Guidelines for the Design of Technology Enhanced Science Education Learning Content

OpenScienceResources Metadata Authoring Tool Manual

OpenScienceResources:
Towards the development of a Shared Digital Repository for Formal and Informal Science Education

*e*Content*Plus*

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Towards the development of a Shared Digital Repository for Formal and Informal Science Education

eContentPlus

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1. OSR Learning Objects Metadata Authoring Toolkit (OSR ASK-LOM-AT)

This Chapter presents the functionalities of the OSR Learning Objects Metadata Authoring Toolkit (OSR ASK-LOM-AT) which is conformant with the OSR IEEE LOM Application Profile

1.1 General Description and Functionalities

OSR Learning Objects Metadata Authoring Toolkit (OSR ASK-LOM-AT) facilitates authoring and management of educational and science education related metadata following the OSR IEEE LOM Application Profile. The main functionalities of OSR ASK-LOM-AT include:

- Educational metadata authoring of science educational resources and educational pathways following the OSR IEEE LOM Application Profile, through the use of a step-by-step authoring wizard.
- Educational metadata records management and creation of Science Education Resources and Educational Pathways Local Educational Metadata Repository.
- Export of individual educational metadata records as XML files conformant with the IEEE LOM Standard[1]

In order to start the OSR ASK-LOM-AT you have to run the file named **OSR ASK-LOM-AT v1.4.msi**. A window will appear asking you to proceed with the installation process. You have to follow all the steps of the process by pressing the **"Yes"** button. After the finalization of the installation the following message will appear: "The Installation completed successfully" (See Figure 1.1, Figure 1.2, Figure 1.3 and Figure 1.4).

1 IEEE LOM (2002) Draft Standard for Learning Object Metadata, IEEE Learning Technology Standards Committee (LTSC), Available at: http://ltsc.ieee.org/wg12/files/LOM_1484_12_1_v1_Final_Draft.pdf

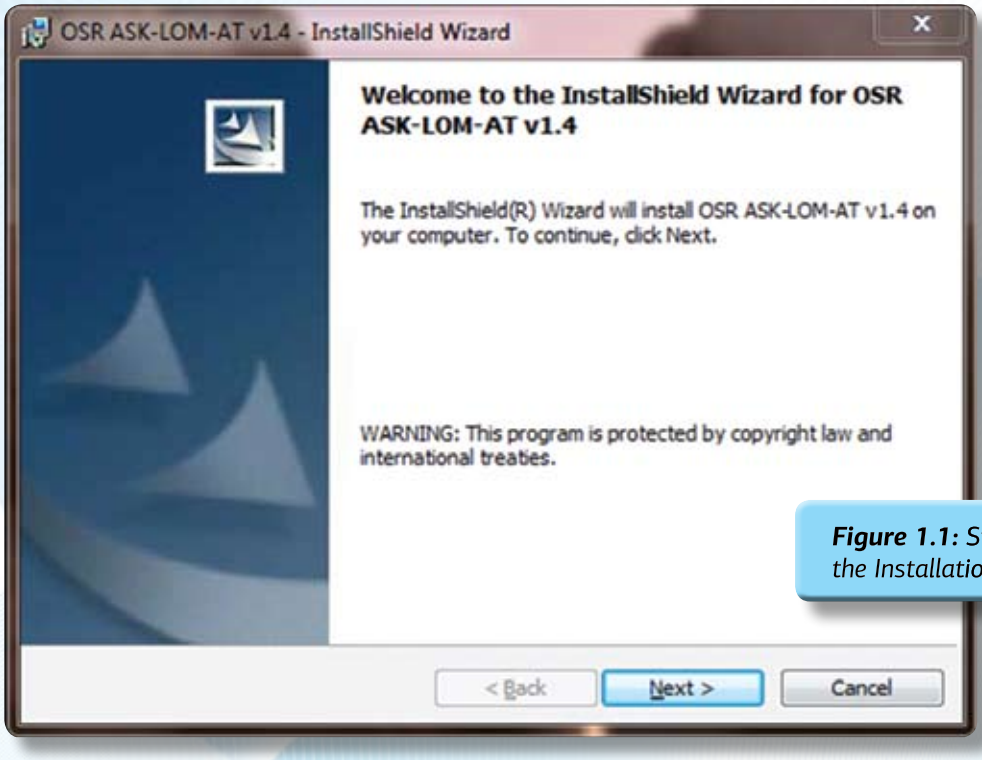

Figure 1.1: *Starting Up the Installation Process*

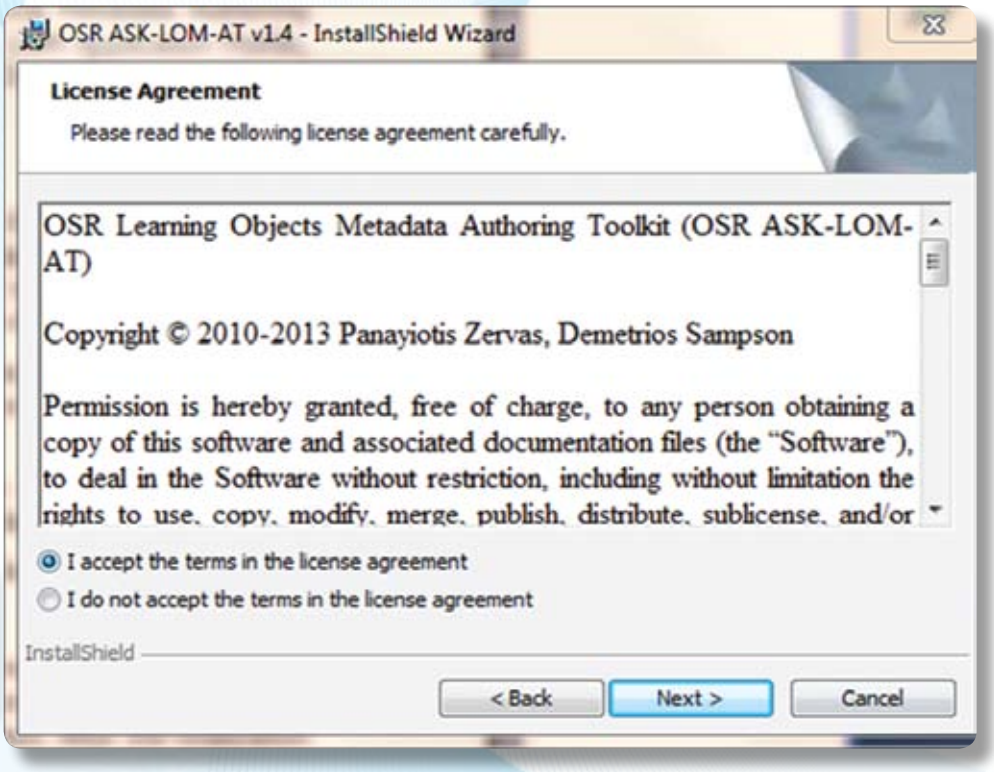

Figure 1.2: *Accepting the License Aggreement of the Application*

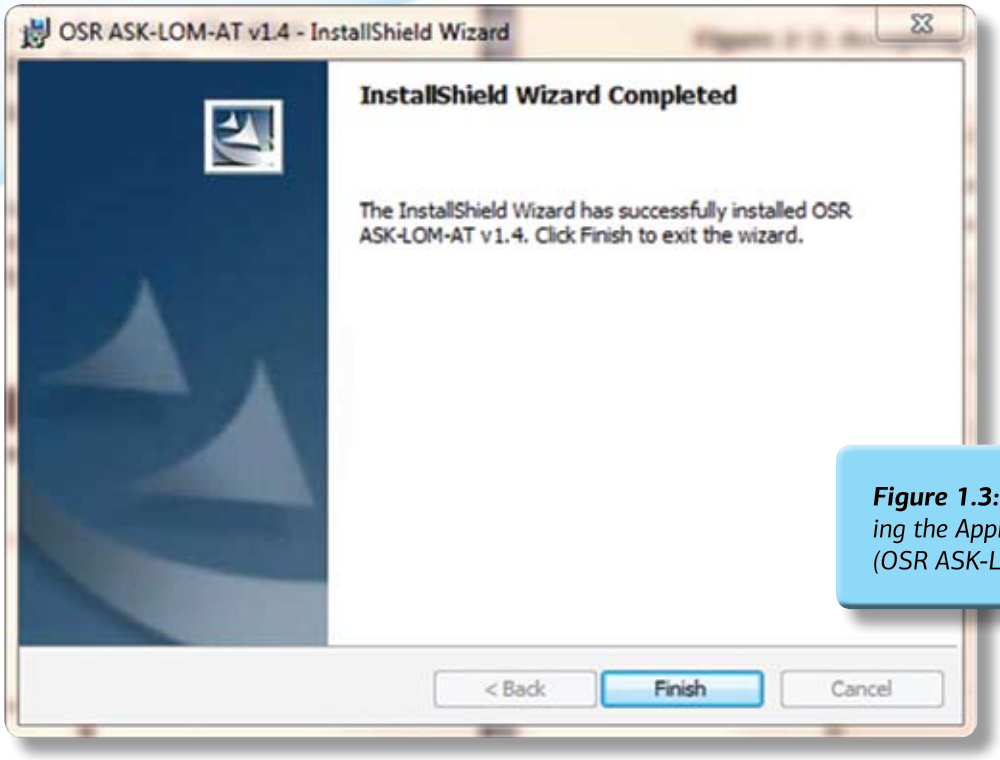

Figure 1.3: *Installing the Application (OSR ASK-LOM-AT)*

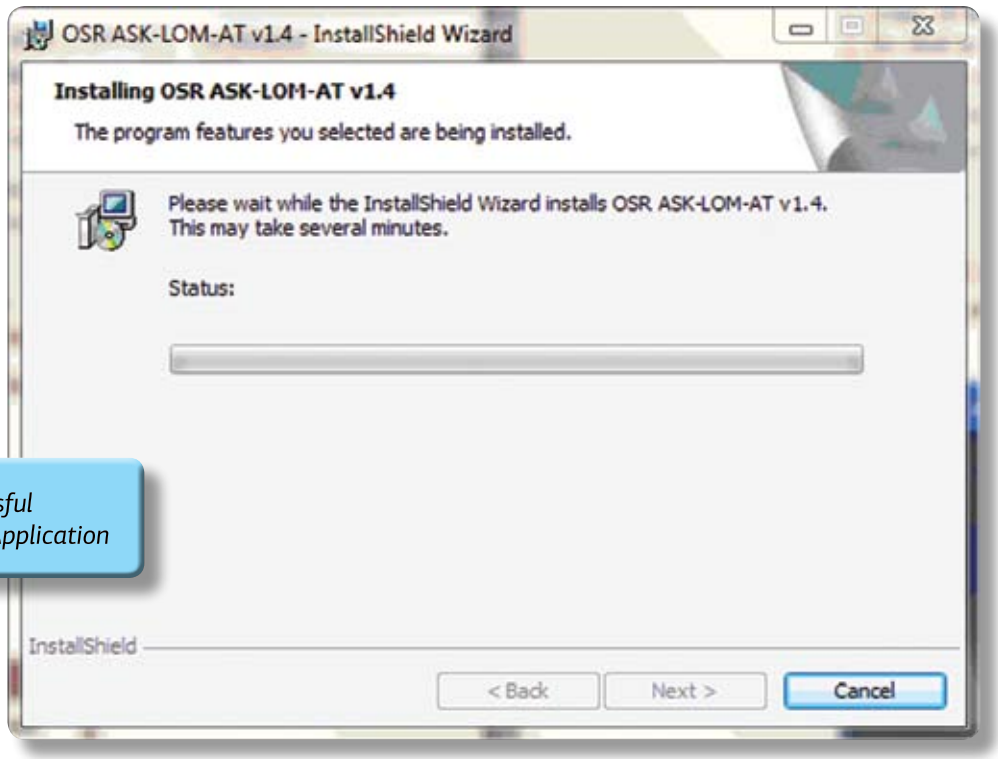

Figure 1.4: *Successful Installation of the Application*

After the successful installation process a new Group will be added to the "Programs Group" with the name "OSR Tools", which contains the OSR ASK-LOM-AT application. The execution of the application can by done by clicking the choice "OSR-ASK-LOM-AT".

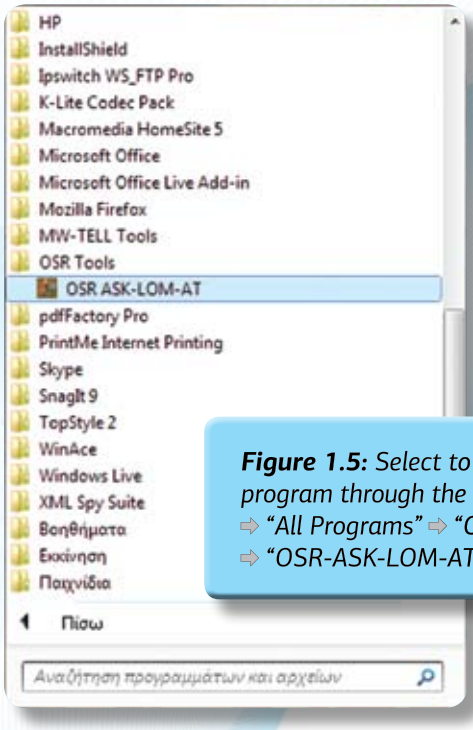

Figure 1.5: *Select to run the program through the menu "Start" ⇨ "All Programs" ⇨ "OSR Tools" ⇨ "OSR-ASK-LOM-AT"*

Provided that the installation process is completed successfully the first screen of the OSR ASK-LOM-AT will appear (see Figure 1.6).

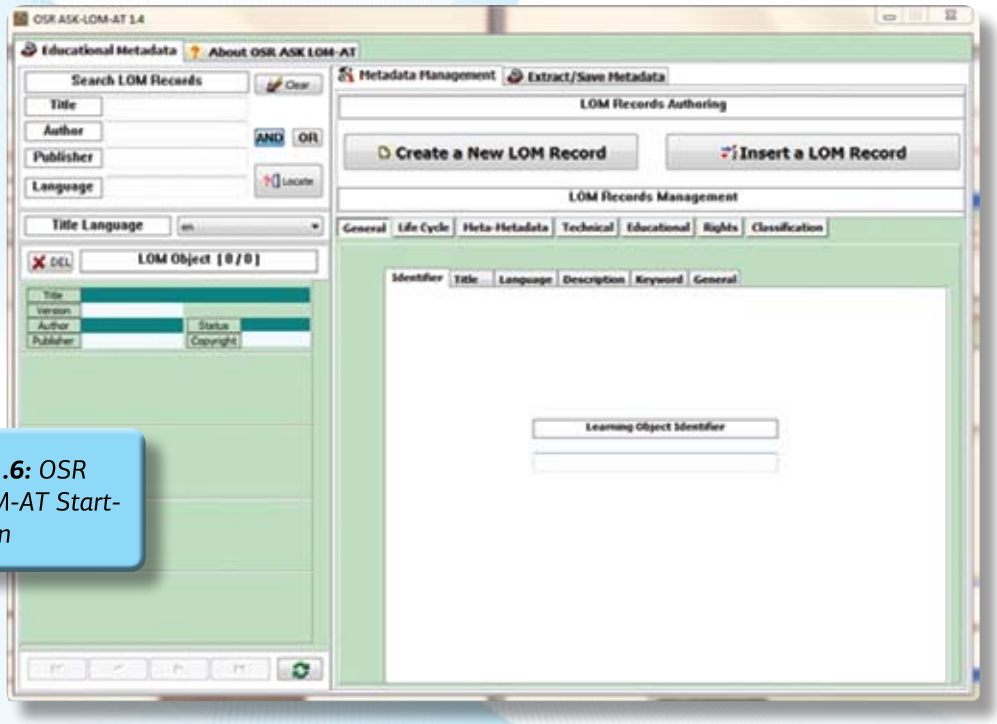

Figure 1.6: *OSR ASK-LOM-AT Start-up Screen*

By clicking the tab **"About OSR ASK-LOM-AT"** you can see the about page of the application (see Figure 1.7), which includes information on the project and information about the organization, which developed the Tool.

Figure 1.7: *OSR ASK-LOM-AT "About" Page*

1.2 OSR ASK-LOM-AT Authoring Process

Figure 1.8 depicts the Learning Object Metadata authoring process with the use of OSR ASK-LOM-AT.

