Internal Deliverable 5.9
Cycle 5 Evaluation Report
Sarah McNicol, Geoff Bright, Cathy Lewin, Adam Wood
August 2014

http://itec.eun.org
Credits

Thanks to all the NPCs and NTCs for their support in data collection activities.

Thanks to the teachers and students who responded to the surveys, and took part in focus groups and interviews.

Thanks also to Charmian Wilby for her help in administering the teacher and student surveys.

http://itec.eun.org

Coordinated by European Schoolnet

The work presented in this document is partially supported by the European Commission’s FP7 programme – project iTEC: Innovative Technologies for an Engaging Classroom (Grant agreement Nº 257566). The content of this document is the sole responsibility of the consortium members and it does not represent the opinion of the European Commission and the Commission is not responsible for any use that might be made of information contained herein.
# Table of contents

Executive Summary .................................................................................................................... 5  
1. To what extent do the iTEC Learning Stories and relevant iTEC technologies benefit learning and teaching? ........................................................................................................... 5  
2. To what extent are the iTEC Learning Stories and iTEC technologies sustainable, transferable and scalable? ..................................................................................................... 6  
3. To what extent are the Learning Stories and iTEC technologies fit for purpose? ........... 7  
4. What are the enablers of and barriers to adoption of iTEC Learning Stories and iTEC technologies? ......................................................................................................................... 7  
Recommendations ..................................................................................................................... 8  
1. Introduction ...................................................................................................................... 11  
   Overview of methodology ................................................................................................. 11  
2. The iTEC process and learning design .............................................................................. 14  
   Learning Activity design (Edukata) .................................................................................. 14  
   Teacher as designer of learning: moving beyond the isolated teacher ......................... 18  
   The Composer .................................................................................................................. 20  
   The SDE ............................................................................................................................ 23  
3. Impact on learning and teaching ...................................................................................... 25  
   Impact on pedagogical innovation .................................................................................. 25  
   Impact on technological innovation ............................................................................. 29  
   Radical pilots .................................................................................................................... 34  
   iTEC technologies .......................................................................................................... 35  
   Impact of iTEC on student experience ........................................................................... 43  
4. Sustainability, transferability and scalability ................................................................... 55  
   Benefits of iTEC .............................................................................................................. 55  
   Dissemination and transfer of the iTEC approach ............................................................ 57  
   Potential impact on stakeholders ................................................................................... 64  
   A focus on head teacher views .................................................................................... 68  
   Challenges and iTEC ....................................................................................................... 70  
Conclusions and recommendations ...................................................................................... 75
| References | 79 |
| Appendix A: Overview of the iTEC piloting process | 80 |
| Appendix B: Analysis of data by country | 85 |
| Appendix C: Contextual information about participating teachers and their schools | 87 |
| Appendix D: Pilot case studies | 88 |
| Appendix E: Radical case studies | 100 |
| Appendix F: Methodological notes | 120 |
Executive Summary

A summary of the main findings is now presented in relation to the four evaluation questions considered in C5.

1. To what extent do the iTEC Learning Stories and relevant iTEC technologies benefit learning and teaching?

Participation in iTEC had a positive impact on students in many ways, including increased use of technology; more opportunities for independent learning and collaborative learning; and greater student autonomy. When asked about differences in their students’ experiences when implementing the Learning Story (LS), 20% of teachers (n=251) noted the opportunities afforded for team working and collaborative learning experiences; 18% referred to the use of new tools and resources. 15% to opportunities for independent learning; and 15% to greater student motivation encouraged through iTEC. Among students responding to the open-ended survey question: ‘For me, the best thing about iTEC lessons is…’ (n=1,293), the most frequently occurring themes were the use of technology (37%) and collaborative working (24%).

Both teachers and students reported perceived improvements in student attainment and 21st century skills. 73% of teachers (n=248) agreed that the implementation of the LS had led to improvements in their students’ levels of attainment (as indicated by their assessment data) and 78% of students agreed the skills and knowledge they had gained would help them to do better in their assessments. The percentages of teachers believing that the implementation of the iTEC Learning Story had led to improvements in their students’ 21st century skills were: digital literacy: 88%; collaborative skills: 88%; creativity: 86%; communication skills: 86%; independent learning skills: 86%; problem-solving skills: 79%; and critical thinking: 73% (n=247). Similarly, 88% of students believed their collaboration skills had improved; 85-86% reported improvements in digital literacy; 83% in independent learning; 80% in critical thinking; 83% in communication skills; 77% in problem solving; and 77% in creativity.

