



Validation Manual

How to design and run school pilots



Before and After
School Pilots
Validation school network
Action Research
Impact assessment
Validation Service
Focus Groups

Research questions
Quantitative
Interviews
Qualitative
Case Studies
Surveys
Questionnaire
Evaluation
Scenarios



Future
Classroom
Lab





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NB: Websites are referenced throughout this report; these were checked prior to publication. The reference to the website does not constitute an endorsement of the product or organisation.

Discover more online:

- Future Classroom Lab Validation Service and related documents: fcl.eun.org/validation-service
- More results from the Living Schools Lab project: fcl.eun.org/lsl

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1 Executive Summary

Technology-enhanced learning (TEL) projects and ICT suppliers frequently underestimate the complexity and cost of developing and running effective pan-European validations in schools. In particular, many have a poor appreciation of the degree of support that busy classroom teachers may need in different countries (with different curricula and levels of ICT deployment) in order to: test prototype platforms and services; explore the pedagogical use of new forms of digital content; validate pedagogical scenarios and learning activities for the future classroom, etc. Others have unrealistic expectations about what can be achieved within validations that have a limited budget, duration and scope.

The Future Classroom Lab Validation Manual, produced in the European Commission -funded Living Schools Lab project, is designed to provide TEL projects, ICT suppliers and other stakeholders with:

- An introduction to different evaluation methodologies and approaches used in school pilots.
- An analysis of why an action research approach had been adopted in the numerous pan-European school pilots that European Schoolnet has run with its supporting Ministries of Education and industry partners over the last 16 years.
- An insight into how European Schoolnet manages the school pilot process within a new validation service that it offers as part of its Future Classroom Lab initiative.
- A methodology and templates which any organisation can replicate or adapt if it wishes to set up and run its own school validation pilot.

Above all, the manual aims to provide a practical, step-by-step guide, as indicated in the following graphic, for those wanting to commission an evaluation activity or to run their own validation pilots in schools.



Validation Pathway

STEP 1
Why validate a product or service?

In terms of:

- The initiator: EC projects, Ministries/policy-makers, industry
- The beneficiary: the schools, teachers, students



Ref. Section 3

STEP 2
Planning an evaluation

Gathering information about:

- Product/service/tool to be validated (checklist 1)
- Intended evaluation process (checklist 2)
- Intended outputs from the evaluation (checklist 3)



Ref. Sections 4.1 & 4.2

STEP 3
Designing an evaluation

- Formulating the research questions
- Desk research
- Sample selection
- Method/instruments to gather information
- What counts as evidence



Ref. Sections 4.3

STEP 4
Determining the approach

Evaluation approach – action research in schools:

- Incentives to participate
- Evaluation methods: quantitative, qualitative
- Evaluation instruments



Ref. Sections 5&6

STEP 5
Running validations in schools

- Validation spectrum
- Validation roles
- Running a school pilot: small-scale or large-scale
- Templates and proformas



Ref. Section 7

STEP 6
Validation scenarios

Three scenarios and flow-chart to support running your own validation pilots: small scale, medium scale and large scale

Ref. Section 8

2 Introduction

2.1 Background

European Schoolnet (EUN) has coordinated numerous pan-European school pilots over the last 15 years and been invited to run validations as a partner within Commission-funded projects. Larger validations coordinated by EUN typically involve Ministries of Education (MoE) from 10-12 countries in EC-funded projects that may include several hundred schools. Recently, European Schoolnet has coordinated the FP7 iTEC Integrating Project which has validated future classroom scenarios and innovative learning activities in over 2,500 classrooms with 17 MoE. This is by some measure the largest pan-European validation exercise yet undertaken involving innovation in schools supported by ICT.

In many EUN projects, ministries work alongside industry partners who participate as either funded project partners or unfunded Associate Partners. Over the last five years, EUN has also designed and run school pilots on a bilateral basis for individual ICT suppliers, particularly around 1:1 computing approaches. In some of these validations EUN has handled all the operational issues related to: identifying schools; contracts with schools and insurance related to hardware/software being supplied; organising and managing school pilots in several countries; monitoring and observing classroom practice; publishing the results of the action research; and helping the company to promote the results of this work to both policy makers and practitioners.

2.2 Validation challenges

As a result of this experience, EUN has become aware that many TEL projects and ICT suppliers frequently underestimate the complexity and cost of developing and running effective pan-European validations in schools. Many in particular have a poor appreciation of the degree of support that busy classroom teachers may need in different countries (with different curricula and levels of ICT deployment) in order to: test prototype platforms and services; explore the pedagogical use of new forms of digital content; validate pedagogical scenarios and learning activities for the future classroom, etc.

For many stakeholders there is frequently a lack of clarity about the research questions they are trying to answer. Most appear to start with the aim of demonstrating that new ICT hardware, software, digital content, etc. 'improves' teaching and learning in some way that can be assessed using either qualitative or quantitative measures – or both. This need to prove effectiveness is particularly important for both policy makers and suppliers when there is a demand for

guidelines from schools that are under pressure to invest in the latest technology or when decisions have to be made concerning whether to scale up an interesting pilot.

However, there appears to be a very low level of awareness of: how one can frame meaningful research questions; what one can measure accurately when it comes to teachers and students using ICT; and what sort of evaluation methodologies should be selected in order to answer specific research questions.

More often than not, many stakeholders, particularly ICT suppliers, also have unrealistic expectations concerning evidence-based research in education, even where a project budget allows only limited testing of new hardware or software in classrooms over a matter of weeks or, at best, a few months. For ICT suppliers, this is often the case where the demand for some sort of validation activity is led by marketing professionals, who are looking for evidence to support sales. The expectation is often that such validations can demonstrate clear impact on student learning outcomes when this is rarely, if ever, possible unless a longer term validation can be undertaken and effective controls can be put in place to ensure that the research can withstand scientific scrutiny.

A further complication is that each project or study involving a school validation usually requires a 'bespoke' solution and considerable consultancy may be needed in order to develop a 'protocol of experimentation' or methodology for a school pilot. However, this process is time-consuming and can potentially inhibit take-up and mainstreaming of results in a fast-moving market.

2.3 Development of a Validation Methodology/Service

In order to address these challenges, European Schoolnet and 12 MoE carried out work in the EC-funded Living Schools Lab (LSL) project to standardise and package existing validation methodologies and make the costs of running school pilots more transparent so that projects themselves are better able to mount and run their own validations. The project also carried out work which led to the launch by European Schoolnet of a complete, turnkey validation service that can be used by EC projects, industry partners and other stakeholders wishing to carry out a school pilot.

During LSL, surveys were conducted with other EC projects and industry partners to better understand

requirements and identify the demand for a K-12 validation service; and with the LSL network of schools to understand their motivation for taking part in validations. Results from this work are contained in project deliverable D4.1 Validation Requirements.

Some early validation pilots were also carried out during the project with SMEs (small and medium enterprises). The initial plans for the validation service were then fine-tuned following discussion with 150 teachers at the LSL summer school in May 2014. Finally, a validation workshop for interested industry partners and projects was run in June 2014, which provided an overview of some of the evaluation methodologies outlined in this manual and tested some of the validation scenarios in Section 8, particularly to discuss the possible cost elements involved in different types of validations.

2.4 Purpose of the Validation Manual

The aim of the Future Classroom Lab Validation Manual, therefore, is to increase the ability of the educational research community, Commission-funded projects and ICT suppliers to better understand what is required in order to develop and run pan-European validations in schools and particularly what outputs they can expect as a result of carrying out different types of school pilots. A key part of this will include helping various stakeholders to appreciate the challenges faced by busy teachers who are engaged in educational research activities when their first priority must remain delivering a high-quality learning experience for their students.

The manual describes the process that European Schoolnet follows in the validation service that it offers as part of its Future Classroom Lab initiative (<http://fcl.eun.org>). You will also find links in the manual to downloadable templates and tools that European Schoolnet regularly uses when it is running school pilots in different projects and in validations for industry partners and other stakeholders.

2.5 Key concepts underpinning the validation service

Below are definitions of key terms used in this manual such as validation, evaluation, pilots, assessment and impact. It is important for European Schoolnet to establish a common working language with organisations that wish to use the Future Classroom Lab Validation Service and for these stakeholders to have a baseline understanding of the processes involved. It is also important to understand these key concepts if you intend to set up and run your own school pilots.

Action research is a recognised form of applied research that focuses on the effects of the researcher's direct actions of practice within a participatory community

with the goal of improving the performance quality of the community or an area of concern (Dick, 2002).

Action research is the main approach for the validation of ICT in schools as part of the Future Classroom Lab Validation Service.

Assessment is the process through which the progress and achievements of a learner or learners is measured or judged in compliance with specific quality criteria (UNESCO-IBE, 2013).

Evaluation is the systematic and objective assessment of an activity, project, programme, strategy, policy, topic, theme, sector, operational area or institution. As an essential part of the policy development process, evaluation provides timely assessments of the relevance, efficiency, effectiveness, impact and sustainability of interventions. Evaluation is essentially about: are we doing the right thing, are we doing it in the right way, and are there better ways of achieving the results?

Evaluation (in teaching and learning) refers to a systematic process aimed at **judging the effectiveness** of any teaching and learning programme.

- ◆ **Formative evaluation:** Evaluation that is used to modify or improve products, programmes, or activities and is based on feedback obtained during their planning and development.
- ◆ **Summative evaluation:** Evaluation at the conclusion of an activity or plan to determine its effectiveness.

Impact refers to the changes the activities (e.g. a national initiative, a teacher training programme, use of a device) bring about, the effect of the intervention on the target area and group.

Impact is a primary or secondary long-term effect of an intervention (positive, negative, intended or unintended). The more direct outputs of an intervention on:

- attitudes (e.g. X number of students are more motivated)
- processes (e.g. changed teaching practices) and the more indirect wider impacts on educational outcomes (e.g. higher digital literacy rates of students), stakeholders and systems.

Impact Assessment is widely used to describe Policy Impact Assessments. These are formalised, knowledge- and evidence-based procedures to assess the intended and unintended, positive and negative impacts of policy proposals on economic, social, and environmental aspects, to inform policy development. An impact assessment gives decision-makers evidence regarding the need for action and the advantages and disadvantages of alternative policy choices. It may also find that no action should be taken.¹

Impact Evaluations are designed to assess how well a programme or policy is meeting its goals.²

Learning Outcomes: The totality of information, knowledge, understanding, attitudes, values, skills, competencies or behaviours a learner has mastered upon the successful completion of an education programme (UNESCO-IBE, 2013, adapted from: UIS 2012).

Pilot Project or Study

The Concise Oxford Thesaurus defines a pilot project or study as an experimental, exploratory, test, preliminary, trial or try-out investigation. Epidemiology and statistics dictionaries provide similar definitions of a pilot study as a small-scale

- ‘...test of the methods and procedures to be used on a larger scale if the pilot study demonstrates that the methods and procedures can work’;
- ‘...investigation designed to test the feasibility of methods and procedures for later use on a large-scale or to search for possible effects and associations that may be worth following up in a subsequent larger study’.

A Pilot within the Future Classroom Lab validation service means all the activities carried out by a group of people to test and explore a product (tool, method) within a given timeframe and stated objectives. Pilots usually consist in offering support to schools (e.g. training) and are evaluated by a scientific method, the results of which are used to inform decision making.

Validation is proof that you can replicate the results of a described intervention/approach under defined conditions. The more accurately the approach is described (i.e. there are few or no unknown factors that influence the intervention) the more realistic it is that the results can be reproduced if the approach is repeated. To validate you first need a description of the objectives and the approach.

Validation is also commonly used in the context of the accreditation of learning outcomes. Validation can also be understood as the confirmation by an approved or authoritative body that learning outcomes or competences acquired by an individual have been assessed against reference points or standards through pre-defined assessment methodologies (Colardyn & Bjornavold, 2004).

Validity is an important concept in research. It usually tells us whether an item or instrument measures or describes what it is supposed to measure (Pepper, 2013). The main purpose of validity studies is to determine whether the object, the focus of the validation, does what it intends to do, e.g.:

- if a test measures what it is supposed to measure;
- if an analytical method is suitable for its designed purpose, area of application;
- if a system (informatics) meets the requirement of practice;
- if statistical values are valid (plausibility check).

Other definitions take validity to mean the design of research to provide credible conclusions. Questions such as: ‘What are you trying to find out or measure?’ and ‘Will the questions and items you have devised do the job?’ are therefore crucial to establish a ‘valid’ and credible piece of research. In quantitative research, for example, validity is related to careful sampling, randomisation of samples, control of variables, reliability and replicability, just to mention a few factors.



1 See also: http://ec.europa.eu/smart-regulation/impact/index_en.htm
 2 <http://www.sri.com/research-development/impact-evaluation>

In the Future Classroom Lab Validation Service we use the term validity as part of checking the rigor of the research/evaluation that will be carried out. Possible validity checks are described in more detail in Section 4.3 on evaluation design.

In the Future Classroom Lab Validation Service we use the term validation in its wider sense and mean the scientific evaluation of the (pilot) intervention, which aims to test a specific ICT product, tool, content or service in an educational context against a set of objectives and research questions jointly agreed upon by the initiator of the validation and the evaluator.

Validation requirements: are all the elements that need to be in place for carrying out the intended evaluation or validation, e.g. the selection of schools based on agreed criteria, agreement between initiator, evaluator and/or EUN on timeframe, costs methods and outputs, agreement on pilot support measures and on the conditions (technical, organisational) that schools must have in place to take part in the validation pilot.

Validation Service: A validation service encompasses all the actions and processes that need to be undertaken to carry out an evaluation. This includes: identifying clear objectives for the validation; defining specific research questions; developing an evaluation methodology and instruments for data collection; documenting how to set up and run a school/classroom pilot that includes criteria for selecting schools/teachers and training/support mechanisms.

Actors involved in the validation:

- ◆ **Beneficiaries (the pilot teachers, students):** the 'subject' or 'testbed' of the intervention or pilot (e.g. students, teachers, headteachers), those who test, explore something and should directly (or indirectly) benefit from the intervention.
- ◆ **Evaluator:** the person responsible for the evaluation activities, namely the scientific evaluation of the (pilot) intervention including designing the evaluation approach, deciding on methods and tools for data-gathering and drafting the evaluation report.³
- ◆ **Initiator:** the organisation or person who commissions the validation.
- ◆ **Stakeholders:** those who have an interest in the outcomes of the evaluation (e.g. initiator) and/or are affected directly by the pilot and validation (e.g. beneficiary), but also those who are more indirectly involved in the validation, such as parents whose children take part in the validation pilot.
- ◆ **Validation Manager:** the person appointed to coordinate the overall validation process managing the validation as a project in terms of quality, time and cost.



³ Other actors which may have a role in running a school pilot are specified in Section 7.2 on operational processes.

3 The Evaluation Process

3.1 Introduction

Before producing this manual, European Schoolnet reviewed the validation methodologies and protocols in over 25 pan-European projects involving MoE in order to determine the key elements behind designing and running successful school pilots. Particular attention was paid during this review to identifying the 'lessons learned' in each of the pilots.

In parallel, work was carried out to identify existing guides or manuals that could help stakeholders understand different evaluation methodologies and how to run effective school pilots. The Web-based resource currently overseen by Maureen McGinty at the University of Plymouth,⁴ for example, provides a useful introduction to both qualitative and quantitative education research methods. The GSMA mEducation Evaluation Toolkit⁵ also provides a good explanation of why one should evaluate, different evaluation methodologies and examples of evaluation instruments and tools.

Evaluation is essentially about asking: 'Are we doing the right thing, are we doing it in the right way and are there better ways of achieving the results we want?' In this section we look at what we mean by evaluation and some of the questions that you need to consider before you can begin to design an evaluation and plan your school pilots. We also look at different evaluation approaches including the action research approach that is frequently used in Future Classroom Lab validation pilots.