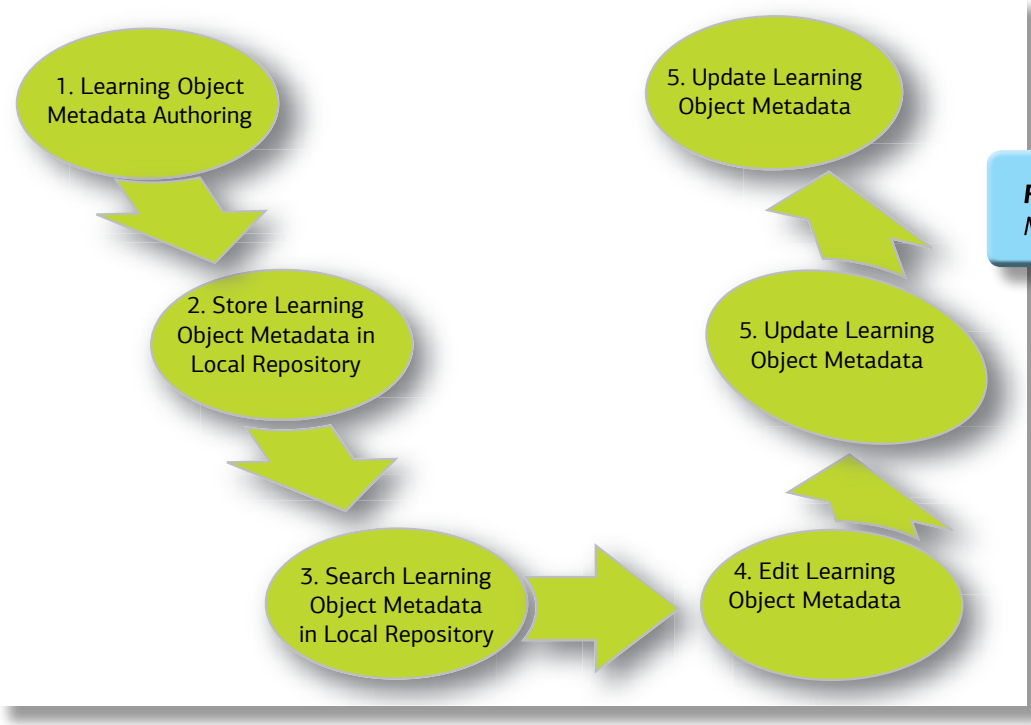

Figure 1.8: *Learning Object Metadata Authoring Process*

The Learning Object Metadata authoring process consists of six (6) basic steps. All steps are depicted in Figure 1.8 and presented below:

- **Step 1 – Learning Object Metadata Authoring:** During this step the user is using a step-by-step wizard in order to characterize with educational metadata a specific learning object (science education resources or educational pathway).
- **Step 2 – Store Learning Object Meta data in Local Repository:** After the finalization of Step 1 the learning object educational metadata record is stored to the local repository of the Tool.
- **Step 3 – Search Learning Object Metadata in Local Repository (Optional):** This is an optional step and the user during this step is able to search the local repository of the tool, so as to find the metadata record that has just been stored.
- **Step 4 – Edit Learning Object Metadata (Optional):** This is an optional step and the user during this step is able to edit various metadata elements of the newly added learning object metadata record.
- **Step 5 – Update Learning Object Metadata (Optional):** This is an optional step and the user during this step is able to update the metadata elements' values that he/she has edited in the previous step.
- **Step 6 – Export Learning Object Metadata Record to XML format:** During this final step the user is using the OSR ASK-LOM-AT in order to export the educational metadata record to XML format (conformant with IEEE LOM Standard). This step is essential in order to be able to upload the learning object and its metadata record to the OSR Portal, so that other users of the Portal can search for it and retrieve it for future usage.

1.2.1 Use the OSR ASK-LOM-AT Wizard

The OSR ASK-LOM-AT facilitates authoring and storing of learning objects metadata descriptions in the local repository, by selecting **"Create New LOM Object"** option (see Figure 1.10). This feature launches the specially developed Learning Object Metadata Authoring Wizard that guides the user through a simple step-by-step process of the OSR IEEE LOM Application Profile.

The Wizard presents guidelines to the user in every step regarding metadata authoring. There are different alternatives of metadata authoring, depending on the type of the element:

- Data can be filled in the form of free text. An example is the case of the Title element (see Figure 1.13).
- A metadata element value can be filled from a pre-defined list of values. An example is the case of the Structure element (see Figure 1.18).
- Multiple data records can be added in one metadata element, when this is allowed by the Application Profile. An example is the case of the Keyword element (as there might exist more than one keywords) (see Figure 1.17).

After the metadata authoring is completed (see Figure 1.36) the metadata are automatically stored in the Local Learning Object Metadata Repository.

In order to author Learning Object Metadata using the OSR ASK-LOM-AT Wizard you have to follow the steps described below in this Section.

1. Select the Tab **'Educational Metadata'** and press the Button **'Create a New LOM Record'** (see Figure 1.9).
2. Click **'Start'** to begin the Wizard (see Figure 1.10) (Suppose that the learning object we want to characterize with metadata is an explanatory text regarding Electromagnetic Spectrum).

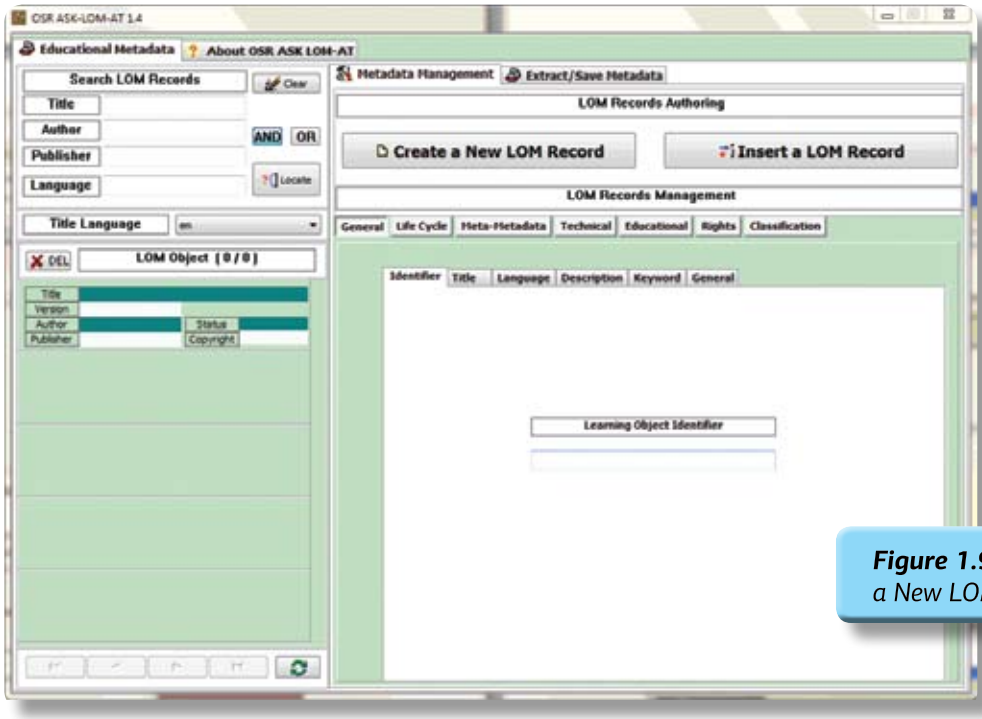

Figure 1.9: *Create a New LOM Record*

Figure 1.10: *Initial Screen of the Learning Object Metadata Authoring Wizard*

3. Give the **'Title'** of the learning object (see Figure 1.13).
   a. Read the dialog that describes the element 'Title' (see Figure 1.11).

Figure 1.11: *Dialog that describes the metadata element*

b. Select the 'Language' in which the title of the learning object will be provided (see Figure 1.12).

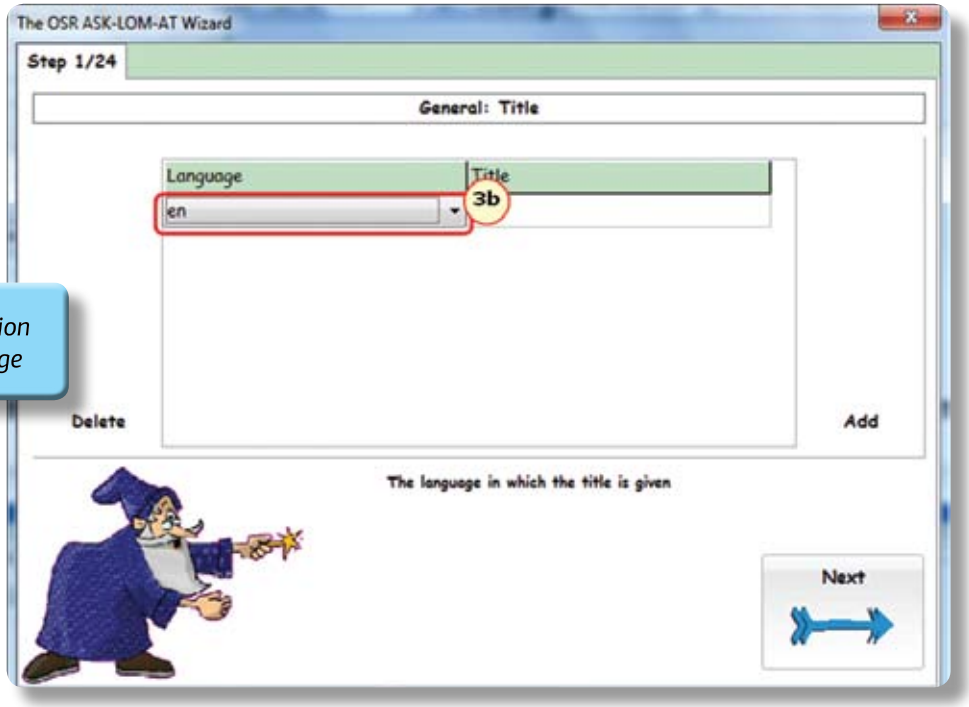

Figure 1.12: *Selection of the Title's language*

c. Read the dialog that describes the value of the element 'Title' (see Figure 1.13).
d. Insert the 'Title' of the learning object (see Figure 1.13).
e. Click 'Next' to continue (see Figure 1.13).

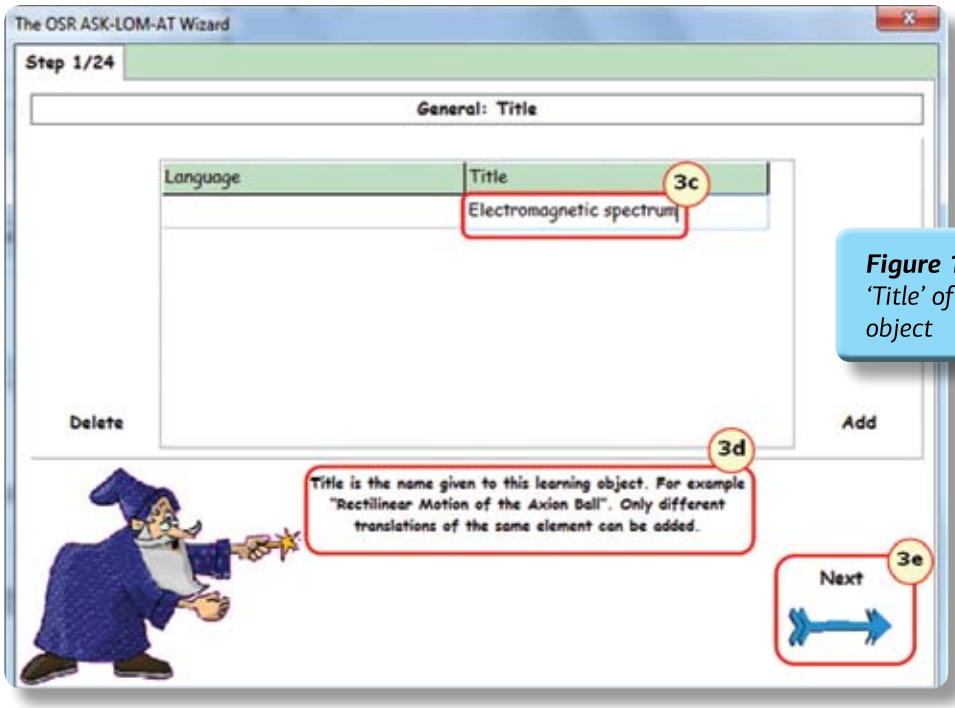

Figure 1.13: *Insert the 'Title' of the learning object*

4. Insert the 'Identifier' of the learning object. The identifier will be the filename of the learning object you are describing, i.e. FreeFall.swf (see Figure 1.14).

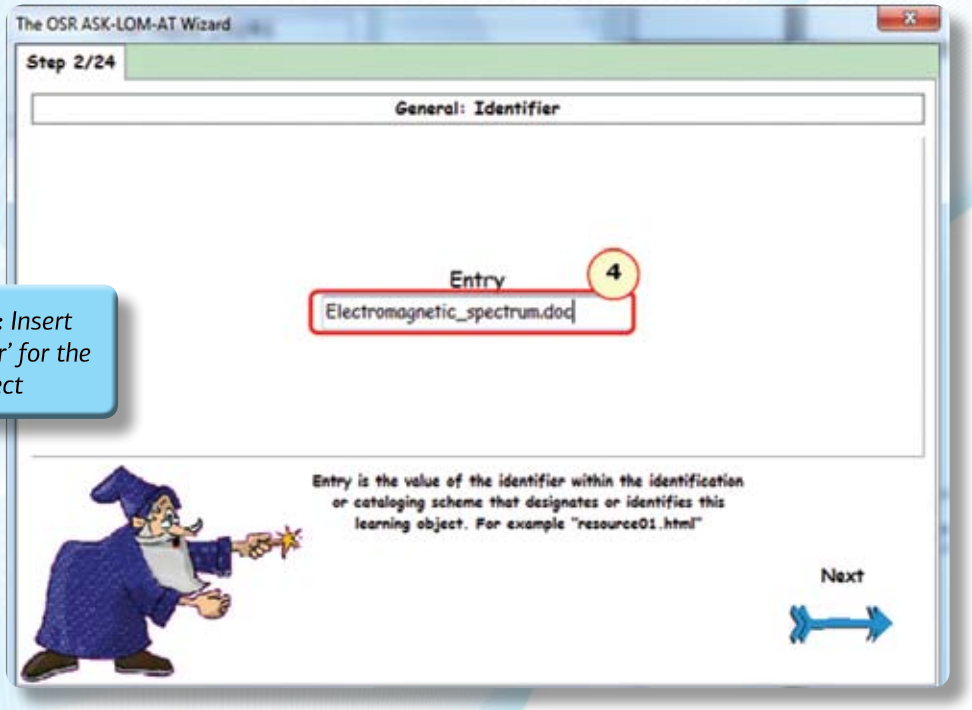

Figure 1.14: *Insert the 'Identifier' for the learning object*

5. Insert the 'Language' or the languages used within the learning object to communicate to the intended user (see Figure 1.15).

