MiniEduAgri Miniguide

Comics and Interactive Games for Explaining the
Farm to Fork Strategy to Primary School Students
2023-2-LV01-KA210-SCH-000174107

About the miniguide

Purpose of the miniguide

The MiniEduAgri Mini-Guide was developed as an educational tool to promote emotional intelligence, civic engagement, and pro-environmental behavior among primary-school students through accessible and experiential learning activities. Its purpose is to translate complex sustainability principles into age-appropriate, engaging narratives and tasks that foster reflection, empathy, and responsible decision-making.

- Support teachers in integrating sustainability education into everyday classroom practice by providing short, structured learning materials linked to EU priorities such as the Green Deal, the Farm to Fork Strategy, and Education for Sustainable Development (ESD).
- Encourage pupils to develop self-awareness, perspective-taking, and cooperative attitudes, helping them understand how individual choices affect the environment and community well-being.
- Act as a didactic bridge between emotional and cognitive learning — combining storytelling, visual materials (such as comics), and guided discussion to cultivate sustainable thinking and empathy.
- Provide a standardized framework for evaluation, enabling researchers and educators to measure learning outcomes through psychometric testing before and after implementation.

What You'll Find in This Miniguide

Pro-environmental education and civic engagement programs in primary schools

Psychometric test and results

Guide to administrate the test

01

Pro-environmental education and civic engagement programs in primary schools (Latvia, Italy, Greece)

1.1 Introduction

Educational programs that nurture pro-environmental behavior and civic engagement in children have gained momentum in recent years. Across Europe – including Latvia, Italy, and Greece – schools are incorporating sustainability and citizenship topics through both formal curricula and extracurricular initiatives. This review synthesizes research from the past five years on such programs for primary school students in these three countries. Key findings from peer-reviewed studies are highlighted, distinguishing the types of programs (e.g. integrated curriculum reforms, school-wide projects, NGO partnerships) and their outcomes. We examine impacts on students' environmental awareness, sustainable behaviors, civic participation, and sense of social responsibility, as well as successful pedagogical approaches. Where available, comparative insights and longitudinal observations are noted. The goal is to provide a structured overview of how Latvian, Italian, and Greek primary schools are fostering young eco-citizens and the evidence of what works.

1.2 National Curriculum Initiatives for Sustainability and Citizenship

All three countries have recently introduced formal curriculum changes to embed environmental and civic education from an early age.

Italy in 2019 became the first nation to mandate climate change and sustainable development education in all grades. Starting in 2020, approximately one hour per week is dedicated to climate change issues as part of a new civics curriculum. The then-Education Minister emphasized putting "environment and society at the core" of schooling. This Civic Education framework **(Law 92/2019)** covers topics like environmental sustainability, global citizenship, and digital literacy, making climate and civic topics a regular part of primary instruction.

Similarly, **Latvia** has integrated sustainability principles into its competency-based curriculum. The national education guidelines treat sustainable development as a cross-cutting competency: primary students are encouraged to explore ecosystems, biodiversity, climate action and related themes across subject. For example, Cabinet **Regulation No. 747 (2018)** ensures that environmental topics are infused throughout the curriculum rather than confined to a single subject. This reflects a shift to viewing education "through the sustainability lens" so that children develop values and skills for a sustainability-oriented society from a young age. Early research in Latvia suggests that raising students' awareness of sustainable development is pivotal and should be built into school programs to cultivate lasting sustainable habits.

In **Greece**, a major recent reform has been the introduction of "Skills Labs" (Ergastiria Dexiotiton) in 2021 as a compulsory part of the weekly timetable for all primary grades. These labs are short modules that use project-based learning to develop soft skills and civic competencies. They are organized around four thematic units:
(1) **Well-being** ("I Live Better"), (2) **Environmental care** ("I Take Care of the Environment"), (3) **Social awareness & civic responsibility** ("I Am Interested and Active"), and (4) **Creative thinking** ("I Create and Innovate"). Through the Environment and Active Citizen themes, Greek pupils engage in hands-on activities about ecology, sustainability, and community service during regular class hours. In parallel, the Greek system maintains subjects like Study of the Environment (in lower primary) and Social/Civic Education (in upper primary) in the standard curriculum. Schools are supported by a network of Environmental Education Centers (KEPEA) that provide teacher training and resources for sustainability programs. Overall, these national initiatives signal a trend toward formalizing education for sustainable development (ESD) and citizenship as core elements of primary education in all three countries.