3.2 What do we mean by evaluation?

MoE in Europe have already made substantial investments in integrating ICT in schools and there is an increasing demand for more evidence that this investment is worthwhile and really works. There is obviously a vast literature on different evaluation methodologies and the purposes of evaluation but it is not the aim of this manual to provide in-depth analysis or debate the validity and merits of one educational research method over another. Rather, the aim is to provide some practical guidelines to a variety of stakeholders who want to run a school pilot or validation so that they can understand how these can be developed and at what cost, and also what outputs one might reasonably expect as a result of utilising different evaluation methodologies.

Evaluations are essentially related to the design, implementation and effectiveness of an intervention that aims to:

- document and examine a range of perceptions and experiences;
- identify lessons learned, what has worked and why;
- identify practices (innovative or common practice).

Evaluations are based on a given agenda and scope set by the initiator of the evaluation. In that sense, evaluations have different objectives than research but still use rigorous scientific methods for information gathering and analysis. Results of the evaluation are usually fed back to inform future decisions and to set new agendas. Evaluations should therefore be independent and can involve a summative approach (evaluation is carried out at the end of an intervention) or a formative evaluation approach (evaluation is carried out throughout the intervention with the aim of improving the processes and results of the intervention via feedback loops), or both.

A validation pilot related to the use of ICT in schools may be carried out for a number of different reasons, including to:

- collect evidence and get structured feedback from teachers and students on the 'real' benefits of a product, service, instrument, content or tool;
- carry out a 'proof of concept' or build up a knowledge base of 'what works' under 'which conditions';
- test a prototype to inform further development;
- test a final product to inform future decisions (e.g. on marketing, purchasing, contracts, training maintenance);
- identify effectiveness and impact of an intervention, tool (e.g. with a view to upscaling and mainstreaming);
- identify good/best practice to be shared with others (e.g. including as part of teacher professional development);
- evaluate the implementation process of the ICT intervention (e.g. to decide what may be the best support measures to put in place for larger-scale deployment).

The following sections outline the main initiators that are likely to commission evaluations and school pilots

⁴ <http://www.edu.plymouth.ac.uk/resined/actionresearch/arhome.htm>

⁵ mEducation Evaluation Toolkit, GSMA, August 2013 <http://www.gsma.com/connectedliving/gsma-meducation-evaluation-toolkit/>

as part of the Future Classroom Lab Validation Service and their specific interests. It also outlines the major steps you will need to go through and key questions you need to consider if you want to design and run your own validation pilot in schools.

3.3 Why carry out validations in schools?

The Future Classroom Lab validation service is offered to a variety of quite distinct initiators including: European Commission research projects focused on TEL; companies providing ICT hardware, software, content and services to schools; and policy makers within national/regional education authorities. Each of these actors has specific interests in undertaking validations in schools, examples of which are outlined below and which are the starting point for the validation. In terms of its validation service, European Schoolnet can be seen as the 'broker' at the core of this process, working with and linking the different actors and managing expectations.

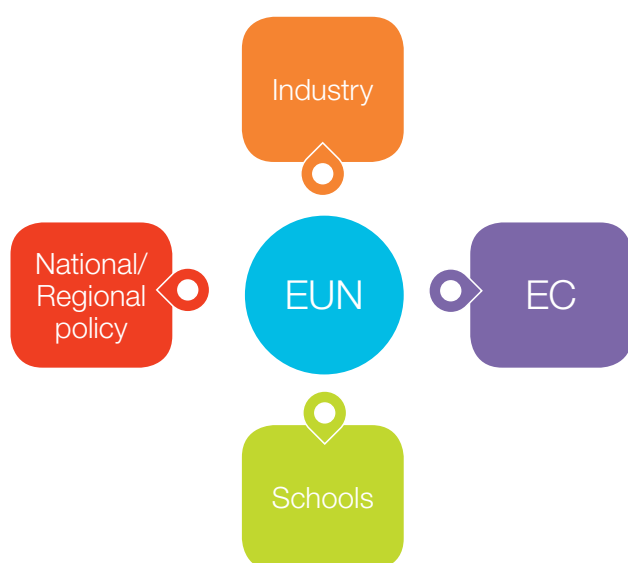


Figure 1: Main actors involved in the validation process

Ministries of Education and regional education authorities in some countries have been making a serious investment in ICT for schools for more than three decades. They are interested in collecting evidence in order to make informed decisions about 'what works to improve quality in education', under 'which conditions' using ICT. Many policy makers across Europe are currently interested in some of the following issues:

- Mainstreaming ICT in schools to bring about positive changes in the education system and reach out to all target groups who can benefit from ICT;
- Running ICT pilots in schools to test and explore the latest ICT developments and new pedagogical approaches in order to inform future decision making, including where to invest (areas, types of technologies) and how to cost-effectively manage resources;
- Studies that help them to provide central advice and guidelines to schools that are negotiating contracts with suppliers;
- Exploring new ways of providing online and other forms of professional development for teachers;
- Evaluating the effectiveness of an existing initiative (e.g. the deployment of a new device);
- Designing new policies or initiating reform based on evidence obtained;
- Identifying both short-term benefits and also the potential longer-term impacts ICT can bring about in schools.

Companies interested in validations and school pilots may be marketing consumer products to schools or may have developed specific hardware, software, content or services for teachers and students. Some may also wish to evaluate how they can work with schools as a part of a corporate social responsibility programme. Many of the companies that are European Schoolnet industry partners are currently interested in:

- Getting feedback from students and teachers on their products and services;
- Gathering evidence on the impact that products and services have on the education sector including benefits for users (particularly on student attainment);
- Developing case studies of good/best practice involving teachers and students using their technology;
- Understanding how to better provide training and support to schools using their technology;
- Testing technology prototypes in order to inform the development of new products and services.

The European Commission has funded a large number of projects related to the introduction of ICT and the piloting of innovative ICT practices in schools. Issues that are of strategic interest concerning the use of ICT in society and education are highlighted in the following documents:

- ◆ Horizon 2020 Work Programme 2014-2015, Leadership in enabling and industrial technologies: Information and Communication technologies⁶
- ◆ Erasmus+ Programme Guide⁷
- ◆ Opening Up Education communication: Innovative teaching and learning for all through new Technologies and Open Educational Resources⁸

Calls for proposals issued by Commission programmes often explicitly state that TEL research should include an element of testing or evaluation ‘in real-life contexts’. However, there is a growing concern that, while research confirms broad benefits, pilots are not scaling up as expected. This has led to **a greater focus on mainstreaming meaningful use of ICT** in schools, as in the European Schoolnet iTEC project, where the original call for proposals indicated the need for a very large-scale pilot on the design of the future classroom in order to help mainstream innovative practice. Closely linked to this is **a growing recognition of the need to study and evaluate change management processes in schools**. Or, as again indicated in the iTEC call for proposals, ‘the design of the classroom, the pedagogical practices and the organisational structures need adaptations to fully exploit the digital revolution.’

Schools, which are at the core of the validation process, are defined in this manual as ‘beneficiaries’ of validations rather than initiators. At the same time that any project or company starts to think about initiating an evaluation, it should stop and consider why teachers would want to be part of any school pilot that is organised. Why should teachers give up their time to be involved in the evaluation and how will a school benefit from the possible disruption and additional work that may be involved?

European Schoolnet’s experience over the last 16 years indicates that many teachers and schools are interested in participating in school pilots for a range of motives⁹, including the possibilities that validations will:

- ◆ Provide opportunities to try out new technologies or services;
- ◆ Help school leaders to take more informed decisions about which technologies or services to invest in;
- ◆ Enable schools be at the forefront of new ideas and innovation;
- ◆ Help improve practice and professional development as a result of teachers being involved in action research;
- ◆ Sometimes enable schools to receive free hardware or software;
- ◆ Enable peer exchanges and support sharing of practices with teachers often as part of a community.

Work in the European Schoolnet LSL project has particularly highlighted that many teachers will be motivated to participate in school pilots if there is the possibility of having access to new professional development opportunities during the validation.

6 http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-leit-ict_en.pdf

7 http://ec.europa.eu/programmes/erasmus-plus/discover/guide/index_en.htm

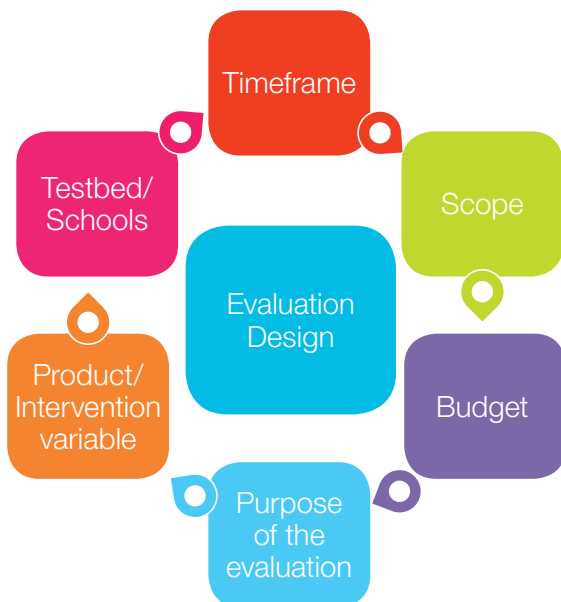
8 <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1389115469384&uri=CELEX:52013DC0654>

9 Example of school validation of ICT products in the Turku region: <http://isl.eun.org/news/-/blogs/2348845>

4 Planning Your Evaluation

4.1 Factors to consider

There is a large number of factors that have an influence on the evaluation design and how a school pilot is organised, including the initiator's objectives, timeframe and available budget as well as the type of technology to be tested (is this already in the schools or does it need to be supplied before the pilot can begin?) and the expected outputs or deliverables from the evaluation.

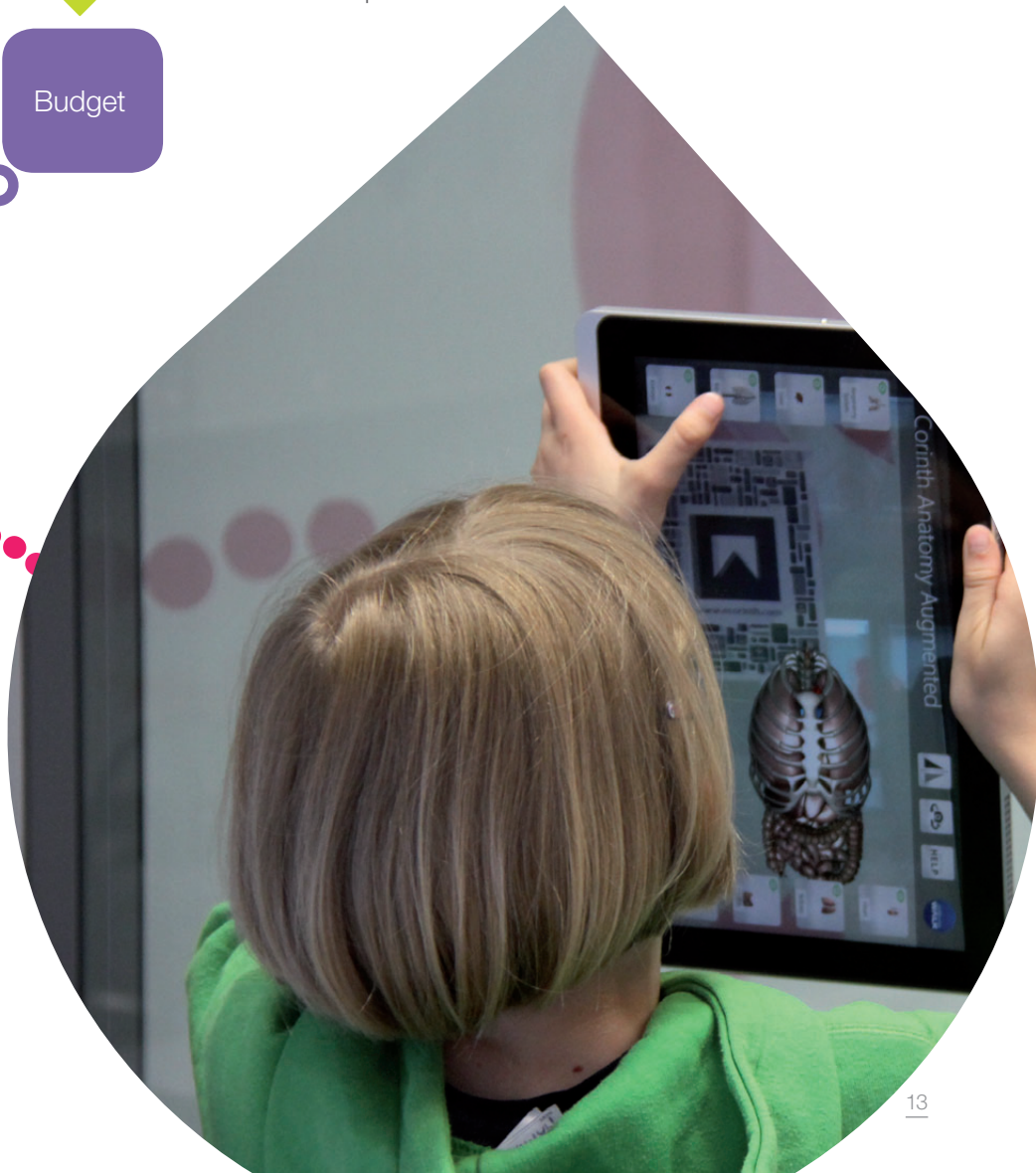


Before starting to plan an evaluation and deciding on the most effective evaluation approach, European Schoolnet normally works closely with the initiator of the evaluation to gather as much information as possible on these factors, which can be grouped in three main areas.

- 1 Information about the product, tool, service, etc. to be validated
- 2 Information about the intended evaluation process
- 3 Information about the intended outputs of the evaluation

In Section 4.2 you can find some checklists that will help you think about the information you need to collect. Whether you want to carry out your own evaluation or wish to use the Future Classroom Lab Validation Service, it is essential that you are first able to answer these questions.

Figure 2: Factors influencing the evaluation design



4.2 Gathering information to help design the evaluation

In Section 8, you can see how the following templates and checklists are used in three exemplar validation scenarios.

1. Information about the product, tool, service to be validated

<p>Short description of the product/programme or service to be tested</p>	<ul style="list-style-type: none"> ▶ Product? (virtual learning environment, eBook, tablet, game, Web portal, etc.) ▶ Service? (training course, MOOC, cloud services) ▶ Method or tool? (scenario building toolkit) ▶ Test? (self-assessment tool) ▶ A set of tools, products and their interaction? (tablets and screen sharing/collaboration software, games on handheld mobile devices, etc.) ▶ A strategy? (1:1 computing, Bring Your Own Device) ▶ Prototype or final product?
<p>Who is the target user?</p>	<ul style="list-style-type: none"> ▶ Is it a consumer product or has it been specifically designed/adapted for education (in what way)? ▶ For a specific age range of students? ▶ For students with specific educational needs?
<p>How will the product be used?</p>	<ul style="list-style-type: none"> ▶ For administration? (typically foreseen-use case) ▶ By the teacher? (typically foreseen-use case) ▶ By the student? (typically foreseen-use case)
<p>In which environment is the product primarily used?</p>	<ul style="list-style-type: none"> ▶ At school, in classroom, outside of school, at home, etc.?
<p>What type of (educational) outcomes/processes does the product seek to improve? If at all?</p>	<ul style="list-style-type: none"> ▶ What is the intended outcome of the intervention/use of the product or service? ▶ What do you consider the potentially positive contribution of the product in education? ▶ Is there already any evidence to support this?
<p>Does the product/service require substantial training or setup for it to be used?</p>	<ul style="list-style-type: none"> ▶ What are the technical requirements for the product/service to be used? ▶ What type of training needs to be provided? By whom? How should the training be delivered?
<p>Is the product linked to a wider policy/industry programme, educational vision?</p>	<ul style="list-style-type: none"> ▶ Ask the initiator to explain and give links to such documents, if available.



