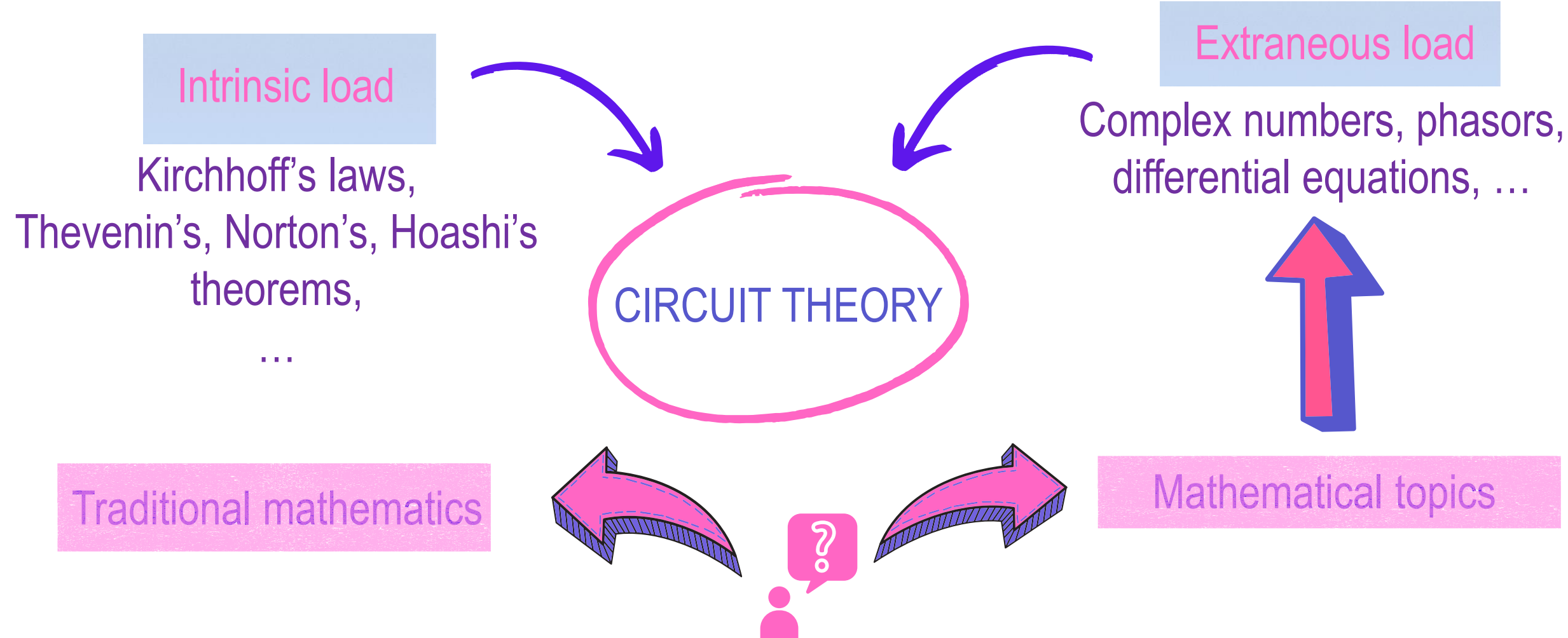


## Research context and motivation

- A course of circuit theory presents a very high both intrinsic and extraneous cognitive load