1.3 Extracurricular and Whole-School Programs

Beyond the official curriculum, a variety of whole-school and extracurricular programs have been implemented to promote environmental stewardship and civic engagement. A prominent example common to all three countries is the Eco-Schools program, an international framework (Foundation for Environmental Education) that empowers students to lead sustainability actions in their schools. In Latvia, Eco-Schools has grown dramatically over the past two decades.

As of the mid-2020s, over 200 **Latvian** educational institutions (from preschools to high schools) participate in Eco-Schools. The program entails forming student eco-councils, conducting environmental audits of the school, devising action plans, and integrating sustainable practices into daily school life. By 2018, 135 Latvian schools earned the Green Flag award for excellence in sustainability, with dozens more joining each year. According to the national Eco-Schools coordinator, this program serves as "a universal tool that helps promote sustainable development and develop knowledge, skills, responsibility and motivation to act" in students. Children in eco-schools are taught to think critically, collaborate, and actively engage in solving problems affecting their school, community, and society. The emphasis is on child-led, action-oriented projects – for example, students might organize waste recycling drives, energy-saving campaigns, or biodiversity gardens. Research notes that Eco-Schools not only improve the school's environment but also foster students' sense of agency and social responsibility. Latvia's experience suggests that sustained whole-school programs can make environmental responsibility a living part of school culture. A future priority is to better train teachers to use Eco-Schools activities to also meet academic learning goals, aligning with the new competence-based curriculum.

In **Italy**, alongside participation in the international Eco-Schools (over 200 Italian schools are part of that network), there are home-grown initiatives linking schools with sustainability and community action. One notable program is the "Green School" network, originally launched in Lombardy and now expanding nationally. The Green School model involves school-wide projects on topics such as waste reduction, energy saving, sustainable mobility, food waste, biodiversity, and water conservation. By adopting participatory methods (e.g. student-led audits and projects), the network has engaged 619 schools, reaching over 146,000 students and 12,000 teachers across at least five regions. Each school works on practical sustainability actions and then shares best practices through the network. The ambitious goal is to empower each school to influence local policy – for instance, students might present proposals to the town council on improving recycling or reducing plastic use. The Green School Italy program thereby acts as a bridge between the school and the wider community, forging partnerships with local authorities and NGOs on environmental initiatives.

Teachers receive training (e.g. on the UN Agenda 2030 goals) and support through webinars and an e-learning platform, ensuring that educators have the tools to guide students in these projects. Such NGO-led or regional programs complement Italy's curriculum by providing an experiential, collaborative outlet for students to practice sustainability and civic action beyond the classroom.

In **Greece**, many primary schools engage in project-based environmental learning through extracurricular clubs, collaborations with NGOs, and European programs. For example, some schools partner with environmental organizations (like WWF or local conservation groups) to implement projects on recycling, tree planting, or energy efficiency. Greek schools also enthusiastically participate in eTwinning and Erasmus+ projects that combine environmental themes with international collaboration. A case in point is the recent eTwinning project "Plastics... Plastics Everywhere!"implemented as a participatory sustainability action plan in two Greek primary schools. This project – aimed at empowering young "eco-citizens" – engaged 5th and 6th graders in a series of hands-on, cross-curricular activities focused on plastic pollution, environmental responsibility, and climate action. Students investigated their daily waste habits, explored European Union environmental policies on plastics, and then created collaborative outputs such as awareness posters, digital stories, a student-authored newspaper, and even a board game about reducing plastic waste. Through experiential learning and creative use of digital tools (Padlet, Canva, etc.), the pupils not only learned content but also built skills in digital literacy, critical thinking, and teamwork, all while strengthening their civic engagement. The project culminated in each school organizing a community awareness campaign and a school-wide sustainability event, where students shared their work with families and local community members. This example illustrates how participatory, project-based programs can transform sustainability from an abstract concept into a lived experience for students, shaping their values and attitudes as active young citizens. Greek schools also benefit from regional "Environmental Education Centres" that host field trips and workshops, bringing students outdoors to learn about local ecosystems and encouraging outdoor environmental education. Such extracurricular engagements, often voluntary, reinforce and extend the formal curriculum, fostering a strong connection between students and their environment.