2. Information about the intended evaluation process

Purpose of the investigation	<ul style="list-style-type: none"> ▶ What are you trying to find out? What is it you are trying to test and to prove? ▶ Do you already have some specific research questions? ▶ Will it be necessary to provide new technology to schools in the pilots?
Are there certain methods/instruments that you would already prefer to use to collect the data and evidence?	<ul style="list-style-type: none"> ▶ Qualitative and/or quantitative? ▶ Surveys, interviews, classroom observations? ▶ Randomised control trials, etc.?
What are the main characteristics of the target group you would like to involve in the validation?	<ul style="list-style-type: none"> ▶ Students, parents, teachers, school leaders? ▶ Age, gender of students or teachers? ▶ Innovative or advanced teachers/those with lower levels of ICT competence? ▶ Particular curriculum subjects/areas? ▶ Rural/urban schools? ▶ Large/small schools? ▶ Level of education (primary/secondary)?
What is the geographical scope of the intended activity?	<ul style="list-style-type: none"> ▶ At school, in classroom, outside of school, in the home, etc.?
What is the intended scale of the activity?	<ul style="list-style-type: none"> ▶ Numbers of schools, classrooms, students, teachers to be involved? ▶ Schools in which countries?
Which schools would you like to use for the activity?	<ul style="list-style-type: none"> ▶ Own network of schools that are already equipped with the required technology? ▶ Future Classroom Lab validation network schools already equipped with the required technology? ▶ Open call for schools to participate in the validation?
Can you already identify any organisational requirements/issues to address?	<ul style="list-style-type: none"> ▶ Minimum level of technical infrastructure required at the school? ▶ Security, privacy, ethical issues? ▶ Are parents' permissions required for filming classroom practice, etc.?
Approximate budget available for the activity?	<ul style="list-style-type: none"> ▶ Defining the budget
What timeframe is envisaged?	<ul style="list-style-type: none"> ▶ Weeks, 1-2 terms, longer?
What do you bring to the project and how can you motivate teachers to take part?	<ul style="list-style-type: none"> ▶ Evidence from previous studies or evaluations? ▶ Donations of equipment, free licences for the duration of the pilot? ▶ Training and professional development (face-to-face workshops, webinars)? ▶ Technical support?
Preferred evaluator?	<ul style="list-style-type: none"> ▶ External independent evaluator (university)? ▶ Internal independent evaluator (European Schoolnet, experts)?

3. Information about the intended outputs of the evaluation

Who is the main audience to be informed about the results of the pilot and the validation?	<ul style="list-style-type: none"> ▶ Internal: To inform the further development of the product/service? ▶ External: Policy makers, school leaders, teachers, parents, wider public?
What are the main outputs envisaged?	<ul style="list-style-type: none"> ▶ Overall analysis report, case studies country reports, (NB: depending on the research approach)? ▶ Videos of classroom practice? ▶ Strategic seminar or conference to present results?

4.3 Designing the evaluation

This section explains in more detail core components that are usually part of any evaluation and provides some practical tips on how to address each of them. They should serve as a tool for both the initiator and the evaluator to fully flesh out an evaluation design by following four main steps.

- 1 Define the purpose of the investigation and formulate a research question.
- 2 Carry out desk research.
- 3 Define the sample for the selection of schools.
- 4 Decide on the main method and instruments required to gather the data and evidence.

During this process it may also be necessary to address any ethical issues that relate to a specific evaluation. Once you have completed these steps, you will then need to develop a workplan for carrying out the evaluation with roles, timeframes, actors, costs. But, the first step is to formulate your research question(s).

4.3.1 Formulating research questions

Formulating research questions is not an easy task and is usually done by the researcher or evaluator after gathering the information outlined in the previous section. A good starting point, however, in the discussion with the initiator is for the evaluator to get them to move from a general description of their aims, such as *'I want to show that this new technical solution impacts on learning'*, to a more detailed description of specific issues and areas to be addressed in the research. For example, *'How does the use of netbooks at home affect the communication between teachers and students? Does the use of tablets improve learning outcomes in teaching foreign languages in grade 9?'*

In order to be able to formulate initial research questions, the initiator should:

- ▶ Consider or brainstorm all the different dimensions where the solution or activity may have an impact (e.g. on teaching, learning, management, school and classroom organisation, lesson preparation, follow-up).
- ▶ Limit the scope and scale of the potential research and try to be specific (rather than overambitious or general).

Usually the evaluator will then develop one or more research questions that will be tested during a school pilot. Research questions are questions that can be answered by undertaking the research and to which specific, data-driven, concrete answers can be given.

They usually address one (or several) of the following types of investigation (Cohen et al., 2011):

- ▶ **What, what if, why, who, how, where, when?** e.g. How often are tablets used during school time? How often do students take the tablets home and use them for learning purposes?
- ▶ **Predict**, e.g. Will the use of tablets improve learning outcomes in maths? What happens, if...?
- ▶ **Understand**, e.g. Under which conditions does the use of tablets improve learning outcomes in maths?
- ▶ **Explore**, e.g. For what kind of activities is the application specifically suited?
- ▶ **Testing**, e.g. Does the maths application work very well in a flipped classroom scenario?
- ▶ **Explanation**, e.g. What influence does school management have on the use of ICT by teachers? Is there a relationship between students' use of mobile devices at home for science education and learning outcomes in school?

- ◉ **Description**, e.g. What type of learning and teaching activities take place when using Interactive Whiteboards with tablets?
- ◉ **Comparisons**, e.g. Do eBooks enhance students' literacy and comprehension skills as effectively as traditional textbooks?
- ◉ **Correlations**, e.g. Is there a relationship between how much ICT-based training teachers are given and the extent to which they make use of ICT in class with their students?

With regard to research questions, it is also important to understand the distinction between correlation and causality.

- ◉ **Correlation** is an approach to the analysis of relationships between variables, but correlation does not imply causation.
- ◉ **Causality** means establishing causal connections between variables – a set of factors (causes) and a phenomenon (the effect), rather than mere relationships.

Establishing cause and effect is very difficult. It is usually too easy to think (and difficult to prove) that a particular intervention will necessarily bring about the intended effect. A cause or intervention is embedded in a web of other causes, contexts, conditions, circumstances and effects, which can also have an influence between the cause and effect.

4.3.2 Carry out desk research

A literature review, if well focused, offers a timely analysis of current thinking about a topic by identifying and analysing empirical evidence. It is advisable to see what existing research or studies already exist prior to the evaluation in order:

- ◉ to avoid testing something where evidence is already available from other studies;
- ◉ to ensure you do not overlook important issues that may be relevant in the validation being proposed;
- ◉ to formulate your own hypothesis or research questions after taking into account evidence on pilots in similar areas;
- ◉ to identify which elements (variables) have previously been shown to have an impact on the sort of evaluation that you are considering.

On this last point, consider these two examples:

- 1 If we want to test the effect of educational games on attainment, and know from desk research that the gender issue plays an important role in the way and frequency that games are used, this aspect has to be 'controlled' (in the statistical sense) in the evaluation analysis. If there is well-founded evidence that boys in general spend more time playing computer games and mostly specific types of games, this familiarity with certain games might have an impact on boys' attainment when using educational games for learning. Therefore, the evaluator needs to allow for or control the familiarity with different types of games of both boys or girls that are part of the sample, by identifying this through a question in a questionnaire.
- 2 We also know from research that, for example, a teacher's general pedagogical approach can have an influence on what type of activities and pedagogies are applied when they use ICT. When investigating, for example, the capacity of tablets to lead to innovative pedagogical practices, it is therefore advisable to check teachers' general pedagogical approach as part of the evaluation (e.g. by an item in the questionnaire) in order to be able to correctly interpret the findings of the survey.

So a literature review is not an academic exercise but often allows you to really refine your research questions and make sure that you take account of different variables that, if you are unaware of them, could undermine the credibility of your evaluation findings.





4.3.3 Defining the sample

When carrying out research (mainly for large scale quantitative surveys or experiments), the researcher must take account of the **population** (a group of people that share at least one common characteristic, e.g. students) to which the evaluator wishes to generalise the results of the research. For example, if you want to mainstream the use of a specific tool after the pilot, it may not be sufficient to test the tool only with schools making advanced use of ICT, as the evidence obtained will not be representative of the wider school population. The selection criteria for schools in any evaluation are therefore crucial.

The **sample** is the subset of the population (a group or category of individuals) that is selected for research (e.g. students in grade 9). **Random sampling** means

that the inclusion of a unit of the population occurs entirely by chance. Using a large enough random sample enables findings to have greater generalisability (external validity) i.e. to represent the wider population. In any case, whether the sample is randomised or not, the evaluators, when describing the findings, should be clear about what is being represented by the evidence. In some cases 'stratification' is needed. Stratification is a process where the researcher divides the population into groups based on particular characteristics (e.g. whether a school is located in an urban or rural area). Then the researcher randomly selects from each group based on its size.

As outlined above, as a result of desk research, the evaluator will also take into account how far certain **variables** have an effect on the results. **A variable is a characteristic of the population that can take different values**, these values being quantitative (age, salary, weight, etc.) or qualitative (gender, qualification, etc.). Explicitly controlling certain variables will allow you to relate the research findings to a clear context and conceptual framework (e.g. the findings relate to maths teachers teaching 5th grade students who were randomly selected).

In a survey you would check the profile of the teachers who were part of the intervention to put the findings in context e.g. showing that the results refer to a number of variables (different subjects, different types of schools, length of implementation of the pilot, etc.)

As part of a statistical analysis you would check that what you observe is affected by the changes in the values taken by the variables (e.g. x% of students achieving better results were taught by teachers who had at least five years' experience teaching ICT.)

In an experiment you would, for example, control for certain variables that could have an influence on the dependent variable e.g. studying students' engagement in subject matters supported by the introduction of tablets. You would make sure that the students participating in the experiment are within the same type of school, or are the same age in order to arrive at meaningful conclusions and not have distorted findings.

An **independent variable** is a variable believed to affect the dependent variable. This is the variable that the researcher will manipulate in an experiment or check via a statistical analysis to see if it makes the dependent variable change. The **dependent variable** is the variable a researcher is interested in. Next to independent and dependent variables there are also other variables that can influence your results (e.g. age) and that should be controlled for/considered when carrying out experiments or surveys.¹⁰

¹⁰ See also: <http://education-portal.com/academy/lesson/research-variables-dependent-independent-control-extraneous-moderator.html#lesson>

In total, the identification of important variables via the desk research as well as defining the sample will be the basis for the selection of schools participating in the validation.

- ◉ Variables that can be controlled are, for example:
 - school size, as we know from research (and PISA) that this variable usually has an effect on many educational aspects;
 - the type and volume of training or continuing professional development (CPD) of the participating pilot teachers;
 - the subjects taught in the target class;
 - the level of access to devices like tablets (1:1 access, group access);
 - the length of experience (of teachers and students) with 1:1 devices.
- ◉ If it is not possible to build the sample according to some defined variables, the researcher should make sure that information on the variables can be collected later, e.g. via a questionnaire (e.g. check the participants' familiarity and frequency of use of ICT).

4.3.4 Decide on the main method and evaluation instruments

After you have formulated a research question, collected evidence about the issue at stake from the literature and defined your sample, you will need to decide on the type of method (and consequently the instruments suited for the chosen method) that is best suited to collect the evidence required.

Before you can answer that question it is important to be aware that there are different perceptions of what counts as 'evidence'. Some researchers highlight that 'evidence' usually requires randomised controlled trials (RCTs), with an emphasis on careful sampling, control of variables and measurements of effect size (Cohen et al., 2011). In the UK recently, those calling for more evidence-based research in education have highlighted how major advances in medicine have been underpinned by evidence-based research, 'because it's only by conducting "randomised trials" – fair tests, comparing one treatment with another – that we've been able to find out what works best' (Goldacre, 2013). However, as others have pointed out, evidenced-based education faces a number of challenges, not least because 'pupils are not patients and their outcomes cannot easily be measured' (Smith, 2013).

Educational outcomes are not always as clear-cut as most medical trials and experiments, we are not always sure about what needs to be measured, and RCTs are not necessarily the only way forward.

The Evidence for Policy and Practice Information and Coordinating Centre (EPPI-Centre)¹¹ states that evidence that informs educational policy or practice includes:

- ◉ statistical, narrative and conceptual data;
- ◉ evaluations that determine the effectiveness of interventions or policies;
- ◉ studies collecting the views of people about the acceptability of a policy or intervention;
- ◉ people's views on their needs or requirements.

So, evidence can be obtained by any type of research approach, if it is carried out rigorously and based on the scientific principles underpinning the approach. Which approach to opt for depends on what you want to find out, for whom, and the time and resources available for the evaluation. In general, quantitative data can depict trends, whereas qualitative data gathered by researchers can provide important explanations. Therefore, a combination of both methods often yields valuable evidence.

Moreover, you also might want to consider involving teachers more actively in the evaluation process and opt for a formative evaluation approach as opposed to a purely summative evaluation approach.

The following section discusses in detail the main evaluation approach adopted by the Future Classroom Lab validation service and the usefulness/limitations of particular evaluation methods for addressing a specific type of investigation. At this stage the resources required for applying a specific method need to be considered, as some methods will require more resources (human, financial) than others. The researcher should also consider the conditions of teachers and students in schools, e.g. it is crucial to take the school calendar into account when undertaking validation pilots and evaluating them (e.g. avoiding busy exam periods in secondary schools).

¹¹ The EPPI-Centre is part of the Social Science Research Unit at the Institute of Education, University of London. It is committed to informing policy and professional practice with sound evidence. As such, it is involved in systematic reviews and in research use (e.g. the use or non-use of research evidence in political decision making). <http://eppi.ioe.ac.uk/cms/>

5 Evaluation Approaches and Methods

5.1 Which evaluation approach?

The next question to consider is to what extent different approaches to evaluation work for the school pilot you are planning and whether teachers and schools in the Future Classroom Lab validation network have the time, resources and, above all, **the motivation and incentive** to systematically collect the data required by each type of evaluation. After scrutinising several possible evaluation methods used by the educational research community, European Schoolnet believes that what is called ‘action research’ will be well suited to organisations wanting to run their own school pilots as the action research approach involves addressing a problem that is identified by practitioners. This seems to particularly appeal to teachers in the developing Future Classroom Lab network of validation schools.

European Schoolnet’s core activity is to help practitioners improve their professional practice with ICT and **actively involving teachers in research and evaluation activities has proved to be a powerful tool for capacity building**. Moreover, as illustrated in Figure 3 below, **different evaluation methods, both quantitative and qualitative, can be used within the action research approach**. Action research, therefore, can be viewed as a very open, ‘umbrella’ approach to educational validations where different tools can be easily combined, depending on what you want to achieve and the question/issue being addressed.

The quantitative methods in Figure 3, such as simple test and control groups, before and after approach, statistical matching and RCT, are listed in order of increasing reliability of findings, complexity and therefore the expertise required.

5.2 Action research

Action research seems to particularly fit with the overall concept of the FCL as this European Schoolnet initiative has been specifically designed to provide a ‘space’ (both the physical Lab in Brussels and online) where teachers and school leaders can come together to reflect on and rethink teaching and learning.

However, the action research approach also seems to be appropriate for a wider group of stakeholders wanting to carry out evaluations in schools as:

- ◆ **The starting point for action research is to address a real problem or issue in practice which resonates with busy teachers.** Throughout these sorts of validations, teachers are required to reflect on their current practice and can quickly see the benefits of this; in action research, ‘the act of finding your solution makes you understand your practice better’.¹² This reflective practice can also be seen as being at the core of successful professional development for teachers and contributing to the development of a new teaching identity and competence.
- ◆ Most importantly, **there is a built-in incentive for teachers to be involved in action research pilots** as these sorts of validations are about:
 - applied research (action related directly to practice)
 - improving practice (a strong reason why schools and teachers join European Schoolnet projects)
 - action for change (linked to the FCL aim of developing whole-school approaches to using ICT)
 - community-based (linked to the regional hub strategy and Community of Practice (CoP) developed in the LSL project).

