

106

Research & Validation

Scientific Output

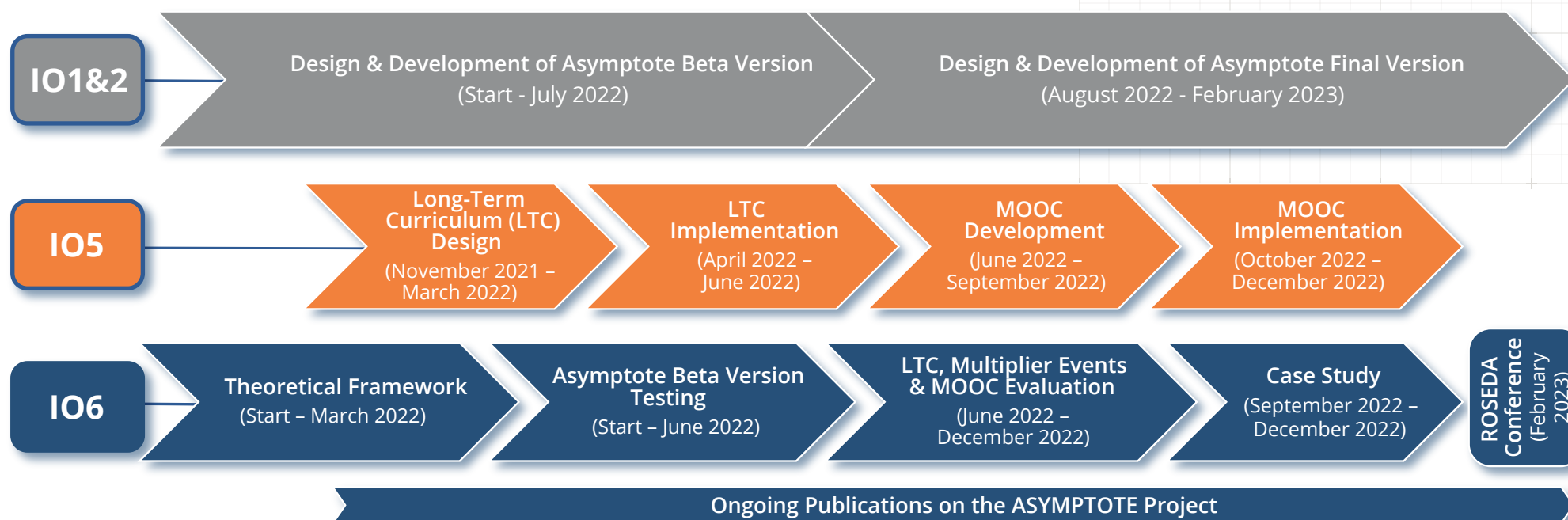
Research & Validation: Description

IO6 includes the design, implementation, and results of the educational research for ASYMPTOTE.

1. Development of a theoretical framework including online teaching and learning, mobile learning and e-pedagogy. It provides **information to the design and development process**.
2. Conduct of an extensive **beta-testing** of ASYMPTOTE and feedback on the user-friendliness and performance of the digital learning environment.
3. Research on the system's use in multiplier events to evaluate **effectiveness and the optimal orchestration of the learning-teaching settings** that utilize this innovative digital tool.
4. Research and validation of ASYMPTOTE in authentic situations by following a **mixed methods methodology**, the use of interaction analysis, and the assessment of the adaptive functionality under partial information conditions.



Overview on Tasks and Outputs



1. Development of the ASYPMTOTE Theoretical Background

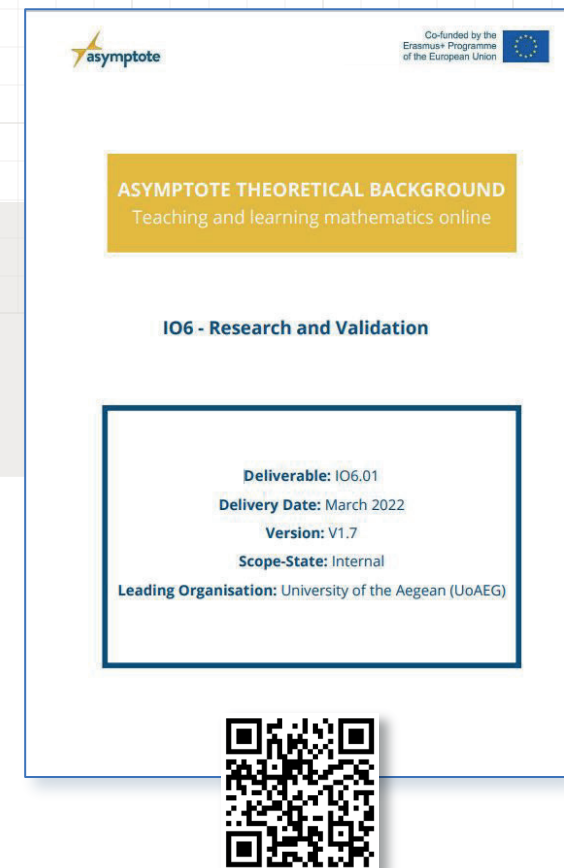
The Theoretical Background is a product of analysis and recompilation of modern approaches and theories on online teaching and learning online. It establishes the pedagogical model of ASYMPOTOTE.