1.4 Impacts on Environmental Awareness and Behavior

Recent studies from these countries provide evidence of positive outcomes on students' environmental awareness and behaviors resulting from these programs. In general, primary school children show significant increases in environmental knowledge and more responsible attitudes when they participate in targeted educational interventions. For instance, a 2025 study in Greece evaluated a waste management education program for primary students. It revealed that prior to the intervention, children had substantial gaps in understanding sustainability concepts (especially regarding organic waste and the broader idea of sustainability). After a focused lesson and an interactive activity (students designed posters for World Environment Day), their comprehension improved markedly – they could better connect sustainability issues with economic, societal, and environmental factors, and they developed a personal sense of responsibility for reducing waste. This finding underscores how experiential learning(e.g. creative projects and real-world context) can boost both knowledge and a sense of personal agency in environmental matters. The researchers advocate integrating such hands-on interventions into formal curricula more widely to cultivate environmental stewardship from early on.

Another key outcome is increased environmental awareness and literacy. A 2022 Greek study by Kosta et al. examined the effect of environmental education programs on children's connection to nature. It found that engaging students in outdoor activities had a measurable positive effect on their environmental knowledge and awareness levels. Importantly, pupils who had previous experience in environmental programs not only felt more connected with nature, but also retained environmental knowledge better over time compared to those without such experience. This suggests a lasting impact: early participation in eco-programs can build a foundation of knowledge and emotional attachment to nature that endures and potentially reinforces pro-environmental behavior. Indeed, other surveys indicate that older primary pupils tend to exhibit more pro-environmental behaviorsthan younger ones, likely as a result of cumulative learning and maturity. In Italy, a nationwide survey of 973 primary children in 2024 found that by ages 10–11, many students were already taking some eco-friendly actions (older children "showed increased pro-environmental behaviors" in their daily lives). This correlates with schools increasingly providing environmental education throughout the primary years.

Overall environmental awareness among students is quite high, but with some nuances. The **Italian** survey reported an impressive 93% of children were aware of climate change and 63% expressed concern about it. Such high awareness even in early grades reflects the penetration of climate topics in media and education. However, awareness alone does not equal empowerment: the same study noted that although children felt a strong sense of responsibility toward caring for the planet, many had only moderate confidence in their own ability to effect change. This highlights a critical point for program impact – effective initiatives should not just inform students, but also boost their self-efficacy in taking environmental action. Educational programs that give children concrete roles (like eco-club duties, conducting experiments, or leading community campaigns) help bridge the gap between knowing about problems and feeling capable to be part of the solution.

Longitudinal aspects are beginning to be studied as well. Some programs conduct follow-ups to see if knowledge and behaviors persist. In the Greek waste-management intervention, a follow-up indicated that students retained much of their improved understanding weeks later and continued to feel responsible about waste issues. Similarly, Kosta et al. observed knowledge retention at 4-week post-program, especially among those who had prior program experience. These short-term longitudinal findings are promising. Still, there is a need for more long-term studies (spanning months or years) to determine if early pro-environmental engagement translates into lasting behavior change as children grow. Notably, intergenerational effects are also reported: children who internalize green habits can influence their families, multiplying a program's impact at home. In summary, research across Latvia, Italy, and Greece consistently shows that well-designed educational programs can significantly raise children's environmental awareness, improve specific knowledge (e.g. waste sorting, climate issues), and encourage practical eco-friendly behaviors from an early age.