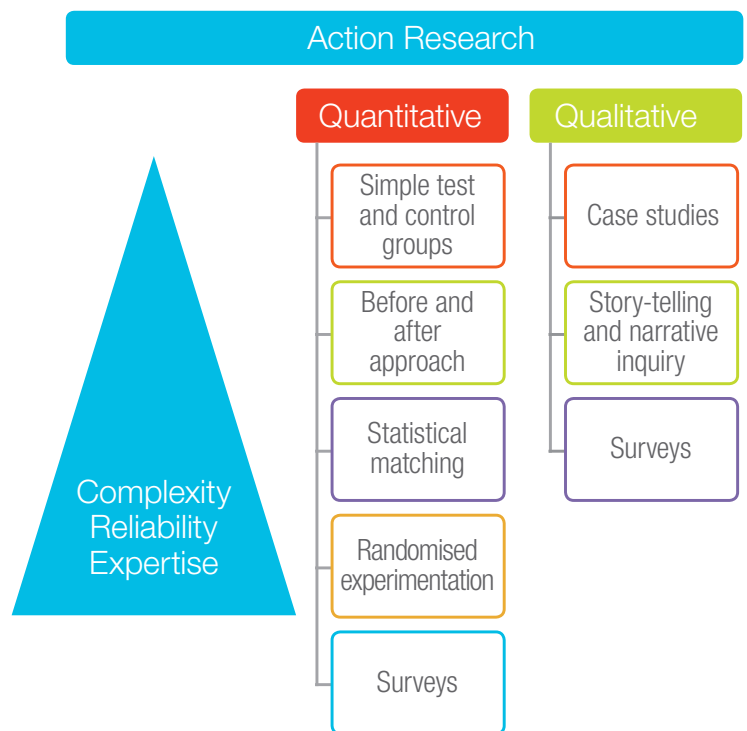


Figure 3: Overview of Future Classroom Lab (FCL) evaluation approaches and methods

12 <http://www.edu.plymouth.ac.uk/resined/actionresearch/arhome.htm>

- ◉ It is based on **a formalised and transferable method that can be easily understood by those with little or no background in educational research methods**. The main components of the method can be summarised very briefly (without detailing here how to implement each phase) as:
 - identify a practice/area/problem to be investigated
 - imagine a way forward
 - try it out
 - take stock of what happens while gathering evidence about the change happening
 - develop a hypothesis based on this evidence to explain the influence of the new way of doing things
 - modify the practice in the light of what has been found
 - monitor what is done
 - review and evaluate the modified practice.
- ◉ It is **compatible with short-term investigation into the changes in teaching and learning imposed by rapid technological change** and can often provide both policy makers and ICT vendors with quick and useful feedback.

When properly implemented, action research produces relevant and useful results. There is also a good deal of flexibility in this approach. For example, there is a wide

variety of investigation tools at the action researcher's disposal, including questionnaires, desk research, focus groups, direct observation, etc. Finally, the core principles of the action research method are also a good fit with current social and educational values, where 'expert knowledge' is increasingly seen as being socially constructed and emerging from communities of practice or relayed through online forums, blogs, wikis, etc.

The key phase of an action research project is to properly define which methods and tools have to be used at each phase of the project – from qualifying the starting point situation through to identifying the post experiment situation, as well as capturing what actually happened and why during the process. Each phase could/should use different methods and tools, or more likely a different combination of them. For example, a written questionnaire will not be suited to understanding what change has happened and why but it may be possible, for example, to capture this through focus group discussions (possibly supported by video practice as a starting point for such discussions).

Sections 5.3 and 5.4 provide an overview of both qualitative and quantitative evaluation methods and some of the evaluation tools or instruments you might want to use as part of an action research school pilot.

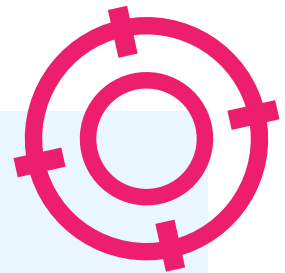
Definitions of action research

Action Research is a recognized form of applied research that focuses on the effects of the researcher's direct actions of practice within a participatory community with the goal of improving the performance quality of the community or an area of concern (Dick, 2002; Reason & Bradbury, 2001; Hult & Lennung, 1980; McNiff, 2002). Action research normally involves utilising a systematic cyclical method of planning, taking action, observing, evaluating (including self-evaluation) and critically reflecting prior to planning the next cycle (O'Brien, 2001; McNiff, 2002). The actions have a set goal of addressing an identified problem in the workplace, for example, reducing the illiteracy of students through use of new strategies (Quigley, 2000).

It is also a collaborative method to test new ideas and implement action for change. It involves direct participation in a dynamic research process, while monitoring and evaluating the effects of the researcher's actions with the aim of improving practice (Dick, 2002; Checkland & Holwell, 1998; Hult & Lennung, 1980).¹³

The above definition does not explicitly specify who the researcher is. In educational projects, researchers can be: academic researchers and practitioners working together; or only academic researchers but endorsing and assuming an explicit change agent role (a possible way to address the Hawthorne effect/bias in projects); or only practitioners, but trained in techniques that enable them to reflect on practice.

The following definition from Jean McNiff focuses only on practitioners as researchers, and states that, 'Action research is a term which refers to a practical way of looking at your own work to check that it is as you would like it to be. Because action research is done by you, the practitioner, it is often referred to as practitioner based research; and because it involves you thinking about and reflecting on your work, it can also be called a form of self-reflective practice' (McNiff, 2002). Reflective practice is defined by Schön (1987) as 'the capacity to reflect on action so as to engage in a process of continuous learning.'



5.3 Qualitative evaluation methods

5.3.1 Case studies

Case studies are an 'An empirical enquiry that investigates a phenomenon within its real-life context' (Yin, 2003). Thus, case studies are often intensive, empirical studies of small groups, organisations, individuals, systems or tools. When conducting case studies, data is typically collected by combination of qualitative and quantitative means such as observations, interviews and questionnaires and with little experimental or statistical control enforced. The data collected is usually very rich and sometimes can be contradictory or inconsistent, thus often resulting in a complicated analysis.

They are an effective way of investigating, for example, how pedagogical tablet scenarios have been actually implemented in the classroom by carrying out lesson observations and interviews with students and teachers.

Case studies are particularly well suited for describing and explaining a specific phenomenon and showing the use of ICT in context. There is an emphasis on understanding different perspectives and processes. Generalising the findings from case studies can be difficult. However, this can be overcome by demonstrating where the case study example fits into the overall picture, i.e. if a researcher conducts a case study of a small primary school he/she can relate the data gathered to significant features for primary schools in general, and then demonstrate where the case study example fits in relation to the overall picture (Bell, 2010).

- ◆ Be aware that a case study approach requires a clear focus of the observation, well-structured data-gathering tools and templates, and a careful and rigorous analysis of data based on well-established data-analysis techniques. An important criterion for judging the merit of a case study is the extent to which the details are sufficient and appropriate so that a teacher working in a similar situation can relate his/her decision making to the situation described in the case study (Basse, 1981: 5).
- ◆ The cost of case studies varies depending on whether the information is gathered and interviews are done remotely or whether the Evaluation Expert visits the schools in question and maybe also carries out classroom observations of lessons.
- ◆ In general three to four days may be needed to carry out a case study visit including one or two classroom observations, interviews with teachers, headteacher, ICT coordinator: one day travel, one day visit, one day preparation of material and templates, two days of analysis and drafting.

European Schoolnet has considerable expertise in carrying out case studies within various pilots and projects, e.g. the Acer–European Schoolnet netbook pilot (Vuorikari et al., 2011) and the Acer–European Schoolnet tablet pilot (Balanskat, 2013). The European Schoolnet Creative Classrooms Lab project has drafted a variety of templates, questionnaires and guidelines to carry out lesson observations (see Appendix 10) and interviews to identify teaching and learning practices as well as describing and analysing whole-school approaches with ICT.¹⁴

5.3.2 Story-telling and narrative inquiry

Stories can be a valuable source of data especially in presenting examples of successful or unsuccessful practice. Information derived from story-telling can be structured in such a way as to produce valid research findings.

Story-telling involves the collection and development of stories (typically involving teachers, school leaders, students and also possibly parents and other stakeholders), either as a form of data collection or as means of structuring a research project. The research method can be described as narrative when data collection, interpretation and writing are considered a 'meaning-making process' with similar characteristics to stories.

- ◆ Be aware that a narrative approach to inquiry is most appropriate when researchers are interested in portraying intensely personal accounts of human experience (e.g. open-ended interviews would allow for such an approach). One of the strengths of such an approach is that it allows for a common understanding of consequences of actions despite cultural differences (J. Gray, quoted by Bell, 2010: 22). This approach should be applied by experienced researchers, however, and requires some time.

5.4 Quantitative evaluation methods

The following methods can help you to identify the impact or effect of a given intervention (product, tool, service) on an intended outcome. The qualitative methods are listed in order of increasing reliability of findings, complexity and therefore the expertise required. Using a method that includes simple test and control groups is less challenging than implementing a rigorous, randomised control trial.

5.4.1 Simple test and control groups

Comparing participants (those who use, test a product) and non-participants (those who do not use the product) is a simple way to evaluate a product, e.g. to measure the

¹⁴ Creative Classrooms Lab Project: Lesson observation record, Observation Visit Handbook <http://creative.eun.org/about>

impact/effectiveness of a training programme on the use of Interactive Whiteboards. The IWB training programme will be offered to all teachers in a number of schools where all classrooms are equipped with Interactive Whiteboards. The impact of the training programme could be measured by comparing the frequency of use of both groups of teachers – those who participated in the training and those who did not. If the frequency of use is higher with the group that received the training, one could conclude that the participation in the training has increased the use by x%. However, for the increase in use to be representative of the true impact of the programme, teachers should be identical in terms of teaching qualification, subject taught, gender, experience in teaching, motivation, preferred pedagogy, etc. – which is almost certainly not the case.

Simply setting test and control groups and looking at what happens captures the product's effect, but not only this; it also captures – to an extent one cannot estimate – the fact that participants differ in observable (age, qualification, etc.) and unobservable (motivation, opinion, etc.) characteristics.

- ◆ Be aware that, if you try to compare the attainment of students without controlling observable dimensions (age, gender) or unobservable dimensions (motivation, attitude), this may distort your findings.

5.4.2 Before and after

Before-and-after studies collect data about the situation which exists before a project, trial or intervention and

compare this with the same data collection afterwards. They are specifically suited to identifying progress over time, e.g. in cohort studies, where one defined group of learners is studied over time or to identifying an association between the intervention and the outcomes (GSMA, 2013).

For example, if you want to study whether and to what extent the use of laptops has increased the frequency of students' collaborative work, you investigate the frequency of use via a pre and post questionnaire in a school that has provided all its teachers and students with 1:1 laptops. When comparing the use of students' group work before the introduction of 1:1 laptops and after their introduction, you might observe that students' group work happens three times more frequently since the laptops have been in use.

This finding about laptops generating more frequent use of group work relies on the assumption that all the other conditions affecting teaching and learning in the school have remained the same after the introduction of the laptops. But this is hardly ever the case. What you have probably captured in reality is not just the effect of the laptops being introduced but also a possible change in the school leadership supporting students' collaboration, or maybe another change in the school linked to the availability of new learning resources or some changes to the curriculum, etc.

- ◆ Be aware that before-and-after studies might fail to fully take account of 'outside' factors that could have an effect on the outcomes measured over time.

Before-and-After Example: Acer-European Schoolnet Tablet pilot (Balanskat, 2013)

Acer and European Schoolnet carried out a pilot study in 2012 on the use of tablet devices to enhance teaching and learning practices. During this pilot, Acer equipped 263 teachers in 63 schools from eight European countries with Acer Iconia W500 tablet computers. The countries involved were Estonia, France, Germany, Italy, Portugal, Spain, Turkey and the United Kingdom. Additionally, 116 students received tablets as part of the pilot: one classroom set of tablets was provided to a UK school (26 tablets per class) and three classrooms were equipped with tablets (30 tablets per class) in Spain.

The study included an online evaluation in order to document the teachers' use of the tablets. The aim of the online survey, which was addressed to all teachers participating in the pilot, was twofold:

- 1 To collect information about the teachers participating in the pilot, their experience with the use of ICT during the six months prior to the study (in school and at home), their collaboration and professional development activities with ICT, their self-estimated ICT competence, and their general attitudes towards ICT prior to the tablet implementation
- 2 To document teachers' use of tablets in school and at home, teachers' collaboration and professional development activities with the tablet, their self-estimated competence using the tablet and the impact of the tablet on teaching and learning activities during the pilot implementation.



Two online questionnaires were sent to the pilot teachers: a pre-evaluation questionnaire (ICT survey) at the beginning of the pilot (February 2012), and a final questionnaire (tablet survey) at the end of the pilot (July 2012).

One objective of the evaluation was to characterise the teaching and learning environment, including the ICT infrastructure and resources that surround tablet use at the pilot schools, which was identified by the two surveys:

- ⦿ What is the general attitude of the pilot teachers towards ICT? (pre survey)
- ⦿ What kind of pedagogical practices do the pilot teachers apply, with and without ICT? (pre survey)
- ⦿ How was the tablet integrated into the existing ICT environment of pilot teachers? (post survey)
- ⦿ What pedagogical practices do they follow during the tablet implementation? (post survey)

These questions made it possible to identify to what extent existing pedagogical practices as well as existing ICT infrastructure had an influence on the integration of tablets. This is something that would have been difficult to identify when carrying out a survey only at the end of the project.

5.4.3 Statistical matching

This approach builds upon the simple test and control groups (participants/non-participants comparison) but reinforces it by constructing pairs made of beneficiaries and non-beneficiaries closely resembling each other, and only those pairs are compared.

If we think again about the previous example of the teachers' participating in an IWB training programme, it would mean that the frequency of IWB use by each teacher who does not participate in the training is compared with a teacher who has participated in the training AND who has an identical profile in terms of age, qualification, gender, subject taught, etc. The impact of the programme will then be the average of the differences in frequency of use between all of these pairs.

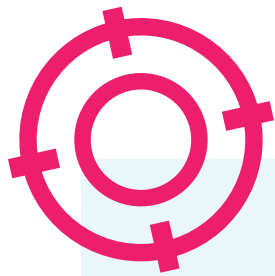
- ⦿ Building identical pairs when comparing results of test and control groups will increase the reliability of your findings. However, building these pairs can be difficult when you only have a small number of teachers involved in the pilot.

5.4.4 Randomised experimentations

In RCTs you work with a participant and a non-participant group (i.e. a test and a control group) but individuals are randomly assigned to the test and control groups. Here again, randomisation will ensure that test and control groups are comparable in every respect (i.e. observable characteristics like age, gender, etc. and unobservable ones like motivation, opinion, readiness, etc.) **provided the population is sufficiently large (calculations related to probability and required confidence level need to be used here and processed by statisticians).** Randomised experimentations also make it possible, because of their size, to compare the programme effect on different sub-groups of the population (e.g. students with special needs, students in the second year of secondary education), which can be important when the focus is on scaling up or mainstreaming activities.

- ⦿ The advantage of randomised experimentations is that the evaluator can focus on one specific aspect or phenomenon of interest and has a large degree of experimental control, which means that it should be possible to easily replicate these sorts of experimentations; that is, the same results would be found in a similar setting when the experiment is repeated. However, **large groups are needed** if the many variations in human behaviour are to be controlled. **And such large-scale experiments can be expensive to set up and take time.**
- ⦿ Randomisation is less appropriate when an intervention (e.g. a policy change) has an effect on many aspects of the education system.
- ⦿ Taking part in an experiment represents a substantially greater investment than filling in a survey. It usually requires pre and post testing, randomisation, a high level of controlling the experiment, as well as skilled statisticians to accurately define the sample and analyse the data.
- ⦿ Randomised experimentations can show 'whether' an intervention is effective, but you would need to complement it with a qualitative approach to find out 'why' a specific intervention was effective.
- ⦿ Randomised experimentations **should probably only be used for key issues and when very solid evidence already exists on the issue to be addressed**, as a way to guarantee its potential interest, acceptability and value for money. Assessment in education is such a key issue, as it can have a huge impact on the education system and there is a need to explore which type of self-assessment tools for teachers will work best for teachers to develop their digital competence.¹⁵

¹⁵ Further reading: Hutchinson, D., Styles, B. (2010). A Guide to Running Randomised Controlled Trials for Educational Researchers, Slough: NFER.



