“FAIRY-TALE COMPUTER SCIENCE” - CREATIVE APPROACHES FOR EARLY COMPUTER SCIENCE IN PRIMARY EDUCATION

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CONCEPT OF “FAIRY-TALE COMPUTER SCIENCE”

The project "Fairytale Computer Science" aims at

• fostering problem-solving thinking,

• presenting concepts of computer science in a child-friendly way

• and developing materials for primary school.

The development of the project was based on the concept of the project "Informatics - A Child’s Play" (Sabitzer et al. 2014).
CONCEPT OF “FAIRY-TALE COMPUTER SCIENCE”

The pilot phase (2018/19) aimed at

1. development of teaching units and materials
2. implementation in the "Digi4kids" exercise
3. final phase with a final evaluation and publication of the materials
CONCEPT OF “FAIRY-TALE COMPUTER SCIENCE”

The project phase itself (2019/20) aims at

• adapting and disseminating the teaching materials,

• investigating the integration of computational thinking through fairy tales in some partner schools and

• investigating attitudes of children and teachers towards these topics as well as the impact for children regarding e.g. motivation and text comprehension.
THE 4 P’S

The project is based on the four basic principles of creative learning by Mitchel Resnick (2014), because they play a central role in the introduction to computer thinking.

• Projects
• Peers
• Passion
• Play
PROJECT DESCRIPTION

The project was realized in the "Digi4kids" course at a primary school in Lower Austria.

A special focus is the introduction to basic concepts of informatics and computational thinking. The course was attended by 13 children of 4th school level. In the school year 2018/19 four modules of "Fairytale Computer Science" were implemented.

The course was held every two weeks. The modules lasted between 2 and 5 units. They include teaching units ranging from programming without a computer to working with robots.
MODUL 1: PROGRAMMING WITHOUT COMPUTERS

The first module served to introduce the students to programming without computers and robots in a playful way.

Targets:
- dividing tasks into small steps
- encouraging algorithmic thinking and problem-solving
- classmates "programming" their own programs

Figure 1 Programming unplugged
MODUL 2: PROGRAMMING BEEBOTS

This module focuses on the programming of Beebots, a very simple floor robot.

Targets:
- familiarizing with the function of the Beebot
- getting to know first steps of programming
- recognizing correlations

Figure 2 Beebots
MODUL 3: PROGRAMMING OZOBOTS

The third module used the small on-board robot Ozobot that moves on two wheels and uses color sensors to follow lines and recognize color codes.

Targets:
- familiarizing with the functions of the Ozobot
- getting to know programming and encoding
- recognizing the connections of the fairytale "Mother Hulda"

Figure 3 Ozobots moving on a fairytale map
MODUL 4: STOPMOTION-VIDEOS

As the pupils were familiar with handling tablets, it was decided to use the app "Stopmotion" to also use multimedia to work up the subject of "fairy tales".

Targets:
- assembling a video from individual images
- telling a story with moving pictures
- presenting the results
- retelling and interpreting the fairy tale Little Red Riding Hood

Figure 4 Stopmotion video
METHODOLOGY

The basis of the study in the pilot phase was a literature review to develop the course into a practicable computer science course for primary school.

The methods chosen for the research were **scientific observation** and **group interviews** conducted as immediate oral feedback of the pupils.
METHODOLOGY

The research question:
Is the course design suitable to implement digital basic education and computational thinking in the primary level?

The sample (n=13):

4th grade primary school students
5 girls and 8 boys.

The course was held in an Austrian primary school in the school year 2018/19.
RESULTS

• Experience to date has clearly shown that fairy tales and digital literacy can be wonderfully combined.

• The structure of the project according to the four principles of creative learning by Resnick contributes to the successful implementation.

• Problem-solving and algorithmic thinking, recognizing problems and creatively solving tasks is already clearly identifiable in primary school children.
RESULTS

• An introduction to computational thinking can be easily started from the 4th school level onwards.

• A pleasant working atmosphere and good cooperation were identified.

• This project contributes to the fostering of creativity and interest in digital media and technology.

• There were also no differences in coding skills or motivation with regard to gender.
CONCLUSION AND OUTLOOK

After this pilot study the course material will be refined, adapted and the project will be part of a research study in the school year 2019/20.

Our future work will focus on further assessment and analysis of the data that we will collect in the field tests. We want to get more insight in attitudes of primary school teachers and pupils towards computational thinking as well as possible impacts on learning outcomes, e.g. story telling or text comprehension.
CONCLUSION AND OUTLOOK

The concept of "Fairy tale computer science" will be presented to teachers in several teacher training courses. After the final evaluation phase, the teaching materials will be made freely available to interested teachers as OER material.

In addition, we will investigate whether primary school teachers can work with the course concept and are willing to use it in their teaching.
REFERENCES