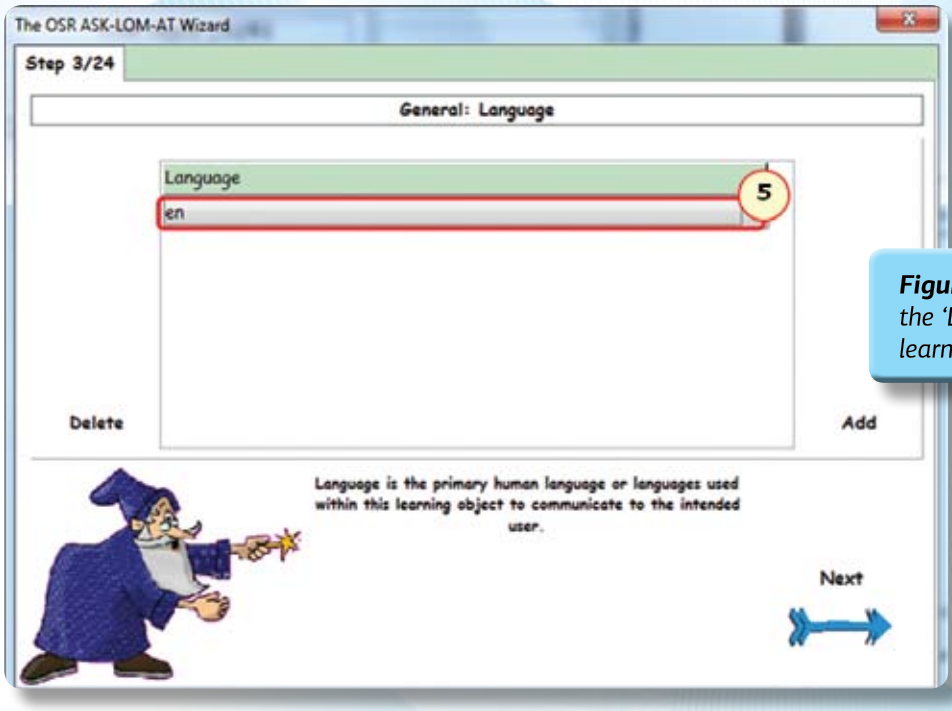

Figure 1.15: *Insert the 'Language' of the learning object*

6. Insert the **'Description'** of the content of the learning object.

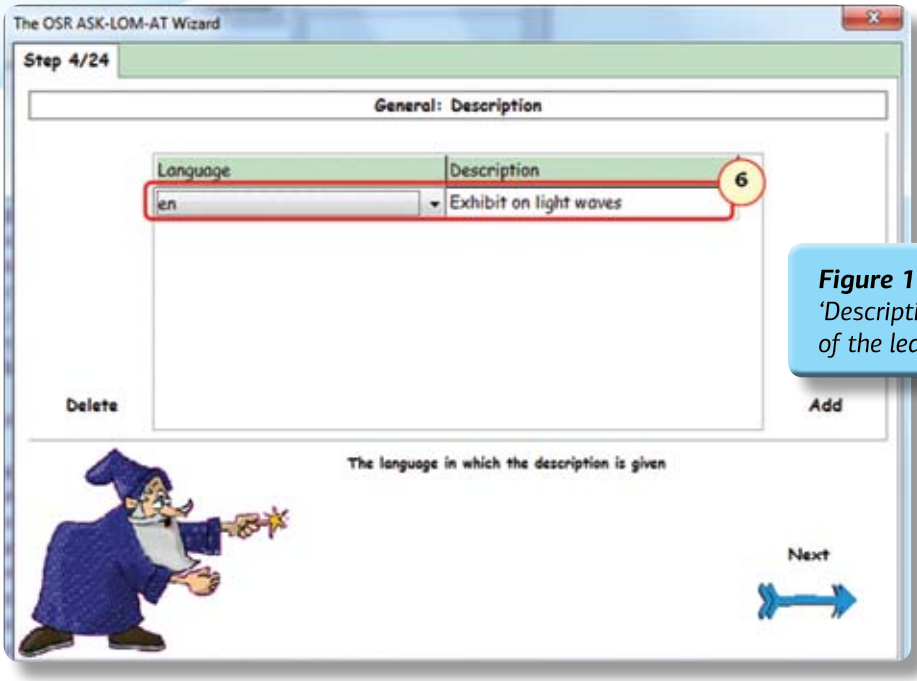

Figure 1.16: *Insert the 'Description' of the content of the learning object*

7. Give a 'Keyword' or phrase describing the topic of the learning object (see Figure 1.17).
   a. Insert the first keyword for the learning object.
   b. Click 'Add' to add a second keyword.
   c. Insert the second keyword for the learning object.

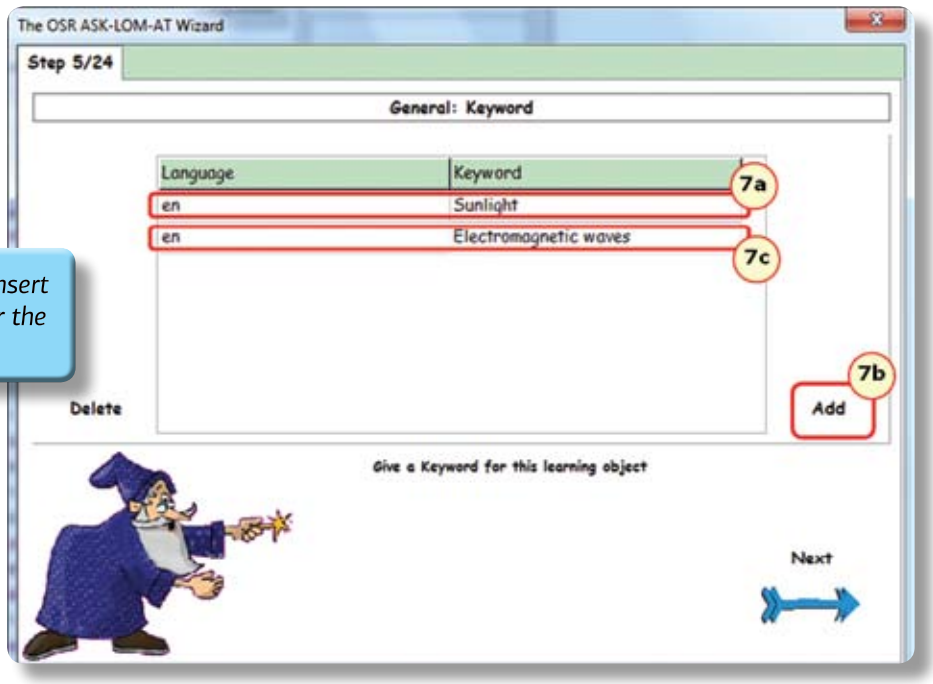

Figure 1.17: *Insert 'Keyword(s)' for the learning object*

8. Give the 'Structure' and the 'Aggregation Level' of the learning object (see Figure 1.18).

   a. Select the 'Structure' of the learning object using the given list. The available choices are:

      - Atomic: an object that is indivisible
      - Collection: a set of objects with no specified relationship between them.
      - Networked: a set of objects with relationships that are unspecified.
      - Hierarchical: a set of objects whose relationships can be represented by a tree structure.
      - Linear: a set of objects that are fully ordered. Example: A set of objects that are connected by "previous" and "next" relationships.

   b. Select the 'Aggregation Level' of the learning object using the given list. The available choices are:

      - 1: the smallest level of aggregation, e.g., astronomic images, worksheets, etc.
      - 2: a collection of learning objects, e.g., a learning activity

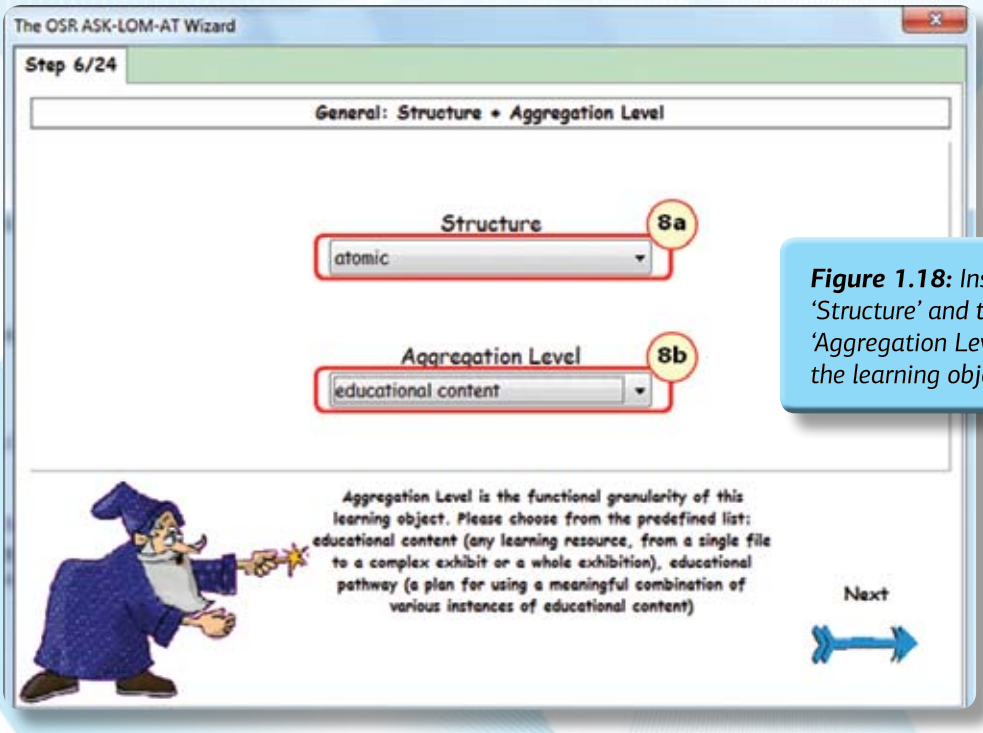

Figure 1.18: *Insert the 'Structure' and the 'Aggregation Level' of the learning object*

