Learning Object Evaluation Metrics Based on Learning Styles Theory

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This poster presents evaluation metrics to assess learning objects in terms of their compatibility with different learning styles. The metrics allow learning objects to be ranked based on their effectiveness with different types of students which, in turn, can facilitate designing and searching for learning objects that meet the learner's requirements and preferences.

Keywords: learning object, learning style, evaluation metrics.

Introduction

Learning objects can be defined as "any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning" (LTSC, 2002). Lecture slides, simulations and textbooks can all be examples of learning objects.

Finding learning objects that meet students' preferences is one of the major problems that may prevent students from using learning objects (Sanz-Rodríguez, Dodero, & Sánchez-Alonso, 2010). This poster proposes evaluation metrics to ensure the compatibility of learning objects with different learning styles. The metrics can be used to guide the instructional design process to ensure that the learning materials provide equal experience for students with different learning styles. The metrics can also be used in learning object repositories to rank the materials based on their compatibility with different learning styles.

Theoretical Background

A learning style is "a particular way in which an individual learns" (Pritchard, 2009). There are different models to describe learning styles. The Felder–Silverman Learning Style Model (Felder & Silverman, 1988) is a famous example which was developed to describe learning styles in four dimensions.

The first dimension concerns information perception. This dimension distinguishes between *sensing* learners who prefer concrete information and facts, and *intuitive* learners who prefer abstract concepts and theories. Sensing learners tend to link the learning material to the real world and prefer to solve problems using well-

established methods. In contrast, intuitive learners tend to look for possibilities and try to find innovative methods of solving problems.

The second dimension is associated with information processing. It distinguishes between *active* and *reflective* learners. Active learners prefer to try something out to see how it works while reflective learners prefer to think something through before making an attempt. Intuitive learners spend more time observing how other people perform a task while active learners tend to practically experiment to understand the new information.

The third dimension describes the way people prefer to receive information. *Visual* learners prefer to use visual media, such as images, diagrams, and animations, to represent information. In contrast, *verbal* learners prefer information in a written or spoken form.

The fourth dimension is associated with information organization. *Sequential* learners prefer to progress in a logical, step-by-step approach, moving from the parts to the whole. *Global* learners prefer to see the big picture before going into the details, using a more holistic approach, without following a sequential path.

Learning Object Evaluation Metrics

The proposed metrics are classified on a number of scales, described below. Each scale represents one dimension of the learning style model. The content of the learning objects should be designed to support the metrics provided in each scale.

Level of Abstraction

This scale evaluates learning objects based on the type of information that they present. The content of the learning object can be either completely abstract, with no link to the real world, or it can be facts, consisting of concrete concepts. To make sure that the content meets the needs of the different learning styles, there should be a balance between the levels of abstraction used in the learning objects. This scale suggests evaluation metrics such as the use of *real world examples* and *analogies*, *facts*, *step-by-step procedures*, and *experimental results*. In contrast, for those who prefer abstract concepts over facts, the leaning objects may contain *mathematical formulas*, *program codes*, *theories*, *puzzles* or *innovative ideas*.

Medium of Presentation

This scale evaluates learning object based on the medium of presentation of the learning object content. The content should be presented visually, using pictures, diagrams or animations. Further, for each visual medium, enough textual or spoken explanations should be provided to support verbal learners. This scale could then use evaluation metrics such as the use of *pictures*, *charts*, *diagrams*, *animations*, *videos* and the use of *text*, *detail* and *audio*.

Interactivity Level

This scale evaluates learning object based on the level of interactivity supported by the learning object. The learning object can support high levels of interaction with the learners by providing features such as *interactive simulations, self-assessment exercises* and *discussions*. To support learners with low preference toward interactivity, the learning object may contain *exercises with model answers*, *reflections* and *ratings* of the learning objects.

Sequencing and Structure

This scale evaluates learning objects based on organization of the content of the material. Balance should be kept between sequential and global organization of information. Sequential support can be achieved by providing *outline* and *overview* components of the learning object. To support global learners, information

related to *prerequisite knowledge* and *comparison* with other learning objects should be provided.

Conclusions and Future Work

This poster presented evaluation metrics to assess the compatibility of learning objects with different learning styles. The metrics can be used by instructional designers and teachers to ensure that the learning material provides an equal experience for students with different learning styles. It can also be used in e-learning systems to recommend appropriate learning objects for learners. In the future, these metrics will be integrated into the design of a new learning object repository to help improve the quality of learning objects during the authoring process.

References

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