LEARNING BOX OF UNPLUGGED ACTIVITIES

The carpool coordination

In this unplugged gamified activity, participants take part in a coordination challenge where they become members of a shared carpool network trying to organize daily rides for a group of people with conflicting schedules. Each participant or team receives character cards representing different passengers, each with specific pickup times, destinations, and availability constraints.

The challenge is to design the most efficient ride-sharing plan while balancing limited car capacity, route restrictions, and time conflicts. As the game progresses, new events, such as delayed passengers, last-minute cancellations, or route changes, introduce unexpected obstacles that force teams to adapt their plans.

Target Group

- ☐ Low-skilled adults with low digital competences
- ☑ Low-skilled adults with limited formal education or qualifications
- ☑ Low-skilled adults with low participation in lifelong learning / training opportunities

Learning Objectives

- Analyze and organize multiple schedules or sets of constraints with overlapping conditions
- Apply decomposition to break down a complex coordination problem into manageable elements such as time slots, locations, and resources
- Recognize patterns in availability and identify compatible opportunities for coordination
- Apply abstraction to focus on key scheduling variables such as time, location, and capacity while ignoring irrelevant details
- Develop and adapt a coordinated plan in response to changing conditions
- Apply computational thinking to solve dynamic,

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BY NC SA

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Theme

Shared mobility and collaborative scheduling in everyday transportation systems

Duration

90 mins

Level

Advanced

collaborative scheduling problems in complex systems

Computational Thinking Steps Used

- ☑ Decomposition
- ☑ Pattern recognition
- ☑ Abstraction
- ☑ Algorithmic thinking

Methodological Approach

- ☑ Gamification
- ☐ Challenge-Based Learning
- ☑ Collaborative learning
- ☐ Experiential learning

Competence Areas

a) Innovation Competences

- ☑ Creativity
- ☑ Critical thinking
- ☑ Problem solving
- ☑ Communication
- ☑ Collaboration

b) Information Literacy Competences

- ☑ Ability to access, understand and critically analyse information
- ☑ Interpretation of digital and visual content
- ☐ Awareness of media influence and biases

c) Life and Career Competences

- ☑ Flexibility and adaptability
- ☐ Initiative and autonomy
- ☑ Sociability and intercultural competence
- ☐ Productivity
- ☐ Leadership and responsibility

Learning Outcomes

- Organize multiple sets of constraints to identify overlaps and shared opportunities
- Identify relevant constraints such as time, capacity, and dependencies when planning shared solutions
- Detect patterns in availability to create efficient groupings or allocations
- Apply decomposition and abstraction to simplify complex coordination problems
- Adjust plans dynamically in response to unexpected changes or evolving conditions

Notes

- Keep the gamified elements clear and structured (e.g., points, challenges, or “event cards”) so they enhance reasoning rather than distract from it.

- Design participant roles or character cards with varied but realistic constraints (different work hours, destinations, flexibility levels).
- Ensure that initial solutions are feasible but not obvious, encouraging discussion and iteration.
- Introduce “event cards” gradually (e.g., delays, cancellations, new requests) to simulate real-world unpredictability.
- Encourage collaboration and negotiation between participants, as the activity is inherently cooperative.

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Step 1: Build your carpool team and understand constraints

Participants are assigned roles as members of a shared carpool network. Each player receives a character card with specific constraints such as pickup location, destination, availability times, and flexibility level.

In teams, they review all character profiles and organize the information into a shared "carpool board." The goal is to understand who needs to travel, when, and under what constraints.

Computational thinking focus: Decomposition, breaking the problem into individual schedules, constraints, and transport needs.

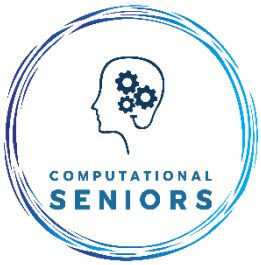
Step 2: Find matches and design initial routes

The carpool coordination

Participants analyze the collected information to identify possible overlaps in schedules and compatible travel combinations. They begin forming carpool groups and designing initial routes that maximize efficiency (e.g., fewer trips, better time alignment, full car capacity).

