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COMPUTER-ASSISTED GAMIFICATION IN A COMPUTER PROGRAMMING COURSE: AN EXPERIENCE REPORT

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Schedule

1. Introduction
2. Methodology
3. Results
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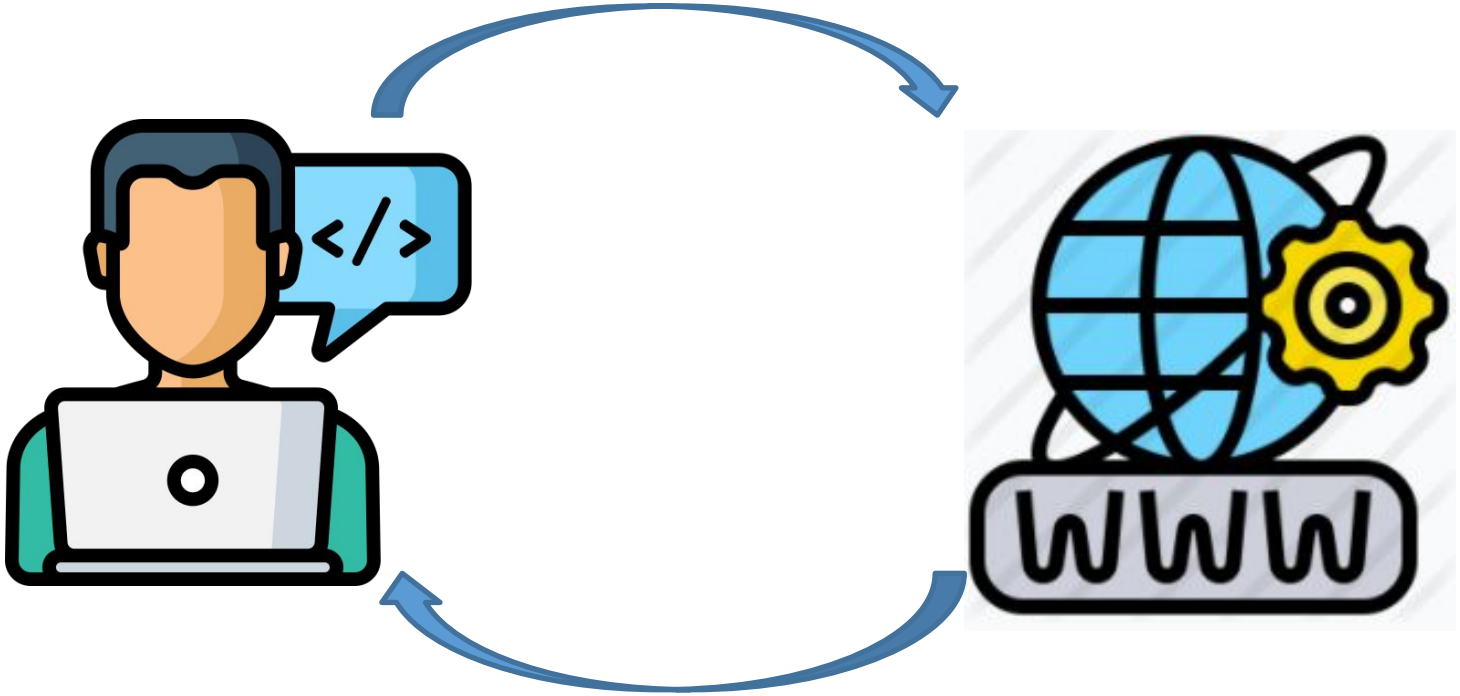
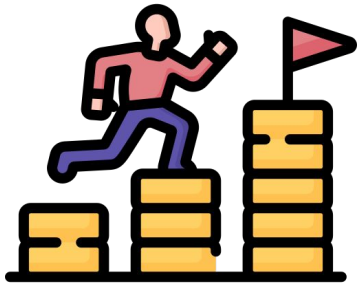
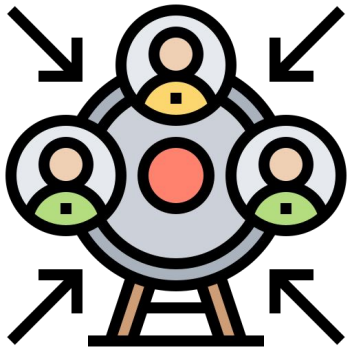


Computer programming is a fundamental discipline today

Game-related methodologies





Benefits in the participation, motivation and commitment of students.