1.5 Outcomes for Civic Participation and Social Responsibility

Programs that link environmental learning with civic engagement have demonstrated benefits in fostering students' sense of citizenship and social responsibility. Many initiatives explicitly aim to turn students into active citizens who not only understand environmental issues but also get involved in communal efforts to address them.

The Eco-Schools program in **Latvia** is illustrative: by having students identify and solve environmental problems in their school or community, it inherently cultivates civic skills. According to the program coordinators, eco-school students learn to "become actively involved in solving their own, community's and society's problems," reflecting a growth in civic participation competencies. Children practice democratic involvement through eco-councils, where even at 10–12 years old they can voice opinions, debate solutions, and take collective action (such as petitioning the school administration for greener policies or organizing a local park clean-up). These experiences contribute to a greater sense of social responsibility – students see themselves as stakeholders who can improve their surroundings. Research in Latvia has noted that such school-based civic engagement is crucial for a sustainability-oriented society, but it also requires a supportive attitude from adults. One challenge reported in earlier studies was that some teachers were hesitant to treat pupils as equal partners in problem-solving, which could inhibit student initiative. Recent reforms and teacher trainings are trying to address this by promoting student-centered learning and trust in students' capabilities.

In **Greece**, the integration of social responsibility into programs is evident in projects like the "Plastics...everywhere!"action plan. Students in that project not only learned about plastic pollution but actively designed a community awareness campaign. By planning and hosting events to educate others (peers, parents, local citizens) about plastics and climate action, they practiced civic participation firsthand. Teachers reported that the students showed enthusiasm and creativity in engaging the public, indicating that given the opportunity, young children can contribute meaningfully to community dialogues on sustainability. Moreover, Greece's Skills Labs (thematic unit "I Am Interested and Active") explicitly target the development of social awareness and responsibility alongside environmental care. Through guided activities, even first-graders might work on simple class projects like making thank-you cards for community helpers or reducing food waste in the school canteen, planting the seeds of civic values. By the end of primary school, Greek students have often participated in multiple collective projects – whether it's a school garden, a recycling competition, or a charity drive – which helps normalize the idea of contributing to society. Educational authorities encourage schools to partner with local governments, NGOs, and national or international networks as part of these programs. Such partnerships further reinforce civic engagement: children see adults and officials collaborating with them, lending real-world weight to their actions.

In **Italy**, civic engagement outcomes are also intertwined with environmental programs. The new civics curriculum itself spans beyond environment into broader citizenship education, including democratic institutions and community values. When Italian students learn about climate change in class, it is often coupled with discussions on what they can do and how society should respond, thus linking knowledge to civic responsibility. The Green School network explicitly aims to have schools act as "promoters of good practices... then involving families and the entire citizenry". This whole-community approach means students' projects are not confined to school grounds; they reach parents (e.g. encouraging them to adopt recycling at home) and local citizens (through public events like the annual "Sustainability Feast" where students present their achievements). By engaging with city councils and local businesses on sustainability issues, Italian primary students in the Green School program experience civic participation in a tangible way. They begin to see how citizen action can influence policy (for example, a group of students might successfully lobby for a crosswalk near their school or for a plastic-free cafeteria policy citywide). A recent nationwide survey in Italy also provides insight into children's civic outlook: it found that most primary pupils feel a strong duty to care for the planet and trust adults (parents, teachers, leaders) to tackle climate challenges, yet they are also eager to be involved. This implies that children are looking to join adults in environmental citizenship, not just leave it to grown-ups – a positive sign for future civic engagement, provided schools continue to give them voice and opportunities.

