RESEARCH GAME

The European scientific research game for schools

CASE STUDIES

Authors

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1. Case studies

A key aspect of serious games in an educational setting is to motivate with game elements, to generate the willingness to reach something through the use motivational factors in the game. There is often the question "Does learning with Serious Games really works?". But then it comes to the point to ask the question: What is learning all about? When it comes to memorizing knowledge or memorizing formulas? The change from a knowledge-based to a competency-based society increasingly demands the skills: "getting a „bigger picture", "find creative solutions", "learning by using/doing".

While researching into case studies about serious games 4 scenarios have been chosen as example of good practices.

1.1 Use of serious games in physics

How to motivate?

How to motivate students to engage with a subject matter and how to make them apply what they have learned? By exploring a world in a wider sense and by changing this world and monitoring in parallel which laws of natural sciences are in force. With serious games in physics students have the opportunity to build a complete physics library on a specific subject, e.g. of energy consumption and savings. In this library, physical laws and phenomena and their interrelationships, and application fields will be recorded. The motivational element while using the game is that the acquired knowledge can be applied and tested in daily routine at home.

How to learn playing?

Discover + Research: phenomena are detected in the game world and associated to physical principles.

Experimentation + apply: Experiments promote playful understanding of the physical principles. Problem-based learning is done by solving tasks and thus drives the storyline.

Organize + deepen: The young "researcher" collects in the game individual knowledge fragments into a complete concept map. Additional training materials such as blueprints, instructions for experiments, worksheets also facilitate the integration of the game content into the classroom.

Knowledge Network: The young people can also collect discovered and researched knowledge in its own knowledge base. Here all information, notes, phenomena, basic laws and much more are stored in the form of a concept map. The knowledge network grows with the gameplay - detailed information on the individual nodes form an increasingly numerous reference work on which the player can also fall back later.

1.2 Use of serious games for cross-over subjects biology-history

History of Biology is a perfect example of a serious game with the approach on the one hand to teach history and on the other to teach the subject biology: The students get familiar with important discoveries and famous researchers while completing tasks and walking through a certain time line.
The lay out of the games enables the students to learn about the history of biology covering topics such as early historical tools and instruments e.g. the first microscopes. In this relation they also learn about optics and lenses and the referring laws. Further elements that are included are classification, taxonomy, genetics and evolution.

Besides the biology the students get familiar with the inventors and researcher in several time periods starting from the 15th century up today.

To give an example: The research and investigation into cell theory will be carried through by analyzing referring letters and a stamp. To get to the final solution it is necessary to deal with relevant terms such as such as nerve cells metabolism, core, and pepsin. The mechanisms and appearances of diversity and as well as the essential contributions Charles Darwin will be revealed by undertaking several activities such exploring maps, using geocaching elements like use of GPS coordinates, studying literature about and from Charles Darwin. The learner has to complete several missions to come to then final result. As the construction of the game is based on randomized interactive events, each play is different. The students reach the solution through different pathways.

1.3 Use of serious games in job orientation

There are several games on the market in which the student can explore the job, which requirements he/she has to fulfill, which activities happen, which skills are needed, and there is also a point where the student comes to the cross way: either becoming employed or becoming an entrepreneur.

Beach manager

This is a very good example what concerns the above mentioned cross way:. Beach manager sounds attractive and reflects the life style of the young generation: music, sports, amusement. All elements are directly linked to leisure time. The aim of the game is to learn that it is much much more.

The business game aimed at secondary education (8th-10th grade) turns economy into an experience in simple, practical and funny way.

The students grouped in teams of 3 or 4 jump into the role of the management of a virtual water sports center. It will be played in several rounds. The tasks are manifold: buy sports equipment, enough to hire employees, set reasonable rental prices, and invest wisely in advertising, while keeping costs and revenues always in view. The center has to be operated successfully so that by the end of the season the highest possible profit is the criteria for the ranking.

With beach manager an economic situation is simulated in which the students can understand real processes in a company approach. Through the reality of the game scenario, students can make a connection to their own experience. They playfully learn about the situation and know the tasks of an entrepreneur, they make their own decisions like a "real" manager, and they make moreover the experience the consequences of their actions.

Because entrepreneurial action takes place not only on paper, practical activities play a central role in the game: production of a poster, designing a multi-page information flyer, generating crisp slogan, offering cocktail sale in the big break or a convincing business presentation to the class - the scenario holds numerous points ready that have a direct impact on the game, for example, through a bonus to the computational simulation result.