9. Insert the name of the **'Author'** of the learning object (see Figure 1.19).

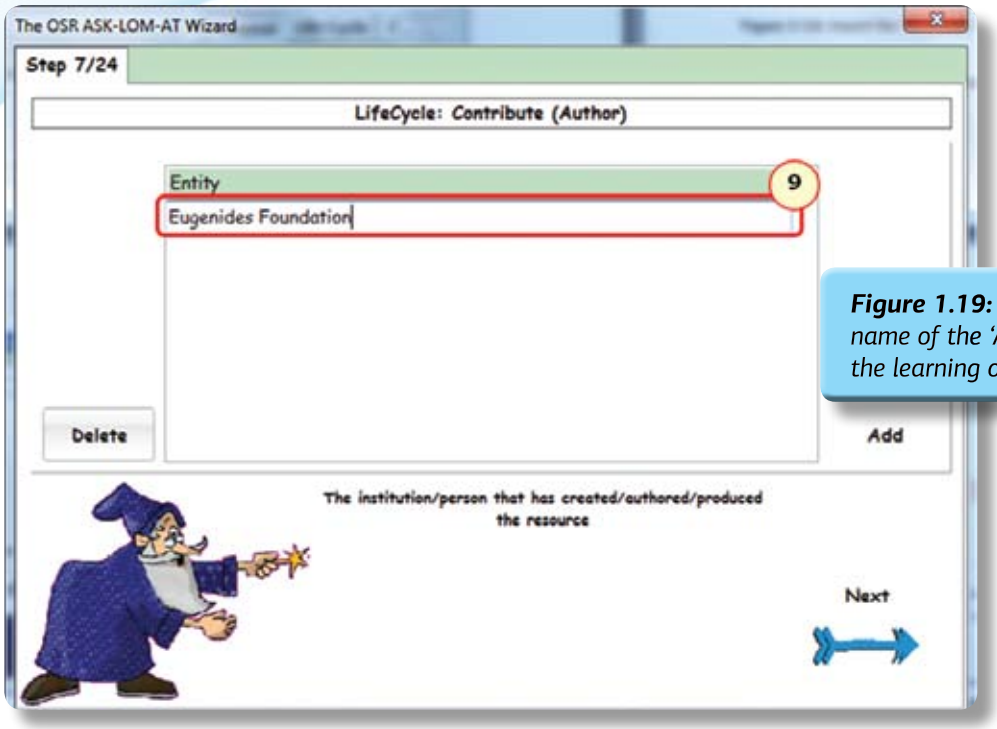

Figure 1.19: *Insert the name of the 'Author' of the learning object*

10. Insert the name of the **'Publisher'** of the learning object (see Figure 1.20).

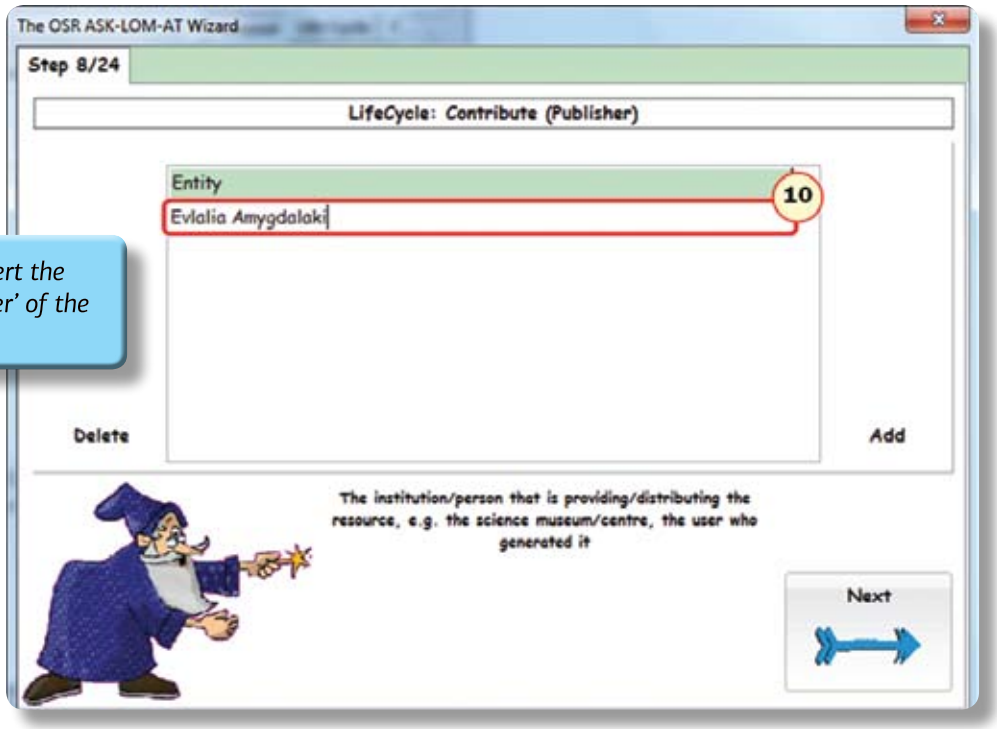

Figure 1.20: *Insert the name of 'Publisher' of the learning object*

11. Insert the name of the 'Creator', which created the metadata instance (see Figure 1.21).

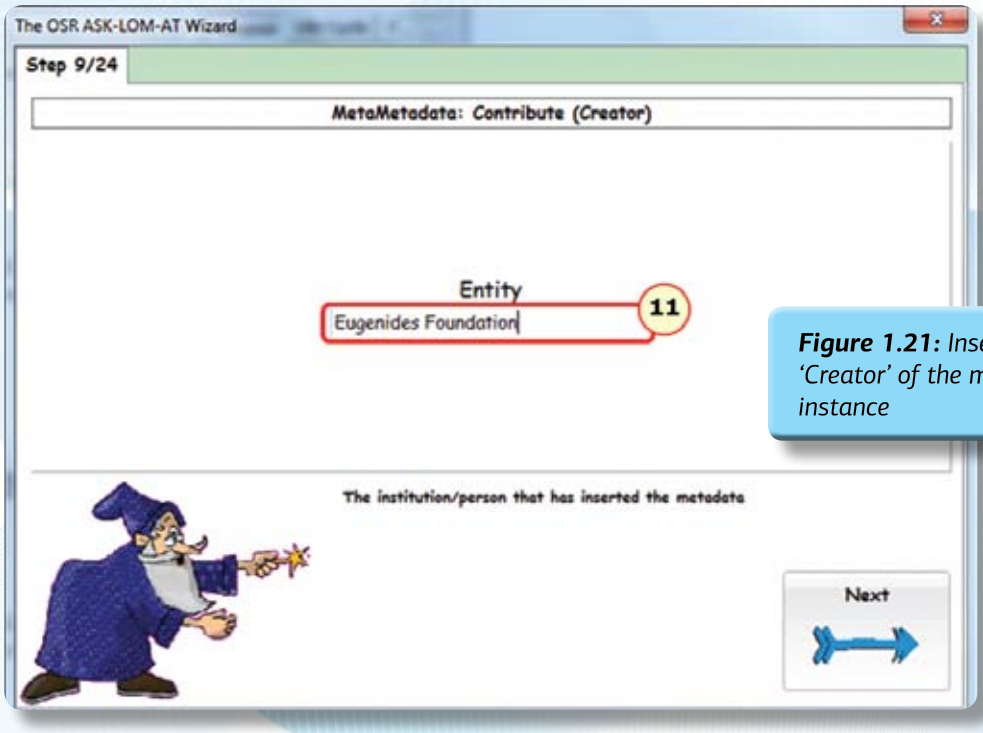

Figure 1.21: *Insert the 'Creator' of the metadata instance*

12. Insert the name of the 'Validator', which validated the metadata record (see Figure 1.22).

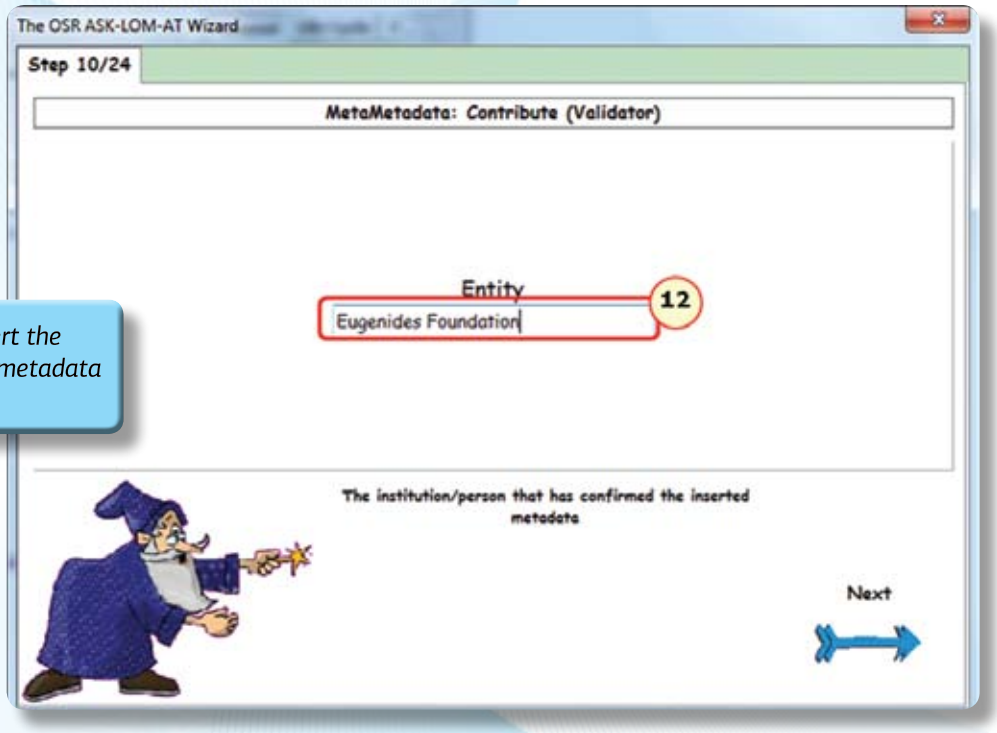

Figure 1.22: *Insert the 'Validator' of the metadata instance*

13. Insert the 'Language' of the metadata instance (see Figure 1.23).

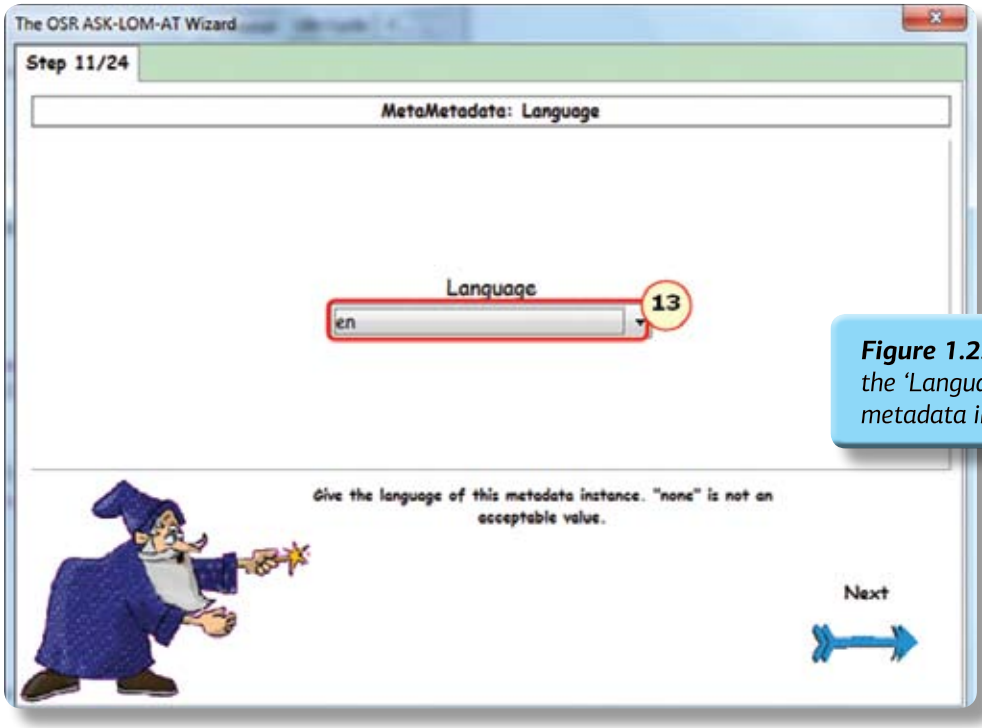

Figure 1.23: *Insert the 'Language' of the metadata instance*

14. Insert the technical 'Format' of the learning object using the given list (see Figure 1.24).

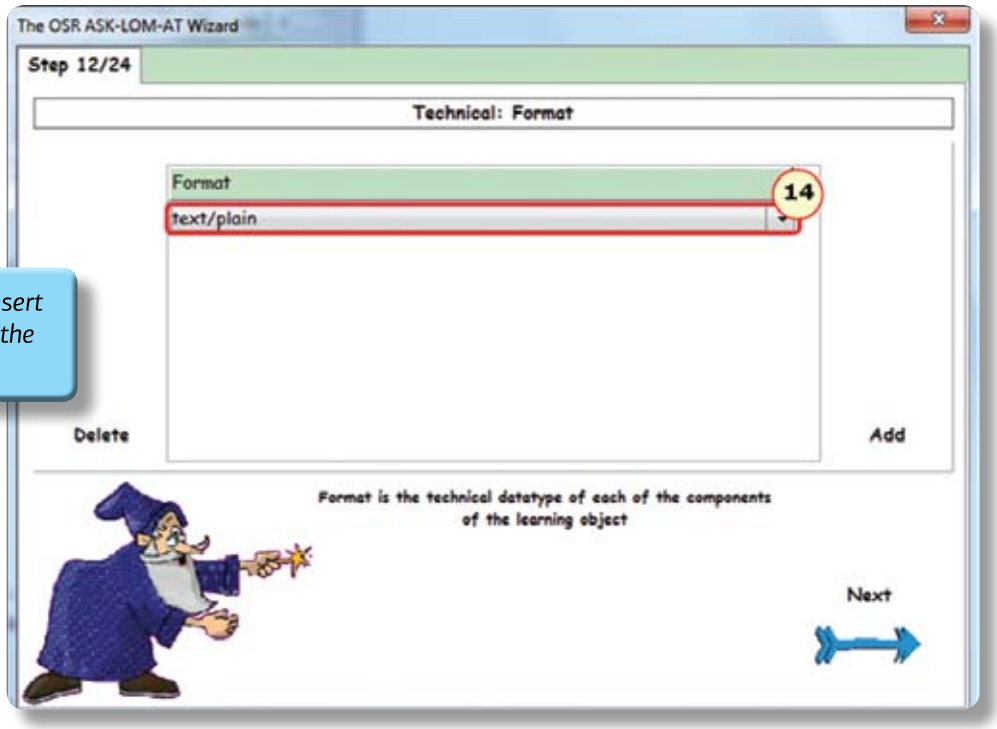

Figure 1.24: *Insert the 'Format' of the learning object*

15. Insert the 'Size' of the learning object using the given list (see Figure 1.25).

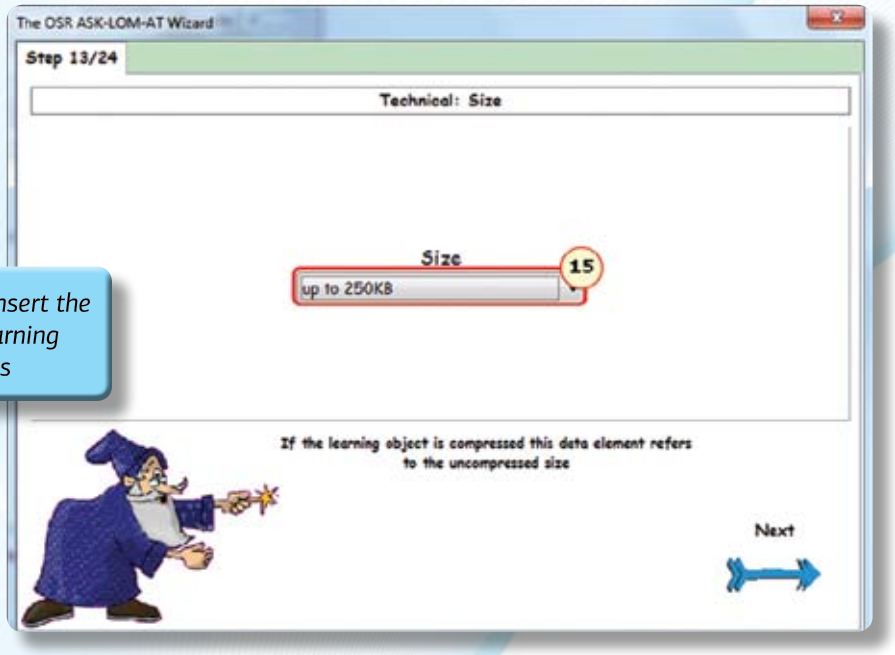

Figure 1.25: *Insert the 'Size' of the learning object in Kbytes*

16. Insert the 'Technical Requirements' necessary for using this learning object (see Figure 1.26).

    a. Insert the **'Type'** of technology required for using the learning object, using the given list.
    b. Insert the **'Name'** of the required technology to use this learning object, using the given list.
    c. Insert the **'Minimum'** possible version of the required technology to use the learning object.
    d. Insert the **'Maximum'** possible version of the required technology to use the learning object.

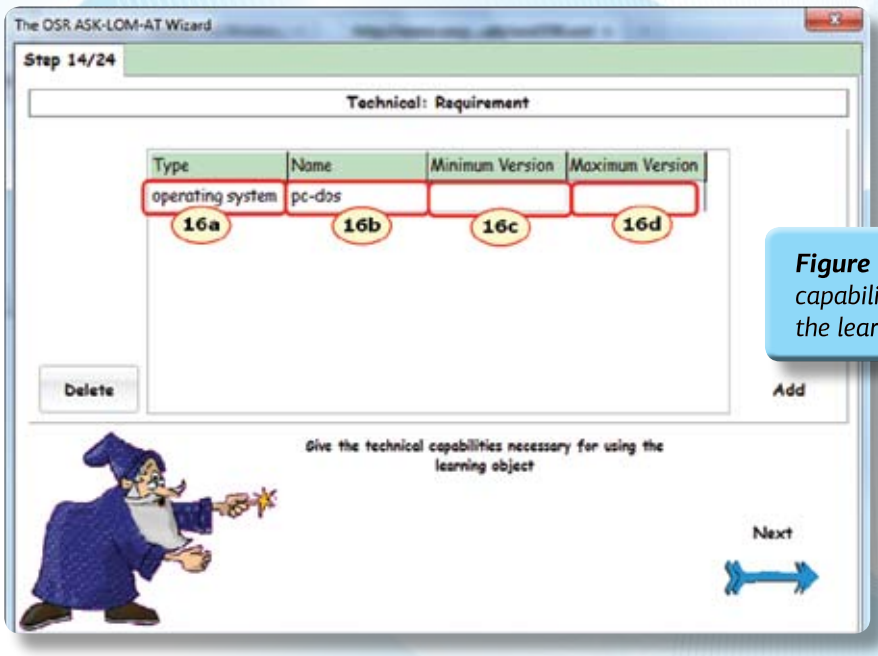

Figure 1.26: *Insert the technical capabilities necessary for using the learning object*

17. Insert the 'Interactivity Type', 'Interactivity Level' and 'Difficulty' of the learning object (see Figure 1.27).

    a. Select the 'Interactivity Type', which specifies the predominant mode of learning supported by the learning object. The available choices are:

        - Active: "active" learning (e.g. learning by doing) is supported by content that directly induces productive action by the learner.
        - Expositive: "expositive" learning (e.g. passive learning) occurs when the learner's job mainly consists of absorbing the content exposed to him (generally though text, images or sound).
        - Mixed: when a learning object blends active and expositive interactivity types then the interactivity type is "mixed".

    b. Select the 'Interactivity Level', which specifies the degree of interactivity of the learning object. Interactivity in this context refers to the degree to which the learner can influence the aspect or behavior of the learning object. The available choices are: very low, low, medium, high, and very high.

    c. Select the 'Difficulty', which specifies how hard it is to work with or through the learning object for the typical intended target audience. The available choices are: very easy, easy, medium, difficult and very difficult.

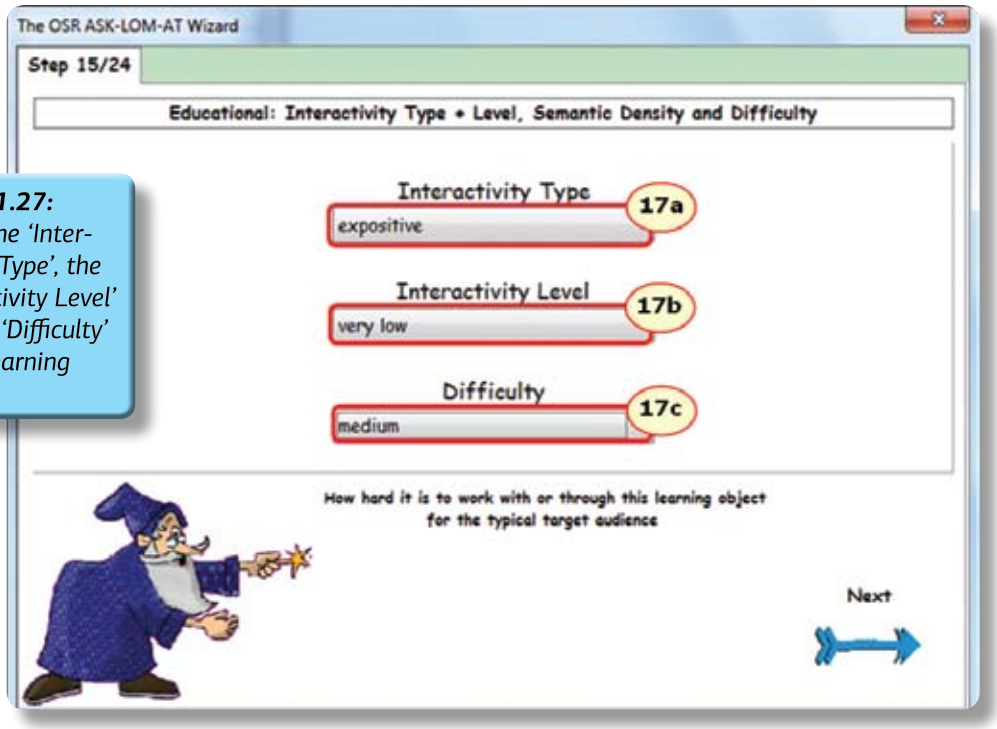

Figure 1.27: *Select the 'Interactivity Type', the 'Interactivity Level' and the 'Difficulty' of the learning object*