These outcomes suggest that environmental education can be a powerful vehicle for civic education. When students engage in solving environmental problems, they simultaneously practice the fundamentals of citizenship: working in groups, understanding societal rules and roles, communicating their ideas, and taking responsibility for the common good. The programs in Latvia, Italy, and Greece all highlight that successful methodologies are those which combine knowledge with action – students learn about an issue and immediately apply that learning through a project or civic activity. This learn-by-doing approach yields growth in both environmental competency and civic maturity. For example, after participating in a targeted program, Greek students not only knew more about recycling but also felt more responsible and empowered to act on it. Likewise in Latvia, eco-school students developed motivation to act and solve problems in their community. These are clear indications that well-designed programs can achieve dual outcomes: educated, environmentally aware students who are also engaged, responsible young citizens.

1.6 Effective Methodologies and Pedagogical Approaches

The body of recent research points to several methodologies and pedagogical approaches that have been especially effective in these programs.

- **Experiential and Hands-On Learning**: Programs that involve active learning experiences consistently report better outcomes in both knowledge and engagement. This includes activities like experiments, outdoor field trips, gardening, art projects, and simulations. For instance, using Augmented Reality (AR) to visualize environmental concepts has shown promise in Latvia – one innovative curriculum (part of a 2025 Erasmus+ project) leveraged AR for virtual field trips and interactive simulations about climate change and resource management, resulting in improved student motivation and understanding of abstract topics. Students learn by doing – whether it's building a model of a solar oven or conducting a waste audit in the school – which makes lessons tangible and memorable. The Greek "Plastics..." project combined science inquiry with creative media production (posters, digital stories), marrying factual learning with personal expression. This kind of project-based learning not only reinforces content knowledge but also builds critical thinking and problem-solving skills as students plan and execute their projects.

- **Outdoor and Nature-Based Education**: Direct contact with nature has been shown to increase children's emotional connection to the environment, which is linked to pro-environmental behaviors. In the Italian context, children's "visions of nature" studies and biophilia research indicate that outdoor play and exploration can foster empathy for living things. The SAGE Open study from Greece explicitly noted the positive effect of outdoor activities on pupils' awareness and nature connectedness, as well as knowledge retention. Many programs, such as eco-school activities or environmental center excursions, capitalize on this by taking students outside the classroom – e.g. tree planting days, pond ecosystem studies, or visits to nature parks. Latvia's "Urda" nature park program is one example where students learn about resource management in an outdoor setting using AR to overlay information on the real environment. Such immersive experiences can spark curiosity and personal investment in environmental topics, which textbooks alone often cannot.

- **Interdisciplinary and Cross-Curricular Teaching**: Environmental and civic themes naturally cut across traditional subject boundaries. The most successful programs often integrate multiple subjects – science, social studies, art, language – around a common project. In Greece, the Skills Labs explicitly encourage a cross-thematic approach to break the "silos" of traditional subjects and link knowledge with real-world issues. The participatory action plan on plastics was cross-curricular by design (touching science, civics, language arts through its various components)oapub.org. Italy's curriculum reform also aimed to infuse sustainability across many subjects rather than treat it as an isolated topic. This interdisciplinary strategy helps students see connections – for example, a lesson on water conservation might include science (the water cycle), geography (local water sources), math (measuring water usage), and civics (the right to clean water), providing a more holistic understanding. It also allows students with different interests to engage (a creatively inclined child might contribute via art or storytelling, whereas another might focus on the science aspect).

- **Student Agency and Participation**: A core pedagogical shift in these programs is giving students a voice and leadership in their learning. Rather than passively listening, students take an active role – setting goals, making decisions, and reflecting on outcomes. The Eco-Schools methodology exemplifies this by having student committees lead the seven-step change process (audit, plan, monitor, etc.). Research finds this participatory approach highly effective: it increases students' ownership of the outcomes and thus their commitment. In Greece, where some teachers historically maintained a top-down approach, those who adopted more facilitative roles (as guides or co-learners) saw greater student enthusiasm and initiative in sustainability projects. The collaborative element is also key – working in teams on a project teaches communication, collective decision-making, and empathy. This aligns with modern pedagogy emphasizing collaborative learning communities in classrooms. For example, the Greek students collaborating with partner schools abroad via eTwinning experienced a sense of global citizenship, realizing that their local actions on plastics connected with peers in another country facing the same issues.