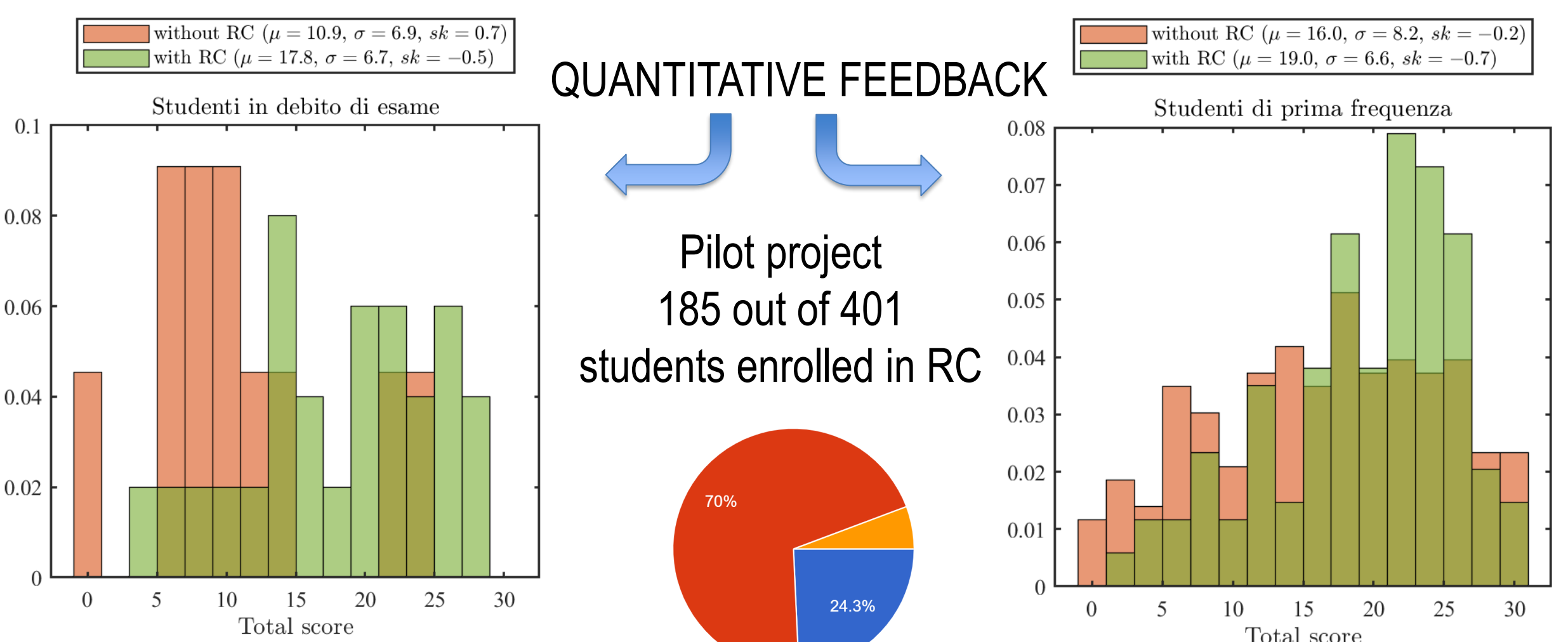
- Mathematical topics in a more applicative way than basic courses.
- A solution that introduces **high germane load** and reduces the extraneous load: a **remedial course** adapting to **individual needs** of students delivered via e-learning tools.

## Addressed research questions/problems

The remedial course has the following goals:

- On the students' side:**
  - Avoid postponing the study and accumulating too many gaps that would prevent the understanding of advanced topics
  - An additional and constant practice throughout the course
  - Consolidate each topic to achieve at least the minimum score
- On the teacher's side**
  - Stimulate constant studying
  - Improve learning efficiency
  - Improve the scores and success rate at the final examination

## Results



### QUALITATIVE FEEDBACK

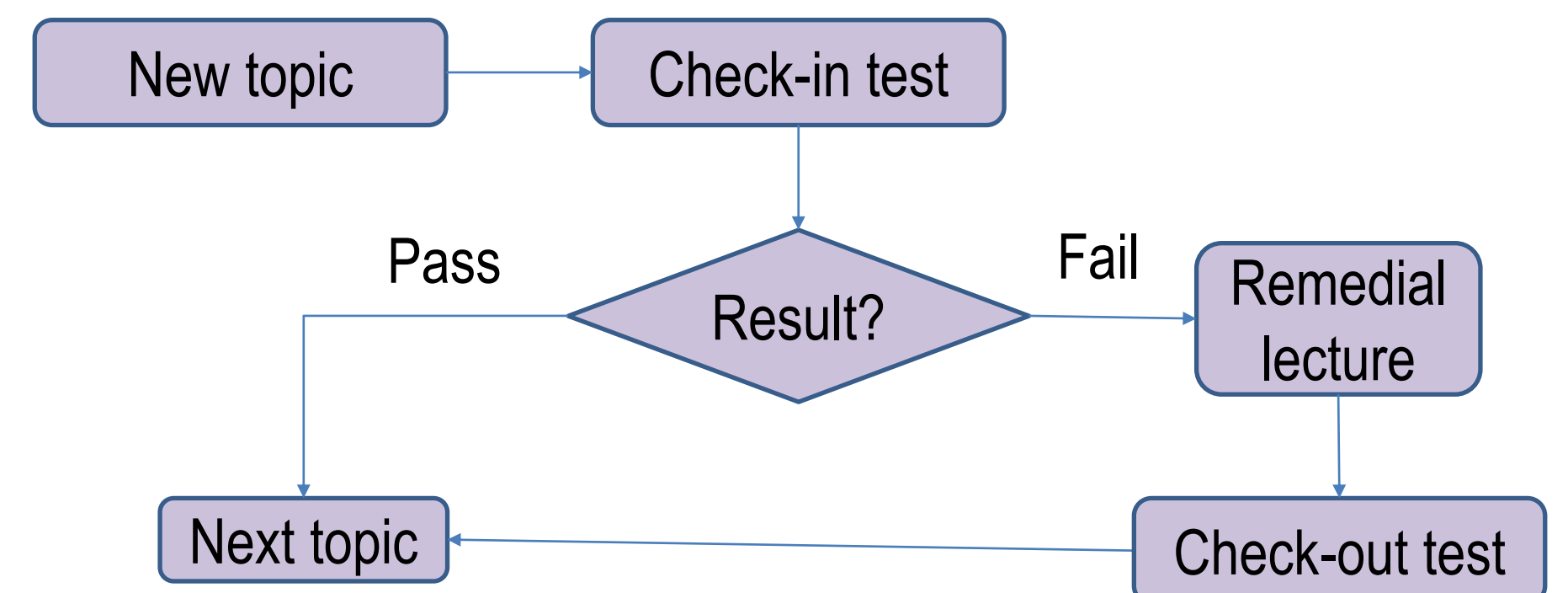
The course met my expectations  
The course was beyond my expectations  
The course was below my expectations