Main chapters:

- Chapter 1. - Teaching and learning with ASYMPOTOTE in the continuum from face-to-face to online education
- Chapter 2. - Online Pedagogy Theoretical Frameworks
- Chapter 3. - Teaching and Learning Design for ASYMPOTOTE

How the Theoretical Background was used in the project?

- Influence the design of the system features-affordances according to **research findings** and Community of Inquiry model
- Supports the **meaningful use** of the systems by the teachers
- The Theoretical Background was used as the **basic text for study** in the corresponding modules of the Long-Term Curriculum (LTC) and MOOC and can be used in every ASYMPOTOTE related professional development program.



2. Testing of the ASYMYPTOTE Beta Version

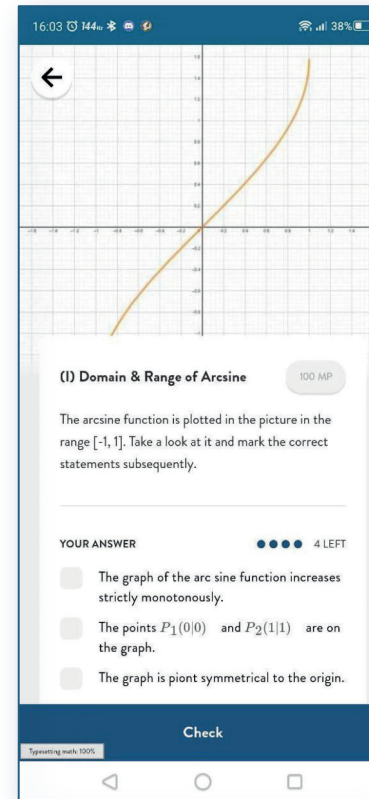
>> Web Portal



During the development phase:

- Expert-based formative evaluation
- System Usability Scale (SUS) Questionnaire (Brook, 1996)
- Heuristic evaluation forms

>> Mobile App



Aim: Report problems before the official release of the system & raise ideas for the further development

Output: Beta-testing led, among others, ...

- to an ease of the user flow when creating learning graphs;
- to an improvement in sharing content with other teachers
- to the setup of a common landing page for the web portal (IO1) and the Erasmus+ project.

3. Evaluation of LTC, Multiplier Events & MOOC

Content Related Evaluation

- to let participants express their experience in using the ASYMPTOTE system

Technology Acceptance Model

- to estimate the impact of LTC and MOOC on the intention of the participants to use the ASYMPTOTE

Course Experience Questionnaire

- to evaluate the reception of the LTC and MOOC by the trainees

The image shows a printed questionnaire form titled 'Long Term Curriculum (LTC) Final Questionnaire' with the ASYMPTOTE logo at the top. The form includes an introduction in English asking for 20 minutes of time to assess satisfaction and experience, a privacy statement, and a thank you note. Below this, there is a section for 'Διεύθυνση ηλεκτρονικού ταχυδρομείου' (Email address) with a red asterisk indicating it is required, followed by a line for 'Η διεύθυνσή σας ηλεκτρονικού ταχυδρομείου...'. There is also a 'General Information' section with a 'Name' field marked with a red asterisk and a line for 'Η απάντησή σας' (Your answer).

Online questionnaires were delivered to LTC, Multiplier Events & MOOC participants.

More details available on the
ASYMPTOTE Research Webpage:



3. Evaluation of LTC, Multiplier Events & MOOC

LTC Evaluation

- 36 in-service & pre-service teachers from Germany, Greece & Italy
- Technical Status:
Beta-version of the app
- Participants perceived the course very well in all aspects & are willing to use the ASYMPTOTE system
- Published in ROSEDA Proceedings (see ASYMPTOTE Research Webpage):



Multiplier Events Evaluation

- 28 in-service & pre-service teachers from all partner countries
- Technical Status:
First released version of the app
- Results can be found on the next slide

MOOC Evaluation

- 47 in-service & pre-service teachers from all partner countries
- Technical Status:
First released version of the app
- Participants perceived the course very well in all aspects & are willing to use the ASYMPTOTE system
- Publication in preparation



3. Evaluation of the Multiplier Events

ASYMPTOTE is rated as a good to excellent system:

- The participants have a **positive perception of ASYMPTOTE** as an intuitive, user-friendly, attractive, and effective system.
- Most of them **wish to use it in practice** for now on. Especially the **most experienced teachers** declare more certainly that they will use the system for teaching.
- They point out advantages of the system **referring to its functional characteristics** e.g., adaptation and Digital Classroom. This justifies the design decisions made by the project team.
- Finally, teachers name and describe some of their **concerns** about the system use and propose specific improvements. These comments were addressed by further developments, e.g., by the provision of supportive materials.

