Open Schools for Open Societies

Deliverable 6.2

OSOS Impact assessment tools

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Abstract	This document outlines the impact assessment tools for the OSOS project. It follows the Impact Assessment Framework, D6.1 and presents the tools that will be used during the pilot phases of the project in order to collect the needed feedback from the activities in the OSOS schools. In the 1st phase of the pilots with the selected 100 schools the tools will be tested and possible modifications will be realised if needed. The main aim is to assess the school openness at two levels: at the school (organisational change, RRI integration) and at the student level (interest and motivation in science, problem solving), as it was presented in the D6.1.
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01	31/10/2017	SV	1st draft delivered by SV (Structure)
02	06/11/2017	SV/EA	D6.2 Meeting at EA and detailed discussion about the tools and the structure
03	15/11/2017	SV/EA/DCU/UBT	Integration of comment/input from SV, EA, DCU and UBT SV: Self Reflection Tool (Organisational Change) DCU: Sustainability Valuation Tool EA: Problem Solving Tool UBT: SMQ and IMI Questionnaires
03	23/11/2017	SV	2nd Draft for final comments
04	30/11/2017	EA/DCU	Integration of Comments from EA/DCU for the Self-Reflection Tool
05	6/12/2017	EA	Integration of final comment from EA. Text included o describe what will be the report that will be produced after the school will fill in the Self-Reflection Tool.
06	7/12/2017	SV	Final Version

Executive summary

This document describes and presents the OSOS Impact Assessment Tools. It follows the Impact Assessment Methodology that was developed in D6.1 as well as it integrates the main aspects of the OSOS Development Plan (D2.2) which will be used in the evaluation of the OSOS activities. The tools will be used throughout the project's duration in order to give feedback and assess the school openness as well as the science education approaches on evaluating students' problem-solving competence, interest and motivation in science which align with Responsible Research and Innovation (RRI) principles.

Following the Impact Assessment Methodology, the tools (self-reflection tools, questionnaires, interviews and focus groups guidelines) will measure and assess the already identified 40 OSOS indicators (D6.1) during the pilot phase, initially with 100, and then with 1000 schools in different European countries.

In Chapter 1 the overview of the tools that will be used is presented, by corresponding each tool to the indicator that will measure. There will be 2 main categories of the assessment and the tools that will be used (1) to measure how the Schools Work according to the OSOS Model and (2) to measure if there is a Shift from Students as Consumers to Creators while following the OSOS proposed strategies. The rationale or the development of the assessment tools for the first category is presented, namely the Self Reflection Tool and the Sustainability Valuation Tool. For the second category, already existing tools that have been tried in several relevant occasions, will be used and therefore are shortly presented in this section.

In Chapter 2 the OSOS Assessment Tools are presented in detail. How were developed and how they will be used is presented along the main contents of the tools (questions, statements, guidelines etc.). The Assessment tools will be used to measure the Organisational Change and at the same time the Pedagogical Impact of the proposed approaches and activities. The main tools presented, are Questionnaires that will be used in different situations. The most important instrument is the Open Schooling Reflection tool. This will be the main tool to measure the organisational change and the RRI integration in the schools and is structured in such a manner that gives the opportunity to each school to identify the status and the level of openness according to the OSOS Model. The students of the participating schools will also have to fill in questionnaires according to the accelerators that they are going to realise in order to measure their motivation and interest.

In Chapter 3 there is a detailed presentation of the 40 OSOS indicators. For each indicator there is a table that includes all the needed data about the indicator: Indicator Number, Name of indicator, Description, Data collection tools - Primary/secondary data (the OSOS Assessment Tool or Tools that will be used), Qualitative / Quantitative (the kind of data analysis), Time-series (the timeframe for the implementation of the measurements), Measurement Level (what will be the expected kind of results), Unit of analysis, Coverage.

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1 Introduction

1.1 Assessing School's Openness

The purpose of the deliverable D6.2 is to provide details on the assessment tools that will be used according to the D6.1 and the assessment methodology. The deliverable provides the needed descriptions on how to use the tools as well as the methods that will produce results. It contains practical information on the use of questionnaires as well as information on the collection of target groups feedback. Additionally, the regular reporting mechanism which will help address any issues as they appear is described.

The project team will focus on assessing the **organisational change** that is crucial for the implementation of the open schooling approaches, which are based on the **RRI principles**. It will explore the **sustainability and the cost effectiveness** of the proposed approaches in order to inform the interested stakeholders at policy levels for the necessary investments. It will explore some key characteristics of the related science pedagogy by focusing on **students' motivation and interest**. Additionally, it aims to demonstrate that such an educational environment (Open School) promotes **deeper learning approaches** by helping students to achieve higher levels in problem solving competence.

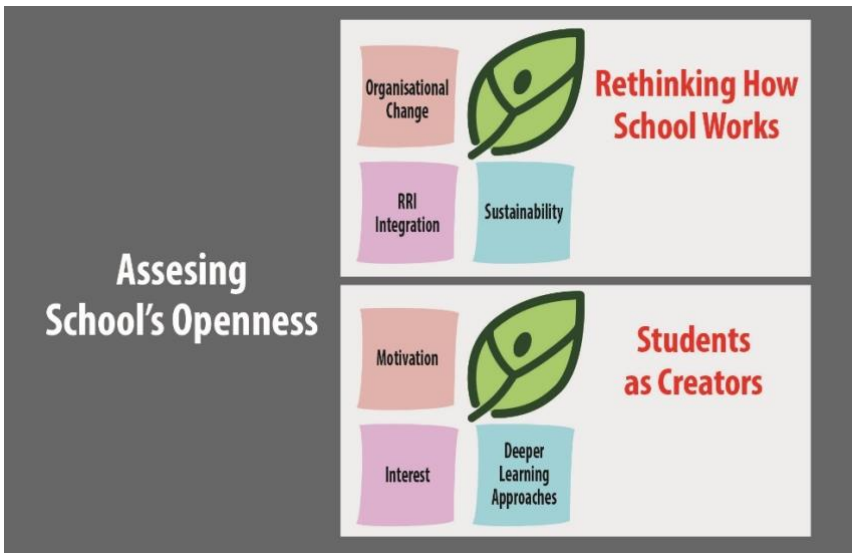


Figure 1.1: The overall Assessment Framework for monitoring the Open School Hubs development during the OSOS project implementation.

1.1.1 Measuring the Organisational Change and RRI Integration

To measure the Organisational Change and the RRI Integration, the OSOS Assessment Team developed a **Self-Reflection Tool** that is based on 3 levels:

- The Management Level
- The Process Level
- The Teachers' Professional Development Level

Each Level includes 8 aspects that cover in each level relevant issues like leadership and vision, processes and how are implemented as well as the school staff competences and how they are included in the strategy of each school. The aspects include also RRI characteristics that the school needs to integrate in its structure and development plan.

The Development Plans that each school will develop according to D2.2 will be used also in the Assessment of the project in order to cross check the planning with the responses in the self-reflection tool.

Both tools will be used in order to measure the Indicators 1 to 20 as it is illustrated also in the Table 1 below.

1.1.2 Measuring the Sustainability

The sustainability assessment of the OSOS approach will be realised by gathering data and conducting analysis on economic and cultural parameters related to school transformation and engagement with external stakeholders. The Sustainability Valuation Tool is consisted of 2 questionnaires:

- Questionnaire on effective and sustainable partnerships
- Questionnaire for assessing the community and cultural conditions

Furthermore, interviews and focus groups with a sample of the participating schools' heads as well as external stakeholders will take place.

The above-mentioned tools will be used in order to measure the Indicators 21 to 32 as it is illustrated also in the Table 1 below.

1.1.3 Measuring the impact on science pedagogy

The OSOS Accelerators and the OSOS Platform will provide the means and the tools along with the necessary collaborative and personalisation functionalities to introduce learners in extended episodes of deep STEM learning related activities.

During the pilots the schools will implement several activities in schools as well as in the OSOS platform. Our aim is to explore some key characteristics of the related science pedagogy by focusing on **students' motivation and interest.** Additionally, as the selected OSOS schools will realise activities that aim to raise the students' levels of Problem-Solving Competences, it is important to monitor and investigate if this is achieved by the proposed **deeper learning approaches**.

In Chapter 2 are presented the relevant questionnaires that will be used to measure the impact on science pedagogy:

- Science Motivation Questionnaire II (SMQII)
- Intrinsic Motivation Inventory (IMI)
- State Emotions (SE)
- Cognitive Load
- Problem Solving Competence Tool

1.1.4 Shallow and Deep Web Analytics

Shallow and deep analytics will be provided from the OSOS platform. These will be used to support students learning and achievement as well as the design of more effective educational experiences for the students.
The main analytics that will be used are:

- Users Behaviour
- Time on Task

- Educational Value of the Resource
- Class Profile
- Competence Proficiency

1.1.5 OSOS Indicators and Tools

Table 1 contains the indicators that were developed and presented in D6.1. These indicators are presented with corresponding tools for each one of them (or group of them) and will be used to measure them. Chapter 3 includes a detailed description of each one of the indicators and the respective tools that will be used in order to measure them. The timeframe for measuring each indicator during the project's pilots is also outlined.

Table 1: *Matching OSOS Indicators with Assessment Tools.*

Driving Forces	Evidence of Openness and Growth	Indicators	Instruments (tools) to be used
Rethinking How Schools Work	**Holistic school approach and vision**	1. **The school has a clear vision and strategy** towards open schooling 2. At least one **appointed teacher with clearly defined actions** to support the open schooling strategy 3. **Strategies** to encourage Problem Solving, Team Work, Active Citizenship, Critical Thinking and Gender Equality exist 4. **Approaches aimed at replacing competitive type classroom** environment with more collaborative working approaches (that also addresses gender equality and inclusion) exist 5. **Plans for professional development of teachers** for School Staff to foster a change in behaviour, enabling teachers to adapt to the open schooling culture 6. Strategies for teachers to participate in **international mobility actions** are in place 7. A **motivation mechanism is set-up for teachers/students undertaking innovative projects and social entrepreneurial behaviour. Brokers, central connectors, and energizers are getting in action.** 8. The school supports the development of an interdisciplinary environment where **students/teachers are encouraged try new ideas and approaches** 9. **Parental engagement is integrated** into the school planning structure	• Open School Development Plan • OSOS Self-Reflection Tool • Web Analytics
	Effective introduction of RRI principles in the school operation	10. School supports and introduces **student-led social enterprise start-ups community-focused courses** 11. School has an ongoing system of teacher and student self-reflection, discussion and learning set-up 12. Teachers/students **engage in platforms for sharing best practice and lessons learned** 13. Schools set up a **system to reflect, track and monitor** how open school practices have shaped the school organisational culture 14. **Parents actively collaborate** with the OSOS projects organised by the school 15. There is a **commitment to changing the school at all levels** 16. Students and teachers incorporate a process of ongoing learning and evaluation into lessons and projects 17. Students and teachers receive **feedback from community partners** and **adapt** projects, where possible, based on this feedback	

		18. Schools encourage and engage in **reflection, discussion and debates** on scientific and societal issues 19. **All actors mutually benefit from the engagement** in the projects and incorporate learnings into their systems and processes i.e. Industry update their CSR/business strategy, there is an economic cost-benefit 20. There is evidence of an **economic benefit-associated engagement** of all partners	
	Effective and sustainable partnerships with external stakeholders	21. School has a **system in place which captures the profiles, needs, contributions and relationships of all relevant external stakeholders** 22. Students identify and align stakeholder needs with **matters of local social and economic concern** 23. School actively **promotes the collaboration** with non-formal and informal education providers, enterprises and civil society organisations 24. School **engages in a number of projects which demonstrate stakeholder inclusion** 25. School engages with outreach groups of research organisations to gain further **insight into the life and careers of scientists/engineers** (paying special attention into providing role models for all genders) 26. There is evidence of **parental engagement in school projects** 27. Schools **increase the science capital of their communities** 28. Local/regional/national businesses and organisations **share their infrastructures and collaborate or work within the school projects** 29. School works with research centres and science museums to **develop initiatives using co-creative approaches, and vice versa** 30. V**isits to research centres, science centres and museums are becoming the norm** 31. **Formal procedures for stakeholder's involvement** 32. **Participation and engagement of policy makers** from key organisations in school projects and initiatives.	• Open School Development Plan • Questionnaire on effective and sustainable partnerships • Questionnaire for assessing the community and cultural conditions • Focus Groups and Interviews • Web Analytics
Shift from Students as Consumers to Creators	**Educational resources generated in school settings according the local needs**	33. Schools show evidence of engaging in **virtual and physical platforms to develop new innovative projects, share ideas, identify and collaborate with other schools** to develop innovative projects aimed at addressing the grand societal challenges 34. **Schools projects and activities are related** to issues of national or local interest in connection with the grand challenges 35. Schools **share Open Schooling approaches with other schools and external agencies on** regional and national levels	• Web Analytics • Open School Development Plan

		36. Development of a **support infrastructure for teachers and students to organise local conferences, workshops, cafes, exhibitions open days** in the school with stakeholder involvement	
	Increased Interest and Motivation	37. P**ositive impact on learning outcomes** – increased student motivation, increased interest in science, achievement of higher levels of problem solving competence and collaboration	Questionnaires: • SMQII • IMI • SE • Cognitive Load
	Development of key skills	38. P**ositive impact on learning outcomes** – achievement of higher levels of proficiency in problem solving and collaboration skills	• Web Analytics • Problem Solving Competence Tool
	Focused policy support actions	39. The school is a **recognised site of shared science learning** in the community 40. Schools engage with **policy makers to inspire curriculum change**	• Focus Groups and Interviews

2 OSOS Assessment Tools

2.1 Open School Development Plan

2.1.1 Presenting the tool

Pilot schools will be asked to cater for a holistic school development plan in using a provided template. That plan will provide a robust base for automating and facilitating the task of periodic school self-assessment based on reliable indicators, such as development of innovative projects and initiatives, school external collaborations, teachers' professional development plans and school portfolios that may also include information on teacher-generated content, effective parental engagement strategies. The proposed School Development Plan Template is presented in D2.2. It will be used in the framework of the first pilot phase and it will be tested in about 100 schools in different European countries. In the second pilot phase the tool will be used with all participating schools (in its final form).

The implementation of an Open School Development Plan is valid here. It could be a helpful tool for the school management who has to be committed to change to initiate a series of activities that will help the educational staff to realize the added value of the innovation process.

The Open School Development Plan will be used in order to cross check the schools' planning with the actual activities that will undertake during the pilot phases.

The plan will be developed as soon as the school will start the implementation phase in OSOS.

2.2 Open School Competence Framework

2.2.1 OSOS Self -Reflection Tool

The self-reflection tool is introduced in OSOS in order to measure the Organisational Change of each school. This is the 1st element of the Open School Competence Framework.

2.2.1.1 Presenting the tool

The tool is based on the three levels that were presented in D6.1 concerning the School's Organisational Change:

- Management Level
- Process Level
- Teacher's Professional Development Level

For each one of the above-mentioned levels the tool will reflect upon 8 aspects that follow the indicators that were introduced in D6.1 as well as the RRI aspects.

	Management Level	Process Level	Teacher's Professional Development Level
1	Vision and Strategy	School Leaders and Teachers Shaping Learning Systems	Teacher Awareness and Participation
2	Coherence of Policies	Creating an inclusive environment	Setting Expectations
3	Shared Vision and Understanding	Collaborative environments and tools (co-creation, sharing)	Professional Culture
4	Education as a Learning System	Implementing Projects	Professional Competences, Capacity Building and Autonomy
5	Responsible Research, Reflective Practice and Inquiry	Parents and external stakeholders' involvement in school's activities/projects	Leadership Competence
6	Motivation Mechanisms	Reflect, Monitor, Debate	Collaborative learning (mobility actions)
7	Plans for Staff Competences	Learning Processes adaptation	Collaborative learning (ICT Competences)
8	Communication and Feedback Mechanism	Established collaboration with local, national institutions	Use and reuse of resources

For each one of the 8 aspects in each level the school has to choose one statement that correspond to the actual situation at the time. Each statement corresponds to a school typology, as it was introduced in D2.2 according to the school's readiness to adapt an open schooling culture.

According to the response in each one of the aspects the school will be characterized as:

ENABLED	CONSISTENT	INTEGRATED	ADVANCED
Schools that are at an initial stage of incorporating educational innovation in the classroom and beyond	Schools that have achieved a certain level of innovation and openness through specific measures, educational ICT tools, best practices, CPD, but they still consist isolated cases without a network of other schools and external partners to facilitate the process	Schools that have achieved a high degree of innovation and openness and they have already established cooperation with community stakeholders and other external partners	Schools that are considered rather extreme cases of schools that offer a glimpse to the open school of the future

In order for a school to start the self-reflection tool should be aware of the main OSOS strategies and most important OSOS School Characteristics (D2.1). According to these and the indicators the school will be assessed if it is in the initial phase of the change or changes have already taking place within the school.

In the following table we present all the statements that the School will need to select from in order to implement the Self-Reflection Tool.