- **Use of Digital Tools and Media**: Incorporating technology and media that students find engaging can amplify program impact. We saw this with AR tools in Latvia making climate education more interactive, and with Greek students using Padlet and Canva to create digital content for their projects. These tools can cater to diverse learning styles (visual, auditory, kinesthetic) and often increase student motivation. Digital storytelling, videos, or even simple coding projects (like programming a recycling game) are increasingly being used in environmental education. They also build digital literacy alongside environmental literacy, a synergy noted as important for "ecological and digital competencies" in some curricula. However, researchers caution that technology should be used in service of pedagogy, not as a gimmick – AR or apps must be well-aligned with learning objectives to be effective. Additionally, equitable access to technology is a consideration: not all schools have resources, so programs need adaptation to different contexts (something noted in the AR curriculum study, which identified tech access and teacher training gaps as challenges).

- **Teacher Professional Development**: The success of these pedagogical approaches hinges on well-prepared teachers. Many studies and program reports highlight teacher training as a decisive factor. In Latvia, initiatives like the Green Schools have begun offering extensive teacher training on sustainability topics to ensure educators can integrate ESD into daily teaching. Greece's reform included training thousands of teachers on the new Skills Labs content and methods (often through MOOCs and regional workshops). Even the best-designed program will falter if teachers are not comfortable with student-centered methods or lack content knowledge about environmental issues. Encouragingly, teachers who do undergo professional development in this area often become enthusiastic champions for change – they bring back new ideas (like project ideas from Erasmus+ exchanges or eTwinning communities) and inspire colleagues. Continued support, such as providing guides, teaching materials, and expert assistance (for example, Greece provides a "Guide for developing environmental education activities" and specialist advisors at the Environmental Centers), is critical to maintain quality and momentum.

02

Psychometric test and results

2.1 Introduction

The MiniEduAgri Psychometric Test is an educational and psychometric assessment tool developed within the project to evaluate children's and young learners' knowledge, attitudes, and motivation toward sustainable food systems, environmental protection, and rural development after reading the comics and playing the game.

The instrument is structured around short illustrated stories featuring young characters (Emma, Athena, Mia, and Elina), each representing different dimensions of sustainability and civic engagement.

It contains 25 multiple-choice questions, grouped into seven thematic domains, reflecting key principles of the European Green Deal, the Farm to Fork Strategy, and the Long-Term Vision for EU Rural Areas. Each question offers four alternatives (A–D), only one of which is correct.

Participants from Greece, and Latvia completed equivalent national versions of the test through standardized Google Forms. This ensured comparable conditions and consistent evaluation across contexts.

2.2 The questions

1. Emma suggests using European funds to save Campoverde instead of selling the land to Scagliozzi. Why is this choice important?
2. At the Brussels competition, Emma presents panzerotti made with organic wheat and local tomatoes. What does this choice teach us?
3. In the end, the villagers use funds to install solar panels, repair farms, and plant trees. If you lived there, what would you do to keep the village "green" and alive?
4. How can agri-tourism benefit farmers?
5. Why might families enjoy visiting a farm as tourists?
6. When Athena shows children that Fthiotida has sun, wind, and fertile land, what lesson should we learn?
7. The children decide to clean the riverbank and start recycling. What does this action show?
8. At the end, Athena tells the villagers: "Our planet's wellbeing depends on everyone's daily choices." If you lived in Fthiotida, what would you do to help the planet?
9. What happens when young people leave villages for the cities?
10. Why is an ageing population a problem for rural communities?
11. Mia demonstrates that freezing and packaging help keep food safe and fresh. What is the main idea of this example?
12. Students learn that composting turns food waste into fertilizer. What does this teach us about food waste?
13. At the end, Mia explains that food science helps us eat healthier. If you were one of the students, how could you apply this in your own life?
14. What is one of the benefits for farmers who use traditional and organic methods?
15. How does eating local food support the environment?
16. What was Elina's first step in building her dream farm?
17. What does Elina's story teach us about achieving our dreams?
18. How did Elina make her farm more sustainable over time?
19. Which action shows that a community is investing in a greener future?
20. What could a young person do to make their village more eco-friendly?
21. After reading these stories, how important do you think it is to protect nature and the environment?
22. Do you think working alone is enough to solve big problems in your community?
23. Do you think what you learned about science, technology or sustainable practices can help you make better choices in everyday life?
24. Do you understand that small actions, like recycling, saving energy or reducing food waste, can make a difference?
25. After reading these stories, how motivated do you feel to take action to help the environment or improve sustainability at school or at home?

