

**Partners Technical Report**

**Development of authoring tool**

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| Abstract | mDita editor is the tool for development of teaching materials at Belgrade Metropolitan University that allows the creation of teaching materials in the form of learning objects in accordance with the DITA standard. In addition to creating teaching materials through the mDita editor, BMU developed a server application that enables the adaptation of lessons (learning processes) and the preparation for uploading it on the distance learning system. After the processing, learning objects are stored in a repository (a directory containing all learning objects). The authors of the teaching materials can search the repository by specific defined metadata (data describing the learning object) and use learning objects created by other authors without having to recreate the learning objects for already existing topics. Writing teaching materials in the form of learning objects requires authors to be concise and to form learning objects as small entities (knowledge particles). The created learning objects allow the students who read the teaching materials to understand the core of the topic they are reading. Final goal of this editor is to personalize the learning process according to the identified characteristics and interests of students. |

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**DEVELOPMENT OF AUTHORING TOOL**

# Introduction

The mDita editor, developed by Belgrade Metropolitan University, is an authoring tool designed for creating teaching materials in the form of learning objects. Learning objects represent XML DITA objects used to form a learning process (distance learning lessons). The "DITA" standard applied to the XML file of the learning object has been developed by IBM and the mDita editor was written in C # programming language. In addition to creating teaching materials in the form of learning objects, the editor also allows adding additional activities to check students’ knowledge in order to create an interactive and adaptive learning process. Currently, lessons created in the mDita editor can be placed on the LAMS (Learning Activity Management System), which is a distance learning system and is used at BMU. The ultimate goal of preparing teaching materials through the mDita editor (in combination with LAMS) is to personalize the learning process according to the level of knowledge of each student that is using teaching material. By applying these additional activities to check the student's knowledge, it is possible to collect information about the student's learning style, habits and characteristics. Editor also allows creation of learning objects of different levels of knowledge. With the help of mDITA editor, the author of the teaching material is able to create learning objects in a simple and intuitive manner, using all the benefits of this editor.

# Updating the version of the mDita editor

The current version of the mDita Editor is 1.4.4. The first version of the editor after version 1.3.0 was 1.4.0 and it allowed creating a learning process directly for the LAMS 3.0 version. Lessons created so far (in all versions of editor) can be saved and uploaded to a new version of LAMS. In addition, from version 1.4.0 it is possible to create a nonlinear learning process. Up to this version, the author of the learning process could only create a linear learning process so that the student have to open every learning object within the learning process and go through any additional activity. By adding the feature that allows the author to create a non-linear learning process, the student can choose which way he/she wants to move through a lesson (which learning object wants to open and when to access it). A student can skip learning objects that he/she believes to have enough knowledge about and can focus only on the learning objects and teaching materials that he/she needs. It can also choose which additional activities he/she wants to do and can move through the chosen learning objects. The author of the learning process is the one who is choosing the option for creation of a non-linear sequence in the course of the lesson, and thus create the described learning process. The next update introduced from version 1.4.0 is the ability to change the number of lessons and additional information about the lesson (title of the lesson, subject code, author) directly through the editor. Additionally the functionality of inserting images from Word documents or directly from the folder on personal computer by using the drag and drop function was enabled. In this way, it was not necessary for the author of the teaching material to choose the option to add an image, but can directly do it by dragging the image from another document or folder where the image is placed. Editor from version 1.4.0 automatically numerates images in learning objects so the author of the teaching material does not need to manually enter the image numbers in the sections. As already mentioned, the editor has the ability to add video material from Youtube, and from this version it is possible to edit the link after setting it to the section. The form for saving the learning process created in the mDita editor has been changed (according to the changes to keep the learning process in non-linear form) by separating the options for saving the project and saving the project in a format (zip format) for sending administrators who publish it at the system for distance learning (LAMS). Version 1.4.0 also corrected the problems with highlighting the text in a certain color in the "Note" functionality, and the key words on the sections of learning objects. Also, the problem with generating HTML view of the lessons is resolved directly through the editor.

The following versions of mDita editors 1.4.1 and 1.4.2 enabled improvements in creating teaching materials compared to 1.4.0. From version 1.4.3, the mDita editor has additional text formatting options:

* Adding a bullet to an existing bullet list
* Adding a numbered list within an existing numbered list

It is also possible to continue numbering from one text box to another on the same section, or to continue numbering from one section to another within a single learning object. For objects that use a large number of images within one learning object, LAMS gallery support is enabled (the "Image Gallery" activity) that allows the author of the teaching material to put more images in the slideshow. Also, the gallery allows collaborations between students so that students can add images to a specific topic defined by the teaching materials authors, as well as to comment images of other students on a given topic. The changes in version 1.4.3 are within the form of adding a learning object within a lesson, where the author of the teaching material can now see the name of the learning object and its ordinal number in the lesson from which it is downloaded. The detected defects in the previous versions are also corrected (display of "&" characters within the sections that contains the code).

Version 1.4.4 of the mDita editor allows user to add an essay type question to the "Assessment" activity that is used to test students knowledge. In this way, the author of the teaching material can also use this type of question when creating knowledge assesment tests.

The next version of the 1.4.5 mDita Editor has the ability to add the mind map to the "Assessment" activity so that the author of the teaching material can set up a mind map that will be used by students as a reminder when testing their knowledge. A student can use the map to pass countless times through the complete learning process and each learning object. Also, lessons from version 1.4.5 have an automatically generated mind map located at the end of each lesson that is displayed through LAMS and serves to ensure that a student can quickly find a learning object at any time when accessing a lesson, or a specific piece of text that is available to him /her at the needed moment. The process of the generating mind-map and end-to-end setting is fully automated and implemented when saving a lesson so that the author of the teaching material does not have the unnecesery work to manually create the mind map. Navigation through the mind map is simple and intuitive. In this version of the editor, the complete user interface and text font have been increased.

Table 1.1 gives a tabular version of the versions of mDita editor with a list of new functionalities, the improvement of existing and defects removed.

**Table 1.1.**

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| --- | --- | --- | --- |
| Version of mDita editor | New functionalities implemented | Improvement of existing functionalities | Defects removed |
| **1.4.0** | * Editor adapted to LAMS 3.0 version * Non-linear sequence from a lesson created * Editing the number of the lesson and object code through the "Edit project" * Inserting image and text via drag and drop function * Automatic numbering of images withinin a lesson | * Option for editing YouTube video link * Modified form for project saving ("Save zip file" option is used to create a zip file for sending a lesson. To save the lesson, "Save project" is used locally.) | * Issue with the same color of the text and background in the note (note) * Problem with the color of the note in the PDF version * Displaying "Reserved word" marked words in PDF version * Problem with "HTML preview" option |
| **1.4.3** | * Bullet in bullet formatting text option * An option to add a numbered list within a numbered list * Continuing a numbered list of numbering from one text box to another * Continuing a numbered list from one slide to another * Adding the LAMS activity of the "Image Gallery" to the lesson | * Updated form for adding one learning object within lesson * Updated form for changing the number of lesson | * Problem with displaying the & character in the lesson * Problem with renaming images when changing the number of lesson |
| **1.4.4** | * Adding an essay type question in the "Assessment" |  |  |
| **1.4.5** | * Adding a mind map to the "Assessment" activity * Automatically adding the mind map at the end of the learning process * Enlarged view of the complete user interface and text font |  |  |