## Submitted and published works

- E. Perano, M. Codegone, "A Mathematical Improvement of the Skate Curves", *Imagine Math* 7, 2020, pp.247-262
- E. Perano, "Further Applications of Continued Fractions to Series-Parallel Circuits", *Applied Mathematical Sciences*, Vol. 14, no. 15, 2020, pp. 717 – 724
- E. Perano, "L'uso delle funzioni parte intera e mantissa nei processi di campionamento e quantizzazione", *EMMECIQUADRO*, Vol. 78, 2021, pp. 1 – 10
- E. Perano, P. Marescotti, L. Morini, "The Building Block Game", *JOURNAL OF INNOVATIVE TECHNOLOGY AND EDUCATION*, vol. 9, no. 1, 2022, pp. 1-19
- E. Perano, P. Manfredi, "Development of a remedial course for students who attend classes of circuit theory," in Proc. of the 4th International Conference on Higher Education Learning Methodologies and Technologies Online (HELMETO 2022), Palermo, Italy, September 2022

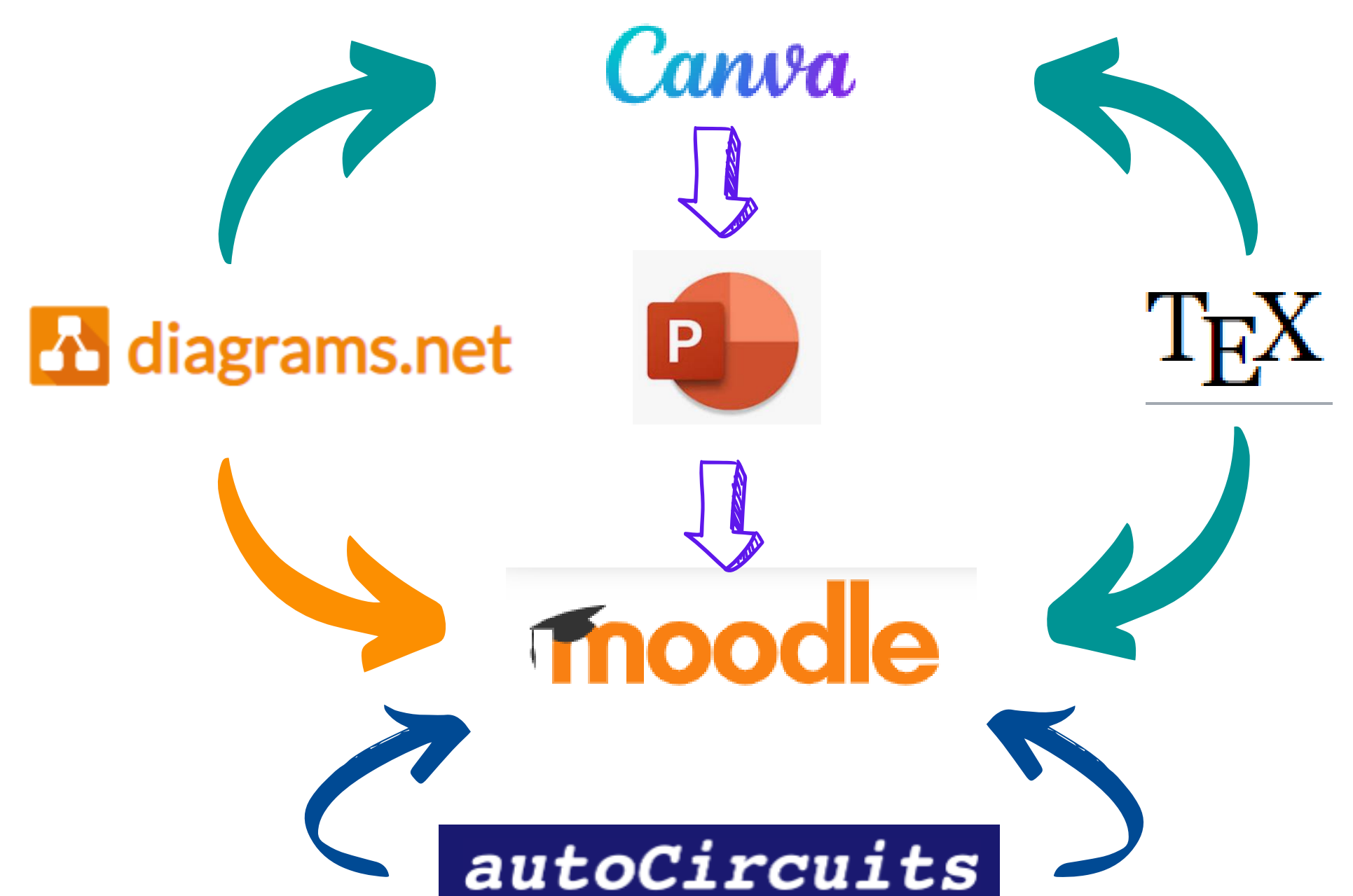
