Learning objects (LO) aligning different learning styles
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Abstract

Learning content will be organized as learning objects. A learning object can be defined as any digital content resource that's supports learning and that can be reused and can be delivered on demand. To found out the optimal presentation of the learning content, taking into account the learning styles of the learners is a challenge for the instructors. It is perhaps more important to build an adaptable learning environment that presents the material in a variety of methods and addressing more styles, than trying to focus on each learners personal style. Trainers need to present information using the three learning styles. This allows all learners, no matter that their preferred style is, the opportunity to become involved.

To improve e-learning effectiveness authors can produce highly interactive and engaging content applying innovative approaches in some designed scenarios models. In the edumap concept the e-learning content has been decomposed into a set of smaller content components. The e-EDUMAP is so telling the story in a graphical way and in a sequence of steps. This makes it possible for the learner to complete the learning activity in a flexible way.

In principle other scenarios can be built upon the same decomposition of the learning content.

Dependant on the type of scenario model, a set of presentation components or atomic learning objects, will be defined and are brought together into a scenario model design.

Keywords: Learning objects, learning styles

1. Introduction

1.1. Learning objects

Learning content will be organised as learning objects.

A learning object can be defined, as any digital content resource that supports learning, that can be re-used and that can be delivered on demand across the network, be it large or small. Examples of smaller reusable digital resources include full and short text documents, figures, digital images or photos, live data feeds, live or prerecorded video or audio snippets, animations, and smaller web-delivered applications. An example of a larger reusable digital resources include a set of web pages that combine text, images and other media or applications to deliver course modules. In our paper the first ones are named the atomic LO's, the second ones are named the LO's.

1.2. Creative e-learning concept

Just publishing learning content on the website is not enough. To find out the optimal presentation of the learning content, taking into account (more) learning styles of the learners, is a challenge for the instructors/authors

Designing learning objects, to deliver the learning content following a creative e-learning concept is a real challenge. It means finding the best presentation layer put above the content layer to create a scenario model fulfilling the personal learning style requirements of the learner.

2. Learning styles: Learners have different learning styles

2.1. Learning styles

Just as every person is unique, so is every learner. But how much this uniqueness matters is a great debate among educators, trainers, and psychologists.

A learning style is a student's consistent way of responding to and using stimuli in the context of learning. We can say that each student learns best using a learning strategy or method that

best matches his or her need. Or we can say that what matters the most is the learning process, not the style. What is the truth?

Till to now, achieving a solid learning environment that meets the student's need, seems to be the most important key for effective learning and not their learning styles.

There are various instruments used to determine a student's learning style.

2.2. VAK (Visual, Auditory, Kinaesthetic) learning styles and presentation of learning content combining those 3 learning styles

2.2.1. Introduction

The VAK style is a style that is especially applicable in the presentation of e-learning content for the organisation of a self-paced e-learning course. This style is derived from the accelerated learning world and seems to be about the most popular model nowadays. Its main strength is that it is quite simple, which appeals to a lot of people.

It uses the three main sensory receivers - Vision, Auditory, and Kinaesthetic (movement) to determine the dominant learning style.

Learners use all three to receive information. However, one or more of these receiving styles is normally dominant. This dominant style defines the best way for a person to learn new information by filtering what is to be learned. This style may not always be the same for some tasks. The learner may prefer one style of learning for one task, and a combination of others for another task.

2.2.2. Presentation of learning content using all 3 learning styles

Trainers/authors need to present information using all three styles. This allows all learners, no matter that their preferred style is, the opportunity to become involved. It also allows a learner to be presented with the other two methods.

2.2.3. What are the characteristics of the three styles? How to present the learning content to fit best to this learning style? What kind of activities can be organised?

Auditory learners may have difficulty with reading and writing tasks. They often do better talking to a colleague or a tape recorder and hearing what was said.