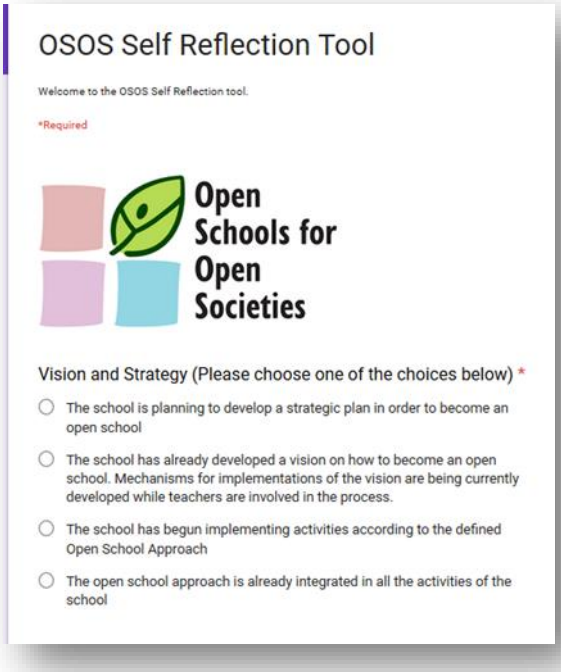
		Enabled	Consistent	Integrated	Advanced
MANAGEMENT LEVEL	**Vision and Strategy**	The school is planning to develop a strategic plan in order to become an open school	The school has already developed a vision on how to become an open school. Mechanisms for implementations of the vision are being currently developed while teachers are involved in the process.	The school has begun implementing activities according to the defined Open School Approach	The open school approach is already integrated in all the activities of the school
	Coherence of Policies	The school management ensures that the school policies are coherent to the latest developments and also to the needs of the students, the teachers and the general community of the school.	The school considers comprehensive strategies to raise the quality in the teaching inside the organisation, including school leadership, and the attractiveness of careers at school, covering such aspects as teacher competences, qualification requirements, a continuum of teacher education and professional development, teacher evaluation, career perspectives and working conditions;	The school critically reviews policies on teachers and school leaders in line with any major changes to curricula, assessment, school organisation and funding, quality assurance etc., and vice versa, to ensure coherence in line with central policy objectives in school education;	The school involves stakeholder organisations in open and regular dialogue with the goal of increasing policy coherence and benefit from their experience and broad networks.
	Shared Vision and Understanding	The school shapes a common vision for open schooling that is shared between the teachers	The school opens fora or platforms to bring together perspectives from different levels of the system including central authorities, national stakeholder organisations; regional/local authorities and stakeholders, practitioners at school, pupils with their parents and families, local communities;	The school balances school autonomy with measures of accountability that support school development and help teachers and school leaders to shape schools as learning organisations; review quality assurance systems and the role of inspection in this respect	When defining policies and priorities for Continuing Professional Development, the school considers balancing needs at system and school levels with those of individual teachers and school leaders
	Education as a Learning System	The school creates a vision of change management, the school head participates in professional development on change management	The school builds capacity for change management, including the identification of change leaders, offering them professional development on change management, and other forms of support	The school sets up broad and inclusive consultation processes, to build trust and enhance support for reforms among stakeholders, and to inform policy-making;	The school considers regional or local partnerships to stimulate school development or support the implementation of specific reforms, e.g. model regions, local networks.
	Responsible Research, Reflective Practice and Inquiry	The school introduces the principles of responsible research, reflective practice and inquiry in the school practices	The school supports teachers in gaining research qualifications and conducting research, for instance by recognising and encouraging research as part of professional development; through grants for research projects or qualifications (e.g. PhD);	The school supports reflective practice to develop learner-centred teaching and assessment strategies; It rewards and stimulates innovation in teaching, and school practice more generally, for instance through grants, awards;	The school creates partnerships between schools and higher education institutions, focused on research, feedback loops between theory and practice (involving both teacher education providers and faculties of educational science); It instigates and develops training for peer-mentoring.
	Motivation Mechanisms	The school plans to set-up a mechanism aimed at motivating teachers and students undertake innovative projects	The school has already set a mechanism to motivate teachers and students undertake innovative projects	The majority of the teachers and students demonstrate a motivation to undertake innovative projects.	The school's motivation mechanism is evaluated and updated in regular base.
	Plans for Staff Competences	The school develops a plan to identify Teachers' Professional Development needs	The school has appointed a teacher or a team of teachers as responsible to identify and plan the whole school staff Professional Development needs.	The school is realising or participating in Teachers' Professional Development programmes	The school regularly updates the plan for the Teachers' Professional Development programme according to a needs analysis mechanism.
	Communication and Feedback Mechanism	The school introduces a mechanism to communicate its Open School vision and strategy to all the stakeholders	School Management is communicating the vision and the strategy of the school to the teachers and students	School Management is communicating the vision and strategy with support from teachers and students as well as to external stakeholders	The school collects feedback about the vision and the strategy after communicating to all the stakeholders.

		Enabled	Consistent	Integrated	Advanced
PROCESS LEVEL	**School Leaders and Teachers Shaping Learning Systems**	School leaders and teachers are acknowledged and respected for their expertise and their contribution to every day school activities	The school creates opportunities for school staff to diversify careers by taking on additional roles to classroom teaching/school leadership, at school (coordinating or leadership roles; support to colleagues, including mentoring, professional development, involvement in school development, (international) project work, extracurricular activities, cooperation with external partners);	The school creates opportunities for school staff to become involved in developing the open school approach (school evaluation; policy dialogue; policy development etc.)	The school creates opportunities for/encourage/support school staff to engage in school-to-school networks to share expertise and teaching resources, spread innovation or support school development
	Creating an inclusive environment	School has identified the national or European guidelines concerning inclusiveness	Teachers are implementing inclusion activities (communication, awareness, equal opportunities, highlight any stereotypical language).	Most of the teachers are implementing inclusion activities (communication, awareness, equal opportunities, highlight any stereotypical language).	Majority of teachers are implementing inclusion activities (communication, awareness, equal opportunities, highlight any stereotypical language) and collaborate with schools at local or national level.
	Collaborative environments and tools (co-creation, sharing)	The school sets-up the needed infrastructure to enable teacher and students to create a collaborative working environment	Teachers and students are using collaborative environments for limited classroom activities	Teachers and students are regularly using collaborative environments in their classroom activities and develop and share content.	Teachers and students are regularly use collaborative environments in their classroom activities and co-create content with other schools.
	Implementing Projects	The school has selected the accelerator(s) that aims to implement in one classroom	The school has developed a specific plan to involve several classrooms to implement more than one accelerators.	The majority of teachers incorporate accelerators in their classroom	Teachers have integrated the use of accelerators in all the classrooms and they are developing their own accelerators
	Parents and external stakeholders' involvement in school's activities/projects	Parental and external stakeholders' engagement is evidenced through projects that the school has initiated.	Parental and external stakeholders' engagement is embedded in most of the school's activities.	Parental and external stakeholders' engagement is embedded in the majority of the school's activities. Initiated an ongoing monitoring and evaluation of interventions.	Parental and external stakeholders' engagement is embedded in all the school's activities and is initiated by them. An ongoing monitoring and evaluation of interventions is established.
	Reflect, Monitor, Debate	The school conducts reflection, monitoring and debates as planned/initiated processes in the school's activities (involving teachers and students). These tasks are performed on components that have been identified as critical to the implementation of the OSOS Open School Strategy.	The school performs regular analysis and evaluation of the data collected from the reflection, monitoring, and debates with teachers and students.	The school produces regular reports on the findings of the reflection, monitoring and debates. The reports are distributed to teachers, students, parents as well as the school management and relevant improvements are realized.	The school produces regular reports on the findings of the reflect, monitoring and debates with all the stakeholders. The reports are distributed to all the stakeholders and relevant improvements are integrated in the school's development plan.
	Learning Processes adaptation	These is evidence of teachers (0-25%) adapting learning processes according to implementation results.	Some teachers (25-50%) adapt learning processes according to established feedback mechanism involving all stakeholders	The majority of the teachers (50-85%) are adapting learning processes according to established feedback mechanism involving all stakeholders	All teachers and students propose improvements and adaptations according to feedback from all stakeholders, regularly.
	Established collaboration with local, national institutions	There is evidence of teachers (0-25%) collaborating with local and/or national research/science institutions	Some teachers (25-50%) implement projects with the collaboration of local and/or national research/science institutions	The majority of the teachers (50-85%) are implementing projects with the collaboration of local and/or national research/science institutions	Collaboration of local and/or national research/science institutions is embedded in all the school's activities. An ongoing monitoring and evaluation of interventions is established.

		Enabled	Consistent	Integrated	Advanced
TEACHERS'PROFESSIONAL DEVELOPMENT	**Teacher Awareness and Participation**	Teachers are introduced and offered to engage in Professional Development opportunities	Teachers are aware of and many have participated in Professional Development programmes (e.g. Summer Schools, Mobility actions)	The majority of the teachers have participated (individually or as whole school) in Professional Development programmes.	Teachers meet their professional needs through active participation in communities of practice, peer to peer networks and accredited practice-based research
	Setting Expectations	The school sets a framework of clear and tangible expectations for each member of the school community	The school creates transparency on the competences required from teachers at different stages of their involvement through frameworks or standards	The school involves teachers and other relevant stakeholders in its development and regular reviews its governance tools to ensure broad buy-in, relevance and usefulness	The school ensures that expectations as set out in the school framework of clear and tangible expectations for each member of the school community are aligned with teacher education curricula, as well as with school curricula
	Professional Culture	The school encourages and supports collaboration among staff for teaching (e.g. team teaching; sharing of teaching resources) and staff learning.	The school encourages cross-school networks and digital platforms to support (a culture of) collaboration in the teaching profession.	The school supports a culture of collaboration by avoiding situations that could encourage counterproductive competition between individuals The school strengthens recruitment and retention of qualified staff by focusing on school ethos or professional culture	The school encourages links between schools and providers of teacher education; It supports systematic induction of beginning teachers, and teachers new to the school.
	Professional Competences, Capacity Building and Autonomy	The school clarifies the definition of CPD for school staff, with a preference for a broad, open and inclusive concept that is operational at the same time (including formal, informal and non-formal forms of professional learning)	The school considers making CPD an obligation/explicit duty, and allocating working time to it	The school aligns priorities with real needs at different levels (teachers' individual learning needs, school level needs,) and review systems of priority setting if needed (at which level, by whom) It encourages professional development cultures at school: this may include reviewing decision-making on priorities and funding allocation; the use of CPD plans by schools/individual teachers; links to teacher appraisal	The school supports self-regulation of the profession (e.g. through a teaching council or consultation processes)
	Leadership Competence	The school creates transparency on the competences required from school leaders, for instance through competence frameworks or standards	The school ensures transparency and common understanding on the leadership competences of teachers (at different stages of their career)	The school reviews teacher education, including CPD available to ensure it addresses leadership competences	The school promotes forms of distributive leadership with broad involvement of staff at school
	Collaborative learning (mobility actions)	There is limited sharing of innovative practices among the teachers of the school	Teachers in the school are sharing and collaborating in innovative projects in an informal manner	Teacher regularly share their innovative projects and collaborate within the school as well as with other schools	School supports and facilitates peer to peer learning in open schooling practices through mobility actions and other formal approaches.
	Collaborative learning (ICT Competences)	Professional Development is focused on basic ICT skills	Some teachers participate (25-50%) in Professional Development Programmes aimed at introducing collaborative learning through digital platforms	The majority of teachers (50-75%) participate in Professional Development Programmes introducing collaborative learning through digital platforms	School identifies and designs its whole school Professional Development programme for collaborative learning through digital platforms, delivered also to other schools.
	Use and reuse of resources	Teachers are offered the opportunity to engage in web communities and avail of online resources to support teaching practices	Teachers in the school use online resources and share self-developed resources.	Teachers regularly uses online resources from web communities and portals in their classroom.	Teachers confidently share their online resources within their own school and with other schools.

2.2.1.2 Implementation Process

The school representative through the OSOS portal, will have access to the OSOS Self Reflection Tool. He/She will have to fill in each one of the 3 levels and to choose between the statements that correspond to the school's status. Each one of the 8 aspects of each level will be presented as in the following figure and the school representative will have to choose between the 4 statements:



After the completion of each one of the required section of the self-reflection tool, the School Head (the school) will get a report that will include the answers in each one of the sections as well as the results of the reflection. The report will present their answers as a table for each one of the sections (see Figure 2.1) as well as will inform about the status in relation to its openness. As it was presented in the previous section there are four categories where a school will be categorised:

- Enabled (0-25%)
- Consistent (25-50%)
- Integrated (50-75%)
- Advanced (75-100%)

Along with the results, concerning the category in which belong, the school heads and/or the individual teachers will be informed in practical terms for:

a. the tailored OSOS Strategies to support the local schools as they transform themselves into open schooling environments
b. the package of the supporting services that they could use (accelerators)

An example of the report that will be produced is illustrated in Figure2.1.

Open Schools for Open Societies

OSOS Self Reflection Report

5/12/2017

NAME OF THE SCHOOL

Funded by the Horizon 2020 Framework Programme of the European Union

This project has received funding from the European Union's Horizon 2020 Framework Programme under grant agreement No. 741572

SCHOOL'S REPORT

MANAGEMENT LEVEL	Vision and Strategy	The school is planning to develop a strategic plan in order to become an open school
	Coherence of Policies	The school considers comprehensive strategies to raise the quality in the teaching inside the organisation, including school leadership, and the attractiveness of careers at school, covering such aspects as teacher competences, qualification requirements, a continuum of teacher education and professional development, teacher evaluation, career perspectives and working conditions
	Shared Vision and Understanding	The school balances school autonomy with measures of accountability that support school development and help teachers and school leaders to shape schools as learning organisations; review quality assurance systems and the role of inspection in this respect
	Education as a Learning System	The school builds capacity for change management, including the identification of change leaders, offering them professional development on change management, and other forms of support
	Responsible Research, Reflective Practice and Inquiry	The school introduces the principles of responsible research, reflective practice and inquiry in the school practices
	Motivation Mechanisms	The school has already set a mechanism to motivate teachers and students undertake innovative projects
	Plans for Staff Competences	The school has appointed a teacher or a team of teachers as responsible to identify and plan the whole school staff Professional Development needs.
	Communication and Feedback Mechanism	School Management is communicating the vision and strategy with support from teachers and students as well as to external stakeholders
PROCESS LEVEL	School Leaders and Teachers Shaping Learning Systems	School leaders and teachers are acknowledged and respected for their expertise and their contribution to every day school activities
	Creating an inclusive environment	Teachers are implementing inclusion activities (communication, awareness, equal opportunities, highlight any stereotypical language).
	Collaborative environments and tools (co-creation, sharing)	Teachers and students are regularly using collaborative environments in their classroom activities and develop and share content.
	Implementing Projects	The school has developed a specific plan to involve several classrooms to implement more than one accelerators.

SCHOOL'S REPORT

	Parents and external stakeholders' involvement in school's activities/projects	Parental and external stakeholders' engagement is evidenced through projects that the school has initiated.
	Reflect, Monitor, Debate	The school performs regular analysis and evaluation of the data collected from the reflection, monitoring, and debates with teachers and students.
	Learning Processes adaptation	Some teachers (25-50%) adapt learning processes according to established feedback mechanism involving all stakeholders
	Established collaboration with local, national institutions	The majority of the teachers (50-85%) are implementing projects with the collaboration of local and/or national research/science institutions
TEACHERS' PROFESSIONAL DEVELOPMENT	Teacher Awareness and Participation	Teachers are introduced and offered to engage in Professional Development opportunities
	Setting Expectations	The school creates transparency on the competences required from teachers at different stages of their involvement through frameworks or standards
	Professional Culture	The school supports a culture of collaboration by avoiding situations that could encourage counterproductive competition between individuals The school strengthens recruitment and retention of qualified staff by focusing on school ethos or professional culture
	Professional Competences, Capacity Building and Autonomy	The school considers making CPD an obligation/explicit duty, and allocating working time to it
	Leadership Competence	The school creates transparency on the competences required from school leaders, for instance through competence frameworks or standards
	Collaborative learning (mobility actions)	Teachers in the school are sharing and collaborating in innovative projects in an informal manner
	Collaborative learning (ICT Competences)	Some teachers participate (25-50%) in Professional Development Programmes aimed at introducing collaborative learning through digital platforms
	Use and reuse of resources	Teachers regularly uses online resources from web communities and portals in their classroom.

SCHOOL'S STATUS

Dear Participants after the self-reflection and according to your above answers, your school has the following status:

CONSISTENT
Your School achieved a certain level of innovation and openness through specific measures, educational ICT tools, best practices, CPD, but they still consist isolated cases without a network of other schools and external partners to facilitate the process

Please follow the link below to see the needed actions that you have to take and the OSOS Strategies that are recommended to follow:

Proposed OSOS Strategies	http://portal.opendiscoveryspace.eu/en/osos/strategies
Proposed OSOS Accelerators	http://portal.opendiscoveryspace.eu/en/osos/projects

Figure 2.1: *Example of the OSOS Self Reflection Report that the school will receive after fill in the Self Reflection Tool.*

The Self-Reflection Tool will be realized from each school participating in OSOS at the beginning of its involvement and then every 12 months.

2.2.2 Sustainability Valuation Tool

The sustainability assessment of the OSOS approach will be realized by gathering data and conducting analysis on economic and cultural parameters related to school transformation and engagement with external stakeholders.

The following 12 indicators (refer to Table 3.2 in D6.1. for full table) will be applied to assess the effective and sustainable partnership with external stakeholder and the value-added dimension of following the Open Schooling approach.