In addition, iTEC was felt to have a positive impact on both student and teacher motivation. 90% of teachers (n=247) believed that there had been improvements in students’ levels of interest and engagement and 83% of students agreed, saying they felt time passed quickly and wanted more lessons of this type.

Pedagogical innovation was the most important feature of iTEC for most teachers, resulting in changes in the roles of students (21%: n=254) and teachers (8%), and in the uses of technology (14%)1. Case study teachers (6 out of 8) described how the role of the teacher changed from ‘expert’ to ‘guide’ or ‘coach’, which in turn

---

1 These answers were given in response to an open-ended question which resulted in a wide range of responses.
impacted on the role of students, especially their development as independent learners.

Technological innovation was also evident in the use of new tools (24%; n=254); student use of technology (19%); greater use of technology (11%); and the use of technology in more creative and collaborative ways (5%)\(^1\).

2. To what extent are the iTEC Learning Stories and iTEC technologies sustainable, transferable and scalable?

The vast majority of iTEC teachers said they intended to use the iTEC approach again (91%; n=244), and planned to recommend it to other teachers (92%). During C5, iTEC was already being widely disseminated with 86% of those surveyed claiming to have shared their experience of iTEC with other teachers outside the project.

Teachers believed that wider implementation of the iTEC approach would impact on teachers' motivation (13%; n=234); professional collaboration (7%) and digital literacy skills (6%). They also believed student motivation (26%; n=239), autonomy (14%), collaboration skills (10%) and digital literacy (7%) would be improved through wider implementation\(^1\).

However, those who had already shared their experiences with colleagues reported mixed responses. While 81% of teachers (n=244) agreed that the iTEC approach could become part of their own routine practice, around half (52%) agreed that such methods could become part of the routine practice of other teachers in their school and 43% agreed they could become part of routine practice for the majority of teachers in their country. A lack of skills, low levels of confidence and an unwillingness to embrace innovative practices among some teachers were perceived as likely to present significant barriers to the wider adoption of the iTEC approach.

There was evidence that head teachers viewed iTEC as a change agent which can help to drive improvement in schools. While few head teachers were actively involved in the implementation of the project, they were concerned with the resulting management and leadership issues.

TeamUp was the only iTEC tool to be widely used during C5; 82% of those teachers responding (n=180) said they would recommend TeamUp to other teachers and 77% said they intended to use TeamUp again in the future. In addition, 22 out of 27 teachers said they intended to use ReFlex again in the future and 23 said they would recommend Reflex to other teachers. 31 out of 34 teachers responding said they would use the Widget Store again and the same number said they would recommend it to other teachers. All 20 teachers surveyed said they would recommend the SDE to other teachers.
Anticipated future uses of the Learning Activity development approach vary by country, and are thus context dependent. They include use in teacher training and professional development; use by classroom teachers; and adoption at school level and at national level.

3. To what extent are the Learning Stories and iTEC technologies fit for purpose?

The focus in C5 moved from individual Learning Stories to an evaluation of the iTEC approach more generally, in particular, the Learning Activity (LA) design process.

The LA design process has potential to develop innovative and creative teaching practices in the classroom. However, it needs to be simplified, made more flexible and the presentation improved, including making it more interactive. Although the idea was well-received, the process that was piloted was perceived to be too time-consuming and complicated for regular use, particularly for a single lesson and some of the terminology used was difficult for teachers to understand. Teachers may also need support in engaging in collaborative planning as this represents a significant change to their ways of working for many.

Overall, the iTEC technologies are perceived as interesting, but requiring significant improvements were they to be adopted more widely.

TeamUp has become a familiar tool to teachers and is viewed positively as a means of supporting both group work and reflection, providing teachers use their discretion when deciding which classes to use it with, and when to ‘overrule’ the tool.

ReFlex has not been widely used. Some teachers are unsure how to use it effectively and the evaluation data on this tool is therefore very limited.

The Composer is viewed as an interesting framework for collaboration and sharing, but requiring significant improvements to be of value to teachers engaged in learning design.

The SDE has elicited some positive reactions, but feedback to date is very limited.

The Widget Store faces from competition from existing commercial ‘stores’ which are already familiar to teachers. Where significant levels of support have been available, teachers have used the Widget Store in more creative ways, for example, developing their own widgets, but this requires greater technical expertise than most currently possess.