Teams earn points for each efficient match they discover, encouraging strategic thinking and collaboration.

Computational thinking focus: Pattern recognition, identifying overlaps and recurring scheduling opportunities to optimize group formation.



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Step 3: Adapt to challenge events and optimize the plan

The facilitator introduces “event cards” such as delays, last-minute cancellations, new passengers, or schedule changes. Teams must adapt their existing carpool plans in response to these disruptions.

Participants adjust routes, reorganize groups, and refine their strategy to maintain efficiency despite changing conditions. They then present their final optimized carpool plan and explain their decisions.

Computational thinking focus: Abstraction and algorithmic design, focusing on key variables (time, capacity, constraints) while filtering out irrelevant details to make effective decisions under changing conditions.

ACTIVITY CARDS

The carpool coordination

Card Categories

Events | **Characters** | **Vehicles** | **Roads** | **Teams**

Priority Levels

Essential
Extremely necessary to take into consideration

High
Importance

Medium
Helpful to take into consideration

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Print and cut the cards on the following slides to use in the activity.

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HEAVY RAIN

All journeys increase by +10 minutes.

BONUS:
Teams that keep all passengers grouped together receive +2 points.

Priority: High

LAST MINUTE CANCELLATION

A passenger leaves the trip.

The team has 3 minutes to reorganize routes.

Impact: Immediate redistribution.

Priority: Essential

NEW PASSENGER

A new person needs to arrive at the center before 09:00.

BONUS:
+3 points if it is integrated without adding cars.

Priority:

HIGHWAY ACCIDENT

Route A adds +20 minutes.

Problem: Cars using the highway can no longer arrive on time.

The teams need to reorganize.

Priority: Essential

GREEN TEAM

"Reduce the number of cars."

Strategy: Maximize the occupancy of each available vehicle.

Bonus points:
+3 for each car removed from the plan +1 per shared passenger

Priority: High

BLUE TEAM

"Maximize punctuality."

Strategy: Ensure everyone arrives before their deadline.

Bonus points:
+2 for each punctual person
-3 for each delay

Priority: High

RED TEAM

"Minimize mileage."

Strategy: Choose the shortest routes and avoid unnecessary detours.

Bonus points:
+2 for optimal route chosen
-2 for long detour

Priority: High

URBAN CENTER

Time: 35 min Cost: no toll Risk: moderate (traffic lights)

Slower but at no extra cost.
A good option if you're not in a hurry.

Priority: Medium

VAN

Capacity: 6 people Consumption: high Restriction: Cannot enter the city center

BONUS:
+2 points if the entire trip is complete

Priority: Medium

COMPACT CAR

Capacity: 3 people Consumption: low No traffic restrictions

Ideal for short urban journeys

Priority: Medium

CENTRAL HIGHWAY

Time: 15-20 min Cost: toll Risk: random traffic

Fast but unpredictable

Priority: High

CIRCUNVALACIÓN

Time: 30 min Cost: no toll Risk: low (stable)

A safe and predictable option

Priority: Medium

MARIA

Role: Driver Capacity: 3 seats Departs from: north district Can depart: 07:50 - 08:10 Must arrive before: 08:50

Restriction:
You must go to the daycare before 8:15

Priority: Essential

LUIS

Role: Passenger Departs from: East Zone Must arrive before: 08:45

Restriction:
He cannot walk for more than 5 minutes

Priority: High

CARLA

Role: Driver Capacity: 2 seats Departs from: Center

Restriction:
You can only drive on the highway.

Priority: High

PEDRO

Role: Passenger Departs from: North district Flexible until: 09:00

No special restrictions

Priority: Medium

SARA

Role: Passenger Departs from: South Zone Must arrive before: 08:40

Restriction:
He has a critical meeting first thing in the morning.

Punctuation:
+3 if it arrives before 08:40
-3 if he/she arrives late

Priority: Essential

TIME

Role: Driver
Capacity: 3 passengers Departs from: North district
Destination: Parque Tecnológico Ideal departure time: 08:00 Latest arrival time: 08:45

Restrictions:
• You must drop off your child at school before 8:15
• Cannot use the highway. Personality: "He is bothered by unpunctuality."

Priority: Essential