Visual learners can be differentiated into two sub-channels: *linguistic* and *spatial*. Learners being *visual-linguistic* like to learn through written language, such as reading and writing tasks. They like to write down directions and pay better attention to lectures if they watch them. Learners who are *visual-spatial* usually have difficulty with written language and do better with charts, demonstrations, videos, and other visual materials.

Kinaesthetic learners do best while touching and moving. It also has two sub-channels, the kinaesthetic (movement) and the tactile (touch). They tend to lose concentration if there is little or no external stimulation or movement. When listening to lectures they may want to take notes. When reading, they like to scan the material first, and then focus in on the details (get the big picture first). They typically use colour highlighters and take notes by drawing pictures, diagrams, or doodling. In the following table some examples of activities can be found.

	E-learning activity	Other blended learning activity
Auditory learner	In the beginning of the course the new material has been delivered with a brief explanation of what is coming. At the end a summary of what has been covered concludes the course.	Questioning of the learners to draw as much information from them as possible and then fill in the gaps with some own expertise.
		Include auditory activities, such as brainstorming
		Leaving plenty of time to debrief activities, so the learners can make connections of what they learned and how it applies to their situation.

		An internal dialogue between the teacher and the learners.
Visual learner	Use graphs, charts, illustrations or other visual aids.	Including plenty of content in handouts to reread after the learning session.
	Include outlines, agendas, handouts, etc. for reading and taking notes	Leave white space in handouts for note taking.
		Supplement textual information with illustrations whenever possible.
		Have them draw pictures in the margins.
		Show diagrams and then explain them.
Kinaesthetic learner	Use activities that get the learners up and moving.	Give frequent stretch breaks (brain breaks).
	Play music, when appropriate, during activities.	Provide toys such as Koosh balls and Play-Dough to give them something to do with their hands.
	Use colored markers to emphasize key points on flipcharts or white boards	
		Provide highlighters, colored pens and/or pencils.
		Have them transfer information from the text to another medium such as a keyboard or a tablet.

2.3. An adaptable learning environment: putting the styles together

First, it should be noted that no single presentation of content or activity supporting a specific learning style, ensures that the learner's needs will be met. It is perhaps more important to build an adaptable learning environment that presents the material in a variety of methods and addressing more styles, than trying to focus on each learners personal style.
The more styles are addressed, the easier the instruction can be received by the learner.
Also, material presented in a variety of methods keeps the learners interested and reinforces itself. To improve the usability of the content produced, the instructor has to define scenarios or templates with media-rich content synchronizing static or dynamic multimedia assets, such as streaming videos, slides and animations, with textual information and/or power point slides.
New learning objects templates or scenario models are implementing advanced instructional design and learning strategies, taken into account different learning styles of the learners.
To improve e-learning effectiveness authors can produce highly interactive and engaging content applying innovative approaches in some designed scenarios models.

3. e-learning course module built following a scenario model

3.1. Decomposition of the learning content into Learning Content components.

The learning content has been decomposed into a set of smaller content components or blocks. The blocks contain a small part of learning content (block-full text doc) and can contain some additional information and some interactive and animation documents.
(Abstracts or short text docs, figures, videos, Q&A, keywords, html links, audio fragment,…).

A certain composition of blocks will be designed, linked with the chosen e-learning concept fulfilling the requirements corresponding to the personal learning style of the learner.
An *auditory* learner may prefer to listen to a spoken explanation. A *visual-linguistic* learner likes to learn through written language, such as reading and writing tasks.
For a *kinaesthetic-movement* learner is some parallel activity welcome.

Not only the composition of blocks is important with respect to learning styles, but even as important is the architecture of the block itself.
Which additional supporting, interactive and animating elements will be linked with the block content and how will it be presented to the learner.

3.2. A scenario model

In instructional design a scenario model has to be defined. A composition of blocks will be defined and the architecture of the blocks will be designed. All additional elements are parts of the presentation layer. The learning content included in the block (being the full text document) will be supplemented with other supporting, interactive and animating elements, being all parts of the presentation layer.
The presentation layer is composed of presentation components put above the same original content components. Some of the presentation components are content related and others are more design/format related.
An example of content related presentation component: someone tells the story of a best practice. An example of design related presentation component: a live picture of the storyteller is shown on the screen
The presentation components are belonging to one or more scenarios models.