18. Indicate the 'Typical Learning Time' of the learning object using the given list (see Figure 1.28).

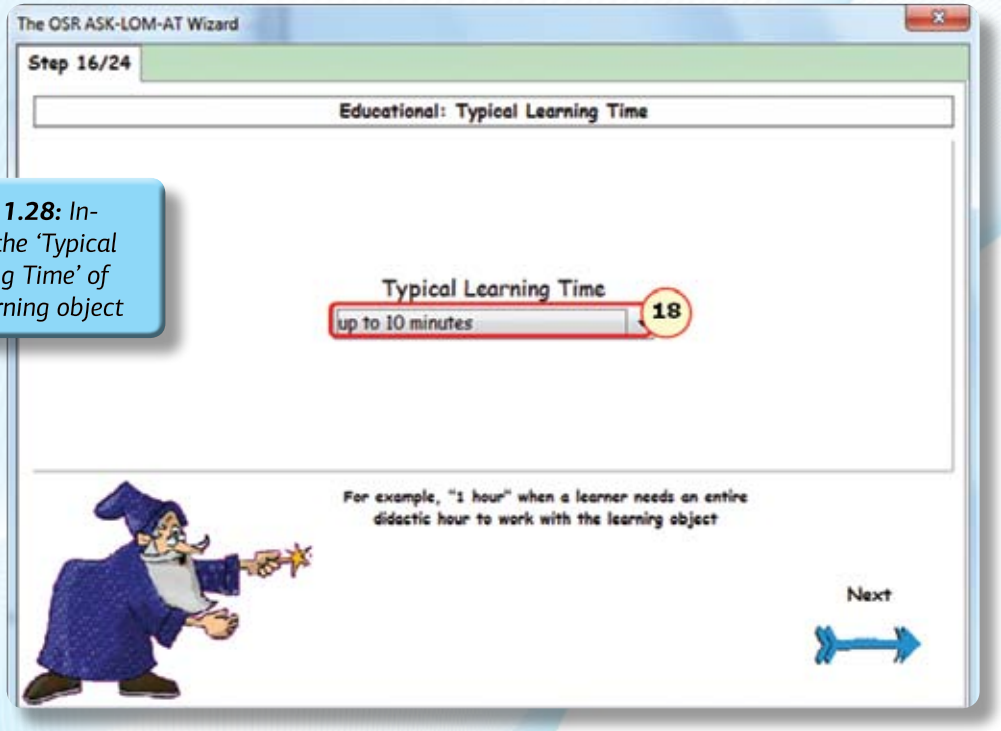

Figure 1.28: *Indicate the 'Typical Learning Time' of the learning object*

19. Select the 'Learning Resource Type' of the learning object, using the given list (see Figure 1.29).

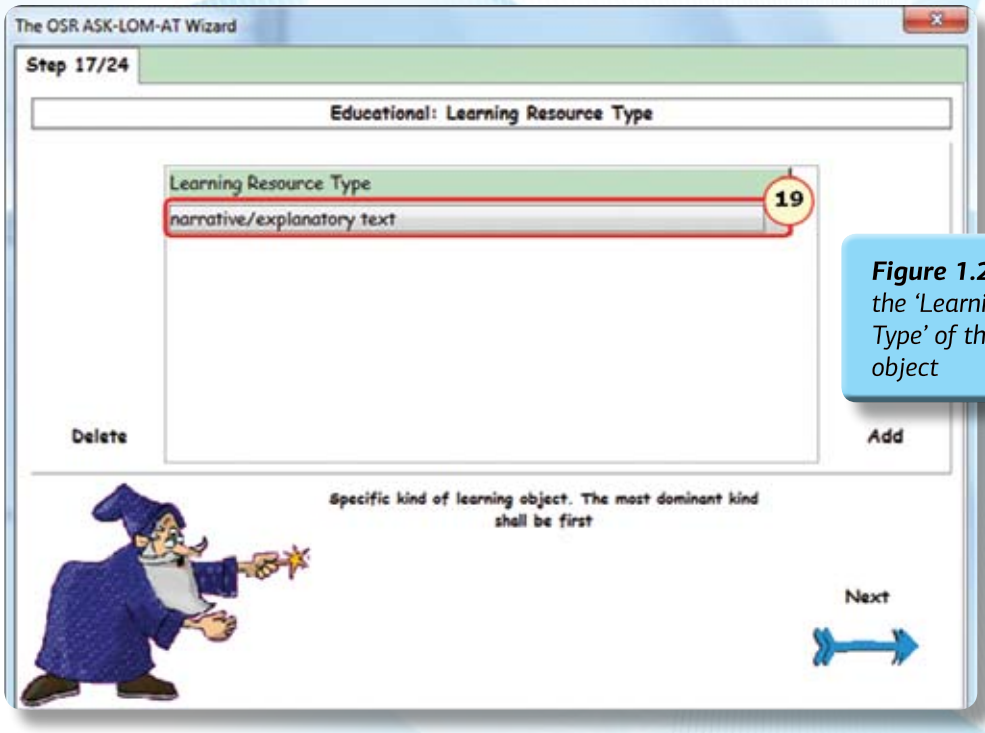

Figure 1.29: *Indicate the 'Learning Resource Type' of the learning object*

20. Select the 'Intended End User Role' for the learning object, using the given list.

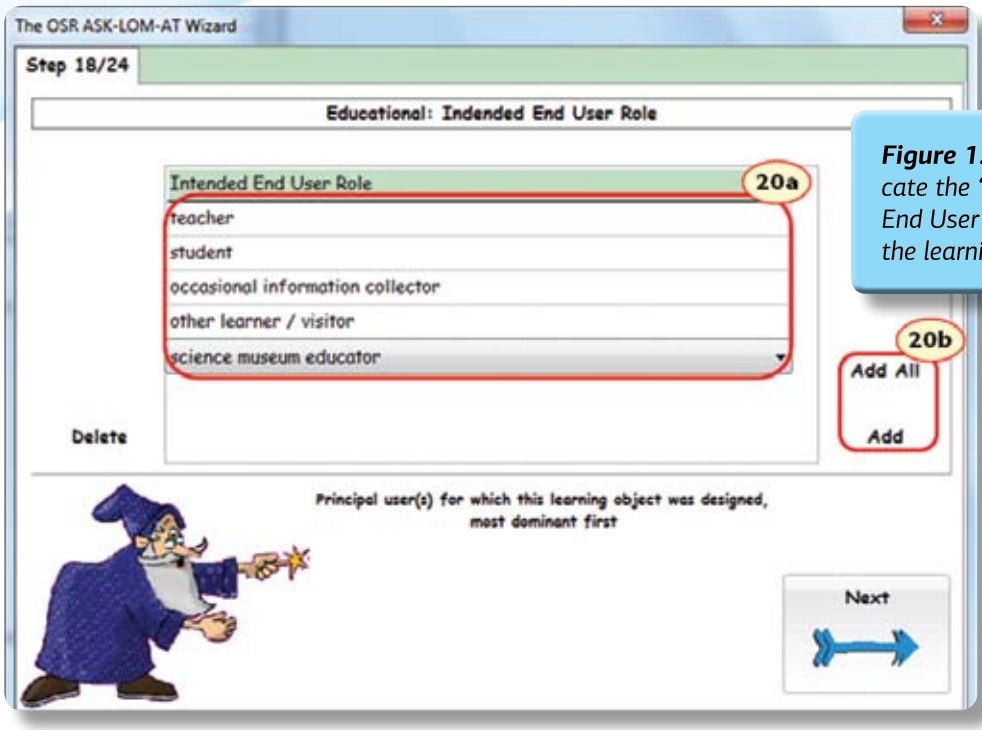

Figure 1.30: *Indicate the 'Intended End User Role' of the learning object*

21. Select the 'Context' within which the learning and use of the learning object is intended to take place, using the given list (see Figure 1.31).

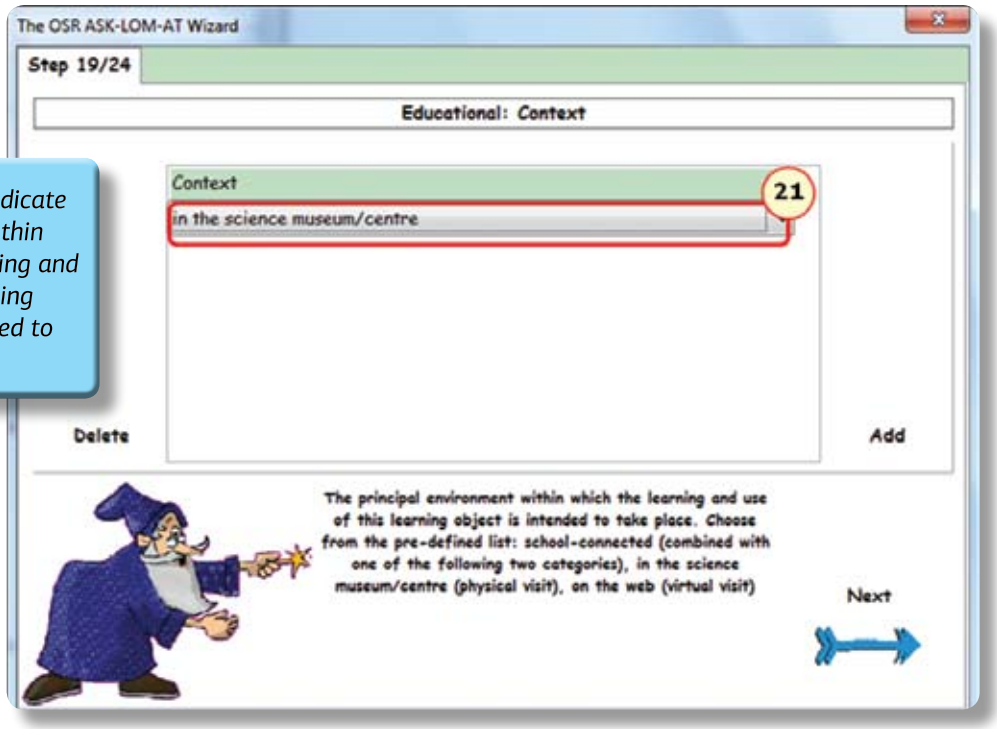

Figure 1.31: *Indicate the 'Context' within which the learning and use of the learning object is intended to take place*

22. Select the 'Typical Age Range' of the intended user of the learning object, using the given list (see Figure 1.32).

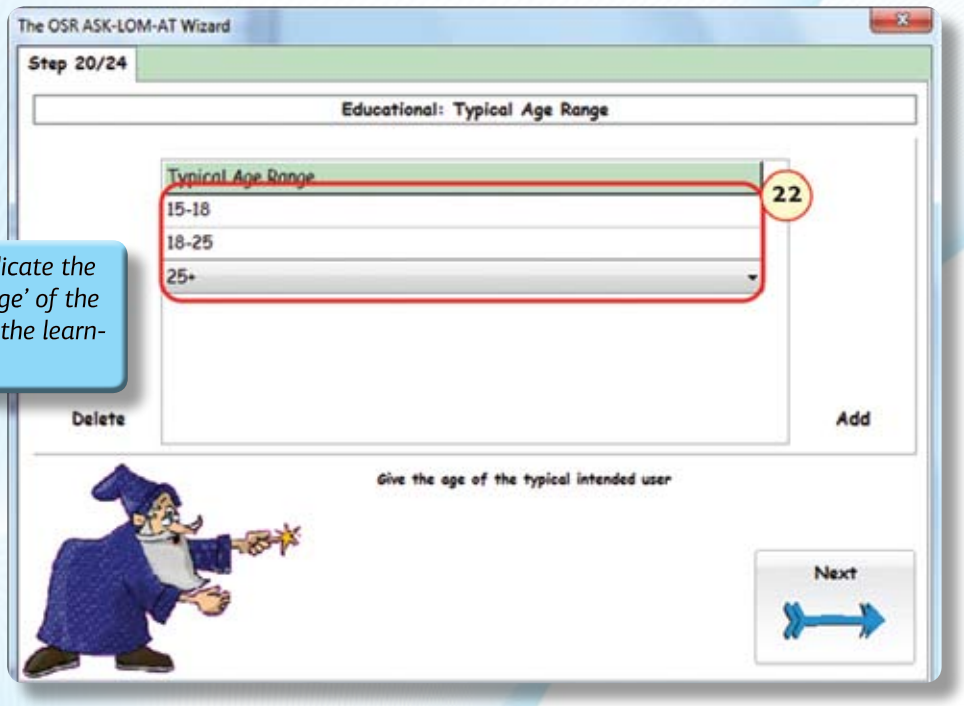

Figure 1.32: *Indicate the 'Typical Age Range' of the intended user of the learning object*

23. Indicate the intellectual property rights and conditions of use for the learning object (see Figure 1.33).

    a. Indicate whether the use of this learning object requires payment, using the given list.
    b. Indicate copyright or other restrictions apply to the use of the learning object , using the given list.

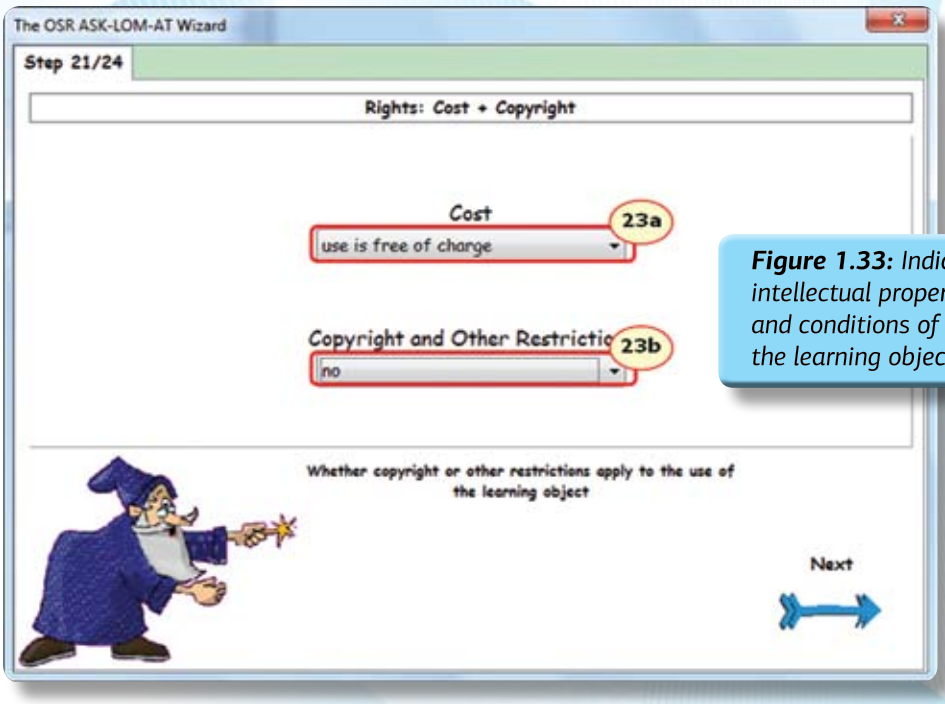

Figure 1.33: *Indicate the intellectual property rights and conditions of use for the learning object*

24. Indicate the terms that characterize the learning object within a particular 'Classification' system, using the given list.