- School has a system in place which captures the profiles, needs, contributions and relationships of all relevant external stakeholders
- Students identify and align stakeholder needs with matters of local social and economic concern
- School actively promotes the collaboration with non-formal and informal education providers,
- School engages in a number of projects which demonstrate stakeholder inclusion
- School engages with outreach groups of research organisations to gain further insight into the Life and careers of scientists/engineers (paying special attention into providing role models for all genders)
- There is evidence of parental engagement in school projects
- Schools increase the science capital of their communities
- Local/regional/national businesses and organisations share their infrastructures and collaborate or work within the school projects
- School works with research centres and science museums to develop initiatives using co-creative approaches, and vice versa
- Visits to research centres, science centres and museums are becoming the norm
- There is evidence of formal procedures for stakeholder's involvement
- Participation and engagement of policy makers from key organisations in school projects and initiatives.

These indicators will be assessed using focus groups and questionnaires. Data from these questionnaires and focus groups will be used to understand the **cost and social value related the OSOS Schooling approach** being implemented. For this, we use the Harvard- approved SMEV model to assess this social weighting aligned with and presented alongside actual costings of, for example, lab experiments, outreach programmes, meetings with stakeholders.

OSOS activities will be realised in 1000 schools, in 11 countries. As it is expected many cultural differences exist from country to country and this will differentiate the way each school will implement the proposed activities. Hence, it is important to gather community and cultural data in which a school is operating, to support the comparative analysis of countries. These data will be gathered by a combination of instruments including: the Open School Development Plan, questionnaires and focus groups as well as national statistics.

2.2.2.1 Questionnaire on effective and sustainable partnerships

The following survey questions will be used to establish the school status and progress against indicators on **effective and sustainable partnerships with external stakeholders.**

1. Does the school have a system in place which captures engagement with relevant stakeholders?

☐ YES ☐ NO

2.a. If you answered YES to the above, please select the details captured about the stakeholder engagement/collaboration

	Stakeholder profiles
	Stakeholder needs
	Time spent by stakeholders
	Time spent by students/school engagement

2.b. Do student projects align with stakeholder needs?

a. ☐ YES ☐ NO

b. If YES, select the sustainability goal which aligns with this need. Please tick the relevant box.

GOALS	
	Ending poverty in all forms everywhere
	Ending hunger, achieving food security and improving nutrition and promoting sustainable agriculture
	Ensuring healthy lives and promoting well-being for all at all ages
	Ensuring inclusive and equitable quality education and promote life-long learning opportunities
	Achieving **gender equality** and empower all women and girls
	Ensuring availability and sustainable **management of water** for all
	Ensuring access to affordable, reliable, sustainable and modern **energy for** all
	Providing **decent work and economic growth**
	Building resilient **infrastructure (technology / innovation)**
	Reducing inequality within and among countries
	Making **cities inclusive and sustainable** communities (urban development)
	Supporting **responsible consumption and production patterns**
	Combating **climate change**
	Managing/supporting biodiversity and ecosystems
	Sustainable **forest management**
	Supporting/promoting **peace, justice and strong institutions**

	Global partnership for sustainable development
	Other: (please write topic/s covered)

2. Does the school actively promote the collaboration with non-formal and informal education providers, enterprises and civil society organisations?

☐ YES ☐ NO

2.a. If yes, what formats are regularly used to promote these collaborations? Please select below:

	Social Media – Twitter/Facebook/Other
	School website
	Local Newspaper
	Local radio
	Other

3.a. Does the school engage in projects which demonstrate stakeholder inclusion?

☐ YES ☐ NO

3.b. Tick the box to indicate the stakeholder types the school frequently (at least annually) the school engages with:

	Industry		Local Authorities
	Civil Society Organisations		Science Centres/ Science Museums
	Libraries		Research Institutions
	Policymakers/Government		Science Exhibitions/Fairs
	Science Competitions		Other:

3.c. If the school engages with stakeholders, please populate the applicable tables below.

Levels of engagement can be differentiated as follows:

Level 1 = Engagement is primarily one-way with little opportunity for students to engage and ask questions. For example: presentations

Level 2 = Stakeholder group visits/engages with the school on annual basis to support with career talk and project work. Dialogue is more open with opportunities for students to ask questions.

Level 3 = Engagement consists of regular interactions with stakeholder group (minimum twice annually) with opportunities of students to ask questions, gain insight into the daily routines of scientist/engineer, learning skills used in the profession with opportunity for students to share knowledge with stakeholders. Projects at this stage are co-created with students.

Industry collaborations (in last three years)

Company Name	Proximity to school select one of the following: (<5km, 6km-15km, 16km-25km, >25km	Hours spent working with students	Number of projects	Number of stakeholders/ staff participating	Number of female role models	Number of students engaged	Engagement Propose (career talk, project work, mentoring)	Level of engagement 1-3

Local Authorities

Proximity to school select one of the following: (<5km, 6km-15km, 16km-25km, >25km	Hours spent working with students on projects (in	Number of projects involved in	Number of stakeholders participating	Number of female role models represented	Number of students engaged	Engagement Propose (career talk, project work, mentoring)	Level of engagement

Research institutions

Proximity to school select one of the following: (<5km, 6km-15km, 16km-25km, >25km	Hours spent working with students on projects	Number of projects involved in	Number of stakeholders participating	Number of female role models represented	Number of students engaged	Engagement Propose (career talk, project work, mentoring)	Level of engagement

Policymakers

Proximity to school select one of the following: (<5km, 6km-15km, 16km-25km, >25km	Hours spent working with students on projects	Number of projects	Number of stakeholders participating	Number of female role models represented	Number of students engaged	Engagement Propose (career talk, project work, mentoring)	Level of engagement

Parents

Proximity to school select one of the following: (<5km, 6km-15km, 16km-25km, >25km	Hours spent working with students on projects	Number of projects	Number of stakeholders participating	Number of female role models represented	Number of students engaged	Engagement Propose (career talk, project work, mentoring)	Level of engagement

4.a. Does the school engage with career events/visits where students gain insight into the life/career of scientists and engineers?

☐ YES ☐ NO

4.b. If yes, how often/number of times annually

	1		7
	2		8
	3		9
	4		10
	5		11-20
	6		20-35

4.c. How many of these scientists/engineers are female? Please select the approximate percentage.

	1%
	5%
	7%
	10%
	>10%

Please populate the table below to capture engagement external to the school and costs associated

Stakeholder Type	Number of visits (annually)	Number of students	Proximity to school select one of the following: (<5km, 6km-15km, 16km-25km, >25km	Cost to school (e.g. bus, train cost)	Cost of entry of any	School contribution received *	Estimated value of contribution*
Industry							
Research Institutions							
Science Museums/Centres							
Policymakers/Government							
Local Authorities							
Civil Society Organisations							
Parents/Parent Group							

**School contribution could consist of parental financial contributions to schools, technology or infrastructure support (purchase of iPads, laptops), government subsidy*

5. Does your school value the contribution and coloration with external stakeholders? Would your school be 'willing to pay' for the collaborative support gained from external partners?

Rate using the scale below where 1 = not willing to pay, 2 = willing to partially pay, 3 = willing to pay, 4 = willing to pay full amount

1	2	3	4

2.2.2.2 Questionnaire for assessing the community and cultural conditions

As mentioned in D6.1 the pilots will be implemented in 100 schools in 11 different countries during the 1st phase of OSOS Implementation. In order to understand the community and cultural conditions related to the schools operate in and to provide scope for cross-country comparisons, data from the following survey questions will be used in conjunction with the Open School Development plan for each school.

Q1. What is the ownership status of your school? Please select and tick the appropriate box

	Government/Public
	Private
	Other:

Q2. Please indicate using the Likert Scale below what you consider the overall affluency of the area where the school is located?

1= Affluent, 2 = Marginally above average, 3 = Marginally below average and 4= Disadvantaged

1	2	3	4

Q3. Is the locality in which your school is located considered to be below median income levels?

☐ YES ☐ NO

Q4. Please tick the answer which best describes the case in your school.

Please circle Y/N	YES	NO
The school and teachers actively encourage all pupils to continue science after the compulsory stages (if relevant)	YES	NO
The school and teachers advocate the benefits of science for our future	YES	NO
The majority of students believe it is useful to know about science in daily life	YES	NO
The majority of students believe that a science qualification can help them achieve many different types of jobs in the future	YES	NO

2.2.2.3 Sustainability Analysis

2.2.2.3.1 SMEV - the cost and social value of Open Schooling

Data from the Questionnaire for assessing the community and cultural conditions and from Questionnaire on effective and sustainable partnerships will be used to assess the cost and social value related to the implementation of the proposed OSOS approaches.

The SMEV model is a holistic approach which uses economic techniques to identify and value the outputs of the schools involved in OSOS. This approach places a cost value of the school's project work and collaborative efforts – giving a higher weight to things are societal priorities, and the priorities of the Open Schooling Model (D2.1). The SMEV model is focused on identifying and calculating what the Open School produces (outputs) and counting how much the school produces (quantification).

The OSOS Evaluation team will apply economic 'shadow pricing' techniques (Kelly and McNicoll 2011) to attribute the economic value to society of the outputs delivered by the schools engaged in OSOS. **Shadow pricing** is a tool used to in cost-benefit analysis. It can support the OSOS team estimate the value of the OS outputs, which have a non-market price (for example they are administrative prices). Applying a shadow-pricing in the context of OSOS Model supports the team attribute an underlying economic and social value which cannot be accounted for in financial value only.

2.2.2.3.2 Techniques used to calculate the cost and social value using SMEV

There are several techniques which can be employed to reveal the economic value to society. The one which will be used for OSOS is **'revealed preference'** which rely on observed behavior. For example, what is paid for an equivalent of the engagement elsewhere (or willingness to pay, time spent attending/completing a task/project).

Another factor which requires assessment in this holistic framework is to apply sets of **'social weights'** to the economic evaluation. Application of a 'social weight' means that a higher value can be imputed to an activity that affects the target group compared to one which affects other groups (Munck et al 2014).

For the OSOS project, the Evaluation Team will ask school heads, using a questionnaire, the following question: 'Is the locality in which your school operates considered to be below the median income

levels. Respondents are asked to answer yes or no. A social weighting of 1.5 will be applies to schools that answer 'yes' to this question.

2.2.2.3.3 Calculating the social value

The metrics used to calculate the **economic value** (quantity x economic price) for OSOS activities are as follows:

Quantity (The time spent in hours by stakeholder group) x **Economic Price** (minimum wage in the country). For schools that are located in an area where the median income is above average, a neutral social weighting will be applied. Schools located in a below median income area will have a social weighting of 1.5 applied. A table, following the format below, will be created for each participating country. This data will support national and cross-country analysis.

COUNTRY NAME:				
School	**Quantity**	**Economic Price**	**Economic Value**	**Social Value**
	(Time spent by stakeholder group engaging with OSOS activities)	*Minimum wage in country- applied to voluntary hours only*	*Quantity x Economic price*	*Apply social weighting of 0 or 1.5 for schools where general income levels are below median*

2.3 Impact Assessment Implementation

2.3.1 Description of motivation, emotion and cognitive load measures

2.3.1.1 SMQ Science Motivation Questionnaire

In general, motivation is the internal state that arouses, directs, and sustains goal-oriented behavior (Glynn, 2011). In particular, motivation to learn refers to the disposition of students to find academic activities relevant and worthwhile and to try to derive the intended benefits from them (Brophy, 2004). In studying the motivation to learn science, researchers examine why students strive to learn science, how intensively they strive, and what beliefs, feelings, and emotions characterize them in this process.

In the social-cognitive theory of human learning (Bandura, 2001, 2005, 2006), students' characteristics, behaviors, and learning environments are viewed interactively. Within this theoretical framework, learning is most effective when it is self-regulated, which occurs when students understand, monitor, and control their cognition, motivation, and behavior (Schunk, 2001; Schunk & Pajares, 2001). Motivated students achieve academically by strategically engaging in behaviors such as class attendance, class participation, question asking, advice seeking, studying, and participating in study groups (Pajares, 2001, 2002; Pajares & Schunk, 2001).

First, there is **intrinsic motivation**, which involves learning science for its own sake (e.g., Eccles, Simpkins, & Davis-Kean, 2006).

Second, there is extrinsic motivation, which involves learning science as a means to an end (e.g., Mazlo et al., 2002).

Third, there is personal relevance, which is the relevance of learning science to students' goals (e.g.,Cavallo et al., 2003).

Fourth, there is self-determination, which refers to the control students believe they have over their learning of science (e.g., Black&Deci, 2000).

Fifth, there is **self-efficacy**, which refers to students' confidence that they can achieve well in science (e.g., Lawson, Banks, & Logvin, 2007).

And sixth, there is **assessment anxiety**, which is the debilitating tension some students experience in association with grading in science (e.g., Parker & Rennie, 1998).

A construct, such as motivation to learn science, is not a directly observable variable. For this reason, a construct is often called a latent variable. Although a construct cannot be directly observed, it can be measured by means of items that serve as empirical indicators of how the construct is conceptualized by students. A construct could be conceptualized by students either as a unitary entity or as one with dimensions (sub-constructs). Students' conceptualizations of a construct may differ somewhat from how experts conceptualize it and describe it in the literature (Donald, 1993). Students' conceptualizations are important in their own right, however, particularly within a social-constructivist view of learning science, because students' conceptualizations influence their actions (McGinnis et al., 2002; Scott, Asoko, & Leach, 2007).

The Science Motivation Questionnaire II (Glynn) consisted of the following five subscales/factors, indicating that they were related to the six motivational components that influence self-regulated learning. Factor 1: intrinsic motivation; Factor 2: self-efficacy; Factor 3: self-determination; Factor 4: career motivation; Factor 5: grade motivation (each 5 items).

The students found science intrinsically motivating (interesting, enjoyable, etc.) when it was personally relevant (valuable, important, etc.) and vice versa. When the students' had high self-efficacy (I am confident, I believe I can, etc.), they were not anxious about assessment (I am nervous, I worry, etc.), and this was evident in their explanations of their motivation to learn science.

Glynn found **no significant differences in total scores** on the Science Motivation Questionnaire due to **gender**; however, there were small, meaningful score differences on the factor-based scales, which indicated that different profiles of motivation to learn science were associated with gender. The scores on the **self-efficacy and assessment anxiety scale** were **higher among the men then the women**, suggesting that the men had more confidence and less anxiety than the women did.

For our young participants we have to consider which sub-scales of the SMQII are focused. Originally the SMQ was designed for university freshmen (Glynn, 2011). Schmid & Bogner (2017) and Schumm &Bogner (2016) have shown that this survey is suitable for students in grade 9 and 10. Marth & Bogner (2017) have inserted this instrument in the transition passage from primary to secondary school students. Finally the questionnaire could be inserted in all age groups and show good results.

The SMQ II survey may deal with following questions:

- Do specific OSOS activities influence the students' science motivation?
- Could the motivation to learn science be raised?
- Are there gender differences?

2.3.1.2 Intrinsic Motivation Inventory (IMI)

The Intrinsic Motivation Inventory (IMI) is a multidimensional measurement device intended to assess participants' subjective experience related to a target activity in laboratory experiments.

It has been used in several experiments related to intrinsic motivation and self-regulation (e.g., Ryan, 1982; Ryan, Mims & Koestner, 1983; Plant & Ryan, 1985; Ryan, Connell, & Plant, 1990; Ryan, Koestner

& Deci, 1991; Deci, Eghrari, Patrick, & Leone, 1994). The instrument assesses participants' interest/enjoyment, perceived competence, effort, value/usefulness, felt pressure and tension, and perceived choice while performing a given activity, thus yielding six subscale scores.

The interest/enjoyment subscale is considered the self-report measure of intrinsic motivation; thus, although the overall questionnaire is called the Intrinsic Motivation Inventory, it is only the one subscale that assesses intrinsic motivation, per se. As a result, the interest/enjoyment subscale often has more items on it that do the other subscales. The perceived choice and perceived competence concepts are theorized to be positive predictors of both self-report and behavioral measures of intrinsic motivation, and pressure/tension is theorized to be a negative predictor of intrinsic motivation. Effort is a separate variable that is relevant to some motivation questions, so is used it its relevant. The value/usefulness subscale is used in internalization studies (e.g., Deci et al, 1994), the idea being that people internalize and become self-regulating with respect to activities that they experience as useful or valuable for themselves.

The IMI items have often been **modified slightly to fit specific activities**. Thus, for example, an item such as "I tried very hard to do well at this activity" can be changed to "I tried very hard to do well on these puzzles" or "...in learning this material" without effecting its reliability or validity. As one can readily tell, there is nothing subtle about these items; they are quite face-valid. However, in part, because of their straightforward nature, caution is needed in interpretation.

Another issue is that of redundancy. Items within the subscales overlap considerably, although randomizing their presentation makes this less salient to most participants. Nonetheless, shorter versions have been used and been found to be quite reliable. Still, it is very important to recognize that multiple item subscales consistently outperform single items for obvious reasons, and they have better external validity.

We recommend a shortened standard version with the four subscales: **interest/enjoyment, perceived competence, perceived choice, and pressure/tension** with 4 items per subscale.

The state emotions survey may deal with following questions:

- Do specific OSOS activities influence the students' general motivation?
- Are there gender differences?

2.3.1.3 Situational Emotions in science education (State Emotions, SE)

The Situational Emotions Questionnaire (State Emotions) measures the learning emotions **after** an intervention with three concepts: interest, well-being and boredom. Each subscale has three items and is to be used complete.

The SE may deal with the following questions:

- What emotions have students at OSOS activities?
- Are there gender differences?