4. What are the enablers of and barriers to adoption of iTEC Learning Stories and iTEC technologies?

According to teachers, student (30%; n=238) and teacher (8%) attitudes; access to technology (17%) and other resources; and support from both the iTEC team
(13%) and other teachers (11%) were all identified as important enablers for teachers engaged in iTEC.

Perceived challenges to the wider adoption of iTEC include a lack of technical resources in some schools (4 case studies); inadequate internet access (4 case studies); financial barriers (4 case studies); and curriculum (4 case studies) and time constraints (2 case studies). The level of students’ digital literacy skills (2 case studies) and resistance among some teachers (5 case studies) were also perceived to present barriers.

**Recommendations**

A number of recommendations arise from the findings reported in this report.

**Dissemination and mainstreaming (national and international level)**

iTEC partners should communicate the potential of the iTEC approach for the development of innovative digital pedagogies scaling up innovation in classroom practices, embedding technology in pedagogy and positively impact on motivation and learning outcomes, clearly to all stakeholders, particularly teachers and school leaders to support further uptake by teachers who have not yet tried iTEC. Dissemination should take place through awareness raising and also professional development opportunities.

European Schoolnet, MoEs and other partners should investigate the potential for integrating iTEC outputs within professional development and initial teacher training.

**Dissemination and mainstreaming (school level)**

Teachers, supported by school leaders and through professional development, should create opportunities for students to take greater responsibility for their learning, work collaboratively, engage in authentic learning experiences and develop their 21st century skills through the adoption of digital pedagogy. This demands a shift in teacher and learner roles. It also demands a positive attitude towards change. The iTEC approach can support this pedagogical shift.

Teachers and students, supported by technology providers, should look for opportunities to integrate the use of technology throughout their teaching and learning.

Teachers should be provided with opportunities to engage in collaborative processes for learning design in order to innovate and develop digital pedagogies suitable for 21st century classrooms, rather than continuing to work in isolation.
Teachers involved in iTEC should ensure they share their experiences with other teachers, within their school and beyond. They should be supported in doing so by school leaders.

Teachers should establish and maintain connections with colleagues in their own school, and beyond, to share and develop digital and pedagogical knowledge and skills as a community. School leaders should facilitate this, through for example embedding professional network participation in the school culture, and they should also ensure that teachers have sufficient time for effective networking.

School leaders should explore ways of integrating the use of the iTEC approach within their school planning to encourage the development of innovative pedagogies and technologies.

**Tools and technologies**

Aalto should work with EUN to integrate the learning activity design process into the Future Classroom Toolkit, ensuring this is simplified, made more flexible and the presentation improved, including making it more interactive.

If possible, WP3 should continue to maintain TeamUp as this is seen as valuable by teachers. There is very limited feedback on ReFlex, but it may be worth integrating some aspects of this tool in any future development of TeamUp.

Findings related to the Composer indicate do not indicate sufficient support for further development in its current form, they do suggest it would be worth exploring ways in which elements of the Composer can be used to support the learning activity design process, particularly collaboration between teachers in learning design.

The value of a bank of LSs and LAs is recognised by teachers and there is support for maintaining this, whether via the Composer or in another format.

The Widget Store faces significant competition from commercial competitors. The evaluation suggests that it may have value for more technically advanced teachers who wish to create their own widgets, but this is likely to require significant support.

There is insufficient data to recommend wide-scale take-up of the SDE. However, it would be beneficial to conduct a larger scale study, particularly in the countries which viewed it favourably.

Technology providers should develop awareness of current pedagogical practices (through working more closely with practising teachers) so that forthcoming developments can better meet teachers' needs.
Research

The evaluation suggests that the iTEC approach has a number of potential benefits, but European Schoolnet and MoEs should explore options for the large-scale systematic validation of the iTEC approach.

While there is evidence that iTEC has had an impact in classrooms, further research is needed to determine whether the approach supports more radical innovation in teaching and learning, and if so what types of additional support are teachers likely need to develop their pedagogy further.