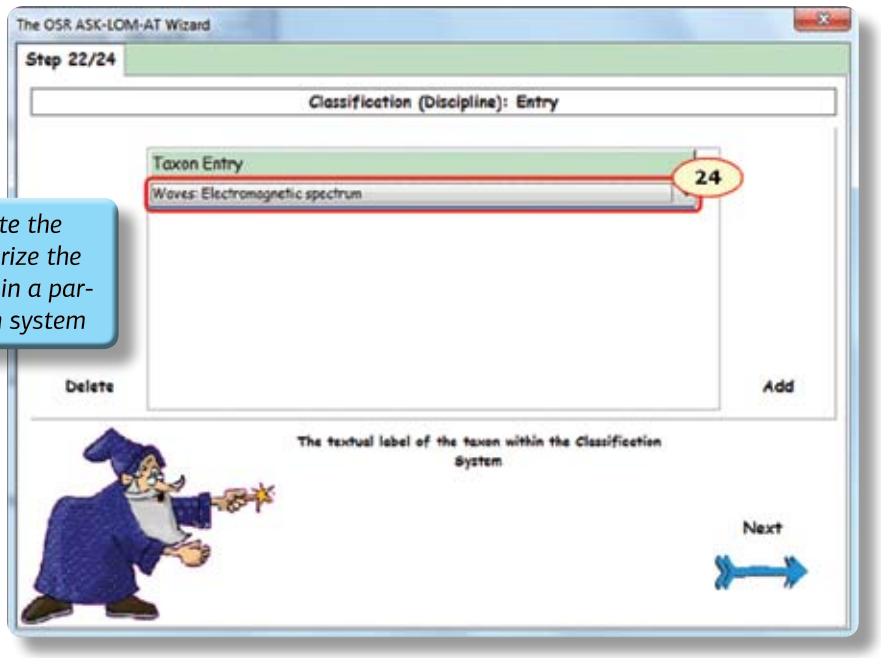

Figure 1.34: *Indicate the terms that characterize the learning object within a particular classification system*

25. Indicate the educational objectives that the learning object is intended to achieve. The educational objectives are divided into four dimensions, as follows

a. Cognitive Domain (Processes): This indicates the main intended cognitive process(es) in the learner as they use this resource. The classification of cognitive processes should be read as a 'scale' representing a gradual move from simple remembering towards higher-order thinking. Each level builds on and subsumes the previous levels. Choose a term from the pre-defined vocabulary list and provide a short open-text description expanding on the vocabulary item selected

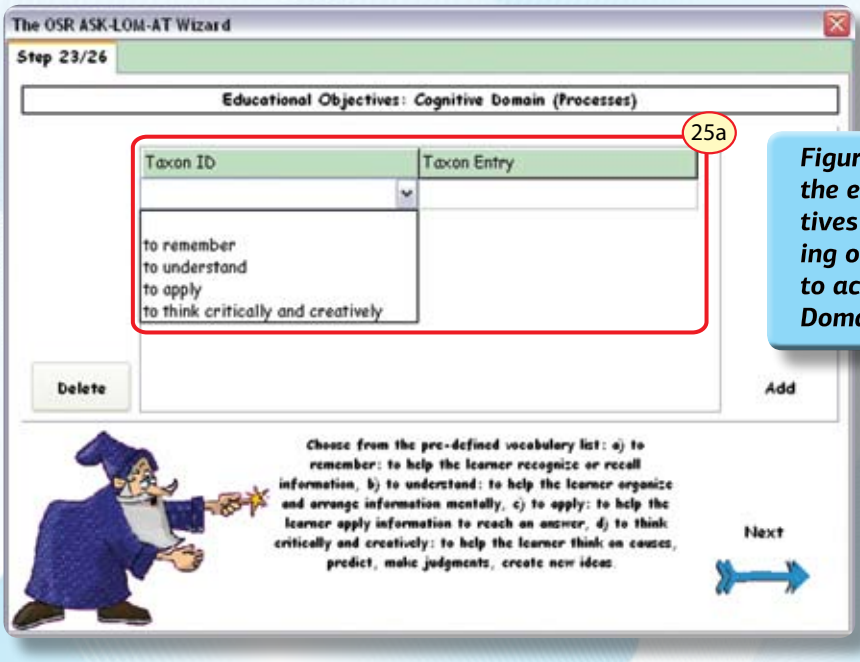

Figure 1.35: Indicate the educational objectives that the learning object is intended to achieve (Cognitive Domain -Processes)

b. Cognitive Domain (Knowledge): This indicates the type of knowledge the learner should gain through the use of this resource. Choose a term from the pre-defined vocabulary list and provide a short open-text description expanding on the vocabulary item selected

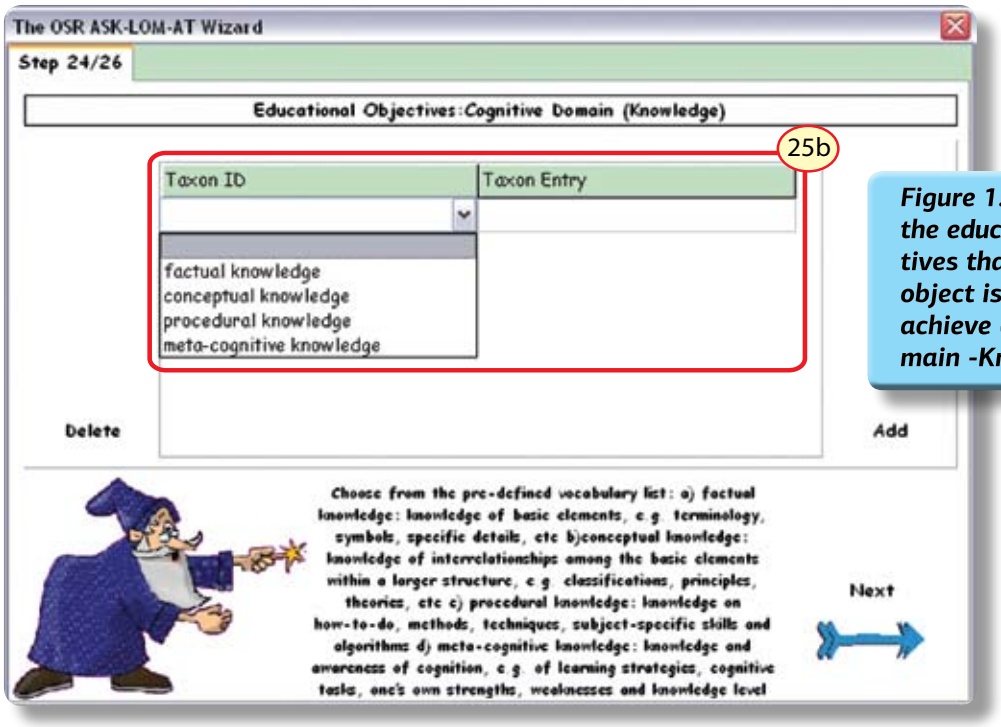

Figure 1.36: Indicate the educational objectives that the learning object is intended to achieve (Cognitive Domain -Knowledge)

c. Affective Domain: This indicates the main interests, attitudes, opinions, values the learner should develop through the use of this resource. The classification of affective educational objectives should be read as a 'scale' representing a gradual move towards higher-order processes (from simple reception of stimuli through to values-based behaviour). Each level builds on and subsumes the previous levels. Choose a term from the pre-defined vocabulary list and provide a short open-text description expanding on the vocabulary item selected

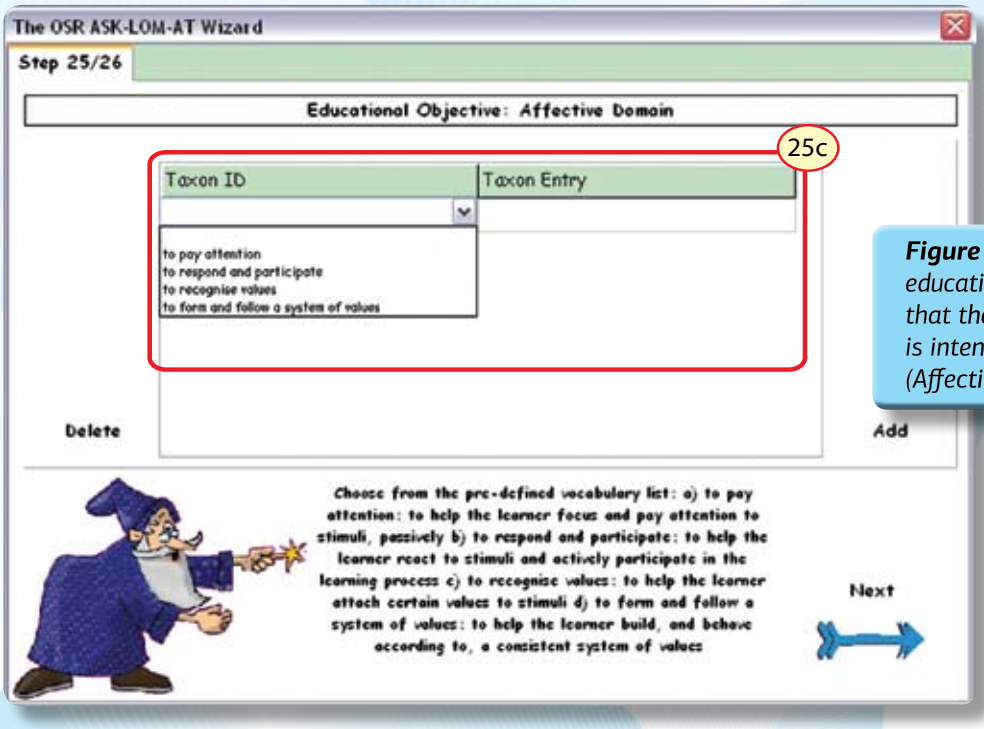

Figure 1.37: *Indicate the educational objectives that the learning object is intended to achieve (Affective Domain)*

d. Psychomotor Domain: This indicates the movement and coordination skills the learner should develop through the use of this resource. The classification of psychomotor educational objectives should be read as a 'scale' representing a gradual move from the simplest behaviour to the most complex. Each level builds on and subsumes the previous levels. Choose a term from the pre-defined vocabulary list and provide a short open-text description expanding on the vocabulary item selected

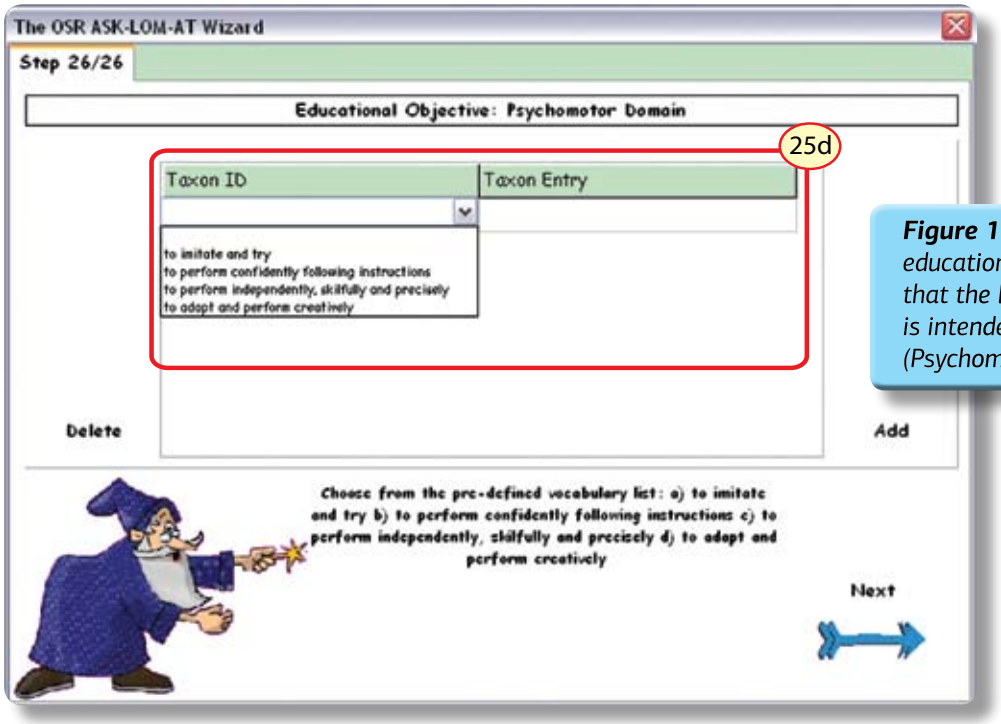

Figure 1.38: *Indicate the educational objectives that the learning object is intended to achieve (Psychomotor Domain)*

26. Click 'Finish' to finalize metadata authoring process (see Figure 1.39).

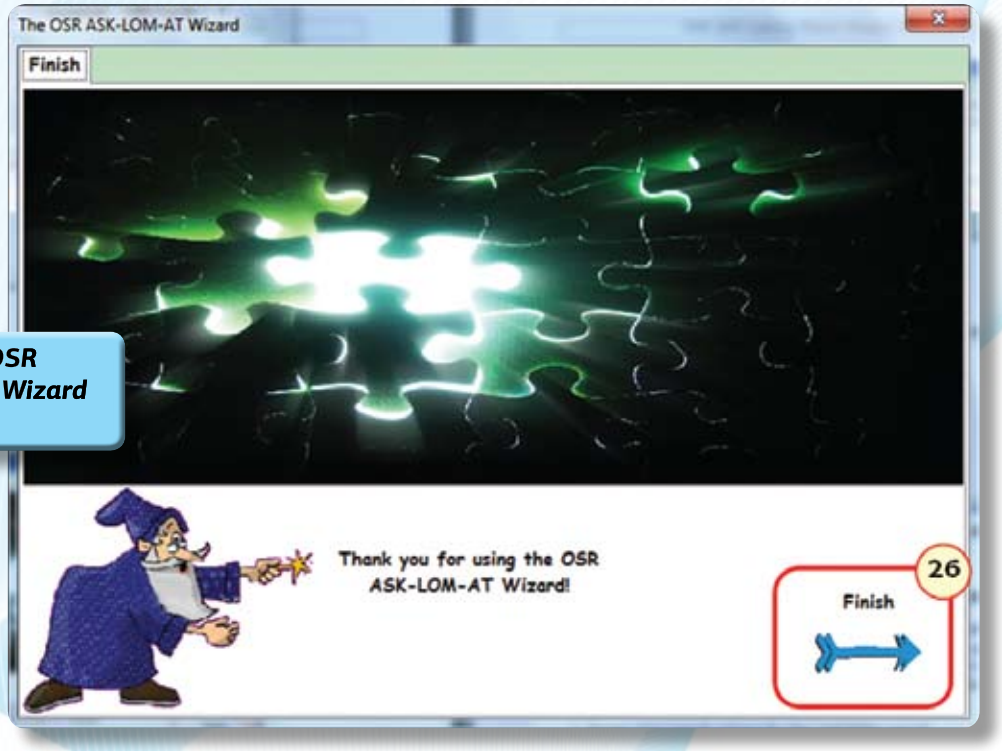

Figure 1.39: OSR ASK-LOM-AT Wizard finish

27. View the newly inserted metadata record in the local metadata repository (see Figure 1.40).

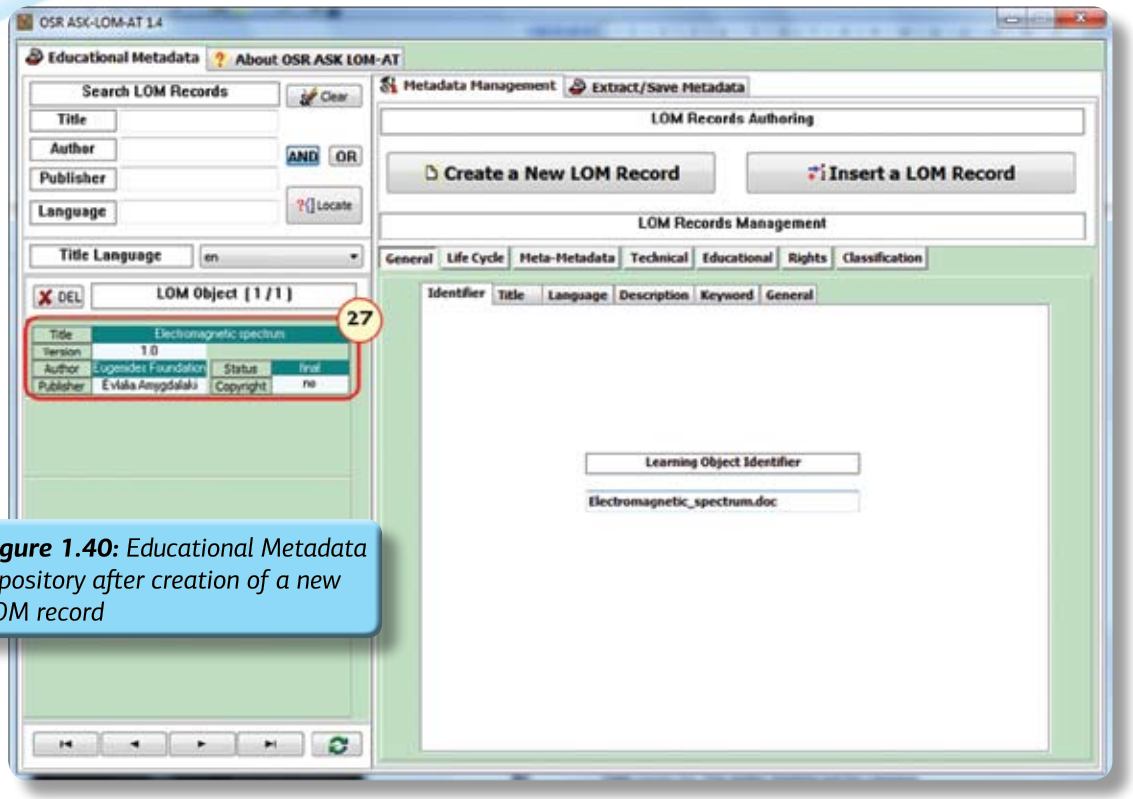

Figure 1.40: *Educational Metadata repository after creation of a new LOM record*

1.2.2 Search Learning Objects Metadata Local Repository

A user can search the local learning objects metadata repository, in order to locate desired metadata records. More specifically, the user can define specific keywords that he/she is looking for in the target learning object description, and in a number of selected metadata fields, namely the Title, Author, Publisher and the Language.