(Borges, Oliveira, Lima, & De Lima, 2018)

GAMIFICATION

Adoption of characteristics and elements of the game in academic contexts.

Increase the level of:

- Participation
- Commitment
- Motivation

Interesting, exciting, fun and playful mechanisms

GAMIFICATION

Increase in motivation and participation in the educational process of students

(Carreño et al., 2018)
(Díaz, Díaz, & Ahumada, 2018; Sprint & Cook, 2015)

(Ortiz-Rojas et al., 2017)

More empirical studies are needed to understand the impact of gamification on several aspects.

(Çubukçu et al., 2017; Kaila et al., 2018; Piteira & Costa, 2017)

What is the effect of a computer-assisted gamified learning environment on the participation and perceptions of computer programming students?

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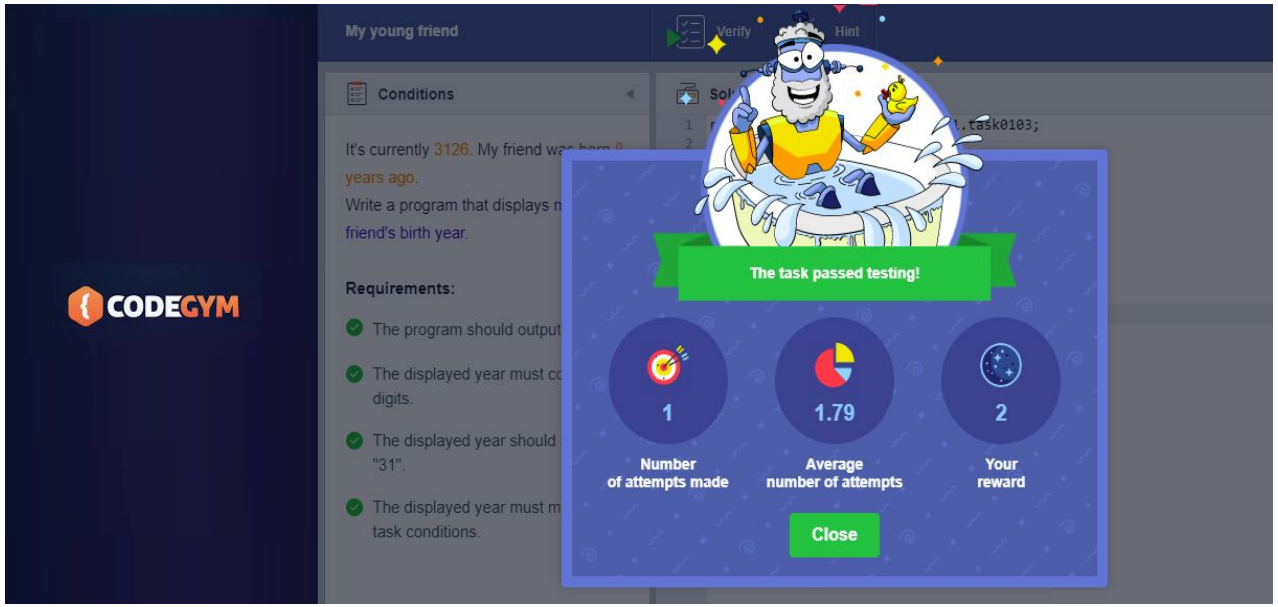
CodeGym

