Adapting Learning Activities: a Case Study of IMS LD based Script and Tooling:

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Overview

• Adaptive script & adaptive learning management system
• Mechanisms provided by IMS LD for modeling adaptive script
• Scripting the scenario with IMS LD
• Executing the scripted scenario in an IMS LD compliant run-time environment
• Work directions to enhance adaptabilities
• Conclusions
Adaptive system & adaptive learning management system

Definition: An adaptive system is an open system that is able to fit its behavior according to changes in its environment or in parts of the system itself (taken from Wikipedia)

Adaptability:
• Observation: what changes
• Adaptation logic: why to change and how to change
• Adaptation action: make changes
Adaptive script & adaptive learning management system

- Human-user
- Learning management system
- Script
- Run-time information
- Real-world learning environment

observing
reasoning
changing
Adaptive script & adaptive learning management system

Support adaptation at

- authoring: learning designer modeling
- instantiation: Course creators setting
- execution: Supervisor monitoring/operating
Mechanisms provided by IMS LD for expressing adaptation

observation

(local-/global-) properties used to represent personal information (e.g., need, preference, and artifact), role-relevant information (e.g., shared artifact and group size), and generic information (e.g., today and number of participants); Some expressions used to assess run-time information (e.g. time-activity-started, is-member-of-role, and activity-completed)

adaptation action

change property value; show/hide item, class, environment, activity, play, and uol; send notification

adaptation logic

condition clauses in the form: if <expression> then <action> else (or else if)
Modeling the scenario with IMS LD

Student

<table>
<thead>
<tr>
<th>Individual learning phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>choose a theme</td>
</tr>
<tr>
<td>water</td>
</tr>
<tr>
<td>question1-1</td>
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<tr>
<td>question1-2</td>
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<td>question1-3</td>
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<td>question1-4</td>
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<tr>
<td>question2-1</td>
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<tr>
<td>question2-2</td>
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<tr>
<td>question2-3</td>
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<tr>
<td>question2-4</td>
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</tbody>
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Tutor

| Monitor |

Expert

| Discuss |

| view score |

Collaborative learning phase
Modeling the scenario with IMS LD

Choice of the Theme:

• A local personal property “my interest” with two options “water” and “renewable energies” is defined for each student to express his/her selected theme.

• Condition clauses are used to adapt question activities to the theme selected by the student.
Modeling the scenario with IMS LD

Answer-dependent progression:

• It is modeled using condition clauses that if a student submits the answer to a question, the following question will be presented without the need to wait for other students completing the same activity.
Modeling the scenario with IMS LD

Monitor and Jump:

• A monitor service is designed for the teacher to monitor the work progress of every student through observing the student’s scores.

• A Boolean type property is defined for the teacher to control the learn-flow of the student being monitored. If it is set “true” by the teacher at any time, the student will jump to the last question.
Modeling the scenario with IMS LD

Late-comer and New-comer:

• A late-comer can start to work on her/his tasks independently from others’ work progresses, no matter whether others are still answering questions or are currently involved in the discussion phase.

• It is allowed to add a new-comer to an executing instance and assigning a role of the instance to the new-comer.
Modeling the scenario with IMS LD

Inviting Expert:

- At design time, pre-define the role “expert” and a string-type property to represent the email address of an expert
- Pre-defined a notification to invite an expert to discussion and a boolean-type property to represent whether send notification
Executing the scripted scenario in an IMS LD compliant run-time environment

Choice of the Theme:
Executing the scripted scenario in an IMS LD compliant run-time environment

Choice of the Theme:
Executing the scripted scenario in an IMS LD compliant run-time environment

Choice of the Theme:

Select Course: peer assessment demo 1 (Tutor) Go

Choose theme

Learning Objectives | Prerequisites | Feedback | Metadata

You have selected a topic as below:

water
Executing the scripted scenario in an IMS LD compliant run-time environment

Answer-dependent Progression
Executing the scripted scenario in an IMS LD compliant run-time environment

Answer-dependent Progression
Executing the scripted scenario in an IMS LD compliant run-time environment

Answer-dependent Progression
Executing the scripted scenario in an IMS LD compliant run-time environment

Answer-dependent Progression
Executing the scripted scenario in an IMS LD compliant run-time environment

Late-comer:
Executing the scripted scenario in an IMS LD compliant run-time environment

Late-comer:
Executing the scripted scenario in an IMS LD compliant run-time environment

Monitoring and Jump:
Executing the scripted scenario in an IMS LD compliant run-time environment

Monitoring and Jump:

You can monitor how many questions the student has answered. If the student answered a question, s/he will get a score. If there is no score in a question, the question is not responded yet.

The score of question 1:

The score of question 2:

The score of question 3:

The score of question 4:

The student may be too slow to answer the questions. If majority of student have answered the questions and are ready for discussing, you can invite the student to answer the final question by set the value of the following parameter as true
Executing the scripted scenario in an IMS LD compliant run-time environment

Monitoring and Jump:
Executing the scripted scenario in an IMS LD compliant run-time environment

Monitoring and Jump:
Executing the scripted scenario in an IMS LD compliant run-time environment

Monitoring and Jump:

CSCL 2009 workshop demo

Select Course:
peer assessment demo1 (Tutor)  Go

Discuss issues

Hello, welcome to the group discussing room.

You can use the service within the environment to discuss the issues with others.

After finishing the discussion, one group member can store discussion result in the place within the environment.
Executing the scripted scenario in an IMS LD compliant run-time environment

New-comer:
Executing the scripted scenario in an IMS LD compliant run-time environment

New-comer:
Executing the scripted scenario in an IMS LD compliant run-time environment

New-comer:
Executing the scripted scenario in an IMS LD compliant run-time environment

Change instance information at run-time (e.g., jump)?

• Yes, for the administrator
• No, for participants
Executing the scripted scenario in an IMS LD compliant run-time environment

Change script at run-time (e.g., Inviting Expert)? No

- What kinds of change? change (e.g., add, remove, and modify) what (role, role-member, learning object, service, activity, properties, condition, structure, relation, execution state)

- Who can change the script? Learning designer (script developer), System administrator, roles defined in a script. If a participant with a particular role can change the script, the access control policy should be specified in the script

- What kinds of user interface? Fully-functional editor or change options
Work directions to enhance adaptabilities

Five levels

- **Enhance expressiveness of IMS LD**: extend expressions (e.g., users-when-expression) and actions (assign-user-role).
- **Support the design of adaptive model**: facilitate learning designers to model adaptation easily and efficiently.
- **Provide High-level modeling languages**: realize adaptation when transforming into models represented in low-level modeling languages.
- **Develop advanced interface between participants (e.g., teacher and student) and run-time environment**: Support to exchange observed information, to make decisions, and take actions.
- **Integrate intelligent systems in the run-time environment**: represent deeper reasons for forming group, choosing learning objects, and selecting pedagogical strategies; automatic choose/combine/change/generate learning designs and change run-time information.
Conclusions

• IMS LD has basic capabilities to express adaptation. It has sufficient expressiveness to represent common adaptations like those specified in the scenario. There is a very little space to enhance the capability of IMS LD to represent adaptation.

• The current generation of IMS LD compliant run-time environment has no adaptability except for enabling users to operate limited run-time information. The adaptability of IMS LD compliant run-time environment can be enhanced largely by providing high-level modeling languages, integrating intelligent systems, and providing advanced human-machine interface.