No reversed items. A higher score will indicate more of the concept described in the subscale name.

A scale from 1 (not at all true) to 5 (very true) is used.

2.3.1.4 Cognitive Load

The Cognitive Load rating scale measures students' perceived difficulty. Students have to report the amount of mental effort they invested in the intervention. Therefore they are asked to estimate their perceived difficulty of the individual items immediately after they had finished an item. The rating scale has to be provided, explained, and illustrated just before the beginning of the OSOS implementation. Students take the rating scale during the general instruction with them. After solving a problem or studying a worked-out problem the students had to score the amount of mental effort invested in the preceding problem.

To test the cognitive load without extra tension students must not be graded during the implementation.

The scale has to be individually modified for the project partner's specific intervention. Therefore a ready to use photo master is not possible. Instead of "Part 1-3" insert the name of your unit, e.g. the name of the station when handling station learning.

The Cognitive Load survey may deal with following questions:

- Do specific OSOS activities influence the students' cognitive load?
- Does mental effort influence students' motivation (SMQII)?
- Are there gender differences?

2.3.2 The Questionnaires

2.3.2.1 SMQII

For each of the following statements, please indicate how true it is for you, using the following scale(SMQII):	- -	-	0	+	+ +
Intrinsic Motivation					
Learning science is interesting	☐	☐	☐	☐	☐
I am curious about discoveries in science	☐	☐	☐	☐	☐
The science I learn is relevant to my life	☐	☐	☐	☐	☐
Learning science makes my life more meaningful	☐	☐	☐	☐	☐
I enjoy learning science	☐	☐	☐	☐	☐
Career Motivation					
Learning Science will help me get a good job	☐	☐	☐	☐	☐
Understanding science will benefit me in my career	☐	☐	☐	☐	☐
Knowing science will give me a career advantage	☐	☐	☐	☐	☐
I will use science problem-solving skills in my career	☐	☐	☐	☐	☐
My career will involve science	☐	☐	☐	☐	☐
Self-Determination					
I study hard to learn science	☐	☐	☐	☐	☐
I prepare well for science tests and labs	☐	☐	☐	☐	☐
I put enough effort into learning science	☐	☐	☐	☐	☐
I spend a lot of time learning science	☐	☐	☐	☐	☐
I use strategies to learn science well	☐	☐	☐	☐	☐
Self-efficacy					
I believe I can earn a grade of ‘A’ in science	☐	☐	☐	☐	☐
I am confident I will do well on science tests	☐	☐	☐	☐	☐
I believe I can master science knowledge and skills	☐	☐	☐	☐	☐
I am sure I can understand science	☐	☐	☐	☐	☐
I am confident I will do well on science labs and projects	☐	☐	☐	☐	☐
Grade Motivation					
Scoring high on science tests and labs matters to me	☐	☐	☐	☐	☐
It is important that I get an “A” in science	☐	☐	☐	☐	☐
I think about the grade I will get in science	☐	☐	☐	☐	☐
Getting a good science grade is important to me	☐	☐	☐	☐	☐
I like do better than other students on science tests	☐	☐	☐	☐	☐

2.3.2.2 IMI

Interest/Enjoyment					
I enjoyed doing this activity very much	☐	☐	☐	☐	☐
This activity was fun to do.	☐	☐	☐	☐	☐
I thought this was a boring activity.	☐	☐	☐	☐	☐
This activity did not hold my attention at all.	☐	☐	☐	☐	☐
I would describe this activity as very interesting.	☐	☐	☐	☐	☐
I thought this activity was quite enjoyable.	☐	☐	☐	☐	☐
While I was doing this activity, I was thinking about how much I enjoyed it.	☐	☐	☐	☐	☐
Perceived Competence					
I think I am pretty good at this activity.	☐	☐	☐	☐	☐
I think I did pretty well at this activity, compared to other students.	☐	☐	☐	☐	☐
After working at this activity for awhile, I felt pretty competent.	☐	☐	☐	☐	☐
I am satisfied with my performance at this task.	☐	☐	☐	☐	☐
I was pretty skilled at this activity.	☐	☐	☐	☐	☐
This was an activity that I couldn't do very well.	☐	☐	☐	☐	☐
Pressure/Tension					
I did not feel nervous at all while doing this.	☐	☐	☐	☐	☐
I felt very tense while doing this activity.	☐	☐	☐	☐	☐
I was very relaxed in doing these.	☐	☐	☐	☐	☐
I was anxious while working on this task.	☐	☐	☐	☐	☐
I felt pressured while doing these.	☐	☐	☐	☐	☐
Perceived Choice					
I believe I had some choice about doing this activity.	☐	☐	☐	☐	☐
I felt like it was not my own choice to do this task.	☐	☐	☐	☐	☐
I didn't really have a choice about doing this task.	☐	☐	☐	☐	☐
I felt like I had to do this.	☐	☐	☐	☐	☐
I did this activity because I had no choice.	☐	☐	☐	☐	☐
I did this activity because I wanted to.	☐	☐	☐	☐	☐
I did this activity because I had to.	☐	☐	☐	☐	☐

2.3.2.3 State Emotions

State Emotions	
SE Well-Being 1	The lesson pleased me.
SE Well-Being 2	I was satisfied with the lesson.
SE Well-Being 3	I enjoyed the lesson.
SE Interest 4	I found that topic important.
SE Interest 5	The information on that topic was relevant to me.
SE Interest 6	I want to learn more about that topic.
SE Boredom 7	I felt bored.
SE Boredom 8	(Today) my mind sometimes wandered.
SE Boredom 9	I wanted to sleep through the lesson.

2.3.2.4 Cognitive load

Example for an Cognitive Load Questionnaire Please estimate your perceived difficulty of *[the station (station learning)]* immediately after you finished it. Please do so even when you "gave up" after having tried solving it.	very easy	easy	rather easy	neither - nor	rather difficult	difficult	very difficult
	1	2	3	4	5	6	7
Part 1	☐	☐	☐	☐	☐	☐	☐
Part 2	☐	☐	☐	☐	☐	☐	☐
Part 3	☐	☐	☐	☐	☐	☐	☐
Part 4	☐	☐	☐	☐	☐	☐	☐

2.3.2.5 Problem Solving Competences

2.3.2.5.1 Presenting the tool

This section focuses on the optional feature of creating and using formative assessment and problem solving questions as part of an educational scenario, providing the rationale behind and guidance for it in the Inspiring Science Education Portal (ISE) that is the platform that the OSOS project is using.

The ISE Authoring Tool offers teachers two features which they may use to enrich and support the delivery and assessment of a science lesson. These are:

1. The option of adding multiple-choice formative assessment questions at any point during an Educational Scenario
2. The option of adding problem solving questions at the end of four of the inquiry phases.

For both of these options teachers are also presented with a graphic analysis report of the results of this assessment for their students.

Create Formative Assessment Questions

By clicking on the 'Question' button on the extra tool bar that appears if you press the Plus (+) sign at any place within an Educational Scenario you can add a multiple-choice question for your students, with up to 4 possible answers. You are also given the opportunity to choose the feedback text that will appear to students who choose each answer (**Figure 2.1**). You can add as many such questions you want.

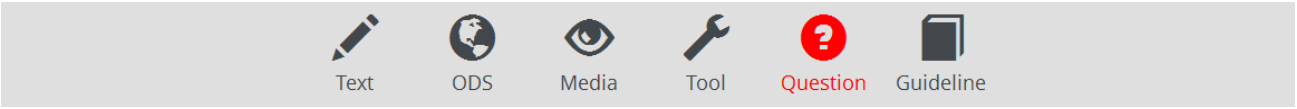


Figure 2.1 – ISE Authoring Tool – Creating formative assessment questions

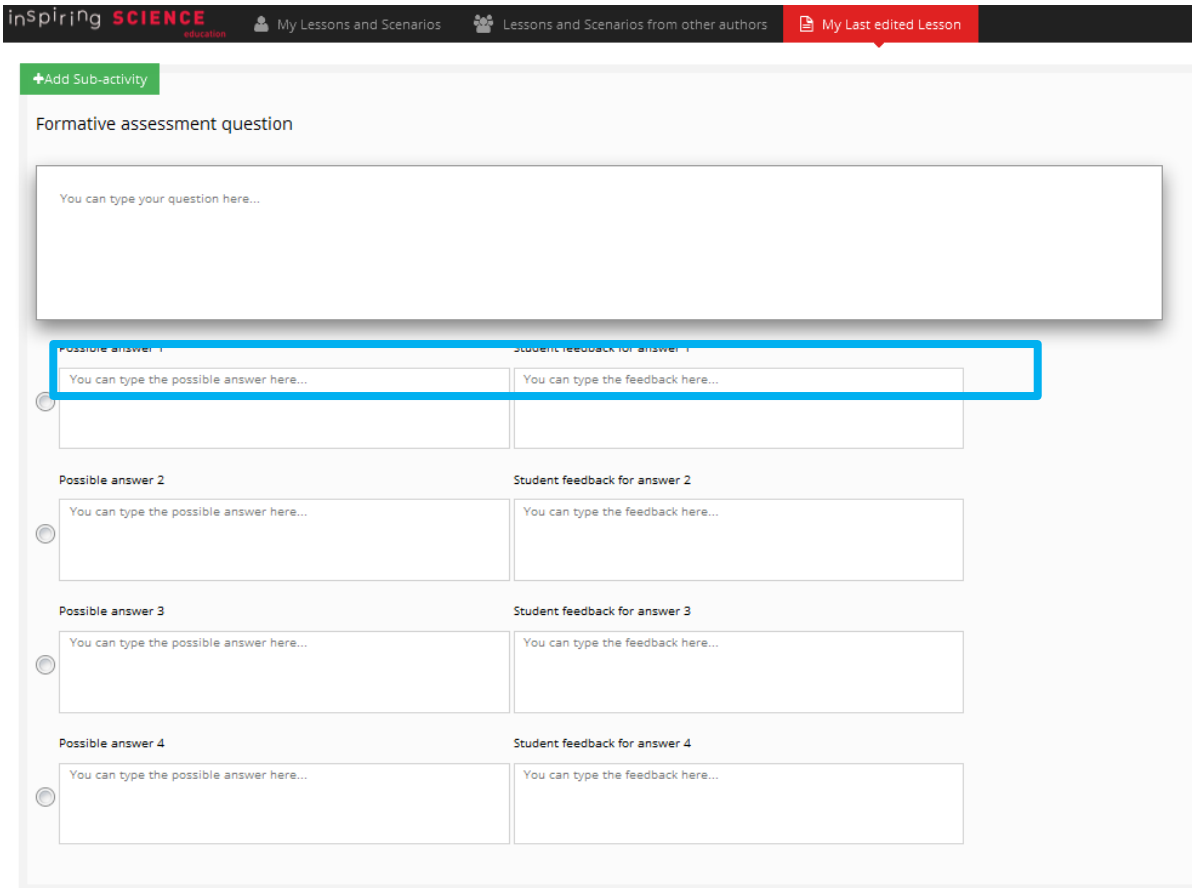


Figure 2.2 – ISE Authoring Tool – Writing formative assessment questions

Create Problem Solving Questions

One of the aims of ISE is to increase the problem-solving competency of students in science classrooms. The following subsections explain the framework used in ISE for developing problem solving questions and provide support to teachers to create such questions in the ISE Environment.

Problem solving competency in ISE

The ISE concept of problem solving competency is based on the framework developed by OECD for use to assess the individual problem-solving competency of 15-year olds in the Programme for International Student Assessment (PISA) 2012 (OECD, 2013). In it problem solving competency is defined as follows:

"Problem solving competency is an individual's capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious. It includes the willingness to engage with such solutions in order to achieve one's potential as a constructive and reflective citizen." (OECD 2013, p. 123)

According to this definition problem-solving competency includes *"a mobilization of cognitive and practical skills, creative abilities and other psychosocial resources such as attitudes, motivation, and values."* (OECD 2013, p. 122)

PISA 2012 and consequently ISE focus more particularly on the cognitive processes required to solve real world problems. These can be described as four distinct processes: 'Exploring and understanding';

'Representing and formulating'; 'Planning and executing'; and 'Monitoring and reflecting' (OECD, 2013, p. 126). They are considered to be the steps to overcome when moving from a given situation to a target goal in problem solving.

Exploring and understanding. This task involves exploring the problem situation (observing it, interacting with it, searching for information and finding limitations or obstacles) as well as understanding the given information and the information discovered while interacting with the problem situation. However, the students should build mental representations of each of the pieces of information presented in the problem.

Representing and formulating. For building a coherent mental representation of the problem situation, the relevant information must be selected, mentally organized and integrated with relevant prior knowledge. This can be reached by representing the problem by constructing tabular, graphical, symbolic or verbal representations and shifting between representations or formulating hypotheses by identifying the relevant factors in the problem and their interrelationships.

Planning and executing. The planning process of this task describes that the students have to set themselves a goal. This includes clarifying the overall goal and setting sub-goals (where necessary) as well as devising a plan or strategy to reach the goal state. After that, in the executing phase, the plan will be carried out.

Monitoring and reflecting. The students should monitor the progress towards reaching the goal at each stage including checking intermediate and final results, detecting unexpected events and taking remedial action when required. Finally, they also should reflect on solutions from different perspectives and critically evaluate assumptions and alternative solutions.

Not perhaps surprisingly these processes were thought to have significant similarities to the inquiry types of learning activities used by ISE in the design of Educational Scenarios, so ISE went a step further and matched the two, making the assumption that questions related to each of the cognitive processes may be best answered at the end of each of the inquiry phases. Given that the latter are five, Table 2 shows the correspondence between the two sets, as well as suggestions about the possible foci of the assessment questions for each cognitive process.

Table 2: *Correspondence between ISE inquiry model and the cognitive processes required to solve real world problems according to PISA 2012.*

Orienting and Asking Questions	Hypothesis Generation and Design	Planning and Investigation	Analysis and Interpreta-tion	Conclusion and Evaluation
(1) Exploring and understanding	(2) Representing and formulating	(3) Planning and executing	(4) Monitoring and reflecting	
Questions... - ...dealing with the representation of the problem - ...about relevant information to understand the problem - ...dealing with different levels of understanding of content knowledge	Questions - ...concerning the exploration of correlations and dependencies -...concerning a precise description of the focused problem	Questions -...concerning the correct strategies of experimentation -...concerning strategies of variable control -...concerning strategies of data analysis	Questions -...about application or transfer of the tasks -...about possible sources of experimental errors -...about enhancement of experimental setting	

Levels of problem solving competency in ISE

The PISA 2012 framework recognises 6 levels of proficiency in problem solving (OEDC 2014, p. 58-59) for students of 15 years old. ISE simplified these into 3 levels (**Figure 2.3**):

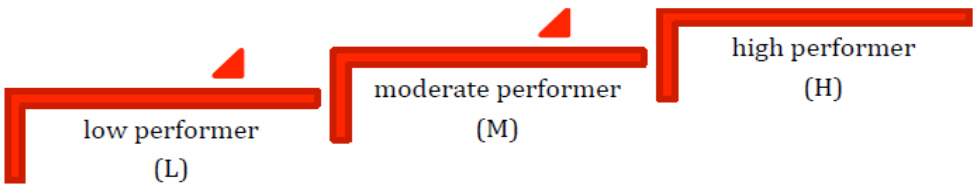


Figure 2.3– Levels of problem solving competency in ISE

Students proficient at **high level** can

- develop complete, coherent mental models of different situations;
- c find an answer through target exploration and a methodical execution of multi-step plans.

To estimate the difficulty of the tasks for this level, an average of about 10% of 15-year-old students should be able to answer on this level.

Students proficient at **moderate level** can

- control moderately complex devices, but not always efficiently;
- handle multiple conditions or inter-related features by controlling the variables.

To estimate the difficulty of the tasks for this level, an average of about 45% of 15-year-old students should be able to answer on this level.

Students proficient at **low level** can

- only answer if a single, specific constrain has to be taken into account;

- only partially describe the behaviour of a simple, everyday topic.

To estimate the difficulty of the tasks for this level, an average of about 45% of 15-year-old students should be able to answer on this level.

Design problem solving questions in the ISE Environment

As previously mentioned the Problem Solving Questions are assigned to the four cognitive process of the problem solving competency ('Exploring and understanding'; 'Representing and formulating'; 'Planning and executing'; 'Monitoring and reflecting'). In the ISE Environment in particular, **two individual problem solving questions** should be created at the end of the corresponding inquiry phases (**Figure 2.4**).