https://codegym.cc/

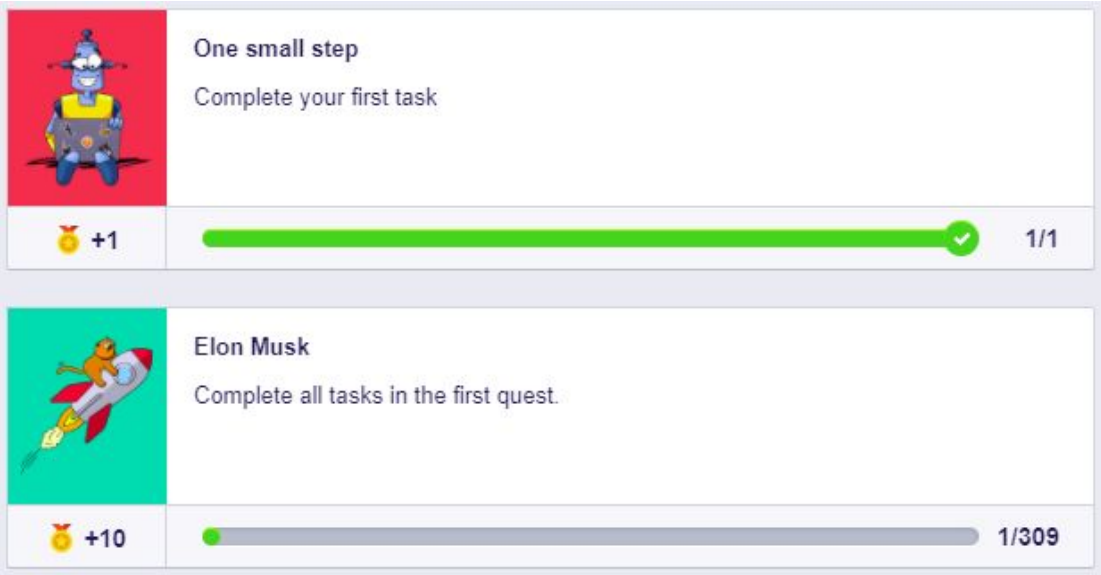


Screenshot of a problem solved in CodeGym

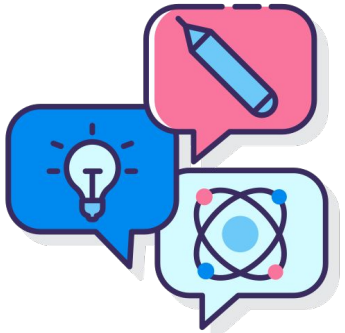
Game-related elements

- Points
- Badges
- Progress bars
- Social interaction
- Levels
- Leaderboards
- Unlimited attempts
- Narrative scenarios
- Player performance
- Statistics
- Access to blocked content

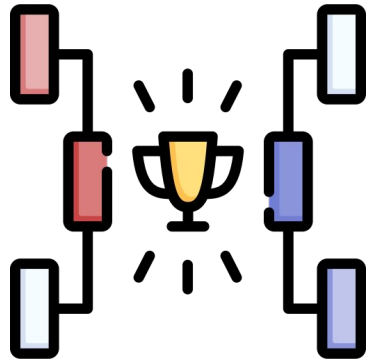
CodeGym



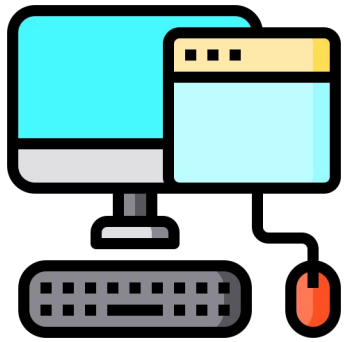
Medals awarded for achievements



Out-of-classroom activities



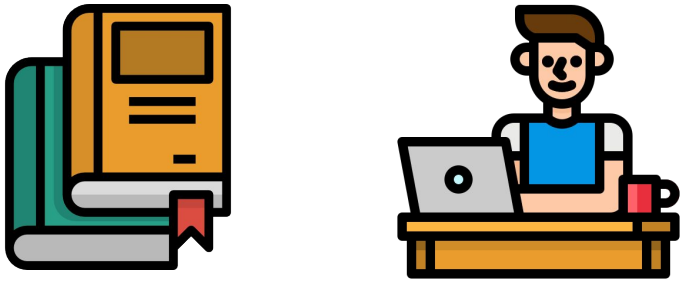
Relationship with the topics proposed in the curriculum