The e-learning course module and the learning content itself are learning objects (LO). The content- and the presentation- components are atomic learning objects (ALO).

e-learning course module						LO
Scenario model	**Scenario model 1** EDU-MAP	**Scenario model 2** Story-telling	**Scenario-model 3** Tree structured html pages	**……**	**Scenario model n** Dialogue	
Presentation layer	**Presentation components: Pci:** building components of the scenarios (short text docs, figures, pictures, …)					**ALO**
Decomposition of content	**Learning Content components: Cci:** tree-decomposition of learning content module into n parts (full text docs)					**ALO**
Learning content of the course module= e-book						**LO**

4. e-EDUMAP concept and scenario model supporting a combination of more learning styles

e-learning courses can be built following new and advanced learning concepts taking into account the diversity of learning styles of learners.
The e-learning course (modules) can be presented in a graphical way by adding a graphical presentation shell to the traditional e-learning content modules. These e-EDUMAP courses are including the traditional e-learning content modules themselves as "full text" atomic block objects. The e-learning content has been decomposed into a set of smaller content components. Each content component corresponds to a block in an EDUMAP, being a composition of a set of blocks. The e-EDUMAP is so telling the story in a graphical way and in a sequence of steps.
The blocks are composed of some atomic learning-elements, being the short text or audio document, the full text, some additional text or graphical presentations, or pictures, some questions and answers, some tests, some mouse-over animations.

As a consequence the learner can complete the learning activity in a flexible way on a first level by reading only the short text components or can evolve to a deeper study of the topic

by reading the full text components in the pre-defined sequence or learning path. In another way the learner can select his preferred learning topics and selects the corresponding blocks in the EDUMAP.

In the e-EDUMAP learning concept the e-learning content has been presented in a way to create the opportunity of fitting different learning styles.

The learner can decide on his/her own learning trajectory.

On point of the content, the learner can take a first draft reading through the summary and the short texts. Later on he/she can drill down in the detailed content delivered as full text and supplementary content documents.