Randomised Controlled Trial (RCT) example

A hardware manufacturer wants to test the impact of a new tablet device on teaching practices but also show the impact of the devices on educational outcomes. Together with a software company it has developed a specific application for teaching English as a foreign language in grade 7 with links to pedagogical resources and scenarios.

The company particularly wants to carry out a rigorous evaluation to investigate the impact of the hardware and software on the educational achievement or learning outcomes of students.

It will equip classrooms in five European countries and provides training to students and teachers participating in the experiment (the “test” group) on how to use the tablet and the software for teachers at the beginning of the pilot. European Schoolnet organises a workshop with the involved teachers and works with them to develop some innovative pedagogical scenarios involving this new technology. The aim is to compare this approach with a traditional approach to teaching English as a foreign language. After the pilot, the company aims to mainstream this approach to more schools and classrooms in the countries involved.

Research question: Is an intervention using tablets with specific computer software effective for learning English as a foreign language?

Main steps in setting up and implementing the RCT:

- ① Determining education level, age of students and school type.
- ① Defining the evaluation protocol to be implemented.
- ① Training National Coordinators to apply and use the protocol.
- ① Determining the sample size required: (to be derived from the population size of the students you want to refer to, i.e. all students in compulsory education during the current school year and the confidence level you want to give to your results).
- ① Randomised sampling of schools, based on lists of schools in each country.
- ① Randomised sampling of classrooms from the sample of schools.
- ① Randomly assigning classrooms involved per school into two groups, the test and control group.
- ① Get agreement from participants about participation and checking the impact of this phase on the final sample (e.g. the fact that some agree to participate in the experiment while others do not may introduce a bias in the final sample established).
- ① Check the make-up of the final sample as to whether it presents similar characteristics as the original sample.
- ① All groups of students will be tested for English comprehension at the beginning of the pilot via a pre- test national standardised test; a questionnaire about their learning in general and personal characteristics may also be administered to collect richer information to be used in the final analysis.
- ① The control group studies English as a foreign language according to the traditional method (to be defined).
- ① The test group receives the treatment according to the protocol defined (training plus use of the tablet).
- ① Timeframe six months to one school year (NB: the questionnaire/test items must be suitable for tracking change over such a short period).
- ① All groups of students will be tested at the end of the pilot via a post test (using the same national standardised test as the one used before the treatment).
- ① Comparing the results and interpreting the differences in the outcomes. The results of the questionnaire on students’ learning in general and personal characteristics will help to interpret the differences.
- ① Drafting of overall analysis report and analysis by country.

5.4.5 Surveys

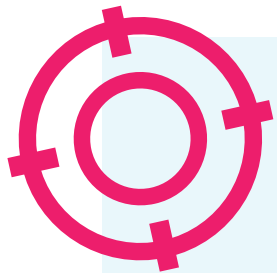
Surveys are commonly used for both quantitative and qualitative studies which respectively look at patterns in numeric data and non-numerical data. In survey research, information is collected predominantly by asking teachers or students to answer questionnaires or by structured interviews at a given point in time. Surveys can vary in their complexity, scope and range from gathering information from a few cases to more ambitious studies that attempt to cover a high number of issues and larger populations.

Typically, but by no means exclusively, they rely on large-scale data from questionnaires and tests and are useful for gathering factual information, attitudes, preferences, beliefs and experiences. In qualitative research, questionnaires are used as a means of collecting information from a wider sample than can be reached by a personal interview or a few observations.

In carrying out large-scale quantitative surveys care has to be taken that the sample population is truly representative (Cohen et al., 2011).

‘In most cases, a survey will aim to obtain information from a representative selection of the population and from that sample will then be able to present the findings as being representative of the population as a whole.’ (Bell, 2010: 13-14)

- During a survey the main emphasis is on fact finding (what, where, when and how). If a survey is well structured and piloted, it can be a relatively quick and cheap way of obtaining information from participants of the validation.
- Large-scale quantitative surveys usually generate data in order to make generalisations and try to establish correlations between the data via statistical analysis.



Quantitative surveys: two examples Survey of schools ICT in education (European Schoolnet, University of Liège, 2012)

This large-scale survey carried out for the European Commission collected and benchmarked information from 31 European countries (EU27, HR, ICE, NO and TR) on the access, use, competence and attitudes of students and teachers regarding ICT in schools. It involved 190,000 questionnaire answers from students, teachers and headteachers in randomly sampled primary, lower secondary and upper secondary schools.

The survey began with a literature review, and an analytical framework guided the survey’s design in terms of scope and content. Key relationships were investigated in the survey using cluster analysis. Three questionnaires were created and piloted in schools in France and the United Kingdom before being translated into 23 languages and published online.

The survey involved a two-stage stratified cluster sampling. First, a sample of schools was selected with a probability proportional to the school size from a complete list of schools containing the student population of interest. Headteachers of participating schools were asked to provide the list of classes at the target grade. In most countries, one class of students was then randomly sampled within the selected schools with equal probabilities. In some small education systems, two or more classes of students were selected in order to increase the amount of data. Finally, one (or three, depending on the education level) of the teachers associated with the selected class was sampled according to a simple random sample procedure. As the student samples were drawn from a sample of schools, the school sample was designed to optimise the resulting sample of students, rather than give an optimal sample of schools. For this reason, the survey analysed school level and teacher level variables as attributes of students

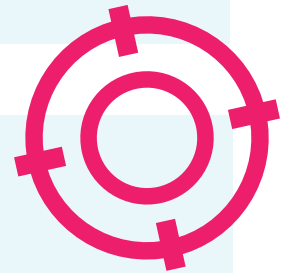
Before drawing the sampling, schools were grouped into strata that shared common characteristics. A school coordinator was designated by the headteacher within each sampled and participating school. A Web tool was developed to help the school coordinator draw class and teacher samples. With the school username and

password, the school coordinator was asked to code the name of all target grade classes, and their size. The software automatically identified the sampled class(es) and informed the school coordinator. At ISCED 2 and ISCED 3 general levels, the system also generated three letters to enable the school coordinator to select one teacher in the language of instruction, one teacher of mathematics and one teacher of science.

The final report from the survey can be found [here](https://ec.europa.eu/digital-agenda/node/51275): <https://ec.europa.eu/digital-agenda/node/51275>

The data from the survey and three survey questionnaires can be found here:

<http://ec.europa.eu/digital-agenda/en/news/ict-education-essie-survey-smart-20100039>



The Acer-European Schoolnet Netbook Pilot (Vuorikari R. et al., 2011)

Between January 2010 and 2011 EUN ran the Acer-European Schoolnet Netbook Pilot and worked with 245 classes in secondary education in six European countries to help implement 1:1 pedagogies and support teachers in this process. More than 7,000 students and 1,000 teachers used netbooks over the pilot period. The pilot explored how the introduction of netbooks and 1:1 pedagogy in schools can have an impact on the processes involved in teaching and learning both inside and outside school.

The evaluation approach consisted of carrying out online surveys with teachers, students and parents involved in the pilot at the end of the intervention. The surveys were translated into the participating country languages. The evaluation was based on a conceptual framework focusing on how learners and teachers use netbooks in and out of school, individually and collaboratively, for educational and leisure use. The evaluation report used descriptive statistics to quantitatively describe the main trends arising from the data across pilot countries. The evaluation did not include hypothesis testing, nor did it aim to compare countries against each other. The report and methodological description can be found here: <http://1to1.eun.org/web/acer/evaluation>



6 Evaluation Instruments

The evaluation methods as outlined above use different methods for collecting data, but no evaluation approach prescribes or automatically rejects any particular instrument for collecting the data.

6.1 Questionnaires

Questionnaires (e.g. online questionnaires) can be a useful and efficient tool to gather baseline information from pilot participants about for example when, how or how often they use ICT, and attitudes to ICT, or to give precise feedback on the functionality of a specific tool or usefulness of a training programme.

A questionnaire needs to be designed so that it gives you clear answers regarding the information you need, and gives you no problems at the analysis and interpretation stage. When administering questionnaires several points have to be considered to ensure high response rates such as:

- ◆ Formulate the right questions and question types: open-ended questions require more time and effort when it comes to analysing responses. Closed questions are easier to answer and can be analysed by computer software. However, a combination of closed and open-ended questions can often be useful as this preserves the possibility of easy computation and allows you also to gather some new ideas.
- ◆ Be clear and precise in the language used (avoiding bias in the wording).
- ◆ Pilot the questionnaire with a group of students or teachers to make sure everything is clearly presented.
- ◆ Provide translations where necessary and ensure you have tools available to merge results from different language versions (here data input should be mainly quantifiable).
- ◆ Inform participants about the purpose of the questionnaire and find the best timing for completion; avoid busy periods in the school year.
- ◆ Where possible, provide incentives for answering the questionnaire. This could involve offering small tangible rewards (e.g. online vouchers). Teachers may be even more motivated, however, if you can provide a webinar or some other form of professional development linked to the evaluation.
- ◆ If you are going to offer an online questionnaire, make sure of course that participants have easy access to ICT and the Internet.
- ◆ Organise European data collection via National Coordinators if possible, especially in large-scale pilots where you may also need assistance in translating questionnaires.
- ◆ If you administer student questionnaires, ensure that support is available for students to fill in the survey (with teachers explaining the procedure, setting up online access) and that the survey (content and format) is suitable for the specific age group.
- ◆ When administering several language versions of a questionnaire you need to check that no bias has been introduced into the translations.



6.2 Interviews

Interviews are especially useful for collecting supplementary information and obtaining deeper insights into the underlying reasons why teachers or students carry out specific activities and the assumptions and beliefs of pilot participants.

They can be structured or semi-structured, carried out face to face or remotely (e.g. via Skype). Usually they should follow a certain protocol; for example, participants should be informed about the type of investigation, and have sight of the questions beforehand (unless spontaneous answers are required). As well as answering specific questions, participants should also have some freedom to make their own statements. Interviews should be recorded (permission required from participants) and transcribed, which is a time-consuming process. Results should be checked by participants for their correctness before publication and reported anonymously.

Especially when carrying out case studies in schools, it is advisable not only to interview the main actors in the evaluation (teachers, students) but also to interview headteachers or other school leaders in order to obtain a more comprehensive picture of the school as an organisation. In some pilots you may also want to interview parents in order to understand the family context, especially when evaluating the impact of mobile devices on learning, Bring Your Own Device strategies or perhaps how ICT is used as part of a flipped classroom scenario.

6.3 Focus groups

Sometimes interviewing a group of people can be more useful than carrying out 1:1 interviews if you want to focus the discussion on one particular issue and receive information from various participants on that point (e.g. a group of teachers using the same screen sharing, tablet software during the pilot). These can be structured discussions (with prepared questions and checklists, showing a video to discuss practice, etc.) or completely unstructured, formal or informal. The intention is to explore an issue in depth but also that participants interact with each other.

Having teachers participate in focus groups can often be a useful way of motivating them during a pilot as it provides them with an opportunity to share experiences and learn from each other. Focus groups also work particularly well if you need to explore what kind of changes happened and why. Groups, however, should be selected carefully (e.g. bringing together very advanced teachers with those who are only starting to use ICT may inhibit the latter. Girls might be reluctant to talk in a group that is mainly composed of boys, etc.).

6.4 Observations

Direct observation is a powerful tool to reveal characteristics of groups and individuals that would be impossible to identify by other means. It is also a good way to identify teaching and learning practices (real use of ICT, innovative use of ICT) in a school, classroom or learning context. Observations are usually carried out in a real-life setting by an observer. This approach can be time-consuming and expensive if a researcher has to travel to observe practice in schools in several countries. However, remote observation may also be possible using ICT. In its Creative Classrooms Lab project, for example, European Schoolnet is exploring to what extent the Iris Connect video-based system may help to reduce the cost of classroom observations and how it can also be used by teachers as a tool for self-reflection and peer learning by recording their own practice and sharing it with others for peer assessment purposes.

Observation records should be as objective as possible. As observations will yield an enormous amount of descriptive data, they should be well structured and have a clear focus. The researcher involved must also take care to be as unobtrusive as possible when observing a lesson or other teaching situation. Visits to the school will need to be carefully organised in advance and permission will need to be obtained from all those involved.

6.5 Diaries, logs, blog entries

Diaries (e.g. keeping track of what has happened or has been learned) or **logs** (e.g. keeping record of events that take place during an intervention) are frequently used in qualitative research. They give insights into students' and teachers' behaviour, perspectives and educational and personal cultures which can be difficult to obtain by other means. They also provide an opportunity for those involved in the validation and evaluation activities to reflect upon an activity.

Personal logs are particularly useful for evaluating the impacts of projects/activities that focus on individual, personal development, for example, projects that aim to increase knowledge and skills. They can be used to obtain real-life accounts about certain activities or behaviours that might normally be inaccessible. They can also usefully capture information that may be forgotten in an interview or focus group. Diaries, reports and logs can provide powerful stories and narratives of certain activities over time (Moon, 2003).

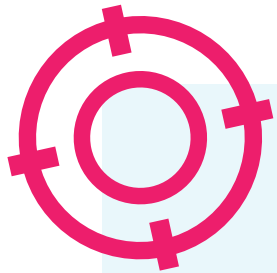
Personal logs may be open format, allowing respondents to record activities and events in their own words, or they can be highly structured where all activities are pre-categorised. An example of a log is to ask teachers to keep a record of their activities throughout a school day by identifying time spent on certain activities (e.g. online offline) and their purpose (collaboration, personalised learning).

The value of the information gathered in the personal log depends on how truthful it is. Those who agree to keep diaries or logs, or supply reports, must be encouraged to be truthful at all times. The researcher, on the other hand, has to ensure confidentiality when publishing the results.

Diaries and blog entries are challenging to analyse as they can contain very rich information embedded in personal reflection that was filtered by each participant (e.g. by contextual filter and language filter). Likewise, the researcher analysing the entries can easily misinterpret what has been written due to different writing styles, gaps in what has been recorded and fluency in English. These instruments are particularly

useful when used in conjunction with other methods, e.g. school observation visits and semi-structured interviews during which described practice is observed and can be further validated.

In the Creative Classrooms Lab project, you can see how structured blog entries¹⁶ are used to cover the perspectives and practices of teachers experimenting with tablets as well as perceived benefits and challenges. These blog posts provide valuable insights into specific tablet uses. They also make it possible to foster communication between the group of teachers and the project partners; and support planning and progress in the project.



A mix of different instruments

During an evaluation pilot, an expert or researcher will usually apply a combination of different methods and instruments to gather the information or data required and to draw on a wider range of sources of evidence. 'The strongest insights come from the use of multiple types of evidence' (Mulgan et al., 2014). The researcher will therefore use a 'triangulation' technique to validate data by collecting it using more than one method for cross-verification. For example, activities related to the use and uptake of laptops by teachers may first be identified during a survey but can then be validated through the observation of real use in the classroom and analysis of teacher interviews. Moreover, answers to the same items can be collected from different stakeholders such as teachers, students and headteachers.

16 <http://creative.eun.org/observation>

7 The Operational Process

Within the Living School Lab project, MoE and European Schoolnet have developed a turnkey validation service that is being run under the umbrella of the European Schoolnet FCL initiative. This validation service is already being offered to FCL industry partners who wish to run a pan-European school pilot and from October 2014 this service will be opened up to other stakeholders including projects funded by the European Commission.

For organisations wishing to set up and run their own school validation activity, this section provides an insight into how European Schoolnet manages the evaluation process within the FCL Validation Service and also references a number of downloadable templates and tools which any organisation can use or adapt. Section 8 then provides a number of case studies of evaluation scenarios that involve both smaller and larger-scale pilots.

