



Eidgenössische Technische Hochschule Zürich  
Swiss Federal Institute of Technology Zurich

# A computer-based learning environment aimed for students at the 3rd and 4th grade level

Bachelor's Thesis

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Eidgenössische Technische Hochschule Zürich  
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## Eigenständigkeitserklärung

Die unterzeichnete Eigenständigkeitserklärung ist Bestandteil jeder während des Studiums verfassten Semester-, Bachelor- und Master-Arbeit oder anderen Abschlussarbeit (auch der jeweils elektronischen Version).

Die Dozentinnen und Dozenten können auch für andere bei ihnen verfasste schriftliche Arbeiten eine Eigenständigkeitserklärung verlangen.

Ich bestätige, die vorliegende Arbeit selbständig und in eigenen Worten verfasst zu haben. Davon ausgenommen sind sprachliche und inhaltliche Korrekturvorschläge durch die Betreuer und Betreuerinnen der Arbeit.

**Titel der Arbeit** (in Druckschrift):

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*Bei Gruppenarbeiten sind die Namen aller Verfasserinnen und Verfasser erforderlich.*

**Name(n):**

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Ich bestätige mit meiner Unterschrift:

- Ich habe keine im Merkblatt „[Zitier-Knigge](#)“ beschriebene Form des Plagiats begangen.
- Ich habe alle Methoden, Daten und Arbeitsabläufe wahrheitsgetreu dokumentiert.
- Ich habe keine Daten manipuliert.
- Ich habe alle Personen erwähnt, welche die Arbeit wesentlich unterstützt haben.

Ich nehme zur Kenntnis, dass die Arbeit mit elektronischen Hilfsmitteln auf Plagiate überprüft werden kann.

**Ort, Datum**

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# Acknowledgements

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# Abstract

a brief introduction describing the discipline that the paper belongs to a clear and concise statement of your problem a brief explanation of your solution and its key ideas a brief description of the results obtained and their impacts

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# Introduction

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With the introduction of Lehrplan 21 Computer Science became an integral part of the Swiss education curriculum [1]. Pupils learn to understand the basic concepts of Computer Science and how to use them for problem solving. These concepts include methods on how to process, evaluate and summarize data, how to securely communicate and how to develop solution strategies for simple problems of information processing [2]. The Education and Counselling Center for Computer Science Education at ETH Zurich (ABZ) supports schools to teach these concepts among others by providing teaching resources and learning environments.

The main goal in this bachelor thesis is to implement tasks and riddles based on the textbook “einfach Informatik 3/4” in a computer-based learning environment that teaches the following concepts:

- representing information with symbols,
- protecting data and keeping information secret and
- learning from data

for pupils in the second cycle. Along with solving tasks and riddles about the mentioned topics the ability of reading, writing, counting and calculating is trained as well.

This report first explains how the aforementioned concepts are thought by hands-on exercises, then gives in-depth technical insight on how a learning environment is developed and how these exercises are implemented. Finally, the report ends with a conclusion with a review of the project.

## CHAPTER 2

# Concepts

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This chapter is split into three parts. Each part discusses a basic concept of Computer Science and its corresponding exercises.

### 2.1 Representing Information with Symbols

#### 2.1.1 Similar Words

#### 2.1.2 Representing Numbers like the Mayas

#### 2.1.3 Representing Numbers with Coins

#### 2.1.4 Representing Numbers with Binary Coins

### 2.2 Protecting Data and Keeping Information Secret

#### 2.2.1 Cipher Texts from Reversed Letters

#### 2.2.2 Cipher Texts from New Characters

### 2.3 Learning from Data

#### 2.3.1 Row of Trees

#### 2.3.2 Tree Sudoku

# Implementation

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CHAPTER 4

# Conclusion

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# Bibliography

- [1] Lehrplan 21. Accessed on 01.02.2021. [Online]. Available: <https://lehrplan21.ch>
- [2] Medien und informatik. Accessed on 01.02.2021. [Online]. Available: <https://www.regionalkonferenzen.ch/medien-und-informatik>
- [3] A. One and A. Two, “A theoretical work on computer science,” in *30th Symposium on Comparative Irrelevance, Somewhere, Some Country*, Jun. 1999.
- [4] A. One and A. Two, “A theoretical work on computer science,” in *30th Symposium on Comparative Irrelevance, Somewhere, Some Country*, Jun. 1999.

# First Chapter Title

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**Todo:** This is a TODO annotation.

## A.1 First Section Title

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### A.1.1 First Subsection Title

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**Remark:** This is a REMARK annotation.

**Theorem A.1** (First Theorem). *This is our first theorem.*

*Proof.* And this is the proof of the first theorem with a complicated formula and a reference to Theorem A.1. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua.

$$\frac{d}{dx} \arctan(\sin(x^2)) = -2 \cdot \frac{\cos(x^2)x}{-2 + (\cos(x^2))^2} \quad (\text{A.1})$$

□

**Lemma A.2.** *lorem ipsum dolor sit amet*

**Corollary A.3.** *lorem ipsum dolor sit amet*

**Observation A.4.** *lorem ipsum dolor sit amet*



Figure A.1: This is an example graphic.

**Definition A.5.** lorem ipsum dolor sit amet

**Problem A.6.** lorem ipsum dolor sit amet

**Assumption A.7.** lorem ipsum dolor sit amet

**Example A.8.** lorem ipsum dolor sit amet

*Claim* A.9. lorem ipsum dolor sit amet

*Remark* A.10. lorem ipsum dolor sit amet

And here we cite some external documents [3, 4]. An example of an included graphic can be found in Figure A.1. Note that in  $\text{\LaTeX}$ , “quotes” do not use the usual double quote characters.