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The EcoMystery Project:
Interactive Escape Rooms for Climate Crisis
Awareness and Civic Engagement in School Education

WP2

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The EcoMystery Project: Interactive Escape Rooms for Climate Crisis Awareness and Civic Engagement in School Education

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1. Portugal's National Survey

1.1 Teachers' knowledge and competencies in climate change education

Based on the chart presented about teachers' familiarity with the scientific principles behind climate change (such as the greenhouse effect and the carbon cycle), the following conclusions can be drawn:

The **majority of teachers do not feel fully prepared** regarding the fundamental scientific concepts of climate change:

- Only **27.5%** of participants consider themselves **very familiar**, demonstrating a deep understanding and the ability to explain the topic clearly.
- **45%** report being **somewhat familiar**, indicating a basic level of knowledge, but with limitations in addressing the subject in depth.
- **25%** say they are **not very familiar**, acknowledging a limited and superficial understanding of the scientific principles.
- Only **2.5%** declared having **no familiarity** at all with the related scientific concepts.

This scenario highlights that, while there is a group with solid training, the **majority of teachers (70%) have limitations in their scientific knowledge** on the topic, which may compromise the quality of climate change education.

It is essential to **invest in continuous teacher training**, mainly through **workshops**, covering both **scientific fundamentals and their social implications**, so that teachers can teach the subject with confidence, clarity, and depth.



Identified gaps in pedagogical approaches and digital educational tools

Based on the chart presented about teachers' familiarity with the scientific principles behind climate change (such as the greenhouse effect and the carbon cycle), the following conclusions can be drawn:

The majority of teachers do not feel fully prepared regarding the fundamental scientific concepts of climate change:

- Only **27.5%** of participants consider themselves very familiar, indicating a deep understanding and the ability to clearly explain the topic.
- **45%** report being somewhat familiar, suggesting a basic level of knowledge but with limitations in addressing the topic in depth.
- **25%** say they are not very familiar, acknowledging a limited and superficial understanding of the scientific principles.
- Only **2.5%** declared having no familiarity at all with the related scientific concepts.

This overview shows that, although there is a group with solid training, the majority of teachers (70%) have **gaps in their scientific knowledge**, which may compromise the quality of climate change education.

It is essential to **invest in continuous teacher training**, primarily through workshops that address both scientific fundamentals and their social implications, so that educators can teach the topic with confidence, clarity, and depth.

Identified Gaps in Pedagogical Approaches and Digital Educational Tools

In this part, we comment on teachers' use of interactive and student-centered teaching approaches, evaluating the availability and use of digital tools, hands-on experiments, and gamification techniques. We also report on the identified barriers to incorporating



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innovative methods in school education (e.g., lack of resources, time constraints, outdated curricula).

The data analysis reveals **significant gaps in the use of innovative pedagogical approaches and digital tools** in climate change education. The main findings are:

1. Structural Barriers to Pedagogical Innovation

- **Curriculum restrictions** were identified as the main barrier by **47.5%** of teachers, indicating that the current syllabus limits the inclusion of environmental and climate topics through more innovative methods.
- **Lack of adequate teaching materials or resources** (25%) and **challenges in addressing student diversity** (30%) also represent major obstacles to implementing more active strategies, such as gamification or hands-on experiments.
- Additionally, **12.5%** mentioned the lack of collaborative support and opportunities for professional development, highlighting the need for **ongoing training focused on interactive teaching practices**.

2. Limitations in the Use of Student-Centered Approaches

The responses suggest that **few teachers are using interactive or student-centered approaches** (such as project-based learning, experiments, educational games, or simulations). This is indicated by the predominance of structural barriers and the **lack of direct references to the use of innovative methods**.

- The **lack of digital resources** and the **complexity of scientific concepts** were cited as specific difficulties in teaching students aged 13 to 16 (17.5% each),



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showing that even when there is an intention to teach the topic, the available didactic tools are either insufficient or not easily accessible.

The data demonstrate that, although there is an intention to address climate change, **the lack of effective digital tools, curriculum limitations, and insufficient teacher training hinder pedagogical innovation.** Overcoming these barriers is essential to build **relevant and transformative climate education.**

Teachers' perspectives on gamification and escape rooms for climate education

Based on the analysis of the questionnaire responses, the following conclusions can be drawn:

1. Familiarity with Digital Tools and Gamification:

- The **majority of teachers (50%)** frequently use digital tools and are familiar with the concept of **gamification**.
- However, **35% report frequent use of digital tools but are not familiar with the concept of gamification**, indicating a significant knowledge gap regarding this specific pedagogical approach.
- A **minority (15%)** have little or no familiarity with digital tools or gamification, which may also be a barrier to the adoption of innovative methods.