The scale of any validation activity will depend on a number of factors. The budget that is available to carry out a pan-European school pilot of course will be very important, but so too are the purpose of the investigation and the sorts of research questions that you hope to be able to answer. For example, as indicated in Section 5, in randomised experimentations involving test and control groups you may need to involve a very large number of teachers/students if the many variations in human behaviour are to be controlled for. The LSL project has developed the concept of a 'validation spectrum' which can also help you determine the scale of the school pilot you want to undertake and the people and processes involved in managing this successfully.

7.1 A validation spectrum

In the LSL project European Schoolnet carried out work to understand the validation requirements of both EC-funded projects and ICT vendors as well as the expectations of teachers who may be interested in being part of a pan-European validation network.¹⁷ The conclusion from this work was that a FCL validation service is certainly of interest both to educational researchers and ICT suppliers.

However, in terms of take-up, it may be difficult for EC-funded projects that are already running to fully participate in a FCL Validation Service, given the limitations proposed by their existing workplan and project budgets. It may be much easier for consortia that are at the stage of developing a new project proposal to look at how the European Schoolnet network of validation schools can be incorporated as part of their project evaluation activities.

For ICT suppliers, the speed at which validations can be carried out is paramount, so that results can feed into future product development cycles or support envisaged marketing campaigns. Many vendors are very interested in carrying out validations which produce evidence of how their technology or solution impacts on student performance. However, some suppliers have unrealistic expectations about what can be achieved within impact studies and validations that have limited duration and scope.

In terms of teachers, the extent to which they require incentives and rewards in order to participate in validations is closely linked to how much time and effort they will need to make in terms of testing and data-gathering/reporting. Many teachers are interested in joining the FCL validation network in the hope that they will receive offers of free hardware and software, and these sorts of incentives may be available in some pilots. However, in the majority of pilots it is more likely that teachers will benefit from being offered new opportunities for professional development and peer exchanges and these sorts of 'rewards' are also highly valued by teachers. At the end of 2014, European Schoolnet also launched a **Future Classroom Ambassador** initiative as a way to motivate teachers who wish to participate in its validation service.

A way of visualising the possibilities that exist for different stakeholders involved in school pilots is via a simple 'validation spectrum', as illustrated in Figure 4; with 'lighter' teacher testing at one end, through to 'heavier' classroom validation at the other.

17 D4.1 Validation Requirements, July 2013, http://isl.eun.org/c/document_library/get_file?uuid=851673ec-680a-4182-a6c7-735958163108&groupId=44572



Validation Spectrum

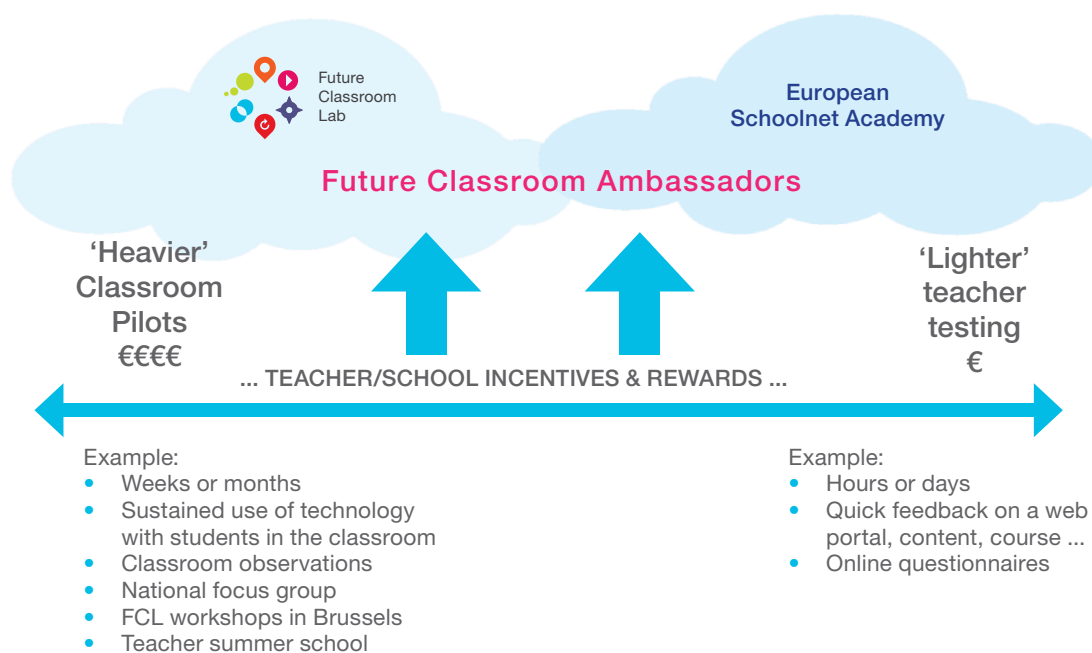


Figure 4: Validation spectrum

Where any one stakeholder resides on this spectrum is linked to the complexity of the research questions and the objective of the validation, and also to what level of rigour is required in terms of the evidence or data that will be collected. At the 'lighter' end, teachers may only be required to quickly test a new Web portal, content or course for a few hours and then provide some feedback via a short online questionnaire. At the 'heavier' end, a prototype technology, platform or new device might need to be tested with teachers and pupils by first developing pedagogical scenarios and learning activities that make use of the solution and then delivering these in several lessons over a number of weeks, months or several school terms. These pilots, which have larger budgets, are also more likely to include observations of classroom practice and a more in-depth evaluation by an experienced educational researcher from a university or other research body.

If the budget allows, 'heavier' validations may make it possible to bring teachers together for training workshops or focus groups. European Schoolnet does this in the FCL in Brussels or via training events organised with MoE at national level. This can be a very effective way to reward teachers and help keep them motivated and committed, particularly during longer validation activities. European Schoolnet also offers online professional development opportunities for teachers via its Academy initiative <http://www.eun.org/academy> which can again be a useful way to keep teachers engaged, as can the summer schools for teachers which are often organised in larger European Schoolnet projects.

7.2 Key Validation Roles

A validation can involve some or all of the following people depending on the scope and scale of the school pilots being undertaken and the available budget.

Validation Manager

- The Validation Manager is the person appointed by European Schoolnet to coordinate the overall validation process, managing the validation as a project in terms of quality, time and cost and responsible for project reporting and all supporting documentation and deliverables.
- A key role is to determine the validation requirements starting with clearly defining the research question(s) to be addressed by the validation (see Section 3 and Appendix 1) and ensuring that the organisation initiating the validation understands the proposed evaluation methodology along with the outputs and deliverables that will be produced.
- In larger pilots the Validation Manager is the central point of contact; manages and supports a network of National Coordinators rather than schools/teachers; works closely with an Evaluation Expert from a university or research organisation; and will normally be assisted by a Validation Administrator.
- In smaller pilots, the Validation Manager is in direct contact with and directly manages teachers/schools; assumes more responsibility for designing simple evaluation instruments; analyses resulting data and writes the final evaluation report.

Validation Administrator

- ◉ In larger pilots the Validation Manager is usually supported by a Validation Administrator who addresses the day-to-day operations and the logistics of, for example, coordination of delivery and setup of equipment, contracts with schools and teachers, maintaining data on schools and teachers, and coordinating travel arrangements for pan-European focus groups, workshops and summer schools.
- ◉ It may also be useful to include a Validation Administrator in smaller pilots if budget permits, particularly if schools are being provided with equipment during the pilot and more formal contracts need to be put in place.

National Coordinator

- ◉ Large validation pilots can involve coordination of hundreds and possibly even thousands of schools/teachers in many countries. The European Schoolnet iTEC project, for example, involved an evaluation of future classroom scenarios in over 2,500 classrooms in 17 countries. Central management of large numbers of schools/teachers is not viable. For these sorts of pilots the European Schoolnet Validation Manager works with a National Coordinator (NC) in each country that is involved in the pilot. The NC reports to the Validation Manager directly. In large pilots, therefore, this means that the Validation Manager is not coordinating schools/teachers directly but is more responsible for coordinating the work of a network of NCs.
- ◉ NCs in European Schoolnet projects may be employed by a Ministry of Education or national ICT agency or could be an experienced teacher or ICT adviser who is seconded to support a project. If you intend to run your own validation, you need to ensure that any NC you appoint has time that is dedicated to supporting the teachers/schools involved in the pilots.
- ◉ Funding for NCs (labour costs plus travel) will need to be included within the budget for running a large school pilot.
- ◉ European Schoolnet works closely with MoE to appoint NCs who:
 - Have a good level of spoken and written English and previous experience of pan-European projects.
 - Help identify and select schools at national level (particularly where there is oversubscription to an open call), gets approval of headteacher and other relevant individuals, and coordinates teachers/schools in the pilots throughout the project.
 - Assist schools with pedagogical/technical/implementation concerns at national level (larger projects may require both a pedagogical and a technical NC).
 - Have some experience of running training workshops and online webinars.

- Support teachers where they struggle with language/comprehension and can, if necessary, coordinate translation of evaluation instruments.
- Ensure teachers/schools complete the evaluation instruments and provide other forms of requested feedback.
- Liaise with a university or educational researcher and help with collecting evaluation data, arranging school/classroom observation visits and national focus groups, and may be interviewed as part of the evaluation.
- Are good communicators and can support project dissemination through teacher networks, conferences, etc.

Pilot school teachers

- ◉ Teachers in the FCL network are invited to participate in validation pilots. A Lead Teacher (ideally with previous experience of a pan-European project) may also be appointed to help coordinate the work of the teachers in the pilot and support the work of an NC.
- ◉ Many teachers who are willing to participate in pan-European validation pilots often have higher levels of ICT competence than the national average. This is an important factor to consider when you are planning your evaluation (see Section 4.3).
- ◉ In some validation pilots initiated by industry suppliers it may be possible to motivate schools to participate by offering donations of free hardware or software or other material rewards such as online vouchers. However, European Schoolnet's experience is that teachers are also strongly motivated in school pilots if they are provided with new opportunities for professional development and peer exchanges.
- ◉ European Schoolnet works closely with MoE and industry partners to select schools/teachers/students who meet the criteria agreed for a specific school pilot. If you are thinking about running your own large school validation pilot, it is advisable to talk to policy makers at national/regional level about what you plan to do.
- ◉ In European Schoolnet validation pilots each teacher coordinates activity at school level and:
 - ◉ Ensures return/signature of relevant contracts, financial details, etc.
 - ◉ Implements use of materials/tools/resources with students or other teachers, depending on the activity.
 - ◉ Provides feedback by filling in surveys, participating in webinars and online focus groups and ensures students/other teachers fill in surveys or provide other types of feedback.

- Where recording of classroom practice is involved in the validation, teachers and parents of students are asked to sign a permission form for subsequent use of photos/videos (see Appendix 9) which may need to be adapted by NCs in line with each country's requirements.
- May participate in national and pan-European workshops and training sessions and possibly a summer school if one is included in the pilot.
- Can be involved in national dissemination of the project and pilot results to the local community (e.g. parents, local newspapers) and teaching peers. Some innovative teachers may become Future Classroom Ambassador teachers and be invited to promote the project at European level.
- In some projects, Lead Teachers or schools may be given a small honorarium; for example, if there is a particularly heavy workload and there are limited other incentives (CPD opportunities, hardware/software donations, etc.).

Community of Practice moderator

- NCs need to provide pedagogical advice and support to teachers in national pilots and may act as the moderator of a national CoP, possibly along with a Lead Teacher.
- Some moderation of webinars and a project CoP (involving all teachers in the pilots) may also be provided by the university partner involved as an Evaluation Expert.

Pedagogical Board

- It can sometimes be useful to appoint a Pedagogical Board (PB) consisting of experts proposed by participating countries. This can be particularly useful in smaller projects where only one or two countries are represented and where it may be useful to see if the project findings have a pan-European dimension and fit the requirements of different national curricula/systems. A PB, however, may also be useful in larger pilots where a large number of schools may be involved but are drawn from only a few countries.
- European Schoolnet contacts MoE in order to identify suitable candidates for the PB and manage the selection process. PB members can be asked to participate in a voluntary capacity (maybe one or two online meetings a year). Depending on the budget available, they may also be paid a small honorarium and/or the project may need to cover the costs of bringing them together for one or two meetings.

Evaluation Expert

- For smaller evaluation pilots, the European Schoolnet Validation Manager works with in-house Evaluation Experts to select the most appropriate evaluation methodology and instruments, analyse data and feedback from the pilot, and produce the final evaluation report or other deliverables such as case studies.
- In larger validation pilots, a university (or other research body) from a European Schoolnet pool of experienced TEL researchers is selected to conduct an independent evaluation of the pilot activities. The objectives of the validation and specific research questions to be addressed in the pilots are analysed with the commissioning organisation and an evaluation methodology agreed (in line with the available budget) along with evaluation instruments.
- If you are looking to run your own school pilot and wish to appoint an Evaluation Expert, a useful way to identify suitable candidates is to carry out a literature review as suggested in Section 3.

7.3 Teacher and school contracts/cooperation agreements

Irrespective of whether it is a large or small-scale validation, it is very important to clearly identify the added value to teachers/schools participating in the project and ensure that the level of commitment required is accurately stated in the invitation to participate (see Appendix 4).

In all validations it is also important to have some form of cooperation agreement in place with the teacher or school that precisely defines the tasks to be carried out and helps in managing expectations. For smaller-scale pilots it may be sufficient to sign a Memorandum of Understanding (see Appendix 6) with the school involved. In other cases, you may want to make a more formal contract (see Appendix 7) or cooperation agreement (see Appendix 8), particularly if the teacher or school receives some sort of financial (e.g. an honorarium, see Appendix 7) or in-kind (e.g. hardware, software, content) reward for their time and effort on a validation activity.

As a first step in the process, you need to check whether there are any issues affecting the type of arrangement you put in place. For example, if you are running a validation as part of a European Commission-funded project, you should particularly review Commission regulations related to cost eligibility and sub-contracting. Careful checks also need to take place to see who you can contract with, as in some countries the contract or cooperation agreement may be at a higher level (e.g. school cluster, region). There is also the issue of bank accounts to check. In some countries, schools do not have individual bank accounts. Similarly for teachers, the

bank account is often in a family name. This requires extra care, particularly for EC projects, to ensure any costs are eligible.

The value of putting a formal contract in place needs to be carefully weighed up against the motivation and interest of the teacher/school to be involved and the administration and management that is needed in handling such contracts. A simpler cooperation agreement or MoU with the school can often be more practical, as it is easier to administer, yet still helps manage expectations on both sides.

For situations where a teacher (or school) contract is required, a template for a contract and debit note is provided as Appendix 7.

- Legal jurisdiction: the template provided is the standard contract used by European Schoolnet (EUN) for cooperation contracts with teachers, schools, experts, advisers and NCs. It is managed and under version control by EUN Project Support Team (PST). As EUN's registered office is in Brussels, the contract is drawn up under Belgium law. Appropriate checks and changes will be required to ensure it is suitable for use in other jurisdictions.
- Payment of honoraria: in order to motivate and maintain the commitment of teachers throughout the project a small honorarium (ex gratia payment) may be paid to the teacher or school. In EC projects, where contracting teachers are asked to carry out specific tasks, it is important to ensure they are paid only for the marginal costs that represent the additional work compared to their regular duties and costs as civil servants. Top-up contributions cover additional marginal costs only.
- Teacher/Schools contracts: typically the contract is made with the teacher carrying out the tasks. Permission to take part in the project is given by the school senior management, and in some countries the local/regional authorities. The approval by senior management is most important in endorsing the work required, ensuring there are no conflicts with existing employment contracts, and in handling the involvement of other staff in the school (e.g. support, technical staff). Depending on the country and/or the school, an honorarium payment might need to be made into the school bank account to recognise the wider involvement (note: it is important to be aware of differences in bank accounts and check this for the country you want involved in the validation, as there are variations. For example, in some countries schools (and teachers) do not have individual bank accounts).
- Management and control of the contract: depending on the size of the project and validation exercise, it is useful to appoint an NC to help with local coordination. National Coordinators play an important role in helping with communications and support in the local language. They also provide an on-the-ground

point of contact to help with the monitoring and sign-off process, confirming the completion of the tasks.