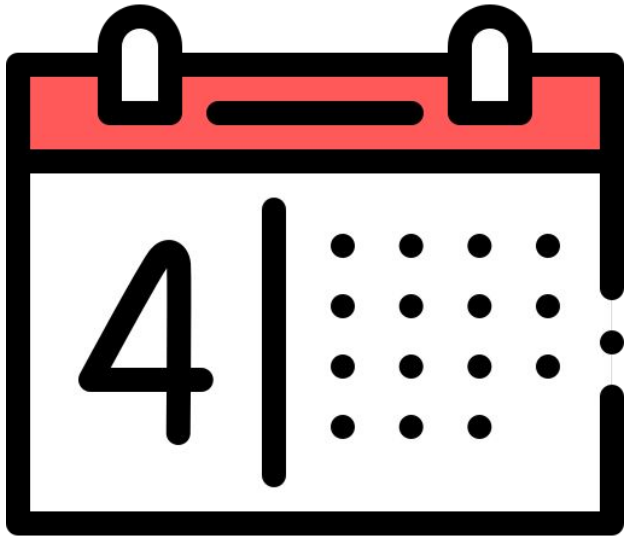
Online access from the web

Design of the educational intervention

Introduction to Computer Programming



Three academic credits



- Four sessions of two hours each were given weekly
- 50% of the sessions were integrated into the CodeGym methodology.
- This experience lasted 8 weeks

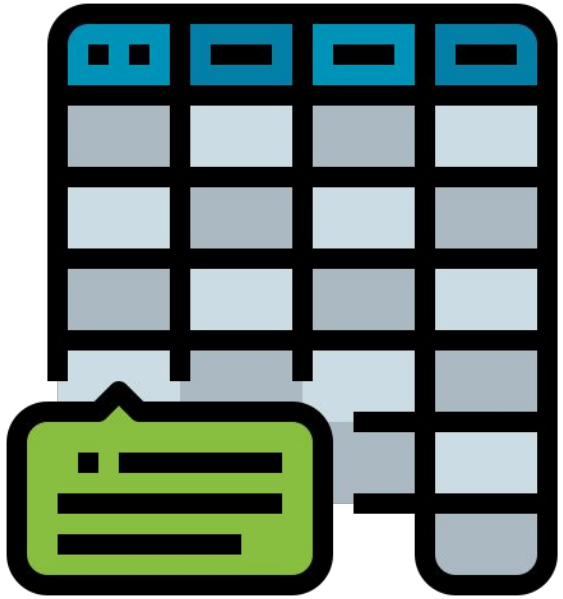
Competence	Content	CodeGym module
Fundamentals of computer programming	Approach to computer programming	Level 0: Introduction (7 exercises)
		Level 1: Introduction to Java: output, int and string data types. (21 exercises)
Understanding of the concept of function, use and application in problem solving	Data types	Level 2: Introduction to Java, variables, methods (19 exercises)
	Functions and procedures in software programming	
Fundamentals of computer programming	Setting up the IDE	Level 3: Your First Program: keyboard input, working in the IDE (26 exercises)
Understanding a structure that allows you to set multiple conditions	Simple and complex conditional structures (IF statement)	Level 4: Introduction to Cycles (43 exercises)
Combination of basic cycle structures, complex loops and assignment of variables	Application of loops in problem solving	
	Use of conditional structures and combination with cycles	

Relation of the proposed topics in the course curriculum and the selected CodeGym modules that were integrated in the course.

Participants and data collection

- Participants: 17 first semester students from the Systems Engineering Faculty of the Universidad Santo Tomás in Tunja (Colombia).
- Ages: Between 17 and 20 years old.
- 100% of them are male.

Participation



Data that CodeGym provided at the end of each practical exercise and when new achievements and badges were obtained.