2.3 Greece

A total of 62 participants completed the Greek version of the test. Statistical analysis based on the aggregated results shows a mean accuracy of 86.9%, corresponding to an average of 21.7 correct answers out of 25. This high average indicates that Greek students demonstrated a strong grasp of emotional regulation, perspective-taking, and sustainable decision-making. The vast majority selected responses aligned with environmental responsibility, civic engagement, and empathy. According to the established interpretative scale, this performance falls within the category "enough points → sustainable attitudes → test effective." This suggests that the educational program preceding the test successfully enhanced both cognitive and affective understanding of sustainability principles, confirming the reliability of the test as a measurement tool for pro-environmental competence.

- Students (per item): 62
- Expected mean points (out of 25): 21.82
- Mean % correct: 87.3%
- Interpretation: Enough points → sustainability → test effective

2.4 Latvia

A total of 55 participants completed the Latvian version of the test. Statistical analysis of the aggregated results shows a mean accuracy of 73.5%, corresponding to an average of 18.4 correct answers out of 25. This result indicates that Latvian students displayed a good overall understanding of sustainability-related concepts, including empathy, civic responsibility, and environmentally conscious behavior. While their performance was slightly lower than that of their Greek peers, the majority of answers still reflected positive pro-environmental attitudes and a sound comprehension of sustainable practices. According to the interpretative scale, this outcome falls within the category "enough points → sustainable attitudes → test effective." This means that the Latvian group achieved a satisfactory level of sustainability awareness and that the educational intervention prior to the test had a meaningful positive impact on both cognitive and emotional dimensions of learning. The results further support the test's effectiveness and validity as a tool for assessing pro-environmental competence in primary education settings.

- Students (per item): 55
- Expected mean points (out of 25): 18.36
- Mean % correct: 73.5%
- Interpretation: Enough points → sustainability → test effective

2.5 Cross-country results

Each correct answer = 1 point. With 25 items, the total score ranges 0–25.
Interpretation (for mean scores or individual scores):

- 0–14.9 points (<60%) → Not enough points → unsustainable attitudes → test not effective
- 15.0–17.4 points (60–69%) → Borderline/partially sufficient → mixed sustainability → test partly effective
- ≥17.5 points (≥70%) → Enough points → sustainability → test effective

Test used: Paired t-test on item-level proportions (Greece vs Latvia), 25 common items (one item had missing data in Latvia, so df = 23.

$t(23) = 4.362, \ p = 0.00023, \ \text{Cohen's } d_p \ (dz) = 0.89 \ (\text{large}).$

Both countries fall in the "enough points → sustainability → test effective" category based on the interpretative scale.
Greece exhibits very strong performance (**≈21.8/25**), with high correctness on most items.
Latvia also reaches the "effective" range (**≈18.4/25**), though significantly lower than Greece by item-by-item comparison.

