• Equip virtual labs with tools that perform Dynamic Difficulty Adjustment (DDA) and semi-automatic adaptation of the learning parameters according to personal requirements of the learners.

• Evaluate the ENVISAGE outcome.

AUTHORING

Instead of designing a specific virtual lab, ENVISAGE will integrate the aforementioned analytics tools in an authoring environment, which will allow for iterating the process of designing a virtual lab enabling the optimization of the several parameters of the lab. This iterative process, will enable the "perpetual enhancement" of virtual labs.

One of the success measures for an authoring environment is the immersion level that endows to the developed labs. However, most of the already existing authoring environments are capable of building labs which support merely 2D iconic representations of the actual experiments, where user can surely learn about the science behind the experiment, but not really attracted to perform more experiments so as to learn more. As a consequence, the experience factor is too low due to the poor visualizations and the non-intuitive interfaces. ENVISAGE will exploit new and emerging technologies that allow for further immersion and intuition experiences that will upgrade the experience factor allowing students to learn faster and better. Moreover, it will explore how contemporary hardware technologies (e.g., Kinect sensor, Oculus Rift glasses, Google Cardboard, Myo sensor, LEAP motion sensor etc) can be incorporated into the end product so as to boost the immersion factor of the end users.

CONSORTIUM
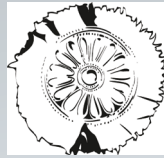
Centre for Research and Technology Hellas - Information Technologies Institute (CERTH-ITI).
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Aalborg University (AAU).
http://en.aau.dk

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ENVISAGE

Enhance virtual learning spaces using applied gaming in Education

http://envisage-h2020.eu

HORIZON 2020
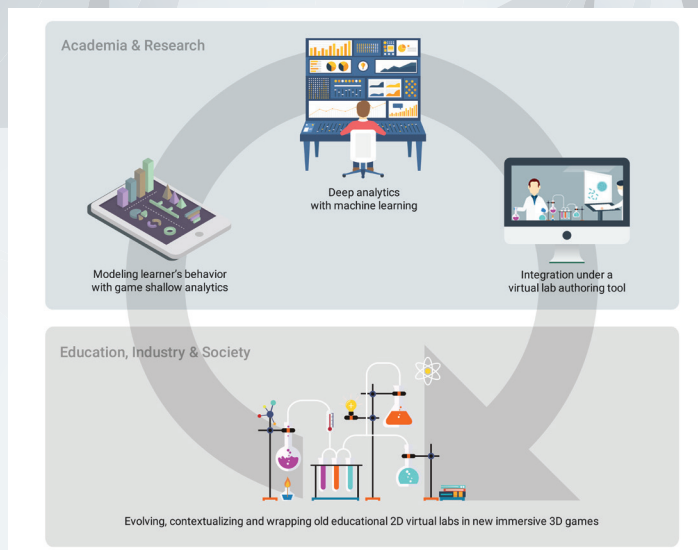THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

ABSTRACT

Online virtual labs, i.e. virtual spaces emulating real laboratories where students can accomplish a number of learning tasks, have the potential to revolutionize the educational landscape by providing students with distance courses and curricula that otherwise would be difficult if not infeasible to be offered. The objective of ENVISAGE is to offer a solution towards optimizing the learning process in virtual labs and therefore maximize their impact in education.

In reaching this challenging goal, ENVISAGE proposes to migrate knowledge from the neighboring domain of digital games, where the capture and analysis of detailed, high-frequency behavioral data has reached mature levels in recent years. In digital games, Game Analytics (GA) is used to profile users, predict their behavior, provide insights into the design of games and adapt games to users. These mature technologies can be readily migrated to learning analytics, especially in the situation of virtual labs as these are delivered online thus enabling detailed tracking of learner behavioral data. Tracking and understanding behavioral data can facilitate decision-making at the design level of a lab, but also can allow for adapting learning content to the personal needs and requirements of students.

ENVISAGE thus proposes a data-driven approach to solve the problems of designing, adapting, revising and evolving virtual labs. To this end, ENVISAGE will develop a high-level, easy to use authoring environment that integrates the above methodological paradigms allowing for designing and implementing high-standard virtual labs. The integrated ENVISAGE solution will offer social benefits, as through the enhancement of virtual labs it will permit easy and effective access to education and learning to the greatest part of community, and economic benefits, as due to its optimized operating level, it will be easily absorbed by educational organizations, offering SMEs the possibility to seize new business opportunities.

CONCEPT

Learning is the subjective process of acquiring knowledge and skills and therefore finding a globally optimal learning pathway is simply impossible. Indeed, it is generally recognized that different learning styles and techniques fit different persons. For instance, some people prefer to learn using pictures and spatial understanding (visual style), while others prefer to learn using words (linguistic style). Furthermore, some people prefer to learn in groups (social style), while others prefer to work alone (solitary style). In addition, each person has its own attitude, cultural background, learning pace, curiosity, habits, competency, preferences, etc. As a consequence, it is straightforward that tailoring learning so as to meet the needs of each subject is a significant concept that can improve the educational level and enhance the social skills of people living in a community. However, personalization of learning using conventional ways (i.e., schooling approaches, book-based learning, etc.) has been the exclusive privilege of merely a tiny subset of people who could afford the accompanying cost of such a service.

Academia & Research

Deep analytics with machine learning

Modeling learner's behavior with game shallow analytics

Integration under a virtual lab authoring tool

Education, Industry & Society

Evolving, contextualizing and wrapping old educational 2D virtual labs in new immersive 3D games

Even in this case though, the personalized service is far from being optimal and perfectly individualized due to inherent constraints of traditional face-to-face tutoring . It is only the recent advance in Information and Communication Technologies (ICT) that has enabled the spread of personalized learning across the largest part of community.

The main advantage of technology-enhanced learning is the ability to offer automated methods, which are easy to be accessed for example through the web.

In this context, recently there have been developed a number of virtual labs emulating real lab environments, where users can accomplish a number of learning tasks and conduct various experiments with no cost and risk. However, the big challenge of such labs is to find effective ways to boost the experience factor in order to motivate the engagement of students with the learning system and prevent them from churning out.

The overarching goal of ENVISAGE is to enhance the design of virtual labs leading to optimal personalized learning processes. Towards this end, the project aims to develop an authoring environment, which equipped with data analytics methods and visualization tools that have been developed and reached maturity in the gaming industry, is suitable for iteratively evolving the design of virtual labs and for dynamically adapting the learning content to the users of the virtual labs.

OBJECTIVES

• Identify the kind of labs that need to be designed and implemented and the learning parameters and services that should be personalized through the analysis of the retained data logs.

• Monitor the activities of users and model their learning behavior by deploying shallow game analytics methods.

• Enable the prediction of the future behavior of learners by deploying deep game analytics methods.

• Provide a high-level authoring environment for designing and implementing virtual labs.

• Relying on an iterative A/B testing approach, inform teachers through a reporting system on the decision-making process for improving the design of virtual labs.