These individual problem solving questions must be:

… multiple-choice (single-select), and

… with three possible answers all correct:

… one answer for a **low** performer on problem solving

… one answer for a **moderate** performer on problem solving

… one answer for a **high** performer on problem solving

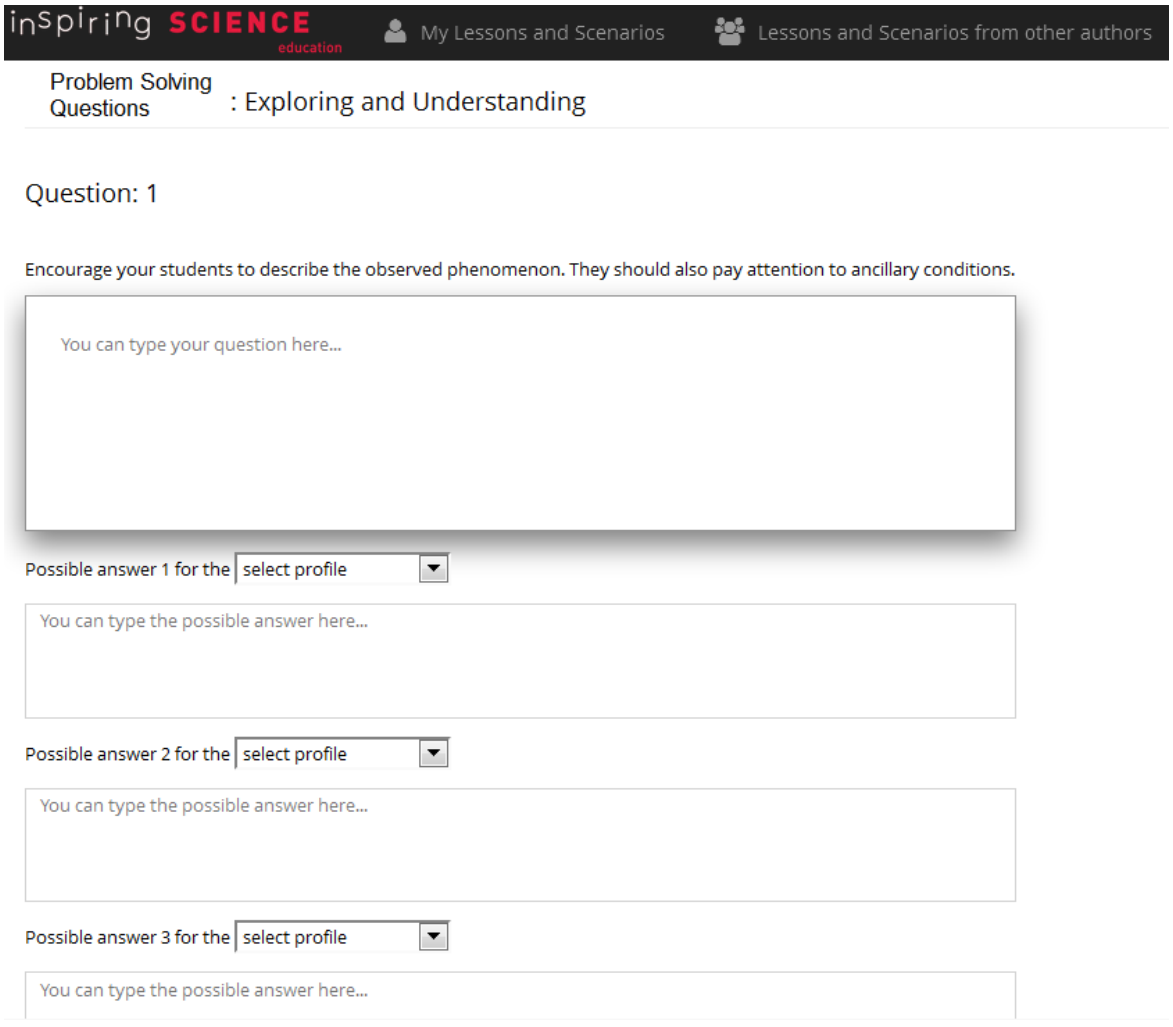


Figure 2.4 – ISE Authoring Tool – Add Problem Solving Questions to my ISE Lesson/Scenario

Example of Problem Solving Questions for an Educational Scenario on Renewable Sources of Energy

Level of problem solving	Exploring and understanding	Representing and formulating	Planning and executing	Monitoring and reflecting
Qu.1	**Why do we need to think about renewable energies?**	**Which domains have to be taken into account for the change in energy supply to be successful?**	**Which consequences can the increase of the price for electricity have?**	**What advantages has the use of a simulation against the look at a whole real world scenario?**
High level	Because we are responsible for our future	Because of interdependencies social, economical and ecological aspects have to be considered.	Government has to think about how to disencumber citizens and companies which can't afford higher prices.	Because of learning by trial and error I get a deeper understanding of the content.
Moderate level	Because as responsible citizens we have to be informed and able to discuss current issues	It's important that no jobs get lost or alternative jobs or retraining are offered to employees. Also investors have to be recruited.	Energy supply is an important economic factor. Companies may threaten with migration to a more cost-effective location.	Because it's not possible to manipulate the real world conditions in the same way as in a simulation.
Low level	Because it's very present in media	People have to be well prepared for the change in energy supply. So it's very important to promote the change and tell people why it is needed.	People become dissatisfied because they have to pay more money for electricity	Because it's funny to play with the simulation I'm more motivated to learn.
Qu. 2	**CO_2 is a problem, because…**	**What is the best way to start change in energy supply?**	**What happens if a power plant is switched off without substitution?**	**The discussion about renewable energies and also the simulation mostly ignore important factors. An important but ignored factor is:**
High level	CO_2 is accumulating in the atmosphere and reflecting thermal radiation from the earth so it can't leave the atmosphere. This contributes to the anthropogenic greenhouse effect.	Change in energy supply would be easier and faster when less energy has to be produced.	Energy supply is an important economic factor. Lack of reliable energy supply can lead to degeneration of a highly developed country.	Use of fossil fuels for transportation and heat production
Moderate level	CO_2 is jointly responsible for human made climate change	It's important to reduce energy consumption	Energy supply is not guaranteed	Importance of cogeneration of heat and electricity
Low level	CO_2 is harmful to the environment	One first step is e.g. to switch of light when leaving a room.	Cities getting dark	Use of coal for barbeque

Results of Formative Assessment and Problem Solving Questions

To support teachers in the assessment of their class, the ISE Environment offers them the facility to view the assessment results of their students, both individually and as a whole.

Access Assessment student results

At any time after running an Educational Scenario you have created with your students you can access the results of their assessment, by clicking on the 'Teacher Link' of the particular run, log in using the same name and e-mail you used in delivering this lesson and pressing the 'Assessment' tab at the top of the page (**Figure 2.5**)

Figure 2.5 – ISE Authoring Tool – Accessing Assessment Results

Four further tabs will appear giving you the opportunity to access both the problems solving and the formative assessment results of your class (**figure 2.6**).

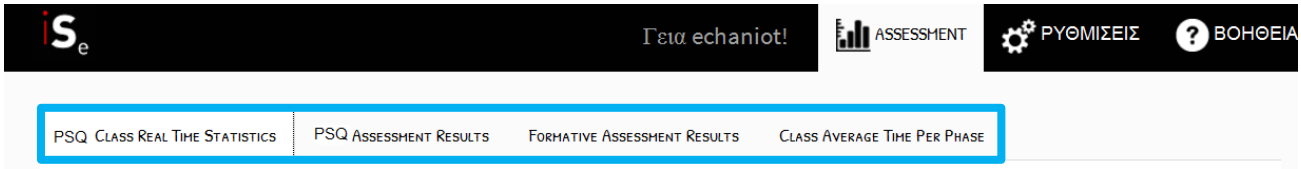


Figure 2.6 – ISE Authoring Tool – Viewing Assessment Results

Problem Solving student results

There are two ways you can view the problem solving student results. The first tab from the left (**Figure 2.6** – [1]) lets you view how many questions each of your students replied and at what level (e.g. **Figure 2.6**– [2]).

The second tab from the left (**Figure 2.7**– [1])shows you an analysis of the results for your whole class. The graph for example in **Figure 2.7** shows the percentage of answers at Low, Moderate and High levels completed by your class in relation to the equivalent average results in PISA 2012 for the whole of the country (where these exist) and for the whole of the OECD countries respectively.

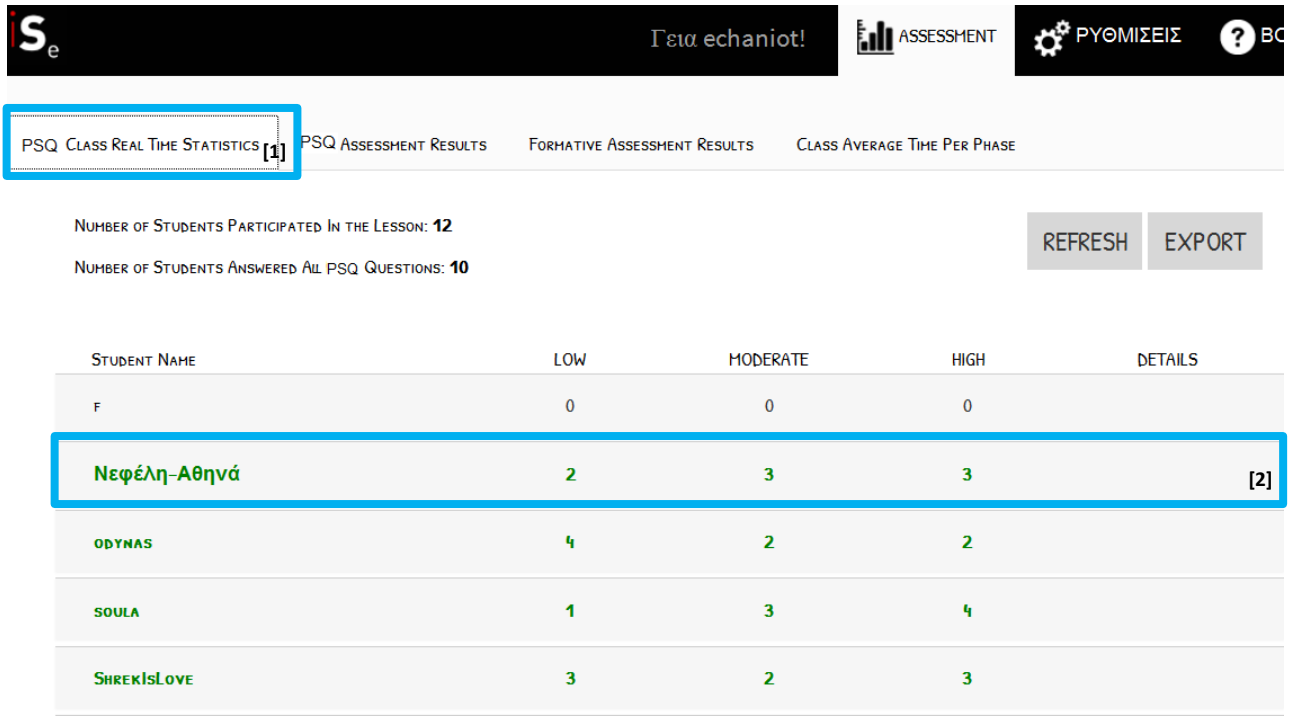


Figure 2.7 – ISE Authoring Tool – Problem Solving Results per student

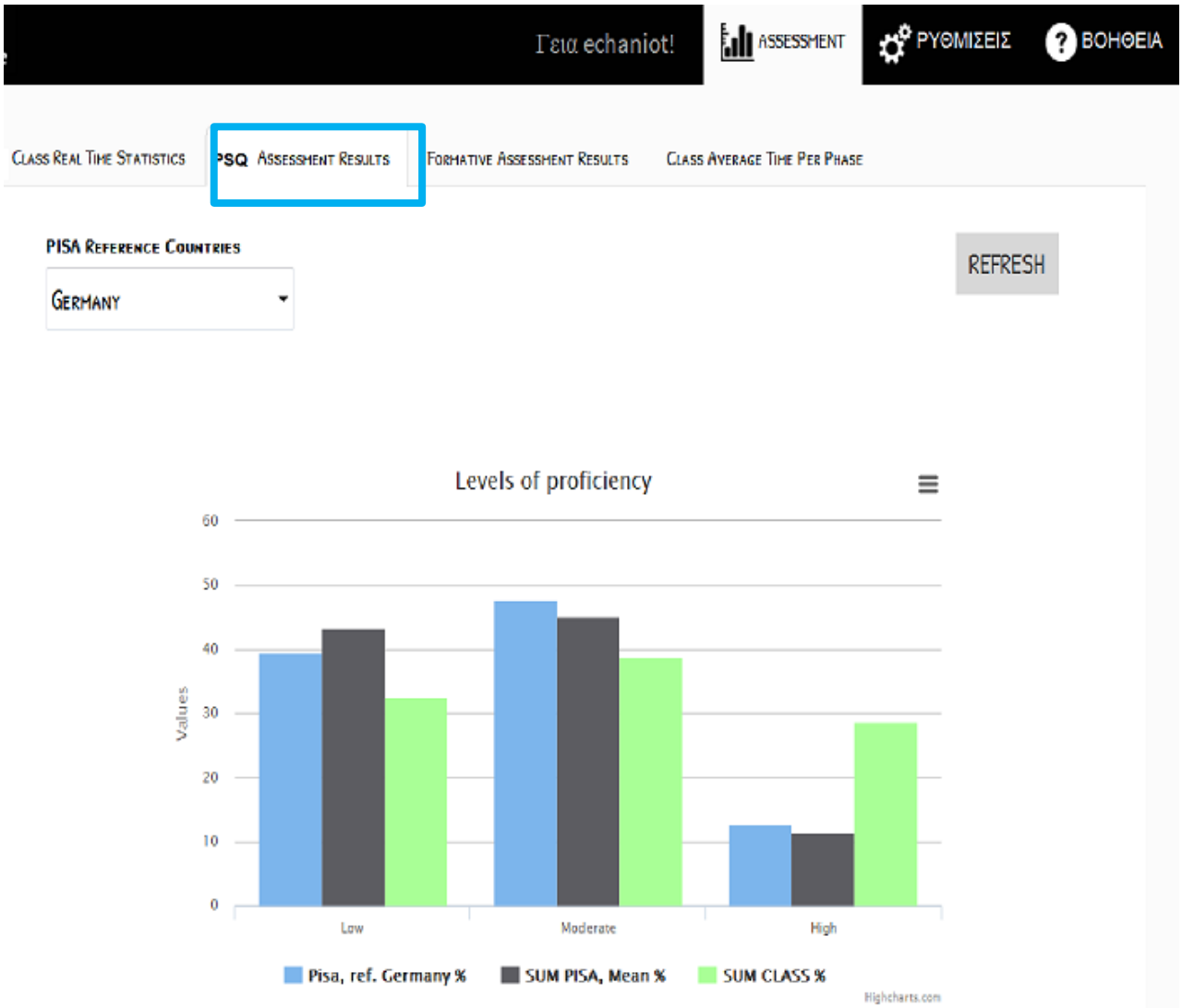


Figure 2.7– ISE Authoring Tool – Problem Solving Results per class in comparison to PISA

Formative Assessment class/student results

The third tab takes you to the Formative Assessment results, where you can see the percentage of correct/wrong answers per assessment question for both each individual student and the whole class.

Furthermore, each student is presented with the results of the formative assessment questions, both of his/her answers and of the class as a whole (**Figure 2.8**).

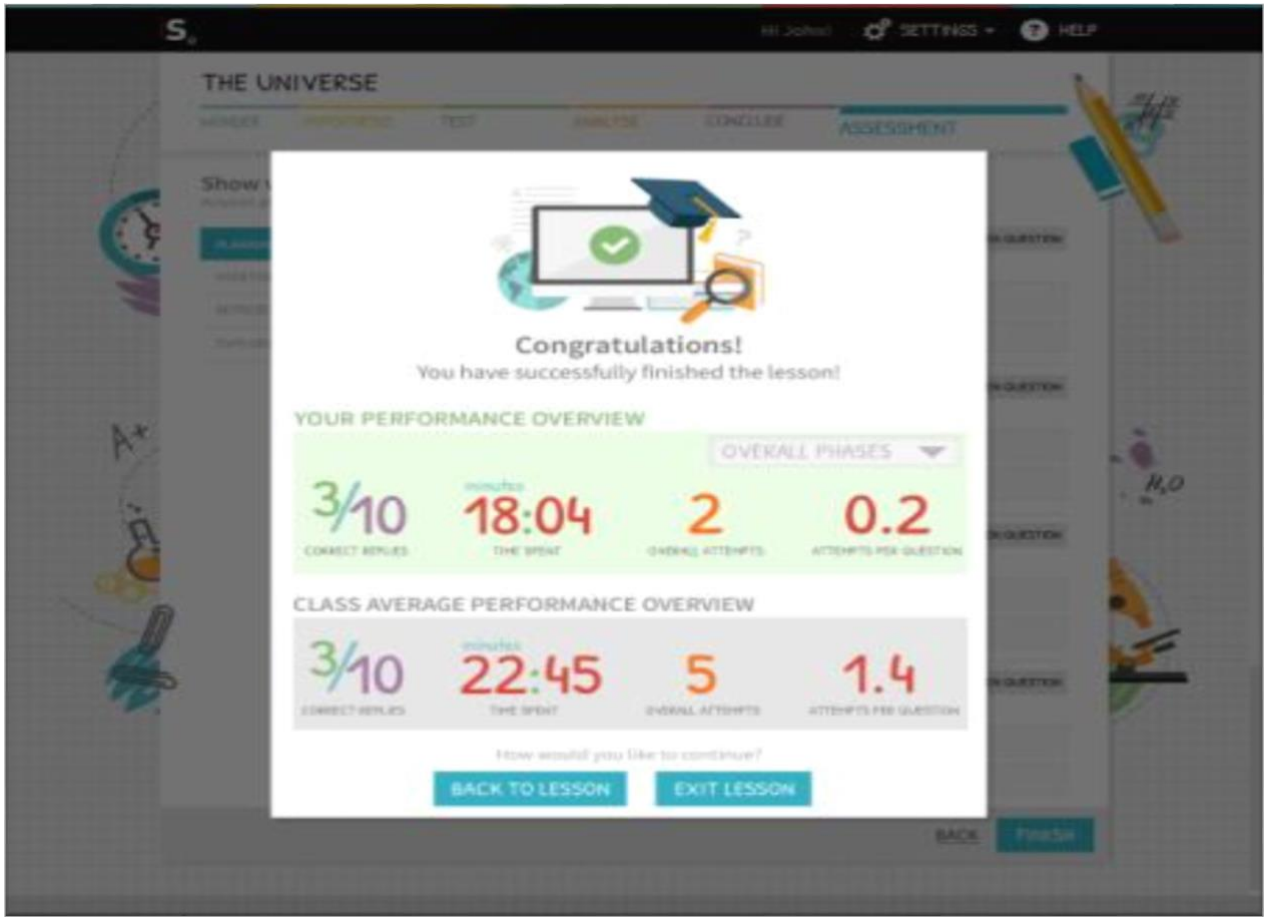


Figure 2.8 – Formative Assessment Results for the student

2.3.3 Interviews and Focus Groups

2.3.3.1 Interviews

When designing an interview schedule, it is imperative to ask questions that are likely to yield as much information about the topic as possible and that will also be able to address the aims and objectives of the research. In a qualitative interview, good questions should be open-ended (require more than a yes/no answer), neutral, sensitive and understandable. Wherever possible, interviews should be conducted in areas free from distractions and at times and locations that are most suitable for participants.