(Student) Teacher's Statements

Easy to learn from teachers and students, enables dynamic course planning and enables the student to engage in learning at the time and place he wants since the system uses a device that the student almost always has with him

Intuitive, complete, flexible.

It is intuitive in the sense that it is very easy to use. It is complete because it offers you a wide range of possibilities in creating tasks.

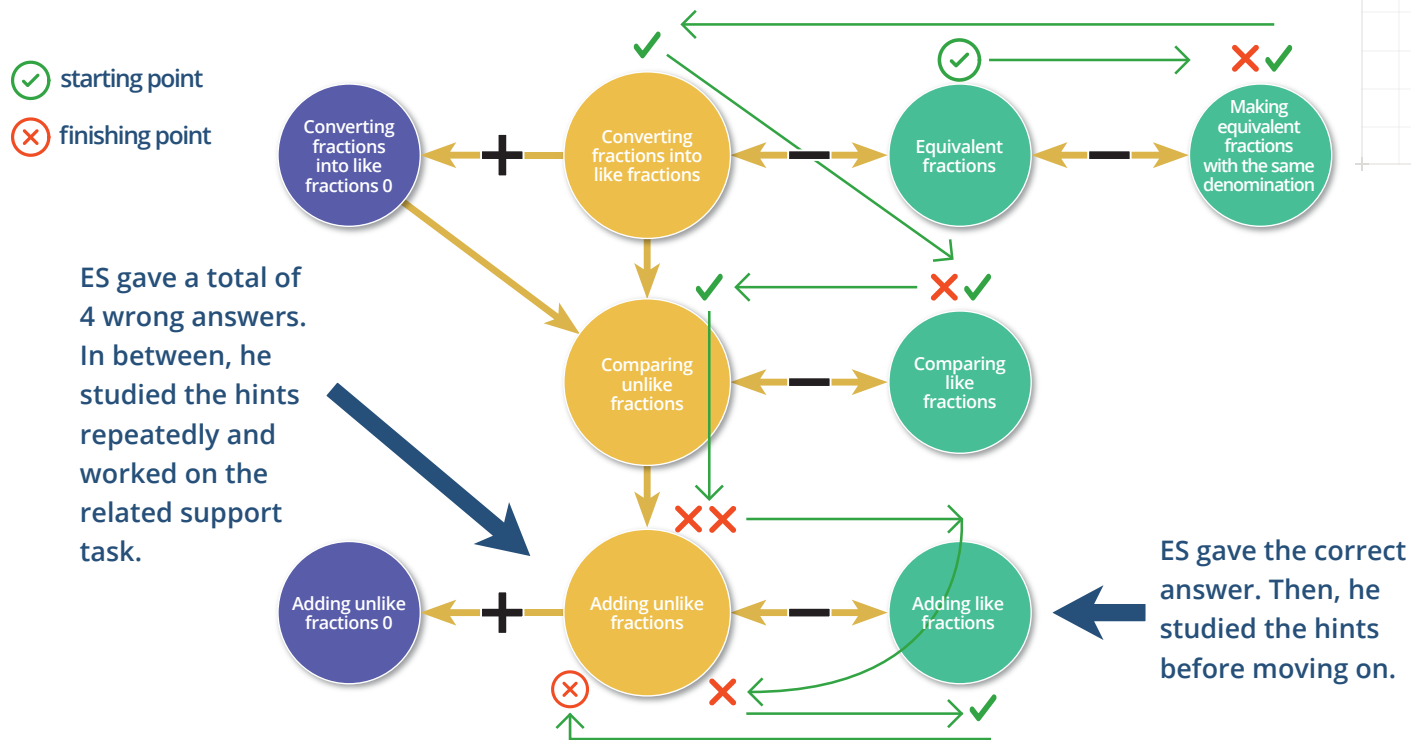
It is flexible because it adapts well to every ideas you can have.

Easy to use like a game (the look of application is like mobile game). Communication teacher student via digital classroom.

4. Use Case Analysis: Pedagogical Validation

During the academic year 2022-2023 experimental case studies were conducted in grade 6 and 7 for the pedagogical validation of ASYMPTOTE along to the evaluation of the usability of the app by the students.

Aim: To examine how students use the affordances of the ASYMPTOTE system to overcome their misconceptions in fractions.



Observations:

Student ES worked on the support tasks in order to solve the related main tasks. This approach was successful on two out of three tasks. His strategy of taking advantage of the hints is remarkable: ES studied the same hints repeatedly and opened some of them even after finding the correct answer.

4. Use Case Analysis: Pedagogical Validation

Key findings

- The students consider most of the affordances of ASYMPTOTE as useful
- The learning graph concept & features like hints help students to overcome misconception.
- The Digital Classroom supports fruitful interactions among the teachers and the students
- The system supports the key requirements for effective teaching and learning for online learning situations such as personal interaction and formative assessment.

Results for 6th Grade

- Published in ROSEDA Proceedings:
(QR-Code zu Research Page)



Results for 7th Grade

- Publication in preparation

Further Results

- Two use case studies in Germany were carried out in autumn 2022
- Publication in preparation