Learning from the evaluation of iTEC should be summarized by WP5 and other partners and made available to assist other evaluators of large scale international projects like iTEC.
1. Introduction

This is the final iTEC evaluation report and presents findings in relation to four evaluation questions:

1. To what extent do the iTEC Learning Stories and relevant iTEC technologies benefit learning and teaching? (Addressed in Chapter 3)
2. To what extent are the iTEC Learning Stories and iTEC technologies sustainable, transferable and scalable? (Addressed in Chapters 2 and 4)
3. To what extent are the Learning Stories and iTEC technologies fit for purpose? (Addressed in Chapters 2 and 3)
4. What are the enablers of and barriers to adoption of iTEC Learning Stories and iTEC technologies? (Addressed primarily in Chapter 4, but also in Chapters 2 and 3 in relation to individual technologies).

In Cycle 5 (C5), the focus of the evaluation moved from the Learning Stories (LSs) to the ‘iTEC approach’ more generally as each partner took responsibility for the creation of their own LSs, using standalone toolkits for scenario development and learning activity development. The fifth evaluation question, “To what extent was the piloting process effective and what were the challenges faced?”, is primarily addressed in D4.5 as in the final two cycles of the project, the focus of WP5 has moved from implementation towards innovation and mainstreaming. (See Appendix A for an explanation of the change in focus for WP5).

Overview of methodology

17 countries participated in C5 (involving up to 439 classrooms): Austria, Belgium (FL), Belgium (Promethean), Czech Republic (Associate Partner), Estonia, Finland (Associate Partner), Finland (Promethean), France, Hungary, Ireland (Promethean), Israel, Italy, Lithuania, Norway, Portugal, Portugal (Promethean), Slovakia, Spain (SMART), Spain (Promethean), Turkey, United Kingdom (Promethean) and the United Kingdom (SMART). Evaluation data were gathered using the methods described below.

Teacher survey

Teachers were asked to complete an online survey on their prior experience and context, together with their implementation of the LS. 259 teacher questionnaires were completed. As in previous cycles, in some countries only a very small number of teachers participated. Data analysis is primarily qualitative and where appropriate aggregated data are presented acknowledging the limitation that this does not account for differences in cultural context or country sample sizes. The findings inform chapters 3 and 4. Information about the sample can be found in Appendix C.
Student survey

In C5, an additional survey was introduced to capture feedback directly from students taking part in iTEC activities. This survey focussed on the perceived development of 21st century skills, attainment and student engagement. 1,488 student questionnaires were completed. Again, the number of responses varied considerably between countries, so as with the teacher survey, data analysis is primarily descriptive. The findings are reported within chapter 3.

Case studies

In C5 NPCs were able to choose between conducting either an ‘Edukata case study’ or a ‘pilot case study’.

Eight countries undertook a Pilot Case Study, which included a lesson observation, interviews with the teacher, students and where possible, the head teacher and ICT co-ordinator. Each NPC chose one case study teacher based on criteria provided by WP5. Data from the pilot case studies are reported in chapters 3 and 4.

Three countries carried out a full Edukata Case Study, which included an online survey for the workshop facilitator, group interview with workshop participants and follow up interviews with 2-4 teachers or other stakeholders. In five countries, partial case studies were conducted with the facilitator survey (BE, CZ, PROM); follow up interviews (FI); or survey plus additional feedback from the facilitator (IS) allowing some data to be collected from these countries. WP5 also conducted short interviews via Skype with two teachers (ES, IS) who had been responsible for facilitating Edukata workshops. This resulted in a total of 13 Edukata interviews (a mixture of individual and group) across 4 countries. These are reported in chapter 2.

For both Edukata and pilot case studies, NPCs were provided with a set of guidelines on conducting the case studies and interview schedules to standardise the process across sites. The NPCs transcribed and translated raw data for their case study and returned this to WP5, together with any further materials such as photographs or observation notes. These were analysed thematically, but are also presented as individual case studies (Appendix D).

Questions for NPCs

To collect additional data on Edukata, NPCs were sent a short survey asking them to comment on the potential for implementing this process across their country/area of operation. Responses were received from 11 NPCs. In Estonia, further detail was collected via a series of Skype interviews with the NPC and NTC. These are reported within chapter 2.

---

2 In Turkey, several pilot case studies conducted, but only one was selected for inclusion in the analysis.
3 Conducted by WP5, rather than the NPC
Technology focus groups

Nine countries conducted a technology focus group with a small number of iTEC teachers towards the end of C5. These focussed on teachers’ use of iTEC technologies. Again, NPCs were provided with guidance and a set of questions for the focus group within the C5 Evaluation Guide. An independent scribe made notes at the focus group and sent these to WP5. These were used to inform chapters 2 and 3.