The interview grid consists of a core set of questions designed to elicit more qualitative feedback from participants in the OSOS Hubs. These interviews should be carried out with teachers and head teachers. The events like summer schools or big events in the hubs could be used in order the interviews to be conducted. In the Appendix 5 there are indicative questions that the person will conduct the interview could ask.

About 10% of the attendees of a training event, e.g. summer school, should be asked to be interviewed individually. The interviewer should explain the need of the interview and assure the confidentiality to the interview partners. The duration of the interview will be no more than 20 minutes.

The interview is preferably to be carried through in English. If there are difficulties with the English language the interview has to be carried out through the native tongue and the answers have to be translated into English (at least the main parts in a way of a summary for each part of the interview).

The National Coordinators should take the lead of these interviews in the countries and the Evaluation

Team (DCU and/or Science View) will conduct the interviews in summer schools of the OSOS Project.

2.3.3.2 Focus groups

Focus groups can reveal a wealth of detailed information and insights. When well executed, a focus group creates an accepting environment that puts participants at ease allowing then to thoughtfully answer questions in their own words and add meaning to their answers. Surveys are good for collecting information about people's attributes and attitudes but if you need to understand things at a deeper level then use a focus group. (Eliot & Associates, 2005)

Below, we highlight some general principles to consider:

Standardisation of questions -- Focus groups can vary in the extent to which they follow a structured protocol or permit discussion to emerge.

Number of focus groups conducted - or sampling will depend on the 'segmentation' or different stratifications (e.g. age, sex, socioeconomic status, health status) that the researcher identifies as important to the research topic.

Number of participants per group - the rule of thumb has been 6-10 homogeneous strangers, but as Morgan (1996) points out there may be reasons to have smaller or slightly larger groups.

Level of moderator involvement - can vary from high to low degree of control exercised during focus groups (extent to which structured questions are asked and group dynamics are actively managed).

Defining a focus group

A focus group is a small group of six to ten people led through an open discussion by a skilled moderator. The group needs to be large enough to generate rich discussion but not so large that some participants are left out. The ideal amount of time to set aside for a focus group is anywhere from 45 to 90 minutes. Beyond that most groups are not productive and it becomes an imposition on participant time.

Focus groups are structured around a set of carefully predetermined questions – usually no more than 10 – but the discussion is free-flowing. Ideally, participant comments will stimulate and influence the thinking and sharing of others. Some people even find themselves changing their thoughts and opinions during the group. It takes more than one focus group on any one topic to produce valid results – usually three or four. You'll know you've conducted enough groups (with the same set of questions) when you're not hearing anything new anymore, i.e. you've reached a point of saturation.

Designing focus group questions

Focus group participants will not have the opportunity to see the questions they are being asked. To ensure that they understand and can fully respond to the questions, questions should be:

- Short and to the point
- Focused on one dimension each
- Unambiguously worded
- Open-ended or sentence completion types
- Non-threatening or embarrassing
- Worded in a way that they cannot be answered with a simple “yes” or “no” answer (use “why” and “how” instead)

There are three types of focus group questions:

- Engagement questions: introduce participants to and make them comfortable with the topic of discussion
- Exploration questions: get to the meat of the discussion
- Exit question: check to see if anything was missed in the discussion

Once a group of viable recruits has been established, call each one to confirm interest and availability. Give them times and locations of the focus groups and secure verbal confirmation. Tell them you will mail (or email) them a written confirmation and call to remind them two days before the scheduled group.

Organize the times, locations and people involved for all the groups you have scheduled.

Reduce barriers to attending when possible by offering:

- Evening or weekend groups for those who work during the day
- Transportation or cab fare
- Interpreter services
- A familiar public setting

Inform participants that the focus group will take about one and half to two hours. Provide a starting time that is 15 minutes prior to the actual start of the focus group to allow for filling out necessary paperwork and settling into the group.

Arrange for a comfortable room in a convenient location with ample parking. Depending on your group, you may also what to consider proximity to a bus line. The room should have a door for privacy and table and chairs to seat a circle of up to 12 people (10 participants and the moderator and assistant moderator). Many public agencies (churches, libraries) have free rooms available.

Ideally, the focus group is conducted by a team consisting of a moderator and assistant moderator. The moderator facilitates the discussion; the assistant takes notes and runs the tape recorder.

The ideal focus group moderator has the following traits:

- Can listen attentively with sensitivity and empathy

- Is able to listen and think at the same time
- Believes that all group participants have something to offer no matter what their education, experience, or background
- Has adequate knowledge of the topic
- Can keep personal views out of the facilitation
- Is someone the group can relate to but also give authority to
- Can appropriately manage challenging group dynamics

The assistant moderator must be able to do the following:

1. Run a tape recorder during the session
2. Take notes in case the recorder fails or the tape is inaudible
3. Note/record body language or other subtle but relevant clues
4. Allow the moderator to do all the talking during the group
5. Both moderator and assistant moderator are expected to welcome participants, offer them food, help them make their name tents, and direct them in completing pre-group paperwork.

At a minimum, all participants should complete a consent form. If the focus group study involves a university partner or is part of a larger research study you may also be required to secure approval from a Human Subjects Committee.

It may be important to collect demographic information from participants if age, gender, or other attributes are important for correlation with focus group findings. Design a short half page form that requires no more than two or three minutes to complete. Administer it before the focus group begins.

Once consent forms and demographic surveys are collected and reviewed for completeness, the discussion begins. The moderator uses a prepared script to welcome participants, remind them of the purpose of the group and set ground rules.

Before asking the first focus group question, an icebreaker can be inserted to increase comfort.

The focus group moderator has a responsibility to adequately cover all prepared questions within the time allotted. S/he also has a responsibility to get all participants to talk and fully explain their answers. It is good moderator practice to paraphrase and summarize long, complex or ambiguous comments. It demonstrates active listening and clarifies the comment for everyone in the group.

In order for all participant comments to be understandable and useful, they must be condensed into essential information using a systematic and verifiable process. Begin by transcribing all focus group tapes and inserting notes into transcribed material where appropriate.

Indicative Questions:

✓ The OSOS Model offers certain approaches and features, do these respond to your needs as a teacher?

✓ What are the most interesting and relevant aspect of the OSOS proposed approaches?

- ✓ What are the main innovative elements?
- ✓ Is the OSOS portal useful to your day to day work? Is it there a collaborative environment that you can work with?
- ✓ Which parts of the OSOS Approaches need improvement?
- ✓ Do your school provide all the needed support for your professional development?
- ✓ Do you feel free to propose new ideas in your school and to implement them within your classroom?
- ✓ Do you collaborate with parent and external stakeholders?

3 OSOS Indicators' Metrics

In this section we present in detail the 40 indicators that were identified in D6.1. These are the key performance indicators that will measure the success and the impact of the OSOS Model and the activities that were implemented in the 1000 schools.

These indicators will be measured throughout the project lifetime using the tools that were presented in the Chapter 2 above.

Following the indicative time plan for the project implementation in an OSOS pilot school that was presented in D6.1 (Figure 3.1), in each of the indicator's table is included a specific time series where each tool will be used in order to collect data for the assessment.

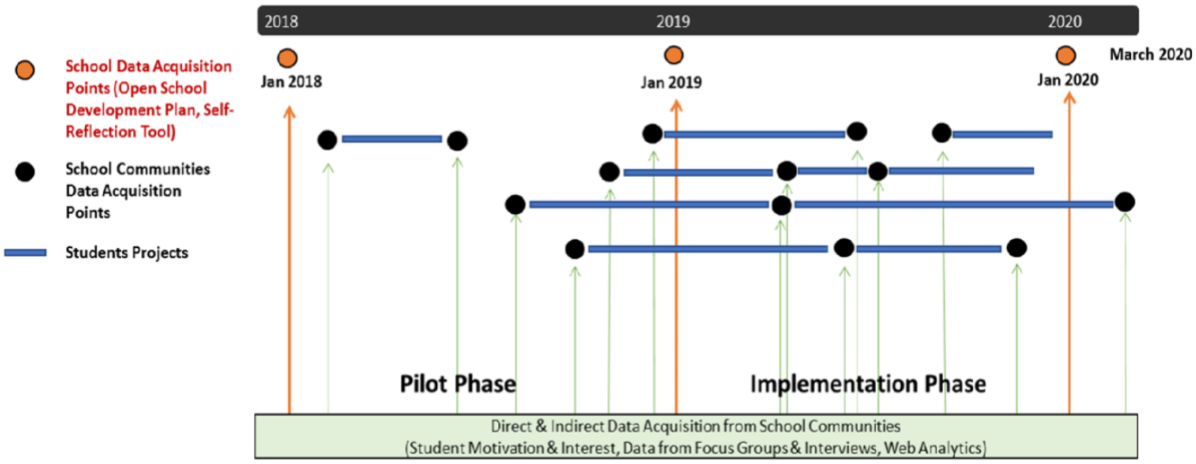


Figure 3.1: *A hypothetical time plan for the project implementation in an OSOS pilot school. It depicts the data collection points during the transformation process. It includes three repeated cycles of school data acquisition and numerous interventions and studies during the realization of the project activities in the school setting.*

Furthermore, in each table there are data concerning the description of the indicator, the measurement level (the possible result) as well as if the indicator refers to the school unit as a whole or in a specific target group category.

3.1 OSOS Indicators

Holistic school approach and vision

Indicator Number	1
Name of indicator	**The school has a clear vision and strategy** towards open schooling
Description	The aim of this indicator is to investigate if the school is following a specific strategy and/or plan towards Open Schooling. This should lead to measure the school openness, and how the school has integrated in its strategy the proposed Open Schooling Approaches.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Both.
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%)
Unit of analysis	School Unit
Coverage	Local

Indicator Number	2
Name of indicator	At least one **appointed teacher with clearly defined actions** to support the open schooling strategy
Description	The aim of this indicator is to investigate the existence of a teacher that will act as the change agent within the school's community. He/she should be able to act as the organiser of the implementation activities/interventions.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Both
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	3
Name of indicator	**Strategies** to encourage Problem Solving, Team Work, Active Citizenship, Critical Thinking and Gender Equality exist
Description	The aim of this indicator is to investigate if the school is actively encouraging deeper student learning and if this is integrated in school policy and strategy, supported from the school leadership. It aims also to measure the long-term commitment of the school to gender issues.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool • Web analytics
Qualitative / Quantitative	Both
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months. • Web Analytics: Continuously, through the OSOS portal's data.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%). Also, the measurements will come from the web analytics:

	• % of schools with strategies on supporting student Problem Solving, Team Work, Active Citizenship and Critical Thinking competencies, • % of schools outlining how these will be achieved through formal and informal learning activities. • % of schools engaging in online problem-solving tools/activities on OSOS platform.
Unit of analysis	School Unit Web analytics on OSOS platform
Coverage	Local/National/International

Indicator Number	4
Name of indicator	**Approaches aimed at replacing competitive type classroom** environment with more collaborative working approaches (that also addresses gender equality and inclusion) exist
Description	The aim of this indicator is to investigates if school has a specific strategy in place to foster students' collaboration through respective activities. The existing approaches might include aspects that could demonstrate that there is sufficient time scheduled in the class for discussion, debate, small group work
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool • Web analytics
Qualitative / Quantitative	Both
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months. • Web Analytics: Continuously, through the OSOS portal's data.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%). Also, the measurements will come from the web analytics: • % of schools with strategies on supporting collaborative working approaches,
Unit of analysis	School Unit Web analytics on OSOS platform
Coverage	Local/National/International

Indicator Number	5
Name of indicator	**Plans for professional development of teachers** for School Staff to foster a change in behaviour, enabling teachers to adapt to a new OSOS culture
Description	The aim of this indicator investigates if the Open Schooling Development Plan includes a focus teacher's professional development. It also includes what courses and skills teachers should acquire in order to adapt the OSOS culture.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Both
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	6
Name of indicator	Strategies for teachers to participate in **international mobility actions** are in place
Description	The aim of this indicator is to investigate the existence of strategy that supports the school and teachers training and competency building. This could lead the school to develop innovation capacity from bottom-up. It examines also if the school develop lateral capacity-building networks with international counterparts
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Both

Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%)
Unit of analysis	School Unit
Coverage	Local

Indicator Number	7
Name of indicator	A **motivation mechanism is set-up for teachers/students undertaking innovative projects and social entrepreneurial behaviour. Brokers, central connectors, and energizers are getting in action**.
Description	The aim of this indicator is to examine if the school has an incentive system in place to encourage students/teachers to participate in innovative projects. The school should use the list of the OSOS accelerators to introduce innovative projects if it is not already implementing.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	8
Name of indicator	The school supports the development of **an interdisciplinary environment where students/teachers are encouraged try new ideas and approaches**
Description	This indicator aims to investigate if there is a commitment and presence of support for teachers and students to introduce and develop novel ways of teaching and learning in the classroom. Also investigates if teachers have the support to gain professional development to facilitate new learning approaches.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	9
Name of indicator	**Parental engagement integrated** into the school planning structure
Description	The aim of this indicator is to provide insight into school provision to include and integrate parental involvement into school decision making process. Will provide information on how parents participate in the planning process of the school and in which steps are involved.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.

Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Effective introduction of RRI principles in the school operation

Indicator Number	10
Name of indicator	School supports and introduces **student-led social enterprise start-ups community-focused courses**
Description	The aim of this indicator is to measure the culture change progress within the school environment in respect with the introduction of more student-led courses. Examines and assesses readiness of the school and its staff to introduce and work in a school environment that empowers students as learners, creators and inventors.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	11
Name of indicator	**School has an ongoing system of teacher and student self-reflection, discussion and learning set-up**
Description	The aim of this indicator is to examine the level of involvement of students and teachers in the organisational procedures and planning of the school. Procedures to follow should have the introduction of activities in order to realise reflection, monitoring and debate activities and collect data that could be used to improve the school's activities.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	12
Name of indicator	Teachers/students **engage in platforms for sharing best practice and lessons learned**
Description	The aim of this indicator is to investigate if the school is in engaging in peer-reflection processes and engaging in deeper learning approaches. Also, if the school is following the RRI aspect of Open Access.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool • Web Analytics
Qualitative / Quantitative	Qualitative and Quantitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months. • Web Analytics: On going

Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	13
Name of indicator	Schools set up a system to **reflect, track and monitor** how open school practices have shaped the school organisational culture
Description	The aim of this indicator is to investigate whether the school produces regular reports on the findings of the reflect, monitoring and debates with all the stakeholders. The reports should also be distributed to all the stakeholders and relevant improvements should be integrated in the school's development plan.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	14
Name of indicator	**Parents actively collaborate** with the OSOS projects organised by the school
Description	The aim of this indicator is to investigate if the proactive collaboration of parents in student projects exists and reveals what this consists of amongst the participating schools.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	15
Name of indicator	There is a **commitment to changing the school at all levels**
Description	The aim of this indicator is to examines the school's commitment for system-wide, root and branch reform. The vision and the strategy of the school should be towards open schooling approaches that should be also integrated in its activities.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit

Coverage	Local

Indicator Number	16
Name of indicator	**Students and teachers incorporate a process of ongoing learning and evaluation into lessons and projects**
Description	The aim of this indicator is to investigate whether the opportunities, processes, structures set up to facilitate teachers and students result to reflect and incorporate new learnings into future lessons and curriculum
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local/Regional/National

Indicator Number	17
Name of indicator	Students and teachers **receive feedback from community partners and adapt projects,** where possible, based on this feedback
Description	The aim of this indicator is to examine whether the data collected via the feedback mechanism in place between the school and community partners, are used in order to adapt its vision and strategy.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	18
Name of indicator	Schools encourage and engage in **reflection, discussion and debates** on scientific and societal issues
Description	The aim of this indicator is to investigate if the school provides opportunities for teachers and students to prepare, participate and engage in reflective exercises on science issues and issues related to global challenges. It measures the proactive engagement of the schools to encourage and incorporate gender-neutral learning practices
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool
Qualitative / Quantitative	Qualitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%).
Unit of analysis	School Unit
Coverage	Local