2. Frequency of Use of Gamified Tools:

- **40% of teachers** indicate that they use gamified tools only occasionally, i.e., a few times during the school year.
- Another **37.5%** state that they use them with some regularity (at least once a month).



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Only **7.5%** use gamification very frequently (weekly).

- **15% of respondents have never used gamified tools**, further reinforcing the presence of barriers to the implementation of these strategies.

3. Implications:

- Although there is a significant base of teachers with digital experience, the **practical adoption of gamification remains limited**, often due to lack of knowledge or specific training.
- The data suggest that teachers are **open to and potentially interested in incorporating gamified practices**, provided they receive appropriate training and practical support for implementation – including strategies such as **educational escape rooms**.
- There is a **clear opportunity to promote teacher training** in this area as a way to enhance climate change education through **more engaging, student-centered approaches**.

Institutional barriers and challenges in implementing climate change education

The analysis of teachers' responses reveals a significant set of institutional barriers that hinder the effective implementation of climate change education in schools.

The **restriction imposed by school curricula** stands out as the main barrier identified, mentioned by **47.5% of teachers**. This curricular limitation reduces teachers' flexibility to integrate environmental topics in a transversal and in-depth manner into their pedagogical practices.



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Another widely mentioned difficulty concerns the **lack of adequate teaching materials and resources**, cited by **25%** of respondents. The absence of updated content, tailored digital tools, and interactive proposals makes it difficult to conduct dynamic lessons and promote meaningful learning about climate change.

Teacher workload also emerges as a relevant obstacle: **30% of teachers** report struggling to meet the various demands of the curriculum and their classes, which compromises the systematic inclusion of these topics. Associated with this, the **lack of institutional support and opportunities for continuous training** (both mentioned by **12.5%**) reinforces a sense of isolation among teachers in carrying out this educational mission.

Additionally, challenges arise from the **lack of student engagement with the topic** and the **widespread misinformation in society** – factors that, although not strictly institutional, reflect educational contexts shaped by weak public policies for promoting climate literacy.

In summary, the identified barriers point to the need for **curricular reform, strengthened teacher training, investment in pedagogical resources, and clear and coherent institutional support**, so that **climate education can be effectively and consistently integrated into the education system**.

1.2. Analysis of Student Survey Results – Climate Change Awareness

Introduction

This report presents an analysis of the results from a **climate change questionnaire** answered by **18 students** from a partner school. The aim is to understand the students' **level of knowledge, perception, and engagement** with climate change, as well as their



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pedagogical preferences. This analysis seeks to provide concrete data and insights to improve **educational practices** in the context of **climate education**.

Methodology

The data collection was carried out through a **structured questionnaire** that included both closed and open-ended questions. The survey covered the following topics:

- Understanding of climate change
- Perception of causes and consequences
- Environmental education in the school curriculum
- Sustainable habits and practices
- Effectiveness of environmental education lessons
- Preferred teaching methods

The analysis of the results aims to provide a **clear picture of the current state** of students' knowledge and engagement, in order to guide future **pedagogical strategies**.

Respondent Profile

The sample consisted of **18 students** with the following age distribution:

- **55.6% (10 students)** are 14 years old
- **16.7% (3 students)** are 12 years old
- **16.7% (3 students)** are 13 years old
- **11.1% (2 students)** are 15 years old

The majority of the respondents (**55.6%**) are 14 years old, an age group that represents the core of the sample and whose maturity suggests they may already have considerable **prior knowledge** of the topic.



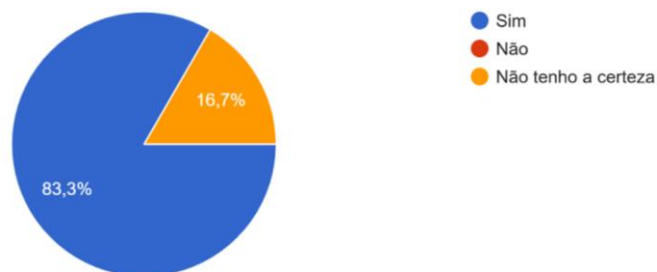
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Understanding of Climate Change

Understanding of the term “climate change” was assessed through open-ended responses. Students gave varied interpretations, including:

- **Changes in weather or seasons**
- **Pollution and global warming**, including mentions of droughts, storms, and other environmental impacts
- **Long-term changes** in temperature patterns and climate

These responses show that while most students understand the **basic concepts**, there is a range of knowledge levels. Some students have a **superficial view**, while others demonstrate a **more technical and detailed understanding** of causes and consequences.



