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LEARNING BY DESIGNING LEARNING OBJECTS THEORETICAL INTRODUCTION

Translation funded by



Education and Culture DG

Lifelong Learning Programme

INTRODUCTION TO CASE FOREST PEDAGOGY

Forests are very important for all of us. Forests make a huge contribution to the economies of many countries, and they have enormous environmental and cultural values, which should be defended and developed. Forests are also good for our health. Controversial topics on the international agenda today are pollution, climate change and the increasing use of bio fuel. These topics are also examples of how forests and the management of forests play an important role in everyone's lives and how new knowledge is produced every day in each country. There is no single answer to the question of how forests can be used in a sustainable manner, and for this reason it is very important to consider the ecological, economical and social dimensions of sustainable development. In this project our aim is to create a method that will enhance learning about forests and their influence on our every-day life.

LEARNING IN INFORMAL AND FORMAL ENVIRON-MENTS

The topical challenge in the international research community is to find new ways to educate our students for today's complex world, and particularly for the future. Many of today's researchers have emphasized that most of the learning that occurs across a person's life span takes places in various informal and non-formal environments and communities. Learning outside school is increasingly becoming more relevant to modern life than what is learned in school. There seems to be a growing gap between the way children live and learn inside schools and outside them. If we think about what is happening in our students' lives, in their communities and networks, we can argue that they have their own ways of thinking about the world, of deciding what is important and what is not. If we compare how children act in their networks and how they work in classrooms, there are huge differences. If we continue to work with children as we do nowadays, most of the students will be bored and gaze with longing out of the school window to the other world that is becoming more and more interesting to them.

Powerful learning environments should therefore be seen as a kind of extended school environment. In addition to traditional classrooms, they should include authentic activities that are situated outside the school environment, as well as technological tools that can function as a bridge between school and the environments external to it. From the perspective of learning design, the challenge is how to construct broadly based learning interventions that encourage students to perceive interesting objects of learning, to ask questions (theoretical as well as practical), and also to create and share the knowledge needed for finding answers to these questions. The key question is how to construct bridges from schools to museums and nature environments, and vice versa.

JOINING TOGETHER TO FORM COMMUNITIES OF INTEREST

The current educational challenge also relates to the basic idea of education. Should we educate our students from the basic elements to the whole or proceed from the whole to the basics. If we take a look at the world we are living in, the challenges that we face and the situations we encounter in our lives, we can argue that it is a question of wholes. Many of today's challenges cannot be solved from only one perspective; we need to have group of people who come from different backgrounds and with different types of expertise. In many cases, no one knows the answer to these problems, but if we work together, communal activities open up possibilities for constructing and finding the answer. For example; if we think about sustainable development, we can easily see the need for collaboration. There are many people who are particularly interested in the environmental, economic or social perspective of sustainable development. If we can bring these people and different point of views together, it becomes possible to develop society in a more sustainable direction. These people can also form a community of interest that shares a common interest, but the participants can approach the phenomena from different expertises or perspecives.

In a school context, this concept challenges the traditional role allotted to the student in the classroom or in an educational setting. Traditionally, students are relatively passive. Study is based on lectures and exams and tasks carried out individually. On the other hand, current pedagogical models emphasize collaborative activities that consider the student to play a central role in the functioning of schools, including the role of teaching other children. It is not memorizing 6 and performing repetitive tasks, but collaborative creation and sharing of knowledge, being open to ideas and constructing, remixing and redesigning new concepts and continually coming up with creative solutions to unexpected problems that have a role position in the learning setting. In this framework, learning means more than anything, else joining the target community, appropriating processes applied by the members of that community, negotiation of meaning; lastly it means learning to be and become something; that is the students should develop their identity.



LEARNING BY DESIGN

Design is a social process and a core human activity. Learning by collaborative design has been seen as one possible instructional approach appropriate for learning, that puts a special emphasis on socially shared and developed thoughts, ideas and knowledge. It is not necessarily important to educate people to know how things are and how the world is, but to educate our students to think how the world should be, and how we would like things to be in the future. These design activities are open-ended and ill-structured by nature, and in most cases the design task becomes concrete through what are called "driven questions" that encourage design and inquiry.



Figure 1. Conceptual model for of learning object design

MUSEUM OBJECTS IN LEARNING

Objects in the museum are physical, conceptual and cultural artifacts that offer exceptional opportunities to develop environments for mediating significant research questions, the semantically rich meanings related to them and at least partial answers to the ill-structured and complex questions constructed by the students. Development of digital technologies has made it possible to represent museum objects in a digital form, and digital technologies like social software can also facilitate various kinds of collaboration - between museum and learners, between different institutions, and among the learners themselves. However, replications of the physical structure of museums in digital form and transfer of the collections to digital form do not in themselves offer efficient solutions for learning. Many museums concentrate on the effort to build a digital copy of the physical museum rather than enhancing and deepening learning from and with museums.

CONCEPTUAL MODELLING OF MUSEUM OBJECTS

In order to approach a museum object or construct digital representations from it, the community constructing their understanding needs to have a conceptual model for the object and tools that can augment physical and cognitive activity. Case Forest pedagogy is partly based on activity theory, which can offer an approach to the conceptual construction of a digital representation of these objects. According to activity theory, learning and action are in ,close interaction, and learning as well as knowledge emerge from action. The three central factors: subject, object and tool are all essential here. In designing the learning objects, the idea is to represent the museum object in several media and integrated closely with the most relevant physical and cognitive tools (see Fig. 1).

The subject comprises the social arrangement whereby the learners participate in the action. The learners can act alone or in a group, although deeper learning results can be achieved when the learners, teacher and other members of the community construct their understanding together.

When constructing a digital representation of the objects in the museum, it is possible to construct representations of different kinds (e.g. video clip, audio, drawing, picture or textual information). When learning from these objects, the learner's also need tools that can be used to augment physical and cognitive activity. For example, if we want to estimate the economic value of a certain tree, we can go to the forest and make measurements and take samples from the forest with the help of certain physical tools (such as hypsometers, increment borers etc). On the other hand, the tools can also be cognitive tools that can help us to construct a conceptual description of the object, for instance, they can help us to analyse the object's structure and its behaviour.

Both the physical and the cognitive have a special function in distributed human cognition. Research in cognitive science has shown that human cognition is not only in the mind of the individual, but distributed among people, artifacts and applied tools. We are constantly storing our knowledge, in the environment, in other people and in the tools we use, and we understand things through certain situations and contexts. Expertise in a certain domain cannot properly be defined without referring to the environment and tools on which the expertise relies.

THE TWO ROLES OF LEARNING OBJECTS IN LEARNING

By learning objects we mean digital representations of real objects that represent the phenomenon in question and the tools for constructing meaning relating to it. Representations refer directly or indirectly to real objects and the contexts where the objects are situated. Representations allow us to perceive the objects from different perspectives, while physical and cognitive tools enhance the negotiation of meaning relating to them.

In Case Forest pedagogy, the learning objects can serve educational purposes in two ways:

a) Learning can be designing these objects, where students and teachers together construct learning objects. This can typically be called a community of learning.

b) Learning through learning objects, where the learning objects can been seen as resources for learning. In most cases learning objects of this kind have been designed and implemented by experts and teachers. In many cases the experts come from different expert cultures or disciplines, but have the same interest (this is an example of a community of interest).

LEARNING OBJECTS IN LEARNING



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