Indicator Number	19
Name of indicator	**All actors mutually benefit from the engagement** in the projects and incorporate learnings into their systems and processes i.e. Industry update their CSR/business strategy, there is an economic cost-benefit
Description	The aim of this indicator is to investigate if external stakeholders gain and learn from experiences in engaging with schools on projects and assesses what information is learned and if impacts future processes.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool • Web Analytics • Questionnaire on effective and sustainable partnerships
Qualitative / Quantitative	Qualitative and Quantitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months. • Web Analytics: On going to measure the engagement of the stakeholders in projects. • Questionnaire on effective and sustainable partnerships: Twice, the first at the end of the 1st Pilot of the project and the second at the end of the last pilot phase of the project.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%). Also, the measurements will come from the Questionnaire on effective and sustainable partnerships: • % of external stakeholders engaged in school activities and gain from their participation
Unit of analysis	School Unit, Stakeholders
Coverage	Local/Regional/National

Indicator Number	20
Name of indicator	There is evidence of an **economic benefit associated engagement** of all partners
Description	The aim of this indicator is to investigate if engagement of all the partners in school activities, is cost effective in terms of resources, time and outputs.
Data collection tools (primary/secondary)	• Open School Development Plan • Self-Reflection Tool • Web Analytics • Questionnaire on effective and sustainable partnerships
Qualitative / Quantitative	Qualitative and Quantitative
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months. • Web Analytics: On going to measure the engagement of the stakeholders in projects. • Questionnaire on effective and sustainable partnerships: Twice, the first at the end of the 1st Pilot of the project and the second at the end of the last pilot phase of the project.
Measurement level	The school will be categorised in one of the 4 following categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%). Also, the measurements will come from the Questionnaire on effective and sustainable partnerships: • % of partners engaged that had economic benefit
Unit of analysis	School Unit, Stakeholders
Coverage	Local/Regional/National

Effective and sustainable partnerships with external stakeholders

Indicator Number	21
Name of indicator	School has a **system in place which captures the profiles, needs, contributions and relationships of all relevant external stakeholders**
Description	The aim of this indicator is to investigate if the school is following a specific strategy and/or plan towards Open Schooling. This should lead to measure the school openness, and how the school has integrated in its strategy data from external stakeholders.
Data collection tools (primary/secondary)	• Open School Development Plan • Questionnaire on effective and sustainable partnerships
Qualitative / Quantitative	Both.
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Questionnaire on effective and sustainable partnerships: Twice, the first at the end of the 1st Pilot of the project and the second at the end of the last pilot phase of the project.
Measurement level	The school will be categorised in 4 categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%)
Unit of analysis	School Unit
Coverage	Local

Indicator Number	22
Name of indicator	Students identify and align stakeholder needs with **matters of local economic and social concern**
Description	The aim of this indicator is to investigate if students work on projects that hold relevance to them while also engaging in key learnings to address local and global issues
Data collection tools Primary/secondary data	• Questionnaire on effective and sustainable partnerships • Questionnaire for assessing the community and cultural conditions
Qualitative / Quantitative	Both
Time-series	• Questionnaire on effective and sustainable partnerships: 6 months following involvement in OSOS, then every 12 months after that. • Questionnaire for assessing the community and cultural conditions: 6 months following involvement in OSOS, then every 12 months after that.
Measurement level	• % of schools with students that identify and align stakeholder needs with global and local importance, • % of schools focusing on one or more of the 17 sustainable development goals (SDGs)
Unit of analysis	School Unit
Coverage	Local

Indicator Number	23
Name of indicator	School actively **promotes the collaboration with non-formal and informal education providers**
Description	The aim of this indicator is to examine what measures the school engages in to promote the collaboration with stakeholders both internally and externally, creating opportunities to further develop network
Data collection tools Primary/secondary data	• Open School Development Plan • OSOS Self-Reflection Tool • Questionnaire on effective and sustainable partnerships • Focus Group
Qualitative / Quantitative	Both
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months. • Questionnaire on effective and sustainable partnerships: 6 months following Schools involvement in OSOS. Then every 12 months. • Focus Group: during summer schools or/and large-scale events in National Level (e.g. OSOS open days, conferences etc.).
Measurement level	The school will be categorised in 4 categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%)

Unit of analysis	School Unit, School Head, Teachers
Coverage	Local/Regional/National

Indicator Number	**24**
Name of indicator	School **engages in a number of projects which demonstrate stakeholder inclusion**
Description	The aim of this indicator is to measure the number of projects which the school engages with external stakeholders. This also gives insight into the category of stakeholder the school engages with and if the number of projects and stakeholders increase as the project develops.
Data collection tools Primary/secondary data	• Questionnaire on effective and sustainable partnerships • Questionnaire for assessing the community and cultural conditions • Web Analytics
Qualitative / Quantitative	Quantitative
Time-series	• Questionnaire on effective and sustainable partnerships: 6 months following involvement in OSOS, then every 12 months after that. • Questionnaire for assessing the community and cultural conditions: 6 months following involvement in OSOS, then every 12 months after that. • Web Analytics: On going
Measurement level	Number of Projects The number should be increased by the end of the project by at least 30% if the school has none at the beginning and at least 5% if the school was at the status of INTEGRATED at the beginning.
Unit of analysis	School Unit
Coverage	Local

Indicator Number	**25**
Name of indicator	School engages with outreach groups of research organisations to gain further **insight into the life and careers of scientists/engineers** [paying special attention into providing role models for all genders]
Description	The aim of this indicator is to measure the frequency of the school's engagement with STEM career opportunities for its' students and capture the number of female role models
Data collection tools Primary/secondary data	• Questionnaire on effective and sustainable partnerships • Questionnaire for assessing the community and cultural conditions
Qualitative / Quantitative	Quantitative
Time-series	• Questionnaire on effective and sustainable partnerships: 6 months following involvement in OSOS, then every 12 months after that. • Questionnaire for assessing the community and cultural conditions: 6 months following involvement in OSOS, then every 12 months after that.
Measurement level	• The number of times schools engage in STEM focused activities • % number of female role models represented
Unit of analysis	School Unit
Coverage	Local

Indicator Number	**26**
Name of indicator	There is evidence of **parental engagement in school projects**
Description	The aim of this indicator is to examine the inclusion of parental involvement in the development of school projects. It focuses on the numbers of parents engaged, the frequency and depth of the engagement
Data collection tools Primary/secondary data	• Questionnaire on effective and sustainable partnerships • Questionnaire for assessing the community and cultural conditions
Qualitative / Quantitative	Both
Time-series	• Questionnaire on effective and sustainable partnerships: 6 months following involvement in OSOS, then every 12 months after that. • Questionnaire for assessing the community and cultural conditions: 6 months following involvement in OSOS, then every 12 months after that.
Measurement level	• % of schools with parental engagement in school projects, • the amount of time spent engaging by parents, • the average depth (level) of the engagement – Level 1, Level 2, Level 3
Unit of analysis	School Unit
Coverage	Local

Indicator Number	27
Name of indicator	Schools **increase the science capital of their communities**
Description	This indicator aims to assess the science capital of the communities in which the school operates. Given the scope of the project, the questions will be asked to the teachers with feedback from the students provided.
Data collection tools Primary/secondary data	• Questionnaire for assessing the community and cultural conditions • Focus Group
Qualitative / Quantitative	Both
Time-series	• Questionnaire for assessing the community and cultural conditions: 6 months following involvement in OSOS, then every 12 months after that. • Focus Group and Interviews: during summer schools or/and large-scale events in National Level (e.g. OSOS open days, conferences etc.).
Measurement level	• Frequency of student engagement in scientific dialogue • Platforms outside of school setting • The level of scientific engagement in the family unit • Level of encouragement to pursue sciences in the school setting
Unit of analysis	School Unit, Stakeholders
Coverage	Local – Family Unit, Community

Indicator Number	28
Name of indicator	Local/regional/national businesses and organisations **share their infrastructure and collaborate or work within the school projects**
Description	The aim of the indicator is to assess the number of external stakeholders that share resources/ provide contributions towards with schools. The cost of sharing the infrastructure is also estimated.
Data collection tools Primary/secondary data	• Questionnaire on effective and sustainable partnerships • Questionnaire for assessing the community and cultural conditions • Focus Group
Qualitative / Quantitative	Both
Time-series	• Questionnaire on effective and sustainable partnerships: 6 months following involvement in OSOS, then every 12 months after that. • Questionnaire for assessing the community and cultural conditions: 6 months following involvement in OSOS, then every 12 months after that. • Focus Group: during summer schools or/and large-scale events in National Level (e.g. OSOS open days, conferences etc.).
Measurement level	• % of schools with engagement from business in school projects • The amount of time spent engaging in projects by industry • The purpose of engagement • The average depth (level) of the engagement – Level 1, Level 2, Level 3
Unit of analysis	School Unit
Coverage	Local

Indicator Number	29
Name of indicator	School works with research centres and science museums to **develop initiatives using co-creative approaches, and vice versa**
Description	The aim of this indicators is to assess how many schools are working with research centres and science museums, what topic they are collaborating on and how they are shaping the outputs of the work respectively
Data collection tools Primary/secondary data	• Open School Development Plan • Questionnaire on effective and sustainable partnerships • Questionnaire for assessing the community and cultural conditions • Web Analytics
Qualitative / Quantitative	Both
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Questionnaire on effective and sustainable partnerships: 6 months following Schools involvement in OSOS. Then every 12 months. • Questionnaire for assessing the community and cultural conditions: 6 months following involvement in OSOS, then every 12 months after that. • Web Analytics: On going
Measurement level	• The % of schools that work with research centres and science museums to develop initiatives • The amount of time spent engaging in projects by the research centres and science museums • The level of engagement in projects by research centres and science museums (Level 1, Level 2, Level 3)

Unit of analysis	School Unit, Research Centres and Science Museums
Coverage	Local/Community

Indicator Number	**30**
Name of indicator	**Visits to research centres, science centres and museums are becoming the norm**
Description	The aim of this indicator is to investigate the frequency of visits by students to research centres, science museum and outreach centres with the school
Data collection tools Primary/secondary data	Questionnaire on effective and sustainable partnerships
Qualitative / Quantitative	Both
Time-series	6 months following Schools involvement in OSOS. Then every 12 months.
Measurement level	The frequency a school visits research centres, science centres and museums taking into consideration the proximity of these centres to the school
Unit of analysis	School Unit
Coverage	Community

Indicator Number	**31**
Name of indicator	**Formal procedures for stakeholder's involvement**
Description	This indicator examines if the school has formally adopted models to support stakeholder's collaboration in school projects
Data collection tools Primary/secondary data	• School Development Plan • OSOS Self-Reflection Tool
Qualitative / Quantitative	Both
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Self-Reflection Tool: 1st time, at the beginning of School's involvement in OSOS. Then every 12 months
Measurement level	The school will be categorised in 4 categories: 1. ENABLED (0-25%) 2. CONSISTENT (25-50%) 3. INTEGRATED (50-75%) 4. ADVANCED (75-100%)
Unit of analysis	School Unit
Coverage	Local

Indicator Number	**32**
Name of indicator	**Participation and engagement of policy makers** from key organisations in school projects and Initiatives
Description	The aim of this indicator is to measure the levels of interaction/engagement and collaboration of schools with policymakers. This level of engagement reveals the higher probably for the school to influence and impact changes at the highest level
Data collection tools Primary/secondary data	• Open School Development Plan • Questionnaire on effective and sustainable partnerships • Questionnaire for assessing the community and cultural conditions
Qualitative / Quantitative	Both
Time-series	• Open School Development Plan: Once, at the beginning of school's involvement in OSOS • Questionnaire on effective and sustainable partnerships: 6 months following Schools involvement in OSOS. Then every 12 months. • Questionnaire for assessing the community and cultural conditions: 6 months following involvement in OSOS, then every 12 months after that.
Measurement Level	• The % of schools that work with research centres and science museums to develop initiatives • The amount of time spent engaging in projects by the research centres and science museums • The level of engagement in projects by research centres and science museums (Level 1, Level 2, Level 3)
Unit of analysis	School Unit
Coverage	Local and Community

Educational resources generated in school settings according the local needs

Indicator Number	33
Name of indicator	Schools show evidence of engaging in **virtual and physical platforms to share ideas, identify and collaborate with other schools** to develop innovative projects aimed at addressing the grand societal challenges
Description	The aim of this indicator is to measure the use or not of teachers in online environments to develop new projects ideas. It gives insight into tools adopted by schools to support blended learning approaches
Data collection tools Primary/secondary data	• Web Analytics • Open School Development Plan
Qualitative / Quantitative	Both
Time-series	• Web Analytics: Ongoing • Open School Development Plan: Once, at the beginning of school's involvement in OSOS
Measurement Level	• Number of shared ideas (10-30% raise from the initial measurement depending on the initial status based on the OSOS Self Reflection Tool) • Number of collaborations with other schools to develop innovative projects (10-30% raise from the initial measurement depending on the initial status based on the OSOS Self Reflection Tool)
Unit of analysis	School/Web
Coverage	Local/Virtual/Community

Indicator Number	34
Name of indicator	**Schools Projects and activities are related to** issues of national or local interest in connection with the grand challenges
Description	The aim of this indicator is to assess the ability of the school/teacher and students to open up the learning process to cover topics that are based on real-world problems
Data collection tools Primary/secondary data	• Web Analytics • Open School Development Plan
Qualitative / Quantitative	Both
Time-series	• Web Analytics: Ongoing • Open School Development Plan: Once, at the beginning of school's involvement in OSOS
Measurement Level	• Number of relevant projects (10-30% raise from the initial measurement depending on the initial status based on the OSOS Self Reflection Tool)
Unit of analysis	School/Web
Coverage	Local/Virtual/Community

Indicator Number	35
Name of indicator	**Schools share Open Schooling approaches with other schools and external agencies on regional and national levels**
Description	The aim of this indicator is to reveal how schools support local schools adopt innovative open schooling approaches – developing the community of innovators
Data collection tools Primary/secondary data	• Web Analytics • Open School Development Plan
Qualitative / Quantitative	Both
Time-series	• Web Analytics: Ongoing • Open School Development Plan: Once, at the beginning of school's involvement in OSOS
Measurement Level	Number of schools sharing approaches (at least 10 schools per participating country in OSOS Project)
Unit of analysis	School/Web
Coverage	Local/Virtual/Community

Indicator Number	36
Name of indicator	Development of a **support infrastructure for teachers and students to organise local conferences, workshops, cafes, exhibitions, open days** in the school with stakeholder involvement
Description	The aim of this indicator is to assess the support infrastructure available in the school to invite external stakeholders for opportunities to shared learning
Data collection tools Primary/secondary data	• Web Analytics • Open School Development Plan
Qualitative / Quantitative	Both
Time-series	• Web Analytics: Ongoing • Open School Development Plan: Once, at the beginning of school's involvement in OSOS

Measurement Level	Number of relevant events organised (10-30% raise from the initial measurement depending on the initial status, based on the OSOS Self Reflection Tool)
Unit of analysis	School/Web
Coverage	Local/Virtual/Community

Increased Interest and Motivation

Indicator Number	**37**
Name of indicator	**Positive impact on learning outcomes** – increased student motivation, increased interest in science, achievement of higher levels of problem solving competence and collaboration
Description	This indicator aims to assess the impact of the Open Schooling approach on student attitudes and interest in science as well as levels of science attainment/achievement
Data collection tools Primary/secondary data	Questionnaires: • SMQII • IMI • SE • Cognitive Load
Qualitative / Quantitative	Quantitative
Time-series	Before and after an intervention (implementation of an accelerator) in school
Measurement Level	• Student attainment levels • % perception change towards science-based learning • % motivation to learn about scientific issues
Unit of analysis	Student
Coverage	Local/National

Development of key skills

Indicator Number	**38**
Name of indicator	**Positive impact on learning outcomes** – achievement of higher levels of proficiency in problem solving and collaboration skills
Description	The aim of this indicator is to reveal the students' achievement of higher levels of proficiency in problem solving and collaboration skills
Data collection tools Primary/secondary data	• Web Analytics • Problem Solving Competence Tool
Qualitative / Quantitative	Both
Time-series	Once after each intervention with students
Measurement Level	• High Level • Moderate Level • Low Level
Unit of analysis	Student
Coverage	Local

Focused policy support actions

Indicator Number	**39**
Name of indicator	**The school is a recognised site of shared science learning in the community**
Description	The aim of this indicator is to investigate if the school acts as shared sites of science learning for which leaders, teachers, students and the local community share responsibility, over which they share authority, and from which they all benefit through ongoing knowledge exchanges
Data collection tools Primary/secondary data	• Focus Groups • Interviews
Qualitative / Quantitative	Qualitative
Time-series	Once during a final implementation event of the school
Measurement Level	School recognition from the stakeholders
Unit of analysis	External stakeholders
Coverage	Local/Community

Indicator Number	40
Name of indicator	**Schools engage with policy makers to inspire curriculum change**
Description	The aim of this indicator is to investigate if schools have fosters relationships with local policymakers, are sharing best practices on open schooling to encourage system-wide changes to the local curriculum
Data collection tools Primary/secondary data	• Focus Groups • Interviews
Qualitative / Quantitative	Qualitative
Time-series	Once during a final National event
Measurement Level	Number of curriculum changes
Unit of analysis	Policy Makers
Coverage	National

4 Conclusions

This deliverable presents the tools that will be used during the OSOS pilots in order to collect the needed feedback (data) and analyse them. Tools that are presented are following the Assessment Framework (D6.1) and aim to measure the 40 OSOS Indicators.