On point of structure, the learner can follow the sequence as has been set forward by the instructor, or he/she can opt to learn the topics in a different way.
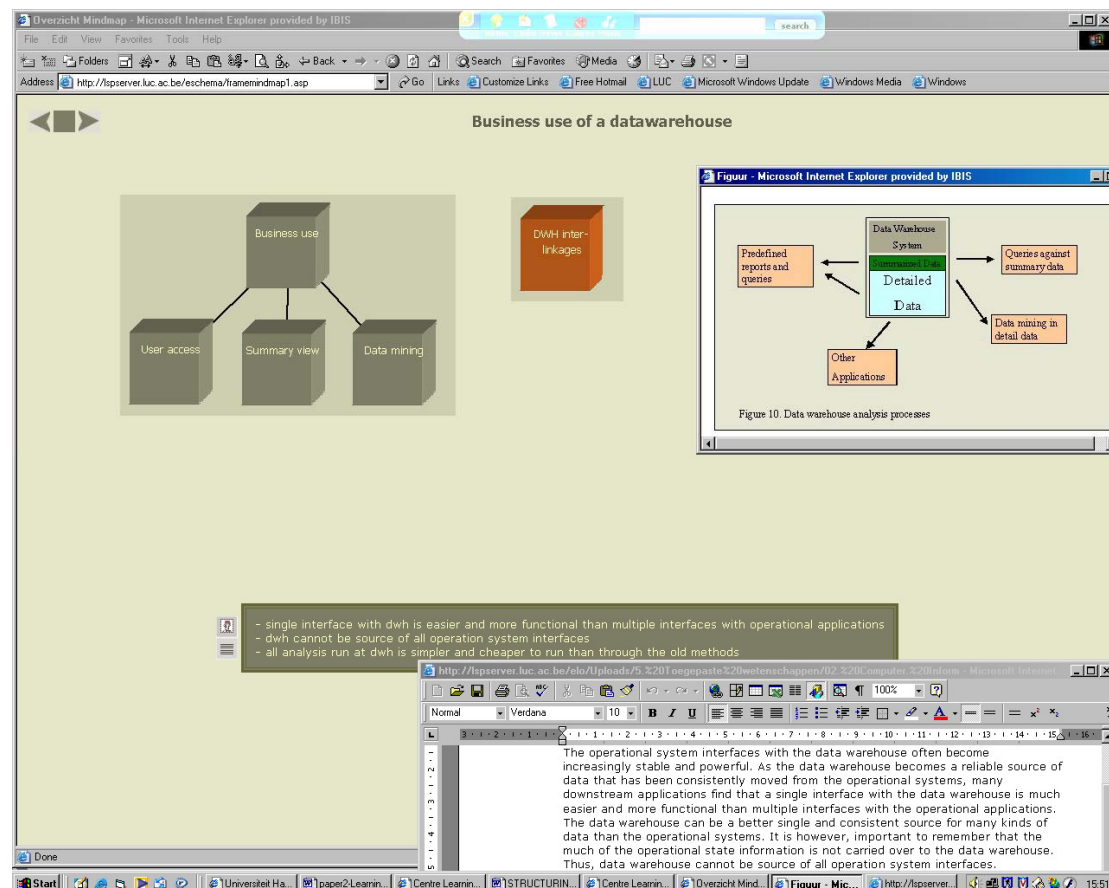
The e-EDUMAP scenario, combining the V.A.K. learning styles
To benefit fully of the advantages of the EDUMAP, it's important for the instructors to try to combine the visual, the auditory and the kinaesthetic components in the e-learning content. E-EDUMAP can capture the auditory component with for example an audio document. The visual component is obvious since the E-mind map is a graphical presentation of the content and contains text as well as pictures. The kinaesthetic component can be built in using animations, video fragments, questions and answers,..

5. Other presentation scenario models built upon the same learning content and presentation components object structure

In principle other scenarios can be built upon the same decomposition of the learning content. But dependent on the type of scenario model, a set of presentation components or atomic learning objects, will be defined and are brought together into a scenario model design. The learning objects (LO) structure corresponding to a scenario model has to be defined and the corresponding relational data model has to be customised.

Some of the presentation components are common to different scenarios and can be re-used. Others are very specific for the scenario to which they belong.

The structure of the Learning Object database has been set up to contain all kind of presentation components required to build e-learning courses following several scenario models.

We can create different compositions or scenario models of the set of blocks to present the learning content to the learner as an e-learning course module. The blocks are the building blocks and linked with them are the basic atomic learning objects.
Not only the blocks are presented in a different composition, the blocks themselves differ in architecture by using the atomic learning objects on a different way.

Following the traditional "web-pages e-learning "concept, we can built a tree structured html scenario model. We can bring together the full text docs of all blocks and put them in the pre-defined tree structure. On this time the block, being a html page must be designed using the presentation of the full text and the other atomic elements, being figures, hypertext links, Q&A, keywords, audio fragments, … can be linked with it following the design of the scenario model.

6. Conclusion

Learning content is organised as learning objects, it can be reused and can be delivered on demand. Finding out the optimal presentation of content is a challenge for every instructor, taking into account the different learning styles of the learners. That's why they need to present information using all three styles. This allows learners, no matter that their preferred style is, the opportunity to become evolved. It is perhaps more important to build an adaptable learning environment that presents the material in a variety of methods and addressing more styles, than trying to focus on each learners personal style. To improve e-learning effectiveness authors can produce highly interactive and engaging content applying innovative approaches in some designed scenarios models. In the EDUMAP concept the e-learning content has been decomposed into a set of smaller content components. The e-EDUMAP is so telling the story in a graphical way and in a sequence of steps. This makes it possible for the learner to complete the learning activity in a flexible way.
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