

Project «OpenOLAT QTI 2»

A new foundation for eAssessment in OpenOLAT LMS

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v0.2



Components

The new eAssessment tool for OpenOLAT will consist of the following elements:

Collaborative item pool

The item

The collaborative item pool allows authors to organize and share their question items either in a use-only or collaborative manner.

Each question item has well defined metadata attached. The meta data describes common attributes like the language, difficulty of the items and also more specific attributes like where the item is used and how well it performs. One metadata element describes the study field for which the item is relevant. This is a hierarchical structure, much like the OpenOLAT course catalog. Authors can propose new catalog levels and there are special catalog administrator users to ensure and monitor the quality of the question pool.

The item itself, the real question content, is not further defined. The item must provide a format and editor information. The format can be something like „QTI 1.2“ or „QTI 2.0“, but also „Plain text“ or „Moodle“ could be an option. For each format, a so called handler can be configured to deal with the editing, previewing, importing and exporting of questions. The reasoning behind this is that the item pool should be restricted to a specific tool, it serves mainly as a tool for organizing the sharing and collaborative creation of question items. Even when those items are just plain text questions that are somehow printed and distributed on papers this is already of great benefit.

The item does also have a question type that is usually the same through the different systems (multiple choice, fill in blank, essay...). Most of this meta data is only used to automatically compile lists and to help finding the right items when using the search tool.

Create, import, export, API

In the item pool items can be imported or created using one of the supported editors or the REST API. The REST API allows also integration of the item pool into external authoring tools.

As a minimal starting point, importing items as XML files will be implemented. Likewise, a file export of selected items is the minimal starting point on the output side. The goal is of course to also have a limited editor and runtime environment for QTI 2 items right from the start, but if the funding is limited the existing QTI 1.2 editor preview runtime will be used.

Implementations for external authoring tools must be done by the owners of those authoring environments.

Organization and navigation

The main actions in the item pool software are managing, publishing and searching question items to get access to a large item pool, discuss item quality and prepare lists of selected questions to be used in an assessment. For this purpose, the item pool software offers several entry points when working with items:

- *Favorites*: authors can mark interesting items that he has access to as his favorites, regardless who the owner of the item is. A compiled list gives a quick access to the personal favorites.
- *Lists*: authors can create named lists of items that he has access to, regardless who the owner of the item is. Lists can be used to collect appealing items for an assessment. At a later stage in the test editor, those lists can be used to quickly compile a test from such a prepared list.
- *Shares*: authors can create shares to grant access or collaborate on questions. A share contains questions provided by the members of the attached group. Depending on configuration the questions in such a share can either just be used by the

members or collaboratively be edited. Unlike items in a private list, items in such a share must be owned by one of the members of the group.

- *Pool*: the pool is a public share for all authors. Items published in the pool can be used by all authors. Restriction on usage might apply depending on metadata configuration (e.g. item already used in a test)
- *Saved searches*: the search can be used to narrow the content of an item list down based on metadata queries. The search configuration can be stored, e.g. to restrict searches to a specific field of interest.

Once a list of items is selected (my items, favorites, a list, a share, the public pool), the items are listed. Above the item list a search form allows filtering the list to narrow down number of items presented. Another way of narrowing the list is to browse through the hierarchical metadata structure.

When selecting an item, an item preview and metadata info box is rendered just below the list. If the item is of a known editable type and the user has the necessary rights, an edit button appears in place. The key up and key down can be used to walk through the list of items.

Multiple items can be selected and put into personal lists, group shares, be marked as favorites or exported as xml files. With the appropriate rights items can be copied, edited (metadata and/or content) or deleted.

Item editor

The item editor is an embedded editor component for the QTI 2 standard. Initially only a few question types will be supported. As the old QTI 1.2 editor we will not be a „generic“ QTI 2 editor and thus not support all possible QTI 2 features. Support for more question types grow as funding is available. The editor will be used as the default editor in the item pool and in the assessment composer.

The item editor is very simple. At the top, the preview is displayed. Depending on the type, the item elements are edited in place. For more complex items the editor might have explicit edit elements instead.

Feedback, metadata and configuration is displayed further below. Each item is edited on one page to reduce the number of clicks needed.

Assessment composer

The assessment composer is used to compile question items from the item pool and newly created items together to form an assessment. The assessment has a structure and meta data that defines how an assessment execution has to be done.

When selecting items from the pool, the pool navigator is used to access the favorites, lists, shares and alike. Selected items can be rearranged and stacked into hierarchies as desired.

While the output format will most likely be QTI 2.1, the assessment composer in its initial release will not support the various simple sequencing options from the QTI 2.1 specification. The items are composed to be played in the hierarchical structure.

The exact feature set and assessment configuration option will be defined at a later point.

Assessment and item runtime

As with the current implementation the assessment runtime is available as a course element in the OpenOLAT course. Assessments can generate a SCORE value or not (self-assessment). Users get immediate feedback about their performance. This mode is not suited to implement exams, for that purpose we envision a dedicated exam mode (see below).

The assessment runtime is a generic QTI 2.1 runtime based on the free qtiworks library. The library provides a complete QTI 2.1 environment and is extremely well tested with an automated test suite. Thus, the assessment and item runtime is theoretically capable to play any QTI 2.1 assessment, regardless what editor has been used. Actual compliance must be tested in detail for each QTI 2.1 editor separately.

The runtime delivers the items to the users, renders the items, displays feedback and hints, calculates scoring information and saves each user click to the database. The runtime behaves much like the existing QTI 1.2 runtime. The runtime is fail save since every submit is stored in the database right away. After a browser or system crash the user can continue where he left off.

The runtime will also be used in the item editor and the item pool to preview items.

Assessment statistics and archiver

The data of each assessment can be analyzed in the assessment and statistics tool. Reports can be generated and downloaded. In this regard, the implementation will be similar to the existing QTI 1.2 assessment tool but with a greatly improved details view on the users answers. This is embedded into the OpenOLAT assessment tool.

In addition a tool similar to the existing QTI test statistics tool (currently only available to frentix clients) is implemented to render graphs and to calculate statistical data about the assessment in general (not on user level).

Exam mode

Exams are not part of the course element structure, they are configured in a separate tool providing an exact list of users who have to take the exam and the exact date of the exam. In the exam mode the assessments runtime is automatically launched when the user logs in. No other tools are available.

Exams will not generate any automatic feedback to users when submitting the answers. In the exam mode, the answers from each student can be revised after the exam has been terminated. Essay type questions can be corrected and credited manually. Scores can be adjusted and converted to grades. Once this correction process is finished, the exam initiator presses the button and the final grades are provided to the students.

Course element „Comprehension question“

A new course node „Comprehension question“ allows embedding of a single question item from the item pool or a random item from a list of items to the course structure. This is similar to a single page compared to an IMS Content Packaging that contains of many pages. Of course instead of using an item from the pool the author can also use the item editor in the course element to create a new item in place.

Comprehension questions can generate SCORE information that can be used to implement dynamic learning path in the OpenOLAT course structure.

Mobile assessment runtime

Assessments compiled with the new editor can be accessed on the OpenOLAT mobile client in a dedicated tool. Not all item question types might be supported on the mobile implementation.