Perception

#	Question	Type of question
Q1	What elements integrated in CodeGym did you like the most?	Multiple choice
Q2	What drove you to advance in the development of the levels and lessons proposed in CodeGym?	Multiple choice
Q3	What is your general perception about the use of CodeGym in the methodology of the Introduction to Computer Programming course?	Open
Q4	Regarding gamification in learning, what is your perception about the use of game elements such as badges, points, levels, rewards, leaderboards, among others, within the methodology of the computer programming introduction course?	Open

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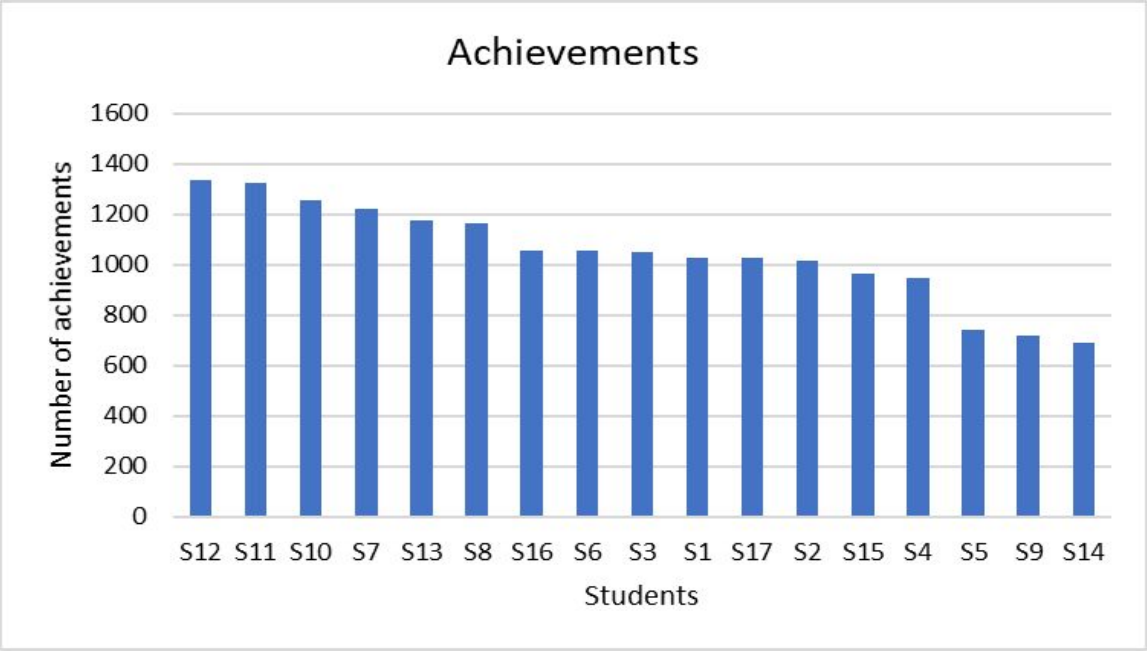
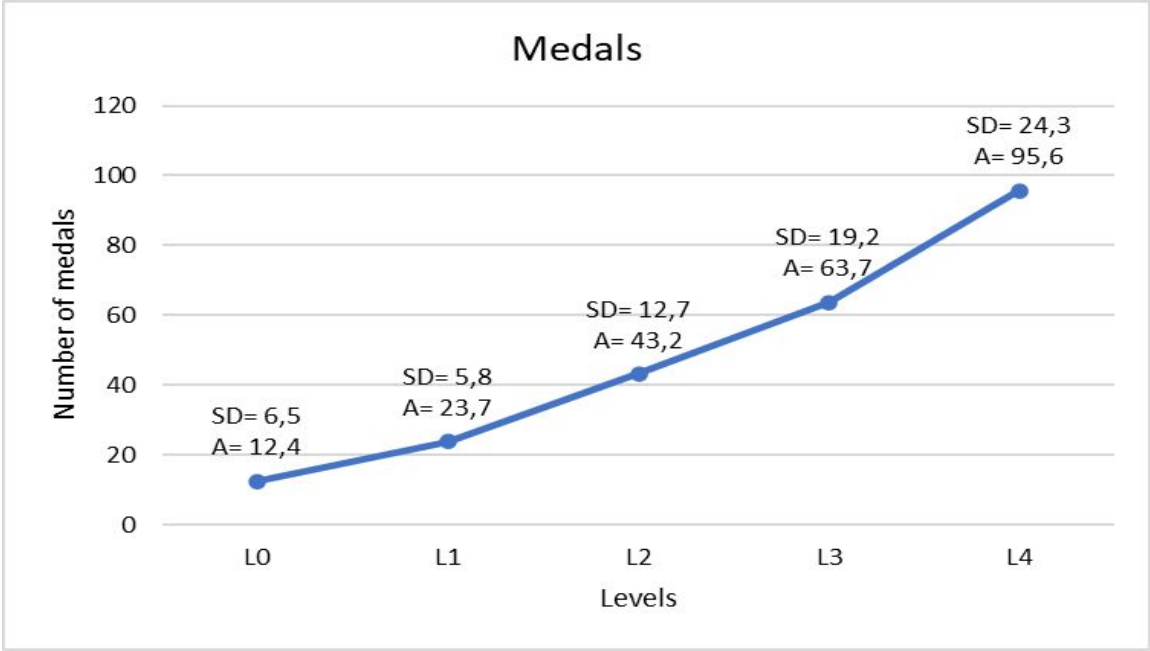
Student Participation