Climate Change Education in the Curriculum

Data regarding the presence of the topic in the school curriculum revealed:

- **83.3% (15 students)** said that the topic **is included** in the curriculum
- **16.7% (3 students)** said they are **unsure** if the topic is addressed
- No student indicated that the topic is **absent** from the curriculum



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Although the majority recognizes the topic's presence, the fact that **16.7%** are unsure suggests it may **not be addressed consistently or transversally** throughout the academic year.

Causes and Consequences of Climate Change

Identified Consequences

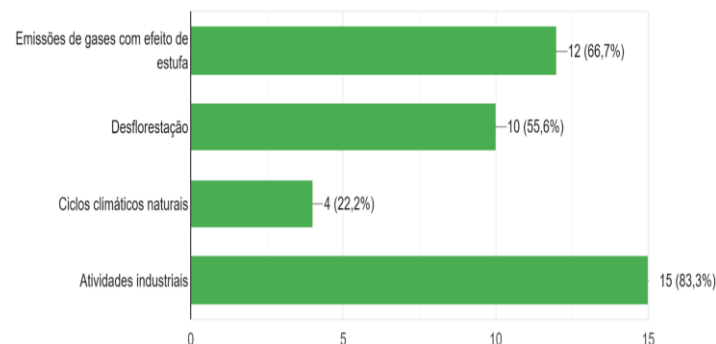
Students identified the following main consequences of climate change:

- **100%** associated it with **extreme weather event**
- **83.3%** mentioned **rising sea levels**
- **77.8%** highlighted **agricultural impacts**
- **72.2%** pointed to **health risks**
- **66.7%** identified **ecosystem disruption**

Identified Causes

Students indicated the following main causes:

- **83.3%** pointed to **industrial activities**
- **66.7%** mentioned **greenhouse gas emissions**
- **55.6%** referred to **deforestation**
- **22.2%** mentioned **natural climate cycle**



Interpretation:

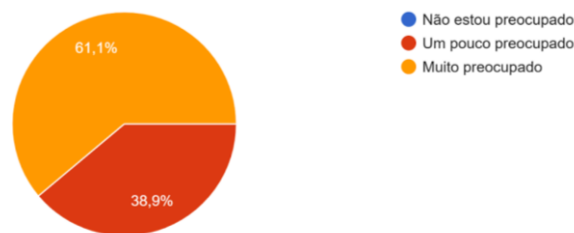
Students demonstrate a good understanding of the **causes and consequences** of climate change, especially the more **visible effects**, such as extreme events and health-related impacts. However, **natural causes** are less frequently mentioned, indicating a **need to strengthen** knowledge in that area.

Concern and Sense of Individual Responsibility

The data shows a high level of **personal concern** about climate change:

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- **61.1%** of students are **very concerned** about the impact of climate change
- **38.9%** are **somewhat concerned**
- **83.3%** believe that their **personal actions** can contribute to combating climate change



Interpretation:

The vast majority of students express **awareness and responsibility**, which is a **positive indicator** for future educational initiatives. The feeling of responsibility is a **key motivator** in adopting sustainable behaviors.

Participation in Environmental Activities and Sustainable Habits

Students reported participation in various environmental actions:

- **77.8%** took part in **community clean-up events**
- **55.6%** in **tree-planting projects**
- **38.9%** in **recycling campaigns**
- Only **5.6%** have **never participated** in environmental activities

Sustainable Habits at Home

The most common sustainable habits mentioned were:

- **94.4%** turn off lights and electronic devices
- **88.9%** recycle and reduce water waste
- **61.1%** use reusable items (bottles, bags, etc.)



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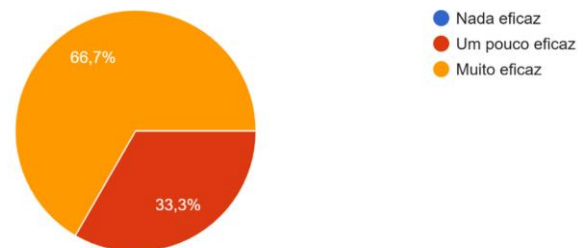
- **44.4%** use public transport or walk

Interpretation:

Students are already adopting **various sustainable practices** in their daily lives. Their **engagement in community activities** is also high, showing a strong **environmental commitment**.