- Debit notes: the invoice is to be submitted in accordance with the payment schedule and completion of tasks as outlined in the contract.
- Project support and administration of contracts: it is essential that the level of support needed to administer contracts is factored into the overall project support costs. It can be easy to underestimate the effort needed here! On the whole, teachers are new to this sort of contract process. The typical contract language is probably unfamiliar to most teachers and this is made harder by the fact that the contracts are normally in English for most pan-European validation activities. In addition, particularly for EC projects, there is a process of checks and balances to be gone through to ensure the eligibility of any payments. Typical issues to be overcome include the length of time it takes to put a contract in place – particularly where the teacher is new to the process. Other issues relate particularly to bank accounts – whether the teacher/school has a bank account, getting accurate information such as IBAN and SWIFT numbers, and recording this correctly in the administrative/financial system that is used by the organisation issuing the contract.

For situations where a school is being provided with equipment, a school pilot model cooperation agreement is provided as **Appendix 8**.

- Cooperation agreement: this sets out the obligations, expectations and responsibilities of all parties involved. Particularly where hardware is involved, it is important to work through and detail its delivery, implementation, any training involved, technical support, and how/where it is used. For example, whether it used outside of school and as appropriate, and also the question of insurance. The cooperation agreement also needs to cover what happens at the end of the project to any equipment or software; for example, is ownership transferred, or is the hardware returned and any software licences revoked?

7.4 Running a school pilot

This section compares the personnel and main steps involved in running both short, small-scale validations involving 'lighter' teacher testing and larger-scale pilots where there is a more sustained, 'heavier' evaluation process involving many more teachers and schools over a longer period. If you wish to organise a validation pilot that is somewhere in-between these extremes, these guidelines can be adapted in line with the available budget. Section 8 provides some examples of how this recommended process is applied to different evaluation scenarios.

Small-scale school pilot

Large-scale school pilot

	Small-scale school pilot	Large-scale school pilot
Scale	Typically involves 10-15 schools in a maximum of five countries. ‘Lighter’ end of validation spectrum.	Could involve 10-15 countries with 20-30 schools per country. Possibly more than one teacher/classroom per school. ‘Heavier’ end of validation spectrum.
Management roles	Schools coordinated directly by a Validation Manager , possibly with some support from a Lead Teacher from one of the countries. Involvement of a university (or other research body) is probably not necessary, particularly where evaluation data require fairly straightforward evaluation instruments (e.g. a simple online questionnaire). The budget available will probably not support classroom observations. A Pedagogical Board (PB) may be useful in determining if the project findings can be applied in other countries.	Overall coordination of pilot by a Validation Manager but teachers/schools in each country are coordinated directly by a National Coordinator (NC) with previous experience of validation pilots. See Appendix 1. NCs report directly to the Validation Manager and may be supported by a Lead Teacher. A Validation Administrator addresses the day-to-day operations and the logistics of, for example, coordination of delivery and setup of equipment, contracts with schools and teachers. An Evaluation Expert from a university or other research body is selected by the Validation Manager to conduct an independent evaluation of the pilot activities, which may include classroom observation, national focus-group meetings, participation in a summer school for teachers. A PB may be useful where there is a large number of schools but drawn from only a few countries.
Teacher roles	Teacher commitment measured in hours/days to complete the agreed validation activities. Feedback gathered mainly online via questionnaires and interviews. Limited opportunities to bring teachers together for training and face-to-face focus groups. As smaller budgets make it difficult to translate evaluation instruments, teachers must have a good command of English.	Teacher commitment is needed over several weeks or months to complete the validation activities. Larger budgets can support face-to-face training sessions and focus groups for teachers at national level, in pan-European summer schools, or within the FCL in Brussels. Teachers’ command of English less important as they are working directly with National Coordinators and there may be some possibility of translating evaluation instruments. A Lead Teacher may be appointed to help the NC with coordination/support.
Planning the evaluation	Validation Manager gathers information from evaluation initiator to define: the purpose and scope of the investigation; research questions; criteria for selection of schools, preferred methodology/instruments; outputs and deliverables. Larger-scale evaluations are more likely also to involve desk research. See Section 4.	Validation Manager produces a first draft of a comprehensive validation protocol and workplan which outlines all stages of the validation and how it will be organised, including the role to be played by National Coordinators. It also incorporates the evaluation methodology and proposed instruments agreed with an Expert Evaluator. This workplan is fine-tuned following feedback from NCs regarding alignment with school terms, national curriculum in different countries. Final workplan is agreed with evaluation initiator and may be periodically revised during longer projects, based on results from initial testing. See Appendix 3.

<p>Teacher/ school selection</p>	<p>Validation Manager invites teachers in the FCL network to participate who match the specific criteria defined previously with the initiator. See Appendix 4. Final list of selected schools is agreed with initiator and additional information required from each school is obtained (particularly important when conducting a ‘before-and-after’ study). See Appendix 5. If organising your own validation pilot, seek advice from national/regional ministries or ICT agencies about how best to identify suitable schools. It may be useful to have a ‘reserve’ list of schools in case some teachers need to withdraw from the pilot.</p>	<p>Validation Manager discusses planned validation and seeks advice from national/regional ministries or ICT agencies (if not already a partner in the project). Initial selection of teachers and schools carried out by Validation Manager in cooperation with NCs who may need to translate or adapt the invitation to teachers. See Appendix 4. In some countries, a general call for participation may be issued to all teachers. Final list of selected schools is agreed with initiator and any additional data required from each school are obtained (particularly important when conducting a ‘before-and-after’ study). See Appendix 5. In larger pilots of longer duration it is advisable to have a ‘reserve’ list of schools in case some teachers need to withdraw from the pilot.</p>
<p>Contract/ agreements</p>	<p>Validation Manager asks selected schools to complete and return a simple Memorandum of Understanding. See Section 7.3 and Appendix 6.</p> <p>Permission may need to be obtained for the use of photos or videos. Particularly important when recording classroom observations or interviews with teachers and pupils where this material may be used for dissemination purposes. See Appendix 9. A code of conduct on industry-school collaboration can be useful if a validation involves an industry partner. See Appendix 11.</p>	<p>A more formal contract or detailed collaboration agreement may be needed particularly if the school is receiving: an honorarium or financial reward; or technology as part of the project. See Section 7.3 and Appendices 7 and 8.</p>
<p>Preparation and support</p>	<p>Schools receive materials/tools/resources from EUN (or where relevant the initiator of the evaluation: e.g. hardware, software) and are provided with information/training through written documentation and possibly a webinar.</p>	<p>Schools receive materials, resources from EUN (or where relevant the initiator of the evaluation: e.g. hardware, software) and are provided with information/training through written documentation and possibly a face-to-face national workshop. Budget will need to be provided to the National Coordinator for teachers’ to an initial workshop and possibly other meetings where support is provided or teachers report on their experience in the pilot. As costs quickly escalate here, NCs will also need to rely on webinars and online communities to provide on-going support.</p>
<p>Evaluation</p>	<p>Validation Manager works with internal EUN Evaluation Experts to design online questionnaires, supports schools as they complete these, analyses evaluation data and writes final evaluation report.</p>	<p>Evaluation Expert from a university or research organisation works with Validation Manager to define the evaluation methodology and instruments. National Coordinators liaise with Evaluation Expert to: translate evaluation instruments (if necessary); coordinate collection of evaluation data; help organise interviews, classroom observation visits (see Appendices 9 and 10), focus-group meetings, etc. Evaluation Expert analyses evaluation data and produces the final evaluation report which may be reviewed by a PB.</p>

<p>Running the pilot</p>	<p>Validation Manager organises kick-off and closing webinars with all teachers. Ad-hoc support provided to individual teachers/schools via e-mail, Skype and possibly some additional webinars. As many small validations have a short duration, it may not make sense to set up a dedicated CoP.</p>	<p>The full draft validation protocol (incorporating the Evaluation Plan) is drawn up by the Validation Manager and the evaluation initiator and is fine-tuned and agreed with each National Coordinator. Some modification may be necessary in order to align with school terms, national curriculum, etc. in different countries. Validation Manager has: regular conference calls: (usually bi-monthly) with NCs who directly support the schools in each country; and as agreed with evaluation initiator. DA dedicated CoP is set up for all teachers in project and possibly national sub-communities in larger pilots.</p>
<p>Teacher incentives</p>	<ul style="list-style-type: none"> • Training and professional development webinars by evaluation initiator. • Certificate of participation. See Appendix 12. • Possibly online vouchers and free software licences. 	<ul style="list-style-type: none"> • Training and professional development webinars by evaluation initiator. • Online and face-to-face professional development workshops at national level and in the FCL. • Possibility of free hardware, software, content in some pilots. • Participation in summer school in some pilots of longer duration. • Certificate of participation. See Appendix 12.
<p>Deliverables/ Outputs</p>	<p>Final Evaluation Report. Possibly case studies and a small brochure.</p>	<p>Interim Evaluation Report for validations that have a longer duration and Final Evaluation Report. Depending on the budget available, other deliverables may include: video case studies and interviews with teachers/students; professionally designed brochure/summary of results; capacity building workshop or strategic seminar with policy makers; closing conference or event; formation of an on-going, dedicated community for teachers; development of a teacher ambassador scheme for the evaluation initiator.</p>

8 Validation Scenarios

In this section we look at how the evaluation process described in Section 3 could be applied in some very different evaluation scenarios. We look at: gathering the information we need for each scenario (using the checklist templates from Section 4); how each evaluation activity is typically structured (e.g. sample size and selection of schools); what evaluation instruments might be used (with some examples of these); the duration and scope of different school/classroom pilots and experimentations; the outputs from each evaluation activity; and some of the key challenges in each pilot.

Scenario A: Testing a prototype learning platform

Company X is a start-up (nine staff) based in Lithuania that has developed a prototype of an online platform which helps teachers with content organisation and student/parent communication. The company does not have a specific education background but has primarily ported experience from developing project management platforms into the education market. The company has successfully launched some first trials in schools in their local area. Feedback from these has been collected via online surveys and has been largely positive. The

company would now like to test their platform in other European countries to determine the appropriateness and requirements of their platform for these markets. The main goal is to receive feedback from teachers about the changes required to make the platform suitable for use in different countries. The company has a budget of around €20,000 to support this piloting activity across Europe. Using the templates in Section 3, the following information has also been obtained.

Information about the product/service to be validated

Short description of the product/programme or service to be tested

The product to be tested is a prototype of a platform that allows teachers to organise all their files and online content according to classes, subjects, timetables, etc. The platform enables teachers to share resources with colleagues and provides options for synchronous and asynchronous exchange between teachers. The platform also offers communication features with parents and easy access for parents to dedicated resources made available by the teacher. More information about the platform can be found here: www.....org

Who is the main target user?

Has it been specifically designed

for education / general consumer?

For a specific age range of students?

For students with specific educational needs?

The main target users are the teachers but the platform also requires buy-in from parents to fully reach its potential. The platform was developed specifically for the education market but it is based on a project management platform developed for a commercial setting. Most expertise in the company comes from a commercial background.

What is the field of application of the product?

E.g. administration, learning & teaching, management, etc.

The platform is primarily applied at the level of school and classroom administration. The aim is to reduce the time needed for administration so that the teacher can focus more on the actual teaching & learning activities but the technology does not intervene on these directly.

In which environment is the product

primarily used? E.g. at school, in classroom, outside of school, in home, etc.

The platform is to be used/accessed both at school and at home.

<p>What type of (educational) outcomes/processes does the product seek to improve? If at all? <i>What is the intended outcome of the intervention /use of the product or service?</i> <i>What do you consider the potential positive contribution of the product in education?</i> <i>Is there already any evidence to support this?</i></p>	<p>The platform should make teachers more efficient in their work processes and promote sharing of resources. The platform should also support better exchange of information with parents. There is no solid evidence that this is possible but first trials provide positive feedback from a small number of teachers and parents who have used the platform.</p>
<p>Is the product linked to a wider policy/industry programme, educational vision?</p>	<p>N/A</p>
<p>Does the product/service require substantial training or setup for it to be used?</p>	<p>The platform is entirely cloud-based, so no technical setup is required. Administrator and teacher accounts would have to be created. Administrators would be managed by the company during the pilot. The teacher interface is very user friendly and will require only a limited introduction after which the teachers should be able to test out different parts of the platform themselves.</p>

Information about the intended activity

<p>What are you trying to find out? What is it you are trying to test and to prove? Do you already have some specific research questions?</p>	<p>The purpose is to find out if the platform can support teachers in their lesson planning, administration and communication task and identify any requirements to make the platform effective at national level. Questions: How does the platform impact on the time teachers spend on administration, lesson planning and parent communication? How are the requirements for effective use of the platform different in countries across Europe?</p>
<p>Are there certain methods/instruments that you would prefer to use to collect the data and evidence? <i>E.g. surveys, interviews, observations, etc.</i></p>	<p>Webinars where teachers provide feedback their impressions and recommendations. Online survey.</p>
<p>Can you identify the target population of your intended activity? E.g. students, parents, teachers <i>Also specify a set of attributes, factors or characteristics of the population, e.g. age, gender, experience, etc.</i></p>	<p>Teachers, parents Mix of teaching experience levels at secondary level of teaching, mix of age level, mix of gender, mix of ICT experience; focus on any curriculum subject where there is increased communication with parents.</p>
<p>What is the geographical scope of the intended activity? Which countries would you like to cover?</p>	<p>10 European countries. 2 Nordic, UK, The Netherlands, 3 Mediterranean, 3 Central and Eastern European</p>
<p>What is the intended scale of the activity? <i>E.g. numbers of schools, classrooms, teachers to be involved</i></p>	<p>20 schools with 40 teachers in 40 classrooms</p>
<p>Which schools would you like to use for the activity? <i>E.g. own network schools, EUN network (FCL), open call for schools?</i></p>	<p>Future Classroom Lab network.</p>
<p>Can you already identify any organisational requirements/issues to address when working with the population? <i>E.g. level of technical infrastructure required at the school, security/privacy issues, is parental permission required, ethical issues, etc.</i></p>	<p>Schools should have WiFi access across the school. Families at the schools should have Internet access at home. Schools should not be in socially deprived localities given the need to access the platform from home. All the data is stored in the cloud, currently on US based servers; therefore certain privacy issues might arise.</p>

What budget is available for the activity?	20,000 Euros
What timeframe is envisaged?	5 months
What do you bring to the project? <i>Equipment, licences for free, training, technical support</i>	Free licences for 2 years and free training and support to the schools taking part in the pilot.

Information about intended outputs

Who is the main audience to be informed by the results of the pilot and the validation? <i>Internal: Inform the further development of the product/service</i> <i>External: the wider education public (Policy makers/schools, teachers)</i>	Internal to inform further development Positive results can be used for marketing activities.
What are the main outputs envisaged? <i>Overall analysis report, case studies, country reports (NB: depending on the research approach)</i>	Report with case studies from countries.

The scenario aims to validate the use of the platform in a variety of subjects, for a wide range of learners and different levels of education in the ten countries. The initiator aims to include two schools per country (T=20) with two participating teachers per school (T=40) with examples from a wide geographical spread across Europe (East, West, North, East).

Method:

Based on the small number of teachers involved per country, a case study approach is suggested, which will make it possible to identify practices and more precisely how the platform is used, what works, and why. In order to have meaningful overall results, it is suggested to concentrate the validation on a specific level of education and limit it to two core subjects (one STEM subject and one teaching the national language) to be able to obtain more information on how it is used in those subjects and to draw some valid conclusions from contextual information.

Research questions:

- 1 How does the platform support teachers teaching 13 year old students in STEM subjects and teaching the national language including lesson preparation?
- 2 What are the main administrative benefits of the platform including possible time gains? Does the platform support teacher parent communication?
- 3 What are the main challenges/enablers of integrating the platform at national level?