NTC focus group on The Composer

In January 2014, NTCs were invited to attend a workshop in Budapest where they would be introduced to the C5 iTEC technologies. As part of this event, a member of WP5 conducted a focus group to gather feedback the Composer based on NTCs’ own impressions (5 NTCs) and the responses from teachers they had worked with (reported by 4 NTCs). This session was recorded and written up in note format, with pertinent quotes being transcribed.

Widget Store questions for NTCs

To capture additional data on the use of the iTEC Widget Store in countries where it was implemented in C5, NTCs were asked to either take part in a Skype interview or to respond to a set of questions via email. Four countries participated in this activity (AT, IS, IT, PT). The findings are reported in chapter 3.

SDE survey

WP10 took responsibility for the evaluation of the SDE, devising an online survey which was completed by 20 teachers. The results are reported in chapter 2.

The following table indicates which types of data are reported in each chapter of this report.

Further details of the methodology are provided in Appendix F, including a table of data used to answer each of the evaluation questions, and an overview of data collected in Appendix B.

---

5 In Norway, individual interviews were conducted due to problems convening teachers.
2. The iTEC process and learning design

The iTEC approach is designed to bring about change in classroom practice in order better to equip young people with the competences and attitudes to meet the opportunities and challenges of 21st century society and the workplace. The approach is based on scenarios of the future classroom and the systematic design of engaging and effective Learning Activities (LAs) using innovative pedagogical approaches, supported, but not driven, by technology.

In cycles 1-4, a small number of teachers were involved in scenario and learning activity development through processes which were managed centrally. In cycle 5, standalone toolkits for scenario development and learning activity development were piloted at national and sometimes, as in the case of learning activity design, school level. In this cycle, coordinators for each participating partner facilitated the learning design process, running workshops for scenario and LA development involving a wide range of stakeholders including students and head teachers.

Learning scenario design: Eduvista

The evaluation of the scenario development process has been reported previously in the scenario development process report, so is only considered briefly here. The main findings were: the scenario development process was viewed by policy makers, teachers and other stakeholders as innovative; the Future Classroom Maturity Modeling tool is perceived to be useful although in a number of countries similar tools for self-review already exist; and a number of benefits of the process were identified, the most notable of which was how it facilitated collaboration and helped bring diverse partners together.

Learning Activity design (Edukata)

The collaborative LA development process is designed to enable teachers to translate educational scenarios into classroom practices. The scenarios provide a stimulus for the development process. The process (involving team work and participatory design with stakeholders):

- identifies challenges and opportunities relating to scenario implementation;
- identifies suitable resources (tools, services, content, people and events) to address challenges and support implementation;
- documents the resulting LAs.

Grounded in research-based design (Leinonen et al, 2008; Leinonen et al, 2010), the process is iterative and involves close collaboration with stakeholders (Keune et al, 2011).

---

During the final piloting cycle, all NPCs were asked to facilitate LA development workshops involving teachers and other stakeholders including head teachers, teacher educators, trainee teachers, commercial providers, students and parents. In excess of 400 people were involved in these workshops, the majority of whom were teachers. This chapter draws, primarily, on data from the Edukata case studies, questions for NPCs, NTC focus group and reports from technology focus groups.

The following case studies illustrate how the LA process was used in two countries during cycle 5.
Edukata case study: Spain

In Spain, an Edukata workshop was delivered by the SMART Education Programs Manager and iTEC NPC, assisted by Teacher G who has been involved in iTEC throughout the project and who had previously attended an iTEC international teacher workshop in Brussels, where Edukata was presented.

The workshop took place at School A and involved the head teacher; three primary and five secondary level teachers; two students who had previously been involved in iTEC pilots; and a parent. The participants were given the Edukata booklet, but the NPC had also prepared a presentation to make it more easily accessible to teachers. In total, it took two full days to run the Edukata process, but Teacher G felt that it could have been extended to a third session to allow more opportunities for group reflection.

Approximately half the teachers participating had previous experience of iTEC. These teachers found Edukata relatively easy to follow and were enthusiastic about the process. However, some of those without previous iTEC experience struggled a little; without a good understanding of the iTEC approach, the process of moving from a future-orientated scenario to concrete ideas for classroom activities could seem a little repetitive. Working in teams to design learning activities, rather than doing this as an individual activity, was new for some teachers, so they needed to adapt to this new way of working.