To measure these proposed transformations of the school unit the OSOS evaluation team will focus on the measurement of the Organisational Change and at the same time the measurement of the Pedagogical Impact of the proposed approaches and activities. The main tools presented, are Questionnaires that will be used in different situations. The most important instrument is the Open Schooling Reflection tool. This will be the main tool to measure the organisational change and the RRI integration in the schools and has structured in way to give the opportunity to each school to identify the status and the level of openness according to the OSOS Model. The students of the participating schools will have also to fill in questionnaires according to the accelerators that they are going to realise. These will be mainly the questionnaires for the Motivation and the Interest of students after implementing activities according to the OSOS Implementation Plan. Finally, there are going to be used the data from the web analytics, data that the OSOS Portal can provide in respect with number of communities created, number of resources and projects, number of users that participate in activities and communities etc

During the 1st pilot phase with the 100 OSOS Schools the tools will be tested and possible modifications and updated will be realized before the rest of the 900 schools will be involved in the project's implementation activities.

All the tools that are presented in the current deliverable will be translated in all the partners countries' languages. For this the National Coordinators will be responsible.

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6 Appendixes

6.1 Appendix 1: SMQ PRE QUESTIONNAIRE

PRE-TEST (T0)

Dear students,

Thank you for your participation!

All questionnaires are part of a study and your answers are strictly confidential! Your teacher will neither evaluate nor mark it!

- Work accurately on the tests on your own!
- Use pen, not pencil!
- Marc with a cross the answers that are right to your own opinion!
- Please answer all questions!
- When you want to change an answer, color the "wrong" check box and marc another.
- Do not speak about third parties. Answer according to your own opinion.
- Do not worry – some questions might be difficult. This is common.
- When you are ready – please check all pages. Have you finished everything?

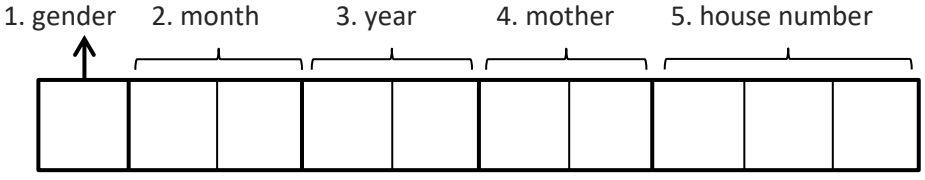
Your School _____. **Your class** _____

Date of today ____ . ____ . _____

Your personal Code:

Your personal Code is built up of:

1. your **gender**: girl is female (**F**) or boy is male (**M**)
2. your **month** of birth (01, 02, 03, …, 10, 11, 12)
3. your **year** of birth (e.g. 98, 99, 00, 01)
4. the **two first letters** of your **mother's first name** (e.g. AN for Anna)
5. your **house number** (e.g. 001 for house number 1; 016 for house number 16)



Example: *Daniel is a boy, i.e. male, born in august 2000; his mother's name is Sandra and he lives in house number 12. Daniel's code is:*

m	0	8	0	0	S	A	0	1	2

In order to better understand what you think and how you feel about your college science courses, please respond to each of the following statements.

For each of the following statements, please indicate how true it is for you, using the following scale(SMQII):	**- -**	**-**	**0**	**+**	**+ +**
Learning science is interesting	☐	☐	☐	☐	☐
I am curious about discoveries in science	☐	☐	☐	☐	☐
The science I learn is relevant to my life	☐	☐	☐	☐	☐
Learning science makes my life more meaningful	☐	☐	☐	☐	☐
I enjoy learning science	☐	☐	☐	☐	☐
Learning Science will help me get a good job	☐	☐	☐	☐	☐
Understanding science will benefit me in my career	☐	☐	☐	☐	☐
Knowing science will give me a career advantage	☐	☐	☐	☐	☐
I will use science problem-solving skills in my career	☐	☐	☐	☐	☐
My career will involve science	☐	☐	☐	☐	☐
I study hard to learn science	☐	☐	☐	☐	☐
I prepare well for science tests and labs	☐	☐	☐	☐	☐
I put enough effort into learning science	☐	☐	☐	☐	☐
I spend a lot of time learning science	☐	☐	☐	☐	☐
I use strategies to learn science well	☐	☐	☐	☐	☐
I believe I can earn a grade of ‘A’ in science	☐	☐	☐	☐	☐
I am confident I will do well on science tests	☐	☐	☐	☐	☐
I believe I can master science knowledge and skills	☐	☐	☐	☐	☐
I am sure I can understand science	☐	☐	☐	☐	☐
I am confident I will do well on science labs and projects	☐	☐	☐	☐	☐
Scoring high on science tests and labs matters to me	☐	☐	☐	☐	☐
It is important that I get an “A” in science	☐	☐	☐	☐	☐
I think about the grade I will get in science	☐	☐	☐	☐	☐
Getting a good science grade is important to me	☐	☐	☐	☐	☐
I like do better than other students on science tests	☐	☐	☐	☐	☐

	consensus				
For each of the following statements, please indicate how true it is for you, using the following scale(IMI):	**- -**	**-**	**0**	**+**	**++**
I enjoyed doing this activity very much	☐	☐	☐	☐	☐
This activity was fun to do.	☐	☐	☐	☐	☐
I thought this was a boring activity.	☐	☐	☐	☐	☐
This activity did not hold my attention at all.	☐	☐	☐	☐	☐
I would describe this activity as very interesting.	☐	☐	☐	☐	☐
I thought this activity was quite enjoyable.	☐	☐	☐	☐	☐
While I was doing this activity, I was thinking about how much I enjoyed it.	☐	☐	☐	☐	☐
I think I am pretty good at this activity.	☐	☐	☐	☐	☐
I think I did pretty well at this activity, compared to other students.	☐	☐	☐	☐	☐
After working at this activity for a while, I felt pretty competent.	☐	☐	☐	☐	☐
I am satisfied with my performance at this task.	☐	☐	☐	☐	☐
I was pretty skilled at this activity.	☐	☐	☐	☐	☐
This was an activity that I couldn't do very well.	☐	☐	☐	☐	☐
I did not feel nervous at all while doing this.	☐	☐	☐	☐	☐
I felt very tense while doing this activity.	☐	☐	☐	☐	☐
I was very relaxed in doing these.	☐	☐	☐	☐	☐
I was anxious while working on this task.	☐	☐	☐	☐	☐
I felt pressured while doing these.	☐	☐	☐	☐	☐
I believe I had some choice about doing this activity.	☐	☐	☐	☐	☐
I felt like it was not my own choice to do this task.	☐	☐	☐	☐	☐
I didn't really have a choice about doing this task.	☐	☐	☐	☐	☐
I felt like I had to do this.	☐	☐	☐	☐	☐
I did this activity because I had no choice.	☐	☐	☐	☐	☐
I did this activity because I wanted to.	☐	☐	☐	☐	☐
I did this activity because I had to.	☐	☐	☐	☐	☐

6.2 Appendix 2: SMQ POST QUESTIONNAIRE

POST-TEST (T1)

Dear students,

Thank you for your participation!

All questionnaires are part of a study and your answers are strictly confidential! Your teacher will neither evaluate nor mark it!

- Work accurately on the tests on your own!
- Use pen, not pencil!
- Marc with a cross the answers that are right to your own opinion!
- Please answer all questions!
- When you want to change an answer, color the "wrong" check box and marc another.
- Do not speak about third parties. Answer according to your own opinion.
- Do not worry – some questions might be difficult. This is common.
- When you are ready – please check all pages. Have you finished everything?

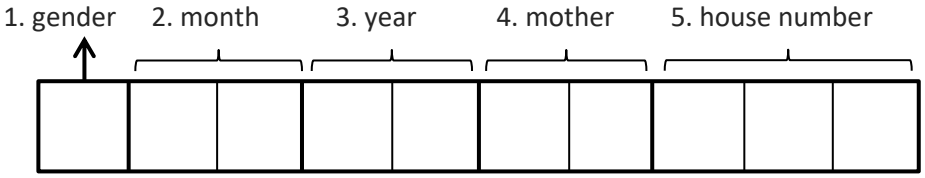
Your School _____. **Your class** _____

Date of today ____ . ____ . _____

Your personal Code:

Your personal Code is built up of:

6. your **gender**: girl is female (**F**) or boy is male (**M**)
7. your **month** of birth (01, 02, 03, …, 10, 11, 12)
8. your **year** of birth (e.g. 98, 99, 00, 01)
9. the **two first letters** of your **mother's first name** (e.g. AN for Anna)
10. your **house number** (e.g. 001 for house number 1; 016 for house number 16)



Example: *Daniel is a boy, i.e. male, born in august 2000; his mother's name is Sandra and he lives in house number 12. Daniel's code is:*

m	0	8	0	0	S	A	0	1	2

In order to better understand what you think and how you feel about your college science courses, please respond to each of the following statements.

For each of the following statements, please indicate how true it is for you, using the following scale(SMQII):	**- -**	**-**	**0**	**+**	**+ +**
Learning science is interesting	☐	☐	☐	☐	☐
I am curious about discoveries in science	☐	☐	☐	☐	☐
The science I learn is relevant to my life	☐	☐	☐	☐	☐
Learning science makes my life more meaningful	☐	☐	☐	☐	☐
I enjoy learning science	☐	☐	☐	☐	☐
Learning Science will help me get a good job	☐	☐	☐	☐	☐
Understanding science will benefit me in my career	☐	☐	☐	☐	☐
Knowing science will give me a career advantage	☐	☐	☐	☐	☐
I will use science problem-solving skills in my career	☐	☐	☐	☐	☐
My career will involve science	☐	☐	☐	☐	☐
I study hard to learn science	☐	☐	☐	☐	☐
I prepare well for science tests and labs	☐	☐	☐	☐	☐
I put enough effort into learning science	☐	☐	☐	☐	☐
I spend a lot of time learning science	☐	☐	☐	☐	☐
I use strategies to learn science well	☐	☐	☐	☐	☐
I believe I can earn a grade of ‘A’ in science	☐	☐	☐	☐	☐
I am confident I will do well on science tests	☐	☐	☐	☐	☐
I believe I can master science knowledge and skills	☐	☐	☐	☐	☐
I am sure I can understand science	☐	☐	☐	☐	☐
I am confident I will do well on science labs and projects	☐	☐	☐	☐	☐
Scoring high on science tests and labs matters to me	☐	☐	☐	☐	☐
It is important that I get an “A” in science	☐	☐	☐	☐	☐
I think about the grade I will get in science	☐	☐	☐	☐	☐
Getting a good science grade is important to me	☐	☐	☐	☐	☐
I like do better than other students on science tests	☐	☐	☐	☐	☐

	consensus				
For each of the following statements, please indicate how true it is for you, using the following scale(Emotions):	**- -**	**-**	**0**	**+**	**++**
The lesson pleased me.	☐	☐	☐	☐	☐
I was satisfied with the lesson.	☐	☐	☐	☐	☐
I enjoyed the lesson.	☐	☐	☐	☐	☐
I found that topic important.	☐	☐	☐	☐	☐
The information on that topic was relevant to me.	☐	☐	☐	☐	☐
I want to learn more about that topic.	☐	☐	☐	☐	☐
I felt bored.	☐	☐	☐	☐	☐
(Today) my mind sometimes wandered.	☐	☐	☐	☐	☐
I wanted to sleep through the lesson.	☐	☐	☐	☐	☐

6.3 Appendix 3: IMI QUESTIONNAIRE

	consensus				
For each of the following statements, please indicate how true it is for you, using the following scale(IMI):	**- -**	**-**	**0**	**+**	**++**
I enjoyed doing this activity very much	☐	☐	☐	☐	☐
This activity was fun to do.	☐	☐	☐	☐	☐
I thought this was a boring activity.	☐	☐	☐	☐	☐
This activity did not hold my attention at all.	☐	☐	☐	☐	☐
I would describe this activity as very interesting.	☐	☐	☐	☐	☐
I thought this activity was quite enjoyable.	☐	☐	☐	☐	☐
While I was doing this activity, I was thinking about how much I enjoyed it.	☐	☐	☐	☐	☐
I think I am pretty good at this activity.	☐	☐	☐	☐	☐
I think I did pretty well at this activity, compared to other students.	☐	☐	☐	☐	☐
After working at this activity for a while, I felt pretty competent.	☐	☐	☐	☐	☐
I am satisfied with my performance at this task.	☐	☐	☐	☐	☐
I was pretty skilled at this activity.	☐	☐	☐	☐	☐
This was an activity that I couldn't do very well.	☐	☐	☐	☐	☐
I did not feel nervous at all while doing this.	☐	☐	☐	☐	☐
I felt very tense while doing this activity.	☐	☐	☐	☐	☐
I was very relaxed in doing these.	☐	☐	☐	☐	☐
I was anxious while working on this task.	☐	☐	☐	☐	☐
I felt pressured while doing these.	☐	☐	☐	☐	☐
I believe I had some choice about doing this activity.	☐	☐	☐	☐	☐
I felt like it was not my own choice to do this task.	☐	☐	☐	☐	☐
I didn't really have a choice about doing this task.	☐	☐	☐	☐	☐
I felt like I had to do this.	☐	☐	☐	☐	☐
I did this activity because I had no choice.	☐	☐	☐	☐	☐
I did this activity because I wanted to.	☐	☐	☐	☐	☐
I did this activity because I had to.	☐	☐	☐	☐	☐

6.4 Appendix 4: Cognitive Load QUESTIONNAIRE

Cognitive load:

Please estimate your perceived difficulty of *[the station (station learning)]* immediately after you finished it. Please do so even when you "gave up" after having tried solving it.	very easy 1	easy 2	neither - nor 3	difficult 4	very difficult 5
Part 1	☐	☐	☐	☐	☐
Part 2	☐	☐	☐	☐	☐
Part 3	☐	☐	☐	☐	☐

Note Please insert your implementation parts.

6.5 Appendix 5: EXTENDED Interview form

When designing an interview schedule, it is imperative to ask questions that are likely to yield as much information about the topic as possible and that will also be able to address the aims and objectives of the research. In a qualitative interview, good questions should be open-ended (require more than a yes/no answer), neutral, sensitive and understandable. Wherever possible, interviews should be conducted in areas free from distractions and at times and locations that are most suitable for participants.

General questions about RRI

What does responsible research mean to you?	
How would you define RRI in your context?	
What is the role of science in society?	
What should be implemented and what not?	
How do you support RRI?	

Questions for the School approaches

The OSOS Model offers certain approaches and features, do these respond to your needs as a teacher?	
What are the most interesting and relevant aspect of the OSOS proposed approaches?	
What are the main innovative elements?	
Is the OSOS portal useful to your day to day work? Is it there a collaborative environment that you can work with?	
Which parts of the OSOS Approaches need improvement?	
Do your school provide all the needed support for your professional development?	
Do you feel free to propose new ideas in your school and to implement them within your classroom?	
Do you collaborate with parent and external stakeholders?	

Development questions

What barriers are there to integrate OSOS approaches at your school?	
How open is the school to critical scrutiny	
Is there ability to change after internal reflective practice and external feedback?	
What is needed at your school for raising its openness level?	

What could you do in the next two years?	
What is the next practical step you could do?	

Science Capital Questions

(these are recommended to be used during events in the school where Stakeholders / Parents / Municipality Representatives / Companies participate)

1. How often do you talk about things to do with science with the following people?

Please note that in the table below, the following is the meaning of each selection that you have:

Never: no occasions

Occasionally: Once or twice every 6 months

Regularly: Once or twice a month

Frequently: 3-4 times per month

Your neighbor (for parents)	Never	Occasionally	Regularly	Frequently
Your colleagues	Never	Occasionally	Regularly	Frequently

2. How often you attend a science event organized by the school(s) nearby your home place?

Please note that in the table below, the following is the meaning of each selection that you have:

Never: no occasions

Occasionally: Once or twice every 6 months

Regularly: Once or twice a month

Frequently: 3-4 times per month

Never	Occasionally	Regularly	Frequently

3. How much do you agree with the following statements?

	I strongly disagree	**I somewhat disagree**	**I agree**	**I strongly agree**
I am very up to date with scientific news and developments				
I am interested in science.				
In daily life, I often use my knowledge of science.				
I enjoyed science at school.				
I feel 'at home' in places where science is discussed and practiced (e.g. in laboratories, in science centres, in industrial settings).				

4. How often do you do the following in your leisure time?

Please note that in the table below, the following is the meaning of each selection that you have:

Never: no occasions

Occasionally: Once or twice every 6 months

Regularly: Once or twice a month

Frequently: 3-4 times per month

Go to a talk or lecture on a science-related subject organized by the local school(s)	Never	Occasionally	Regularly	Frequently
Visit / Collaborate with the local school to guide me in any scientific question that I have	Never	Occasionally	Regularly	Frequently

5. How much do you agree with the following statements?

	I strongly disagree	**I somewhat disagree**	**I agree**	**I strongly agree**
I have a good understanding of scientific terms (e.g. hypothesis, theory) and methods (e.g. randomised controlled trial, experiments).				
I know how to use scientific evidence to make an argument.				

6. Do you work in a science/science-related job?

YES	**NO**

7. What is the highest science or engineering qualification you have?

Doctoral degree ☐

Master's degree ☐

Bachelor's degree ☐

Higher National Diploma ☐

Higher National Certificate ☐

High School Certificate ☐

Other: ……