Effectiveness of Environmental Education Lessons

- **66.7%** consider the lessons **somewhat effective**
- **33.3%** consider them **very effective**
- **0%** considered the lessons **ineffective**



Interpretation:

Although many students find climate education lessons effective, a significant portion believes there is **room for improvement**, particularly in **making lessons more interactive and hands-on**.

Preferred Teaching Methods

Students indicated their preferred methods for learning about climate change:

- **83.3%** prefer **interactive and practical activities**
- **66.7%** prefer **group projects**
- **27.8%** enjoy **videos or documentaries**
- **100%** would like to learn more about climate change through **games and gamified activities**

Interpretation:

There is a clear preference for **active and participatory learning** methods.



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Gamification and hands-on activities are seen as highly effective, suggesting that teaching methods could be made **more dynamic and engaging**.

Conclusions

Students have a **basic understanding** of climate change, with some areas—such as **natural causes**—needing further development

There is a **high level of concern**, and many students are aware of the **need to take action**

Students are actively engaging in **sustainable practices**, but there is potential to **encourage more impactful actions**

There is a clear need for **more interactive teaching methods** that connect theory with real-life practice

Recommendations

- **Deepen scientific concepts** related to climate change, especially the difference between **natural and human-induced causes**
- **Incorporate more practical and interactive activities** into the curriculum, such as group projects, debates, and simulations
- **Use gamification strategies** to create dynamic and engaging learning experiences
- **Ensure continuity and cross-disciplinary integration** of the topic throughout the school year, so all students are aware of its consistent presence in the curriculum

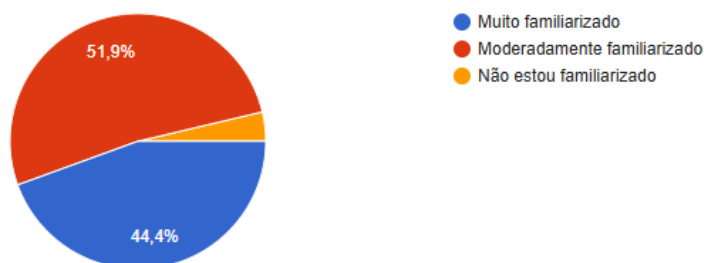
1.3 Analysis of Parents & Families Survey Results

The data shows a diverse distribution of schools, with some schools being more represented than others. This suggests that the target audience is spread across

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various schools, but there are a few schools with a higher concentration of students, which could reflect the location or popularity of these institutions.

Most students are in the **2nd cycle** (55.6%), followed by the **3rd cycle** (40.7%). The **1st cycle** has very little representation (3.7%). This data shows that the majority of respondents are parents of students in more advanced educational stages, likely with a greater capacity to discuss and understand complex issues, such as climate change.



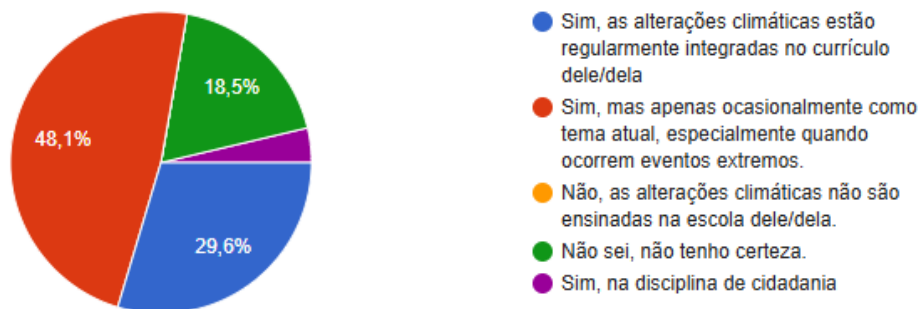
Most of the respondents consider themselves **moderately familiar** (51.9%) or **very familiar** (44.4%) with the concept of climate change and its impacts. This indicates a good general awareness of the topic, though there is room for deeper knowledge, especially about the direct and local impacts of climate change.

