

Pump it up!

Workshop 3: Ist doch alles nur ein Spiel? Games und Simulationen

Smart Teaching – Better Learning

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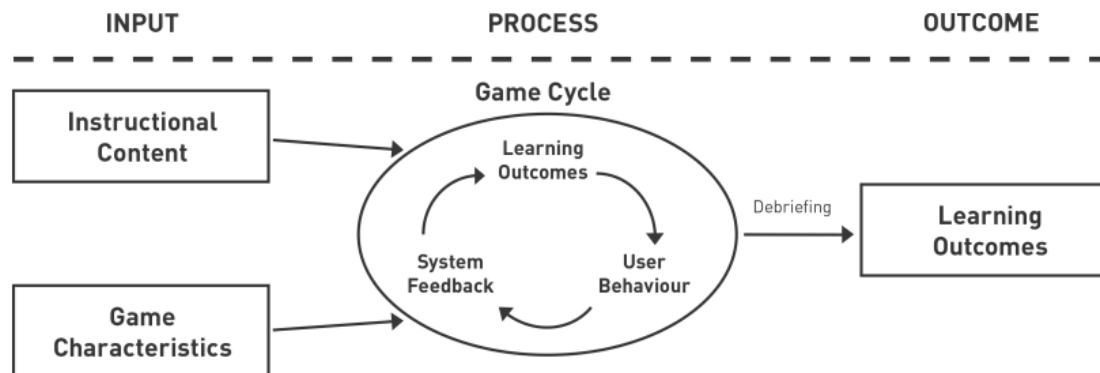
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→ Motivation

- The student dropout rate in mechanical engineering at German Universities is approximately 40%.
- A lacking sense of achievement and the lack of practical relevance for future careers are often named as reasons to quit studies prematurely.
- Evaluation results from the lecture “Computer Science in Mechanical Engineering” at RWTH Aachen University show that most students are unaware of the relevance of computer science in mechanical engineering as well as their importance and application in future career.
- A promising approach combining self-controlled acting with fun is game-based learning.
- One third of the German population regularly plays computer games, two thirds of them play every day (Hampe 2011).

→ Game-based learning

- Over the past decade computers are often used to facilitate learning (Pivec 2008: 17).
- Emotions play an important role in the learning process and in relation to the learners' motivations. Brandstätter et al. (2013: 134) state that emotions have an important function in terms of motivation processes: motivated behavior is aimed to gain positive emotions and to avoid negative ones.
- A well-known model of motivation is the concept of flow, which describes the involvement in an activity (Csikszentmihaly 1997: 29).
- This emotional state can stimulate the students' learning process.
- Students have the possibility to participate actively and experientially in the learning process.
- The didactic concept of the online game "Pump it up!" is based on the game-based learning model by Garris, Ahlers and Diskrell (2002: 446).



game-based learning modell (Garris et al. 2002)



Development of “Pump it Up!!”

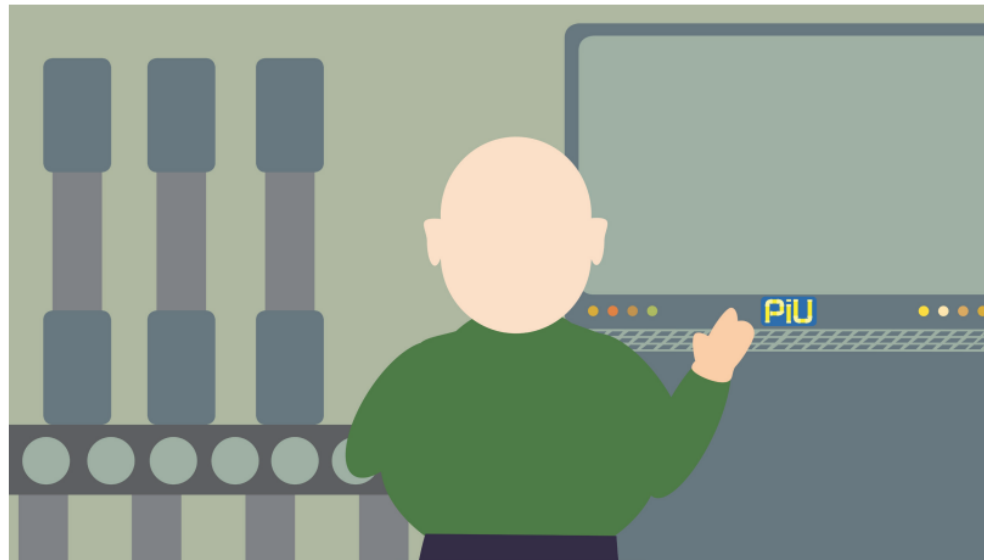
- The game will take up the already existent project-based task as part of the lecture “Computer Science in Mechanical Engineering”.
- Using the example of pump adapter pipes manufacturing as well as programming robots to manufacture the pipes, students experience the importance and application of basic knowledge on computer science for their later career in the field of mechanical engineering.
- One important learning outcome is to illustrate the broad field of application of computer science in engineering education.





Storyline

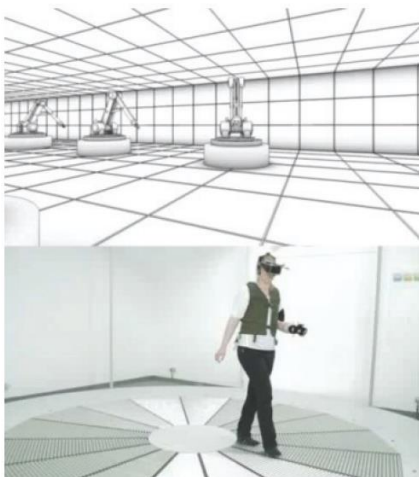
- The manufacturing of pump adapter pipes is embedded in a storyline which is based on a start-up company, called “Pump it up!”.
- The students can choose a character respectively an employee of the start-up company.
- The company gets the order to produce new pump adapter pipes for a brewery.
- Depending on the solution of the task of manufacturing pump adapter pipes, students can decide how the game end is designed. In case of a successful and high-quality manufacturing of the pipes, the start-up company receives follow-up orders by the brewery.





Technical Implementation

- The main technological objective is that students can play the game on different devices like their laptop, tablet pc or smart phone.
- To reach this goal, the implementation of the game must be independent from the OS e.g. Windows, IOS or Android.
- Therefore, the online game will be set up as a browser game.
- To gain the best performance and support for innovative concepts the game is constructed on HTML5, JQuery and CSS3 technologies.
- The remote control of the presented assembly cell will be realized by using ROS-Industrial. The assembly cell will be controlled via the Virtual Theatre (Ewert 2013).



Let's see the Game