This suggests the Greek cohort demonstrates more consolidated sustainable knowledge/attitudes as measured by these items, while the Latvian cohort meets effectiveness thresholds but with more room for improvement: Greece shows a statistically significantly higher average item correctness than Latvia.
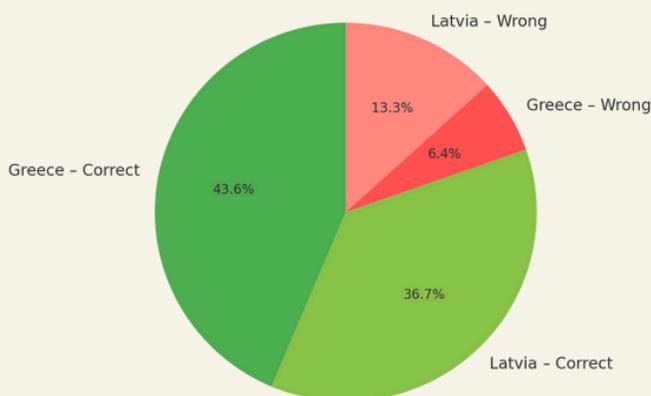
Green tones represent correct answers (higher = more sustainable attitudes).
Red tones represent wrong answers (lower sustainability).
Greece shows a visibly larger share of correct responses (≈87%), while Latvia reaches ≈73%, confirming the quantitative results and the significant difference found by the paired t-test

03

Guide to administrate the test

3.1 Introduction

The emotional intelligence and pro-environmental attitude test aims to evaluate primary school students' understanding of sustainable behavior, empathy, and civic engagement. The test measures how effectively educational interventions — such as the reading of sustainability-themed comics — enhance students' awareness and emotional competence related to environmental responsibility.

To ensure replicability and comparability of results across different countries and contexts, the test must be administered under standardized conditions, following the same structure, timing, and instructions for all participants.

3.2 Target group

Primary or lower secondary school students aged approximately 9–13, or older learners in educational pilot programs on sustainability.

3.3 Timing

The test should ideally be given twice:
- Pre-test, before introducing the educational material (e.g., reading the comics or participating in the MiniEduAgri activities).
- Post-test, immediately after the completion of the learning activity.

This pre–post design allows for the measurement of learning gains and attitudinal change attributable to the intervention.

3.4 Environment

The test should be administered in a quiet classroom or online setting with clear instructions and no external assistance.
Teachers or facilitators must refrain from explaining items or influencing students' responses.

3.5 Format

- Online version via Google Forms (recommended for automatic data collection).
- Paper-based version may be used when internet access is limited, ensuring that item order and answer options remain identical.

3.6 Language

If translated, all language versions must be back-translated and verified to preserve the meaning and order of answers (A–D), ensuring cross-country comparability.

3.7 Scoring and Data Processing

Each correct answer from items 1–22 equals one point. The maximum achievable score is 22 points.

Items 23–25 are not scored for correctness; instead, they provide qualitative or Likert-type feedback on students' motivation and awareness.

To compute results:

- For each respondent, sum the correct responses to obtain a total score out of 22.
- Calculate mean, standard deviation (SD), and sample size (N) for each country or group.
- Statistical comparisons between groups (e.g., countries or pre/post tests) can be conducted using t-tests or ANOVAto evaluate significant differences in learning outcomes.

In addition, responses to items 23–25 can be summarized as percentages of participants who feel "motivated" or "very motivated" to act sustainably. A high proportion of positive responses (>70%) indicates that the educational intervention was affectively effective — fostering environmental engagement even beyond cognitive learning.

Score range	Interpretation	Educational meaning
0-8 points	Unsustainable attitudes	Test not effective; limited understanding of sustainability principles
9-16 points	Moderate sustainability	Partial comprehension; test moderately effective
17 - 22 points	Sustainable attitudes	Strong understanding; test effective in promoting sustainability learning

3.8 Statistical Reporting Example

When replicating the administration, the results should be reported with descriptive and inferential statistics, such as:

"After completing the MiniEduAgri educational module, YY students achieved an average score of 20.25 (SD = 0.71), while XX students scored 1.43 (SD = 0.66).
The difference was statistically significant (p < .001). Attitudinal items showed that over 80% of students across all countries reported high motivation to act sustainably."

Bar charts or histograms visualizing country averages, pre/post differences, and motivational feedback are recommended for clear communication of findings.

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