Instruments:

- One online survey with all teachers involved.
- Skype interviews with two teachers per school.
- Online survey with parents of students involved in the pilot.

Selection of schools:

- Selection of two schools per country, two classrooms per school.
- Selection via an open call for participation within the FCL network based on the defined criteria for participation.
- ICT experienced teacher, one science teacher, one language teacher per school, second year of secondary education with students aged 13.

Support:

- Schools receive access and training for the platform at the beginning of the school year in September via a webinar.
- Teachers will be provided with an online space to submit examples of using the platform for various activities and for creating a CoP.

Timeline:

- Teachers test the platform for a period of 5 months from September till end of January.
- Teachers and parents will fill in an online questionnaire on the use and experience of the platform at the end of the pilot in February.
- Given the extremely low budget and a high number of countries involved, no observation visits will be possible. It is envisaged to carry out Skype interviews with the two teachers from one school per country in February.

Outputs:

Overview report with answers from teachers and parents survey including ten country case study examples.

Challenges:

- The budget of €20,000 is very low given the ambition to carry out validations in 10 countries including administering the surveys, carrying out the Skype interviews and developing a CoP for participating teachers over a period of five months. The company may therefore have to consider a more limited pilot in fewer countries.
- Time gains can only be identified based on perception of teachers.
- The project has to consider strategies on how to engage parents in the evaluation.

Scenario B: Evaluate the effectiveness of a new education-specific tablet

Company Y is a large multi-national technology company that is established in the education market with a variety of products and services (e.g. sensor equipment, displays, administrative software) in most countries in Europe. The company has developed a tablet specifically for the education market which it successfully launched three months ago in the US market. In order to support take-up of the tablet in Europe, the company would like to carry out an evaluation of the effectiveness of the tablet compared to traditional non-education-specific

tablets in classrooms. The main goal is to highlight that the teaching and learning practices in classrooms using the education tablets are different from those in classrooms using traditional tablets. The company has its own networks of schools in which most classrooms are already equipped with traditional tablets. The company would prefer to use this network of schools for the evaluation. The company has a budget of around €120,000 to support this study but requires results within nine months of starting the activity.

Information about the intended activity

What are you trying to find out? What is it you are trying to test and to prove? Do you already have some specific research questions?

The purpose of the activity is to show that the tablet improves the teaching and learning processes in the classroom by making them more student-focused. We are trying to test whether integration of the tablets in classrooms results in a change of the type of activities conducted during lessons. Questions: Does the tablet change the ratio of student talk time to teacher talk time during lessons? What types of activities do teachers conduct with the support of the tablets?

Are there certain methods/instruments that you would prefer to use to collect the data and evidence?

E.g. surveys, interviews, observations, etc.

Preferably surveys combined with lesson observations to validate and substantiate the survey findings.

<p>Can you identify the target population of your intended activity? <i>E.g. students, parents, teachers</i> <i>Also specify a set of attributes, factors or characteristics of the population, e.g. age, gender, experience, etc.</i></p>	<p>Students, teachers Students: mix of age levels across both primary and secondary level, mix of genders Teachers: mix of teaching experience, mix of age level, mix of gender, mix of ICT experience; focus on STEM related subjects.</p>
<p>What is the geographical scope of the intended activity? Which countries would you like to cover?</p>	<p>8 European countries where we have our direct subsidiaries</p>
<p>What is the intended scale of the activity? <i>E.g. numbers of schools, classrooms, teachers to be involved</i></p>	<p>5 schools in each country = 40 schools 2 classrooms in each school = 80 classrooms = 80 teachers = ~2000 students</p>
<p>Which schools would you like to use for the activity? <i>E.g. own network schools, EUN network (LSL), open call for schools?</i></p>	<p>The company would like to use its own network of 300 schools across Europe, about 85% of which currently have some experience of using conventional tablets.</p>
<p>Can you already identify any organisational requirements/issues to address when working with the population? <i>E.g. level of technical infrastructure required at the school, security/privacy issues, are parents' permissions required, ethical issues, etc.</i></p>	<p>Schools should have WiFi access across the school with a central network administrator. Students will keep the tablets to take home, so close communication with parents about responsibilities, insurance, etc. needs to be in place.</p>

Information about intended outputs

<p>Who is the main audience to be informed by the results of the pilot and the validation? <i>Internal: Inform the further development of the product/service</i> <i>External: the wider education public (policy makers/schools, teachers)</i></p>	<p>External: public audience, in particular policy makers and administrators who make buying decisions for schools. Also teachers and parents who need to be convinced of the added value of the tablets.</p>
<p>What are the main outputs envisaged? <i>Overall analysis report, case studies, country reports (NB: depending on the research approach)</i></p>	<p>Brochure, video case studies, text case study.</p>
<p>What budget is available for the activity?</p>	<p>€120,000</p>
<p>What timeframe is envisaged?</p>	<p>9 months</p>
<p>What do you bring to the project? <i>Equipment, licences for free, training</i> <i>Technical support</i></p>	<p>The schools will be able to keep the tablets after the study. Online training will be provided but no face-to-face training can be offered.</p>

The core purpose of this scenario is to identify a change in practice, i.e. to what extent does the education-specific tablet support more student-centred learning activities and inquiry based learning in comparison to tablets not designed for educational purposes?

Method:

A before-and-after survey approach is suggested in order to identify a change in practice over time with the same cohort of teachers. Based on the results of the survey, one

school per country will be identified for a case study visit. A student questionnaire will be administered for secondary students only.

Research questions:

How does the use of the education tablet result in a change of teaching and student practices as opposed to the use of conventional tablets? In particular, does the tablet more easily support student-centred activities and inquiry based learning of students in school and outside school?

Instruments:

- Pre teacher survey online to collect information about the general teaching and learning practices before the adoption of the educational tablet.
- Pre-student survey online to collect feedback from students on their learning experience with conventional (non-educational tablets).
- Post teacher survey online to collect information about potential changes to teaching and learning practices.
- Post student survey online to collect feedback on the learning experience with the educational tablet.
- Case studies: 10 school observation visits (one school per country, two classrooms per school), lesson observations, face-to face interviews with teachers and students and invited parents to be carried out in May.

Selection of schools:

- Teachers having used conventional tablets in their class for at least one school term.
- Initiator to select schools and teachers based on agreed criteria from their network of schools.

- One primary teacher and one secondary STEM teacher per school should participate in the validation pilot.

Support:

- Teachers will receive the tablets before the summer break so that they have some time during the vacation to explore the tablets.
- Teachers receive initial training on the tablet (online) at the start of the new school year.
- Initial webinar on developing lesson plans using the tools and the apps.

Outputs:

Overall evaluation report and ten text case studies by country. 2-3 video case studies.

Challenges:

- Definition of what constitutes non-educational tablets.
- Agreement with schools to allow students to take the tablets home, especially in primary education, insurance issues.
- Making high-quality, professionally shot videos of classroom practice in all ten countries (suitable for marketing purposes by the company) could be expensive.

Scenario C: Develop and test innovative pedagogical scenarios for a primary level maths application

Research Project Z has spent two years developing an innovative maths application that teaches students at primary level important maths concepts in a visual and game-based manner. The project is now at a stage where it focuses on dissemination of its activities. In order to facilitate the take-up of its application in schools, the project would like to develop specific teaching and

learning scenarios around their application which will help teachers use it in their daily practice. The main goal is to arrive at a number of scenarios that have been tested in at least five countries and in a variety of subjects together with supporting materials for teachers to apply those scenarios. The project has a budget of around €60,000 Euros to support this activity.

Information about the intended activity

What are you trying to find out? What is it you are trying to test and to prove? Do you already have some specific research questions?

We are trying to find the right kind of pedagogical scenarios for our application, i.e. does the application work very well in a flipped classroom scenario or does the application work very well in an outdoor learning scenario? We would like to test the scenarios created by teachers and show that they are working especially when using the application.

Are there certain methods/instruments that you would prefer to use to collect the data and evidence?
E.g. surveys, interviews, observations, etc.

Preferably surveys of teachers and students combined with observations to validate and substantiate the survey findings.



Can you identify the target population of your intended activity?

E.g. students, parents, teachers

Also specify a set of attributes, factors or characteristics of the population, e.g. age, gender, experience, etc.

Students, teachers

Students: focus is on age levels 9-11 in primary schools, mix of genders, focus on SEN students and students with difficulties in maths.

Teachers: mix of teaching experience at primary level, mix of age level, mix of gender, mix of ICT experience.

What is the geographical scope of the intended activity? Which countries would you like to cover?

Five European countries, Spain, Belgium, Denmark, UK, Estonia.

What is the intended scale of the activity?

E.g. Numbers of schools, classrooms, teachers to be involved

4 schools in each country = 20 schools
2 classrooms in each school = 40 classrooms
= 40 teachers
= ~800 students

Which schools would you like to use for the activity?

E.g. Own network schools, EUN network (LSL), open call for schools?

We would like EUN to identify the schools from their network.

Can you already identify any organisational requirements/issues to address when working with the population?

E.g. Level of technical infrastructure required at the school, security/privacy issues, are parents' permissions required, ethical issues, etc.

The classrooms involved need to have a 1:1 tablet setup. Tablets need to be either Android or iOS based. For data collection to work on the application, a wireless connection is required for the app to transmit the data to the central server. Data privacy/security issues might be relevant as all the students' interactions are stored on servers. The servers, however, are based in the EU.

What budget is available for the activity?

€60,000 Euros

What timeframe is envisaged?

7 months

What do you bring to the project?

Equipment, licences for free, training, technical support

Free life time licences for the participating classes.

Information about intended outputs

Who is the main audience to be informed by the results of the pilot and the validation?

Internal: Inform the further development of the product/service

External: the wider education public (Policy makers/schools, teachers)

External: the outcome of the activity should provide a collection of pedagogical scenarios combined with lesson resources that teachers can use in combination with the application. So the main audience are teachers. Positive outcomes can also be reported in marketing material for parents, teachers, administrators and policy makers.

What are the main outputs envisaged?

Overall analysis report, case studies, country reports (NB: depending on the research approach)

A publishable resource pack for teachers (online and offline)

Two text based case studies

One summary video.

The aim of this validation is to develop and test a number of suitable teaching and learning scenarios to be integrated with the maths application for primary education.

In order to develop suitable scenarios to support pedagogical integration of the maths application, a Lead Teacher from each country will attend a scenario development workshop in the FCL in Brussels. During the workshop the maths application will first be explored by teachers and then teaching and learning scenarios covering in-school and out-of-school implementation, and the flipped classroom will be developed using the Future Classroom Toolkit from EUN. Teachers will start the scenario development by identifying problems within their class that could be tackled by the scenario implementation. Each Lead Teacher will then discuss the scenarios with the three other teachers in their country and develop adaptations for the students and classrooms concerned (e.g. via webinars or face-to-face meeting).

Each teacher will integrate the scenario developed for a period of 6 months.

Method:

- Action research, document analysis, surveys and case studies

Instruments:

- Document analysis
- Online teacher survey
- Lesson observations and interviews with teachers and students.

Research questions:

- What are suitable learning scenarios (in school and out of school, e.g. flipped classroom) to support the integration of the maths application for students in grade 4 of primary education?
- Does the application support students with learning difficulties? Which scenarios best support students with learning difficulties?

Selection of schools:

- Teachers teaching students in grade 4 in primary education: 9.5 year old students on average (NB: primary education starts (between 5 and 7 years) and ends differently in different European countries. It is therefore suggested to concentrate the validation on one specific age group that covers primary education in each country and also to relate the results of the evaluation to primary education in general.
- Some teachers teaching students with learning difficulties.
- Teachers teaching a class with a 1:1 tablet setup and wireless Internet connection.
- EUN to select from its network of schools with support at national level.

Timeline: validation 6-7 Months

- Lead teachers develop five scenarios during a workshop.
- Teachers develop their own learning activities based on the scenarios developed by the lead teachers according to a common template.
- Teachers will integrate and test their scenarios within a period of one school term.

- ◉ Teachers develop support material and identify additional resources (use of tools) throughout the pilot implementation.
- ◉ Evaluation Expert reviews and analyses the scenarios developed.
- ◉ Establish a database of teachers participating in the project.
- ◉ Online teacher survey after the pilot implementation (general background, ICT experience, pedagogical approach, scenario implementation, challenges).
- ◉ Selection of case studies based on the online survey.
- ◉ One case study per country (1 school visit) to observe teaching and learning practices.

Outputs:

- ◉ 20 best-practice teaching scenarios, online resources and tools.
- ◉ Five case studies.
- ◉ Evaluation report.

Challenges:

Teachers need support to develop suitable scenarios and integrate them into their classrooms. Therefore, it is suggested that a one day workshop should be organised with lead teachers to draft the scenarios that can be used by other teachers in the pilots. In addition, it is suggested to have at least one case study from each country to generate qualitative evidence and to gain deeper insights into the specific national context and to cover aspects that cannot be identified by the online survey.

The travel and accommodation costs of bringing teachers to the scenario development workshop plus the travel costs associated with five country visits by an Evaluation Expert make the operational costs of this validation quite high in terms of the proposed budget. There may need to be either a revision of the budget or an alteration to the proposed methodology.



Summary: Validation pilot options

Finally, the following flowchart is an illustrative approach to help you work through the process of considering the options of small, medium and large-scale validation pilots. It shows the main areas to consider in shaping your validation pilot: what is the focus of the intervention, selection of schools, variables, accompanying pilot measures, method used and type of evidence obtained.

Please note:

- Figures given are indicative, e.g. exact sample sizes need to be calculated depending on the target reference population,
- Costs depends on a number of factors (e.g. number of observation visits to be carried out per number of countries and depending on the number of schools involved, level of expertise and support required, type of instruments applied).



Figure 5: Validation Pilot options

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Appendices: Validation templates

The following templates and forms are used within the Future Classroom Lab validation service. They are provided under a Creative Commons license and can be freely reused or adapted by any organisation wishing to design and run its own school validation pilot. The templates can be downloaded at: <http://fcl.eun.org/validation-service>

1. Model Contract for National Coordinators

Detailed description of the role and responsibilities of National Coordinators that are appointed in each country to provide training and support to teachers in larger validation pilots.

2. Evaluation Terms of Reference

Checklists to help you gather the information about what will be evaluated and to define the purpose of the evaluation and the expected outputs.

3. Validation Pilot Work Plan

Features of an operational work plan that should apply to any school pilot.

4. Invitation to schools/teachers to participate in a validation project

Document inviting schools to participate in a validation which specifies the scope of work; level of commitment and outputs expected from teachers; incentives or rewards for carrying out the work etc.

5. School data form

A form to be completed by each school participating in a school pilot.

6. School Pilot Memorandum of Understanding with Schools

A simple cooperation agreement outlining what teachers/schools are expected to do in small validation pilots.

7. School Pilot Model Contract

A more formal and detailed contract outlining what teachers/schools are expected to do in larger validation pilots involving the payment of an honorarium or financial reward.

8. School Pilot Model Cooperation Agreement

An example of a cooperation agreement made with a school that receives equipment from the initiator of an evaluation.

9. Photo and Video Permission Form

A form to be used when permission is necessary from participants for the use of photos and/or video, related to data privacy. Particularly important when recording classroom observations or interviews with teachers and where this material may be used for dissemination purposes).

10. Lesson Observation Record

A template that can be used by an evaluation expert to record information when carrying out a classroom observation.

11. Code of conduct for school-industry collaboration

Guidelines on how industry partners and schools should cooperate within a validation pilot.

12. Certificate of Participation for Teachers / Schools

A model certificate which recognises that a teacher or school has participated in a validation pilot



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European Schoolnet is a network of 30 European Ministries of Education, bringing innovation in teaching and learning to its key stakeholders: education ministries, schools, teachers, researchers, and industry partners. Created by European Schoolnet, the Future Classroom Lab is an inspirational learning environment in Brussels, challenging visitors to rethink the role of pedagogy, technology and design in their classrooms.



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