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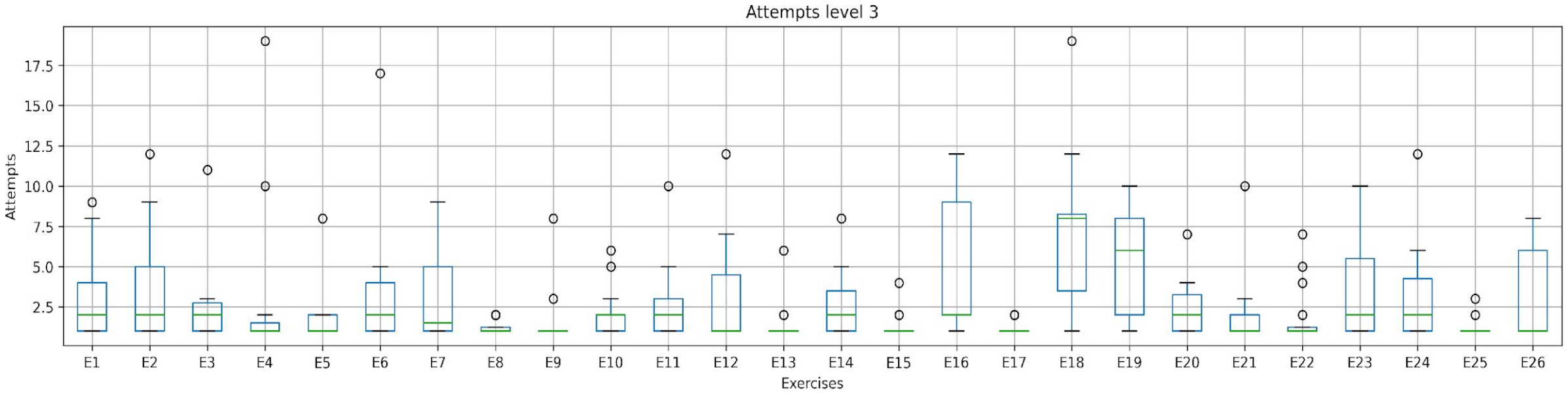
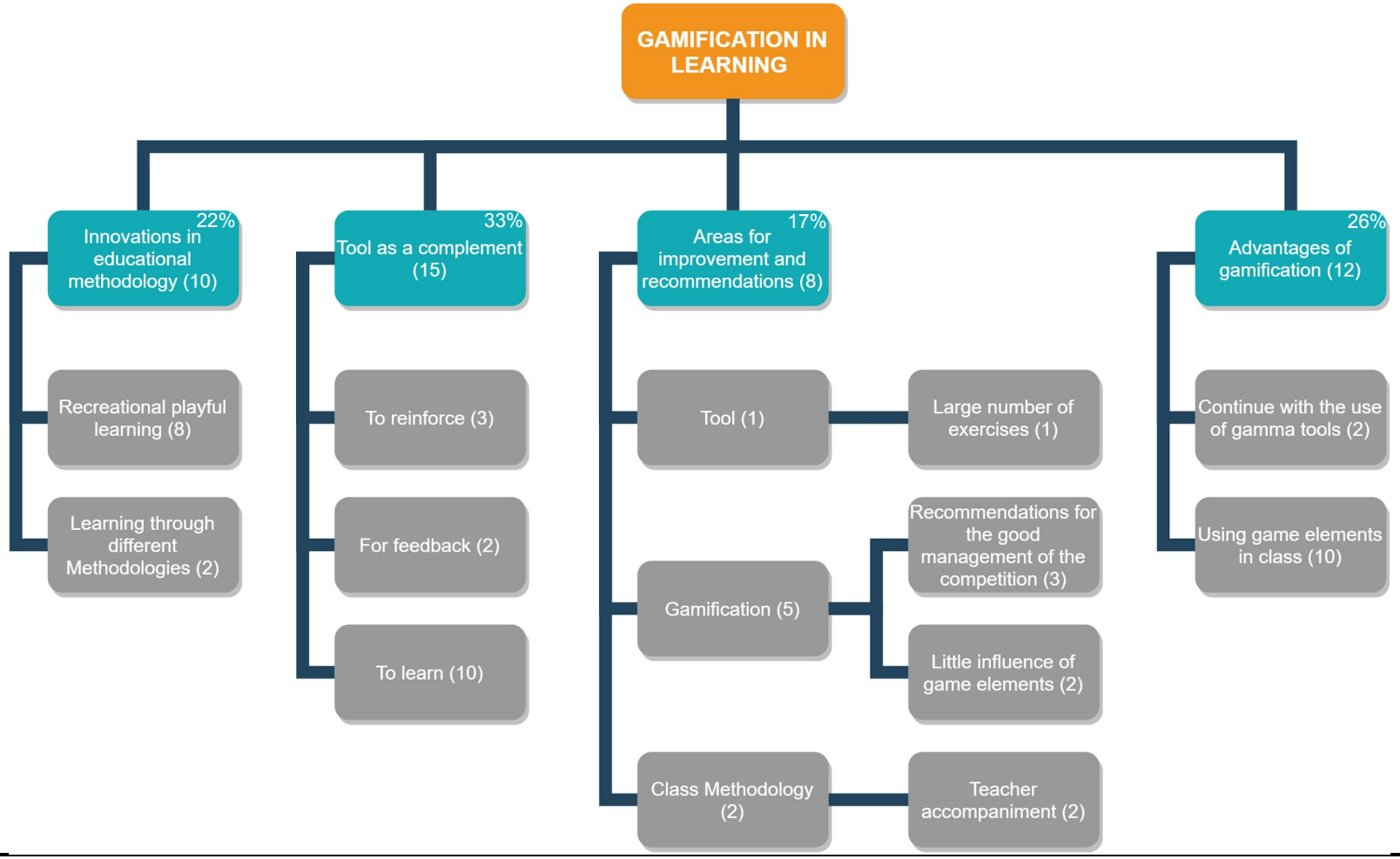


Box plots of attempts in level 3 exercises

Students' perceptions using CodeGym

82% the students' perceptions were favorable to continue implementing computer assisted gamification in the teaching-learning process of computer programming



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- As the level of difficulty in the topics increased, a greater dispersion in the student's participation was observed.
- The students' perceptions were favorable to continue implementing computer-assisted gamification in the teaching-learning process of computer programming.
- There are still challenges and aspects to be evaluated related to the effects generated by gamification.
- It is proposed as future work to replicate this experience in longitudinal studies that allow us to analyze different aspects in the long term.

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Thank you for your attention.
Questions?

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