1. Insert your search criteria for the metadata record.
2. Press the "Locate" button.
3. View the metadata records results.

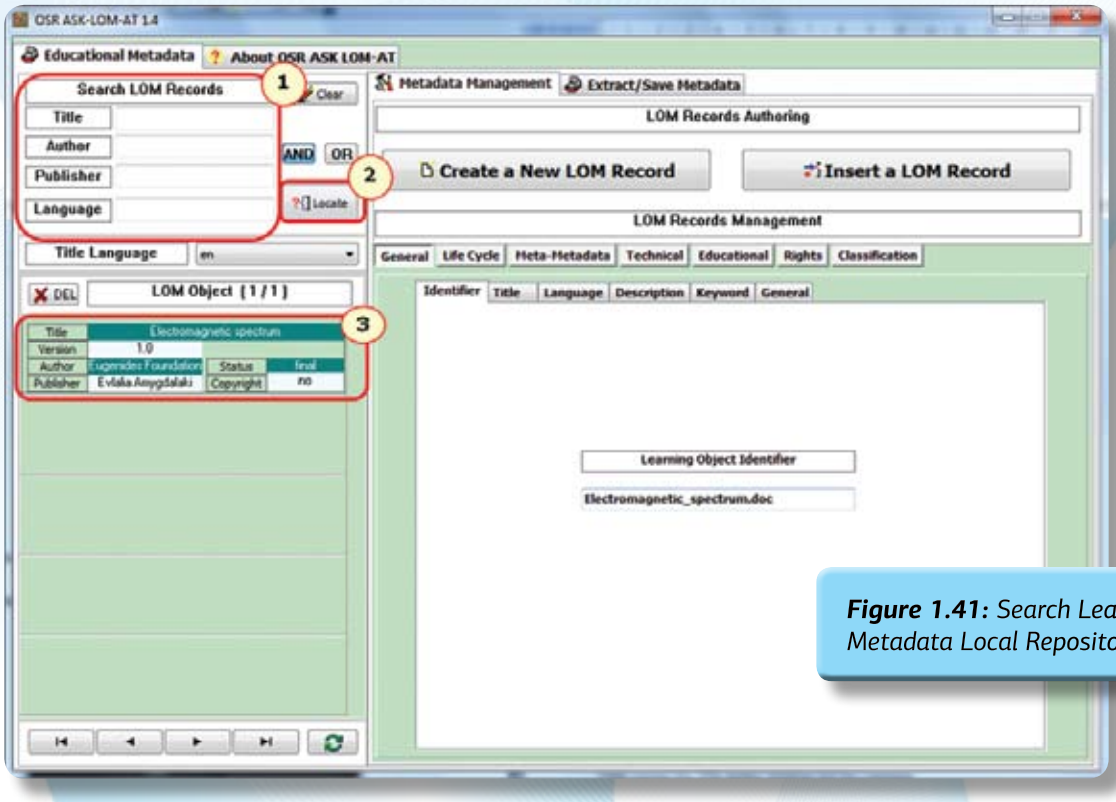

Figure 1.41: *Search Learning Objects Metadata Local Repository*

1.2.3 View or Edit/Update Learning Object Metadata

A user can view, edit or update any of the learning object metadata records that have been created and stored in the local metadata repository of OSR ASK-LOM-AT.

1. Select the metadata record you want to edit/update
2. Select the metadata category you want to edit/update
3. Select the metadata element within this category that you want to edit/update
4. Enter the new value.
    a. Press the 'Insert Record'' button
    b. Enter the new value
    c. Press the 'Post Edit' button
5. Press the 'Refresh' button.

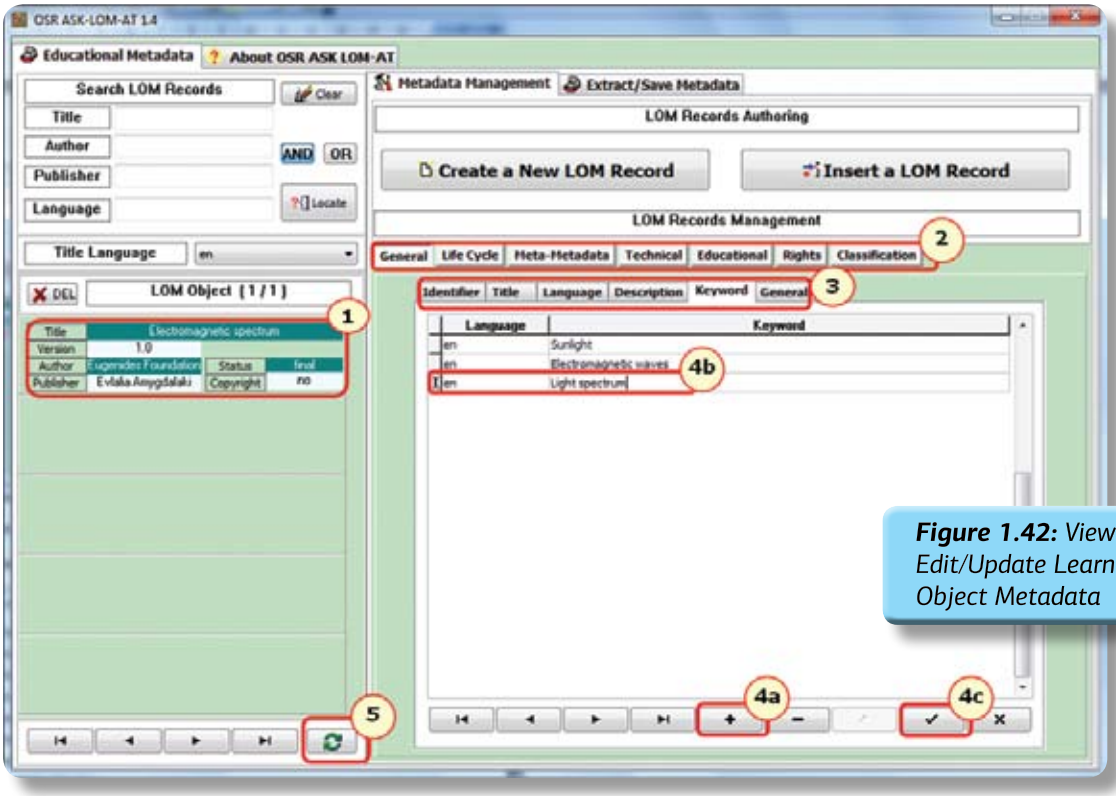

Figure 1.42: *View and Edit/Update Learning Object Metadata*

1.2.4 Extract Learning Object Metadata Record to XML Format

The 'Extract/Save Metadata' Tab allows for exporting the contents of individual learning objects metadata records as XML files. More specifically, it offers the exporting of a selected learning object's metadata record as a single XML file that conforms with the IEEE LOM standard.

1. Select the metadata record you want to export
2. Select the 'Extract/Save Metadata' Tab
3. Press the 'Extract/Save LOM Record' Button
4. The XML representation of the learning object metadata record will be presented

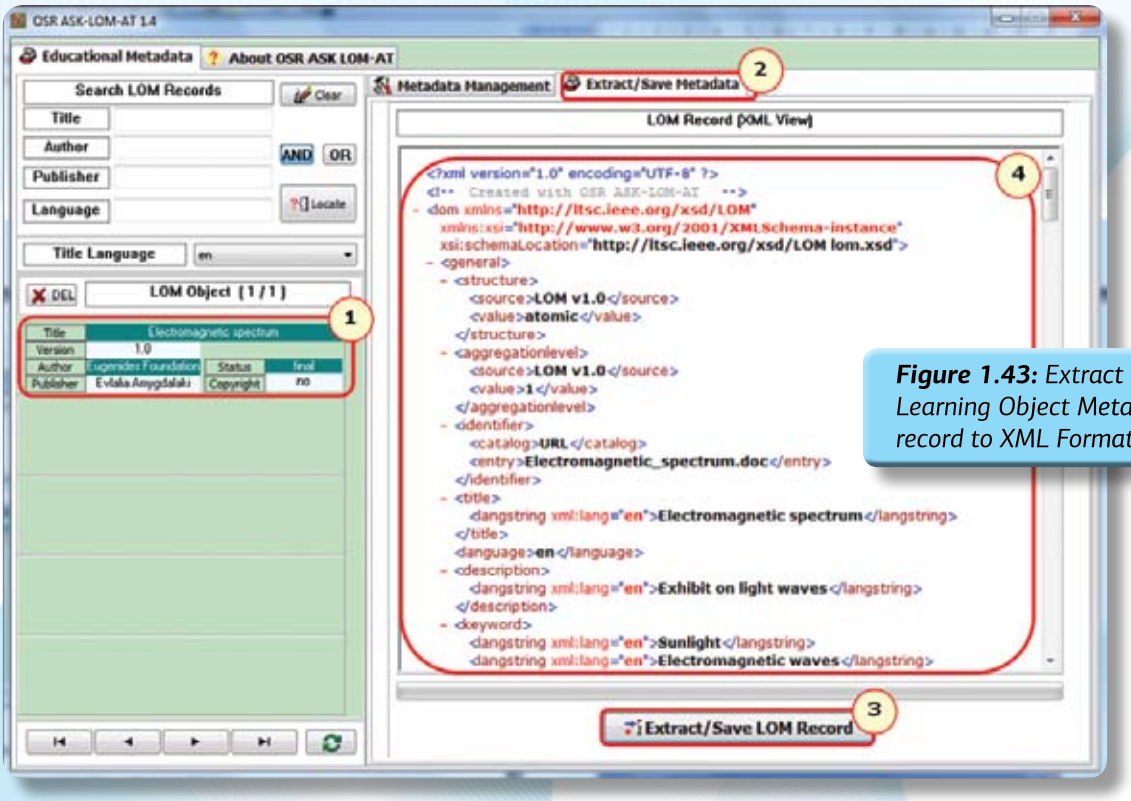

Figure 1.43: *Extract Learning Object Metadata record to XML Format*

1.2.5 Import Learning Object Metadata Record

The 'Insert a LOM Record' button allows for importing the contents of individual learning objects metadata records, conformant with the OSR IEEE LOM Science Education Application Profile, into the OSR ASK-LOM-AT Local Metadata Repository. This feature, is not part of the Learning Object Metadata authoring process, however, it is useful when a user wants to edit/update a metadata record that is not saved in the Local Metadata Repository of OSR ASK-LOM-AT.

1. Select the 'Metadata Management' Tab
2. Press the 'Insert a LOM Record' button
3. The new learning object metadata record is added to the Local Metadata Repository

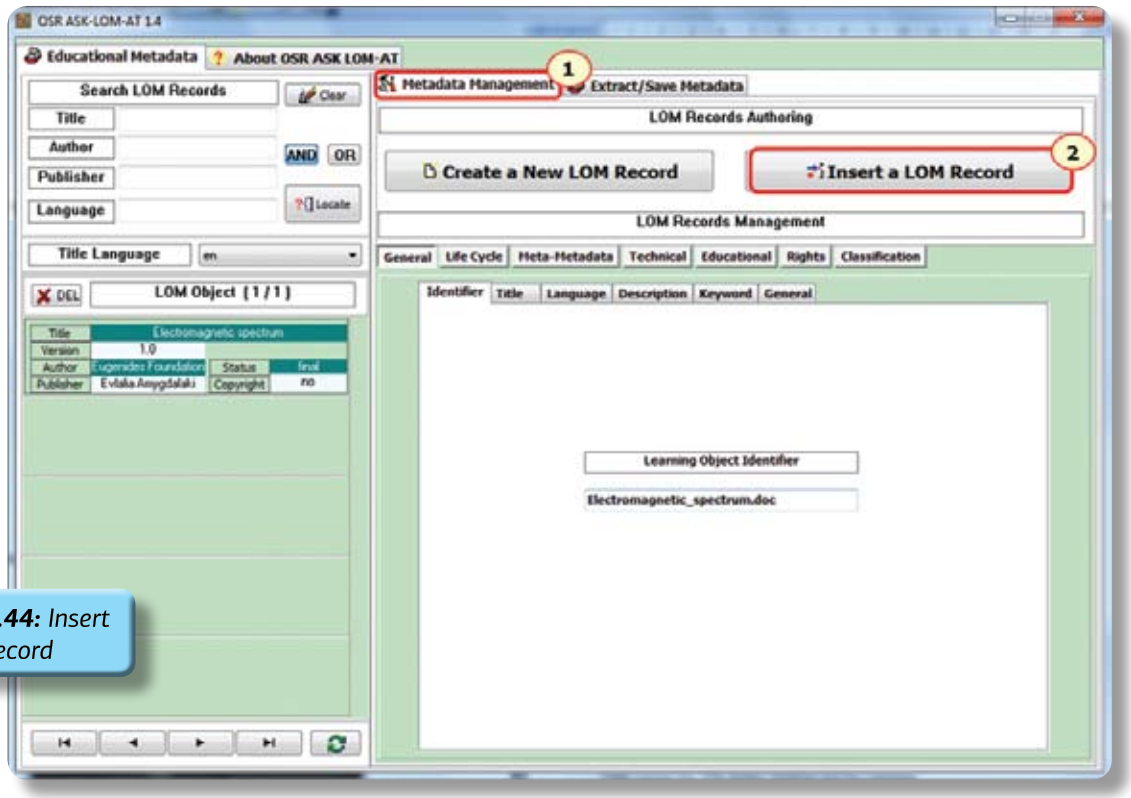

Figure 1.44: *Insert a LOM Record*

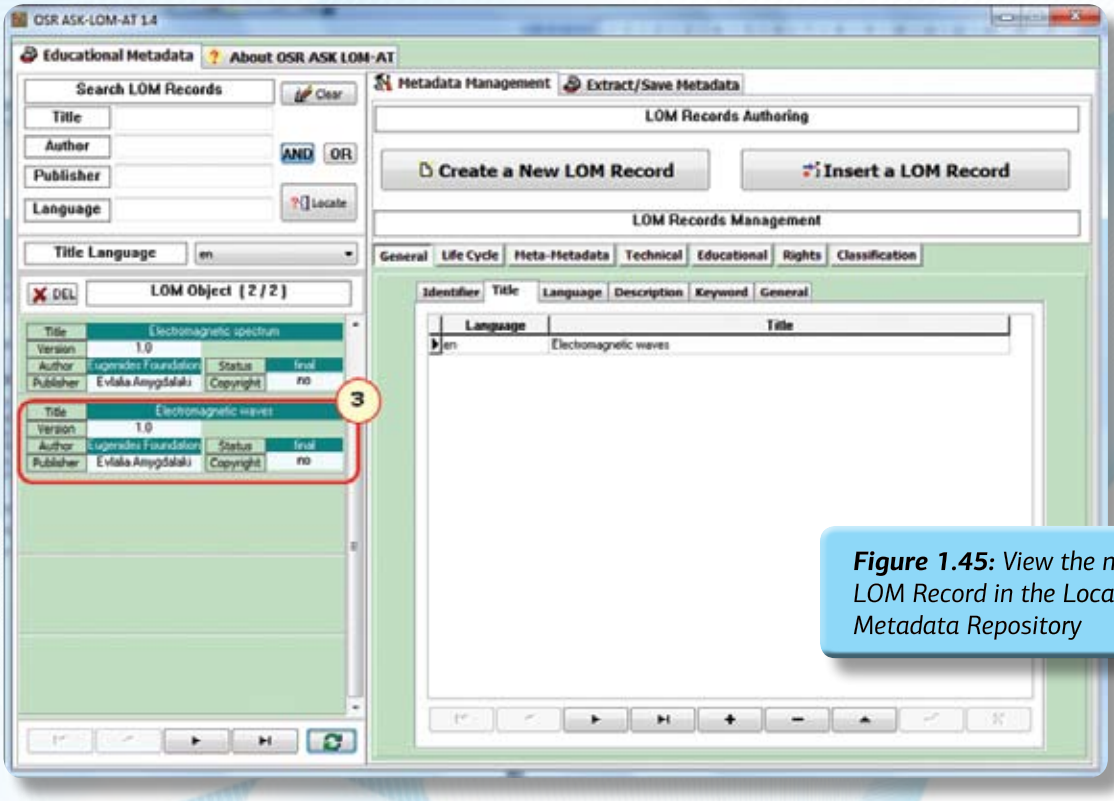

Figure 1.45: *View the new LOM Record in the Local Metadata Repository*

2 Indicative Examples for Educational Metadata Characterization

In this chapter, some indicatives examples for educational metadata characterization are presented. More specifically, in Section 2.1 two indicative examples for educational metadata characterization of Science Education Resources are presented and in Section 2.2, one indicative example for educational metadata characterization of an Educational Pathway is presented.

