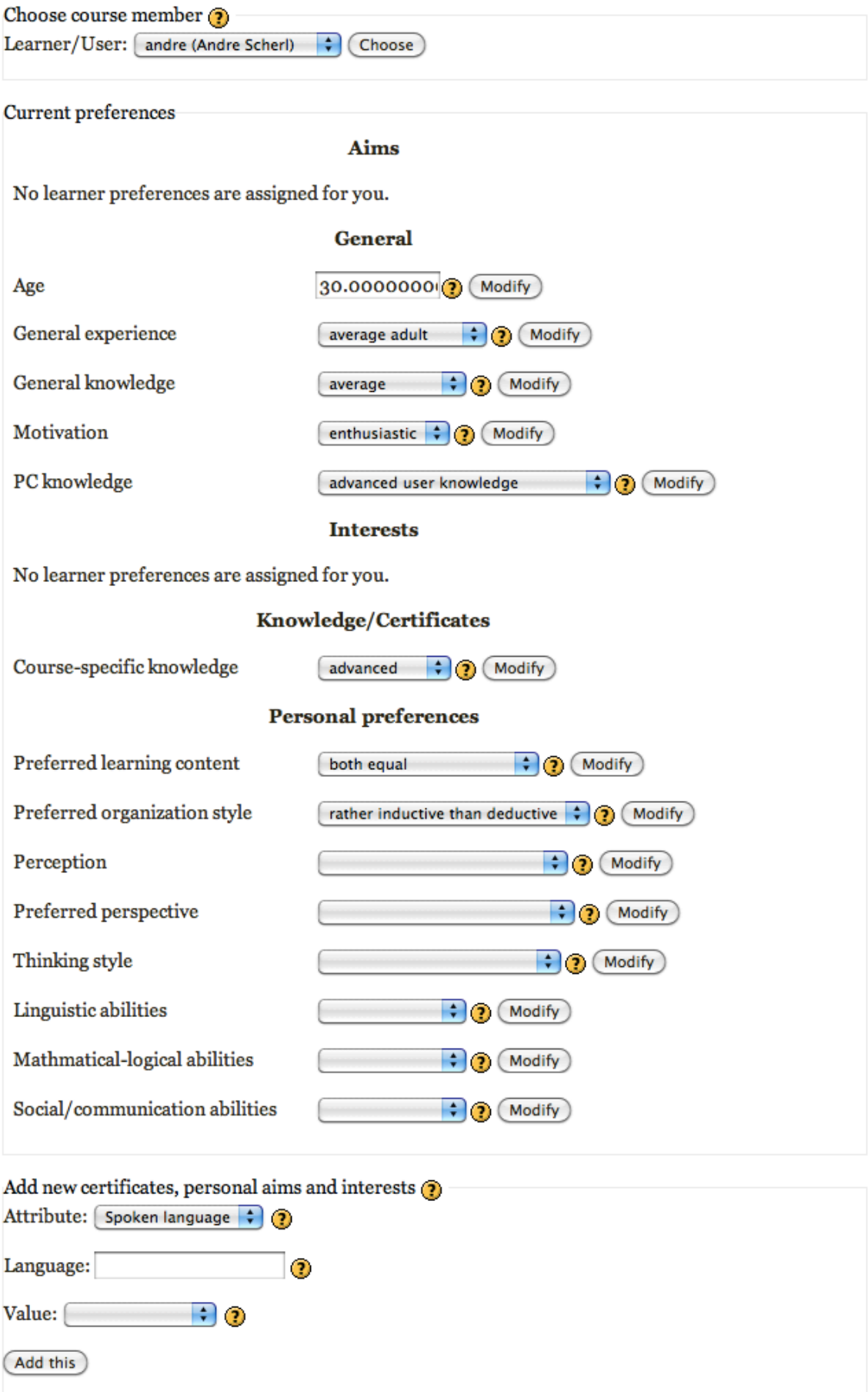

Figure 8. Learner metadata form.

References

[1] "About Moodle," *docs.moodle.org*. [Online]. Available: http://docs.moodle.org/22/en/About_Moodle. [Accessed: 14-Mar.-2012].

[2] G. Sauerstein, *KI-Ansätze zur Lerner-Adaption in Lern-Management-Systemen*, 2007.

[3] "Moodle - Cron-Job," *docs.moodle.org*. [Online]. Available: http://docs.moodle.org/20/de/Cron-Job. [Accessed: 08-May-2012].

[4] "Case-based reasoning: Foundational issues, methodological variations, and system approaches," *AI communications*, vol. 7, no. 1, pp. 39–59, 1994.

[5] R. M. Felder and L. K. Silverman, "Learning and Teaching Styles In Engineering Education," *Engr. Education*, vol. 78, no. 7, pp. 674–681, 1988.

[6] B. A. Soloman and R. M. Felder, "Index of Learning Styles Questionnaire."