For the question " **Which of the following climate change impacts are most relevant to your area**", **parents are** concerned with **extreme weather events** (83%) is predominant, reflecting a clear recognition of the immediate and visible effects of climate change, such as heatwaves and storms. Other impacts, such as **ecosystem disruption, agricultural challenges, and health risks**, were also mentioned, though less frequently. This data indicates an awareness of the severity of climate effects on the daily life of communities.

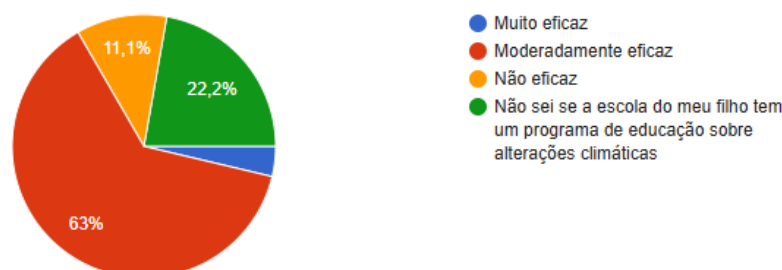
Regarding the understanding of the teaching of this topic in school, most parents respondents (48.1%) stated that **climate change is not taught** at their child's school. This suggests that, despite the growing importance of the topic, formal education

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about climate change is not being systematically addressed in schools. Only a smaller portion (29.6%) stated that the topic is regularly included in the curriculum.



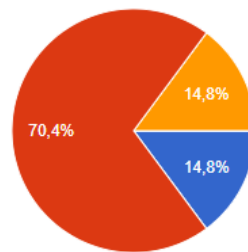
From the analysis of the question **How would you rate the effectiveness of climate change education at your child's school**, The majority of parents (63%) consider climate change education at their child's school to be **ineffective**. This assessment suggests that, even when the topic is addressed, the way it is taught may not be impactful or adequate. Only 22.2% of parents consider the education **moderately effective**, and 11.1% rate it as **very effective**, indicating considerable room for improvement in teaching methods.



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In the answer, topics related to climate change do you think should be included in education at schools, the parents respondents highlighted topics such as **causes and consequences of climate change** (70.4%), **renewable energy** and **sustainable practices** (74.1%) as essential for inclusion in the school curriculum. Other topics such as **solutions for ecosystems and biodiversity** and **advancements in climate solutions technologies** were also emphasized, reflecting an interest in topics that not only address problems but also explore possible solutions.

We could also verify that the majority of parents (70.4%) **rarely discuss climate change** with their children, which may indicate that the topic is not a priority in daily conversations. Only 14.8% discuss the topic **frequently**, and the same



- Frequentemente (pelo menos uma vez por semana)
- Ocasionalmente (algumas vezes por mês)
- Raramente (por exemplo, apenas comentar factos na televisão)
- Nunca

percentage discusses it **occasionally**. This data reflects a lack of continuous engagement with environmental issues in many households.

The most significant challenge identified by parents is the **lack of sufficient knowledge** about climate change (61.9%). This may indicate that, despite general awareness of the topic, parents do not feel fully equipped to teach their children or provide a deeper understanding of the subject. Other challenges mentioned include difficulty in finding **adequate resources** and the **lack of interest or time** to discuss the topic with their children.

Analyzing the responses to the last question, the majority of parents (70.4%) would like to have **access to simple and engaging educational resources**, such as didactic materials and hands-on activities. **Community events** focused on raising awareness of climate change were also mentioned by 51.9% of participants. Support from schools in **guiding how to support education at home** was also an important request (44.4%).



Conclusions

The analysis of the data reveals a situation of **good general awareness** about climate change among parents, but with **significant gaps** in terms of in-depth knowledge and effective educational resources. Most parents are aware of the impacts of climate change, especially extreme weather events, and recognize the importance of including related topics in the school curriculum. However, formal education on the topic in schools is still not consistently or effectively addressed, with many families stating that the topic is either not taught or not taught effectively.

Additionally, parents face challenges related to **lack of sufficient knowledge** and **difficulty finding adequate resources** to support environmental education at home. The lack of frequent discussions about the topic at home is also a reflection of how the topic is still not consistently integrated into family life.

The most valued areas for inclusion in school education are **teaching about the causes and consequences of climate change**, promoting **renewable energy** and sustainable practices, as well as **practical and technological solutions**. However, most parents also express a strong need for **access to simple resources** to promote discussions about environmental issues at home and for **greater support from schools** in this process.