2.1 Science Education Resources Characterization Examples

2.1.1 How can one observe the Earth's rotation?

The Science Education Resource presented below (Figure 2.1), is called "How can one observe the Earth's rotation?" and it is an explanatory text desrining how the earth's rotation can be observed. Table 2.1 presents the educational metadata for this resource.

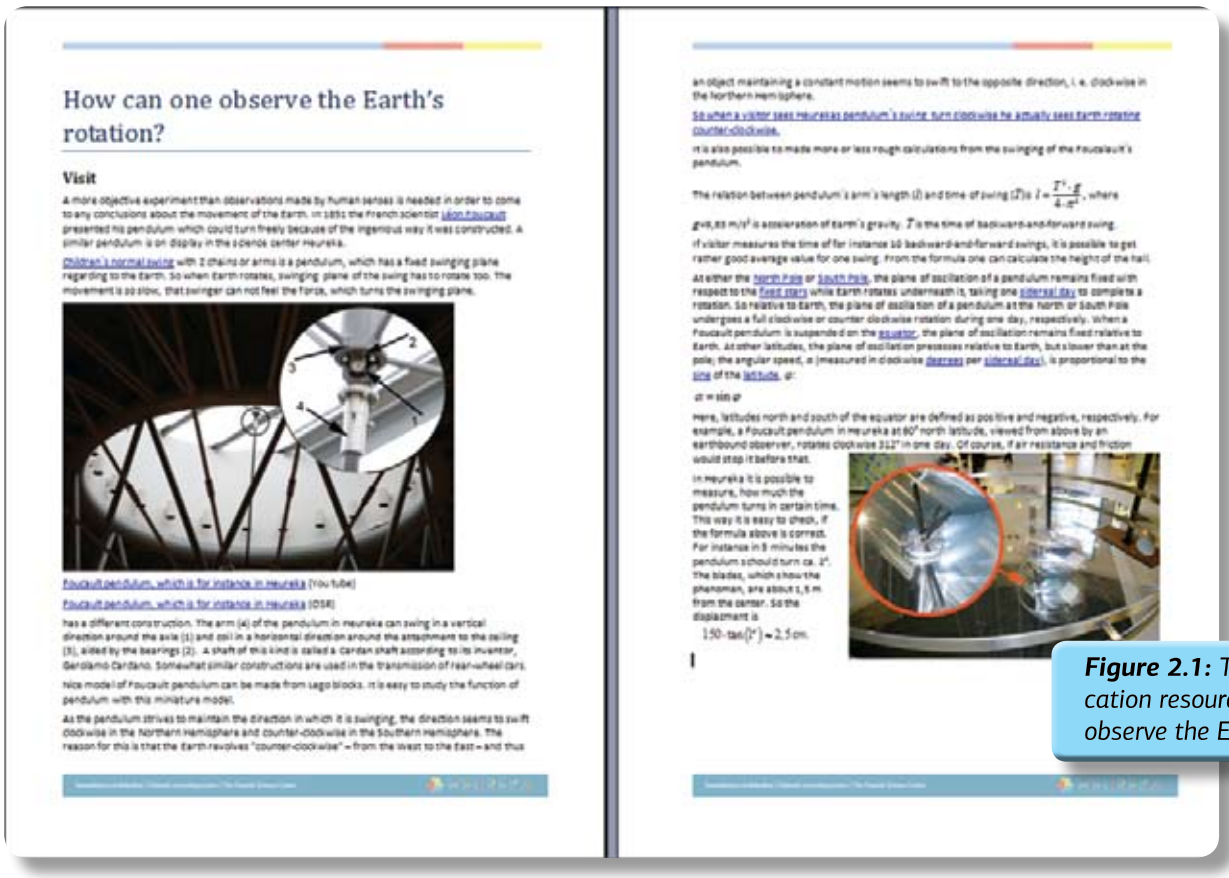

Figure 2.1: *The Science Education resource "How can one observe the Earth's rotation?"*

General		
Identifier		foucault_visit_OSR.doc
Title		Observing Earth´s rotation
Language		en
Description		How can one observe the Earth's rotation?
Keyword(s)		Earth`s rotation, Foucault pendulum
Structure		Atomic
Aggregation Level		Educational Content
Li fe Cycle		
Author		HEUREKA
Publisher		Timo Suvanto
Meta-Metadata		
Creator		Timo Suvanto
Validator		Timo Suvanto
Language		En
Technical		
Format		application/word processing
Size		From 1MB to 5MB
Requirements	Type	-
	Name	-
	Minimum Version	-
	Maximum Version	-
Educational		
Interactivity Type		Active
Learning Resource Type		narrative/explanatory text
Interactivity Level		Low
Intended User Role		Student
Context		School-connected
Typical Age Range		15-18, 18-25, 25+
Difficulty		difficult
Typical Learning Time		Up to 2 hours
Rights		
Cost		use is free of charge
Copyright and Other Restrictions		yes
Classification (Discipline)		
Entry		Astronomy: Earth Forces and motion: Foucault pendulum Forces and motion: Rotation
Classification Educational Objective-Cognitive (Processes)		
Entry		to understand
Classification Educational Objective-Cognitive (Knowledge)		
Entry		conceptual knowledge
Classification Educational Objective-Affective		
Entry		to respond and participate
Classification (Educational Objective-Psychomotor)		
Entry		to imitate and try

Table 2.1: *Metadata for the Science Education resource "How can one observe the Earth's rotation?"*

2.1.2 Discovery of nuclear fission

The Science Education Resource presented below (Figure 2.2), is called “Discovery of nuclear fission” and it is an image of the Nuclear fission experimental setup, reconstructed at the Deutsches Museum. Table 2.2 presents the educational metadata for this resource.

Figure 2.2: *The Science Education resource “Discovery of nuclear fission”*

General		
Identifier		800px-Hahnmeitnerstrassmann.jpg
Title		Nuclear fission
Language		en
Description		Nuclear fission experimental setup, reconstructed at the Deutsches Museum, Munich
Keyword(s)		Nuclear fission
Structure		Atomic
Aggregation Level		Educational Content
Life Cycle		
Author		Deutches Museum
Publisher		Sofoklis Sotiriou
Meta-Metadata		
Creator		Deutches Museum
Validator		Sofoklis Sotiriou
Language		en
Technical		
Format		image/jpeg
Size		From 500KB to 1MB
Requirements	Type	Browser
	Name	Ms-internet explorer
	Minimum Version	6
	Maximum Version	8
Requirements	Type	Operation System
	Name	MACOS
	Minimum Version	10
	Maximum Version	12
Educational		
Interactivity Type		Active
Learning Resource Type		Diagram/graph/chart/plot
Interactivity Level		High
Intended User Role		Teacher Student
Context		In the science museum/centre
Typical Age Range		12-15, 15-18, 18-25, 25+
Difficulty		medium
Typical Learning Time		Up to 1 hour
Rights		
	Cost	use is free of charge
	Copyright and Other Restrictions	yes
Classification (Discipline)		
	Entry	Tools for science: Laboratory equipment – generally Energy: Radiation History of Science and Technology: Scientists and inventors Radioactivity: Nuclear fission
Classification Educational Objective-Cognitive (Processes)		
Entry		to understand
Classification Educational Objective-Cognitive (Knowledge)		
Entry		conceptual knowledge
Classification Educational Objective-Affective		
Entry		to respond and participate
Classification (Educational Objective-Psychomotor)		
Entry		to adapt and perform creatively

Table 2.2: *Metadata for the Science Education resource "Discovery of nuclear fission"*

2.2 Educational Pathway Characterization Example

2.2.1 Foucault pendulum Open Pathway

The Educational Pathway presented (Figure 2.3) is called “Foucault pendulum” and it is a collection of learning objects related to Foucault pendulum. Table 2.3 presents the metadata for this Educational Pathway.

Figure 2.3: *The Science Education structured pathway “Foucault pendulum”*

General		
Identifier		http://www.osrportal.eu/~osrgr/connect.php?m=viewer&nid=93764
Title		Foucault pendulum Open Pathway
Language		en
Description		This is a collection of learning objects related to Foucault pendulum
Keyword(s)		Pendulum, Rotation, Oscillation
Structure		Collection
Aggregation Level		Educational Pathway
Life Cycle		
Author		Ellinogermaniki Agogi
Publisher		Sofoklis Sotiriou
Meta-Metadata		
Creator		Sofoklis Sotiriou
Validator		Sofoklis Sotiriou
Language		en
Technical		
Format		text/html
Size		Not intended for download
Requirements	Type	browser
	Name	Netscape communicator
	Minimum Version	-
	Maximum Version	-
Educational		
Interactivity Type		Mixed
Learning Resource Type		Open Pathway
Interactivity Level		Medium
Intended User Role		Teacher Student Other leaner/visitor
Context		On the web
Typical Age Range		15-18
Difficulty		Easy
Typical Learning Time		Up to 1 hour
Rights		
Cost		Use is free of charge
Copyright and Other Restrictions		No
Classification (Discipline)		
Entry		Forces and motion: Foucault pendulum
Classification Educational Objective-Cognitive (Processes)		
Entry		to understand
Classification Educational Objective-Cognitive (Knowledge)		
Entry		conceptual knowledge
Classification Educational Objective-Affective		
Entry		to respond and participate
Classification (Educational Objective-Psychomotor)		
Entry		to imitate and try

Table 2.3: *Metadata for the Educational Pathway "Foucault pendulum Structured Pathway"*

3 Annexes

Annex 1: Guidelines on How to Install OSR ASK-LOM-AT on Widows VISTA and Windows 7

In order to install the OSR ASK-LOM-AT the user should create an administrator account. After the installation the OSR-ASK-LOM-AT can run from a non-administrator account if the steps below will be followed:

1. From the file C:\Program Files\OSR Tools\OSR ASK-LOM-AT\OSR ASK-LOM-AT.exe right click and select Properties.

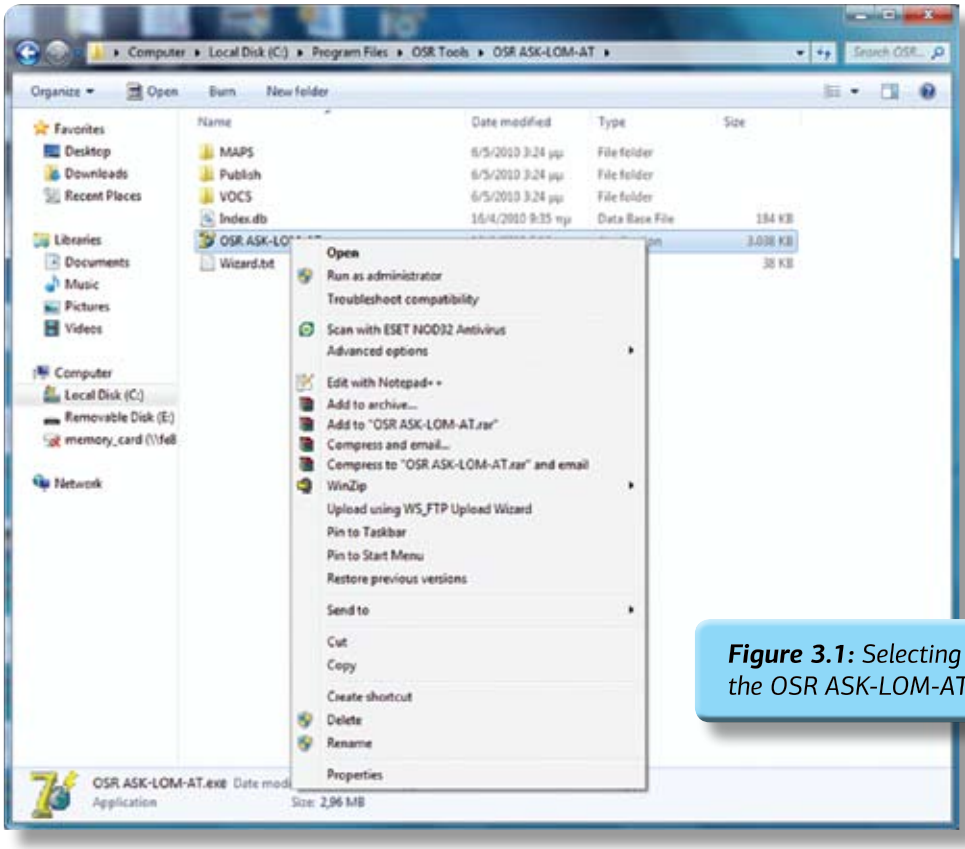

Figure 3.1: *Selecting the Properties of the OSR ASK-LOM-AT.exe File*

2. Then select Compatibility tab and select the ckeck box “Run this program as an administrator”. After this change you can start again the OSR ASK-LOM-AT and it should start normally.

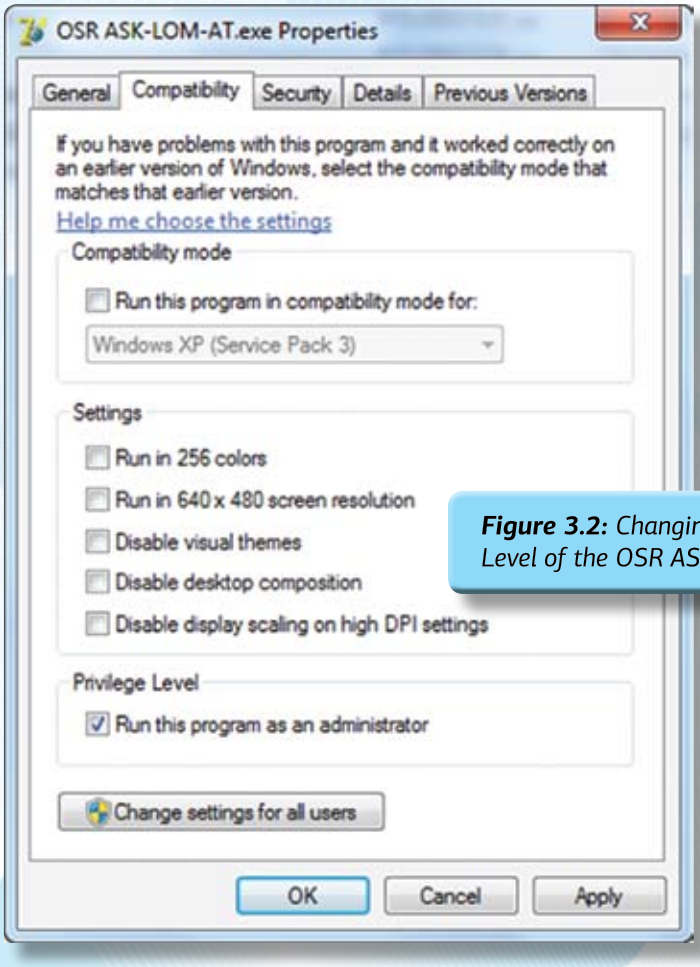

Figure 3.2: *Changing the Privililege Level of the OSR ASK-LOM-AT.exe File*

Annex 2: Technical Requirements of OSR ASK-LOM-AT

The OSR ASK-LOM-AT has been developed in Borland Delphi and can run in Microsoft Windows 98/Me/ NT/2000/XP/2003/Vista/ and Windows 7.

The minimum system requirements for the execution of the OSR ASK-LOM-AT tool are:

- Processor: 400 MHz Intel Pentium Celeron or AMD Duron
- Memory RAM: 64 MB
- Input Devices: Keyboard, Mouse
- Hard Disk: 25 MB for the installation and other space for user files
- Monitor Colors: True Color (32 bit)

The recommended system requirements for the execution of the OSR ASK-LOM-AT tool are:

- Processor: 800 MHz Intel Pentium III or AMD Athlon
- Memory RAM: 128 MB
- Input Devices: Keyboard, Mouse
- Hard Disk: 25 MB for the installation and other space for user files
- Monitor Colors: True Color (32 bit)