## Novel contributions

- A self-learning course in asynchronous mode implemented on Moodle platform.
- 13 sections dedicated to the weekly topics presented during the class lectures.
- For each topic there are:
  - One "check-in" test
  - Remedial lecture (access based on result of check-in test)
  - One "check-out" test (access based on activity completion)



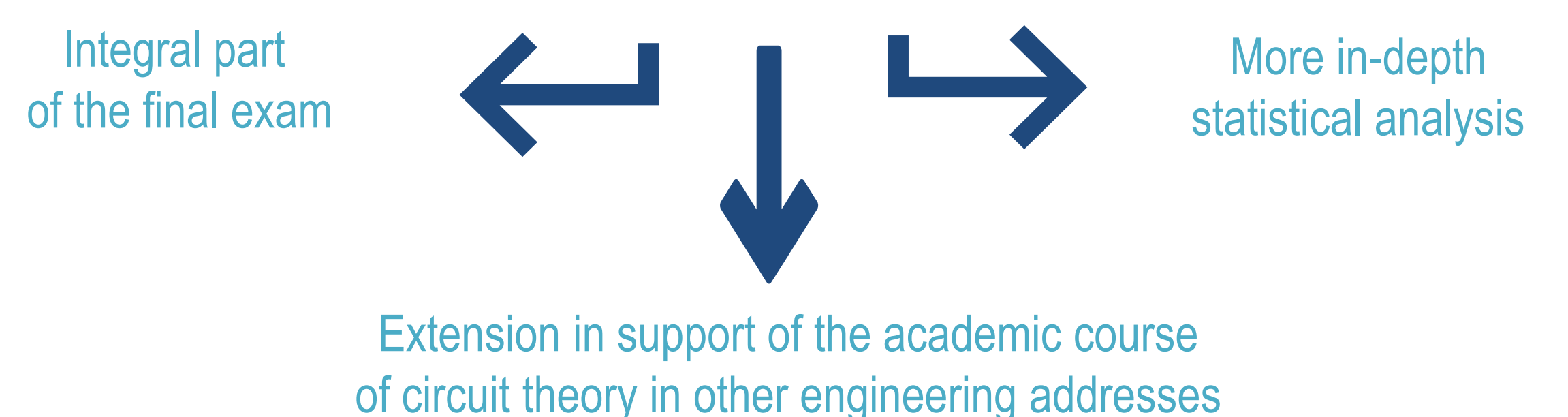
Each section was available for 1 week

## Adopted methodologies



- Canva projects with electric circuits by diagrams.net and formulas by Tex, downloaded in Power Point
- Remedial lessons containing final videos in Moodle sections with conditioned access to test results and activity completion
- Additional exercises and examples from autocircuits.org

## Future work



## List of attended classes

- 01SFURV - Programmazione scientifica avanzata in matlab (27/4/2020, 37.33)
- 01UNLRT - Metodi di analisi matematica per l'ingegneria (7/5/2020, 16.67)
- EduHack (on line course) (8/6/2020, 37)