1.4 Use of serious games in social subjects

The society is faced with the phenomenon that young people are tired of policy. The reasons therefor are manifold: The transparency of the political structure of the country and the political system is lacking. The students have the feeling that they don't have any influence on the system on the whole. The party system is driven by money and corruption. Many of the young students are not aware of the importance of elections. The right to vote is a democratic right which should be used to have an active influence on the society. Social subjects at school seem to be boring. Serious games should help to overcome this situation.

Serious games focusing on democracy come into play: The starting point is in many cases a fictive country with a given political situation. Several different profiles have been allocated to the students. Afterwards after getting familiar with the role e.g. minister, union member, they have to introduce themselves, showing off with their personality, and they have to explain their policy and why it would be good that they will get the votes. In this chain of argumentation all elements of social life are included: education, tax system, national economy, military service, welfare, foreign policy, transport, law and order and public services. While playing the game the students learn about more about the power a vote has and the rights that exist. And it helps to understand and estimated the democracy in comparison to other social systems.

2. GOOD PRACTICE EXAMPLE OF USING SERIOUS GAMES IN BIOLOGY

The below given example is taken from http://forensics.rice.edu
The motivation to run this game media driven. And in this case TV fulfills also the educational task media have. Young people are fascinated by high tech stuffed action serials on TV just like CSI where forensic biology is the research subject. This serial was also the base fore many young people when they had to decide what they want to become and which studies they have to choose.
In this research game all elements are included for using it the context of formal and informal learning.

The game can be played autonomously or by making use of virtual mentor.

The game has different levels to pass according to the knowledge level acquired.

The students learn about forensic biology and in this special case all about DNA, with the background of crime investigation to make it more adventurous.

They learn about the DNA from the biological point of view, about the steps to undertake how to find about the DNA features, how to use the tools, how the equipment works, how to evaluate the results and how to come to the conclusion.

A welcome page makes you familiar with the rules and the framework of the game. Check lists help to keep track.

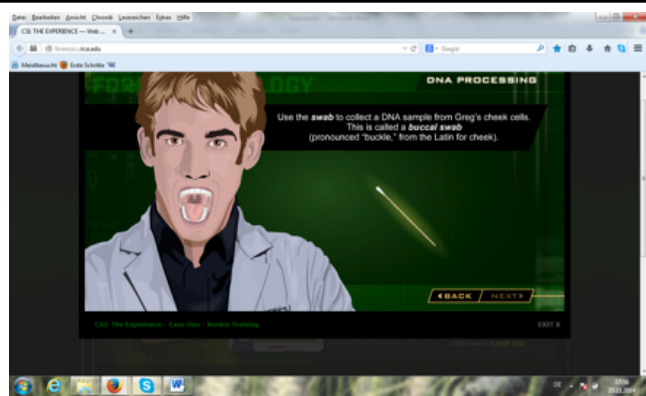A virtual guide is available to give advice when you get stuck, and what is the best way to solve the task.
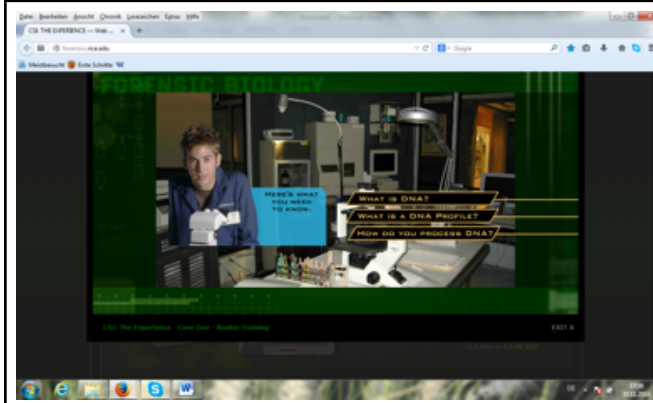
You get an introduction in the terms and definitions and laws of biology.

The right order of steps is given which should lead the learner to success.	
	It is possible to start the game without reading all the materials provided on the platform.
If the student doesn't succeed he/ she has the opportunity to take up training sessions with the help of the virtual tutor which is always a good way to start.	
	The students learn about the terms use in biology (object of investigation, research tools and instruments), and about the way to proceed step by step and in the right order.

http://www.researchgame.eu/platform

They learn how to use equipment. The advantage is that all of the actions they do is a non-destructive usage as it is virtual.

Last but not least they get results they have to analyze and evaluate. This is similar to the research game on biodiversity where the students had to check their results against the thesis made before.