Teacher G felt that the Edukata process fitted well with other developments at School A as teachers here had been engaged in collaborative work for several years. But, although teachers were already working collaboratively, they had been doing so in an ad hoc way and Edukata helped to give more structure to the process and encouraged them to take a more considered approach. Overall, Teacher G was highly positive about the process, in particular the way in which the emphasis on team working could lead to innovation:

*The instantaneous feedback of the Edukata workshop is something that makes you think of new ways of doing slightly different things.*

Teacher G saw Edukata as “the tool we need to get along with the work we’re doing”. It fits well with the approach taken towards learning design in School A and is a process which he intends to continue to use in the future.
Edukata case study: Israel

In Israel, Teacher S, who took part in previous iTEC cycles and also attended the Oulu Winter School at which teachers were introduced to Edukata, was responsible for delivering an Edukata workshop for 19 teachers in her school, including the head teacher. Although she felt Edukata a little difficult to understand at first, she found discussing the process with the NPC had been helpful. She also felt that the use of online planning tools helped her to structure the session. She used Moodle to upload and share resources and a project management tool (6QS) to create a timeline and plan each aspect of the process in detail.

Teacher S felt the concepts underpinning Edukata linked well with the aims of the school, which had recently become a social and environmental specialist school. The workshop therefore gained the support of the head teacher and was seen as an opportunity to inform teachers about the new focus for the school. This helped to overcome the barrier of a lack of time; getting teachers together for the three sessions may have been difficult had Edukata not been linked to this wider agenda.

Although Teacher S used digital tools in her planning for the workshop, technologies such as the Composer were not used during the session because she felt her colleagues might find an emphasis on digital tools off-putting as they were “not so technically oriented”. On the other hand, the use of sticky notes was well received.

The Teacher S expressed the view that if she were to run the workshop again she would give teachers more say in deciding the agenda as this would be likely to help motivate them, leaving them more likely to continue using the approach after the session. She also felt that a translated version of Edukata would have made the process more accessible to teachers in Israel. Another suggestion was to provide a more visual representation of the process, for example, using a mind map to make the concept more immediately understandable for teachers. However, as Teacher S explained, the best way to understand the process is simply to put it into practice:

In order to really understand Edukata one needs to actually work with it – it is pretty hard to explain to teachers what Edukata is – you need to jump into the water and experience the Edukata workshop in order to understand the Edukata way of working.

The process has since been used on another occasion within the school. Teacher S’s description of this episode demonstrates the way in which teachers have already accepted the Edukata process as a valid working method:

...we had an issue in the school that we wanted to tackle in the teachers’ room in terms of learning and teaching in our school. Suddenly the teachers themselves and I remembered that we have a great tool that can help us with the thinking process – Edukata... The teachers felt the fact that in Edukata there is a proper way of getting to a result whilst aiming at the challenges and ways to go about them.

7 http://sixqs.com/sixqs-site/index.xsp
Teacher as designer of learning: moving beyond the isolated teacher

In accordance with the ethos of iTEC, each country therefore adapted the Edukata process in different ways, using different tools to support the process; and simplifying and selecting aspects rather than implementing in full. Therefore, the findings presented below represent the reactions to the principles of the approach rather than the adaptation of the full process as documented in the accompanying teacher guide.

The Learning Activity design process is perceived to have potential to develop innovative and creative teaching practices in the classroom.

Feedback from the small number of teachers involved in the Edukata case studies was positive; they enjoyed participating in the workshop (8 interviews; n=13) and the process (6 interviews); the opportunities to think differently about their practice (6 interviews); be creative (4 interviews); and collaborate with others (including those from other schools) to design learning (4 interviews). Two teachers commented that the emphasis on digital tools was innovative.

*It has been very inspiring...I still have to step beyond my comfort zone and that is challenging, but I realise it is good for me because I need to know these new things about teaching with technology... this is one way to train myself and to get familiar with it. (Finland, teacher)*

*It was nice to work with so many colleagues. You gain ideas; you can tell your ideas; you get constructive criticism to enrich your ideas. It’s a nice way of working. It adds something extra to your teaching. (Finland, teacher)*

*We started to think that we can teach differently. The most important was I stopped [being fearful]. (Slovakia, teacher)*

The aspects of the workshop that workshop facilitators (n=8) felt had worked particularly well were: sharing experiences and working in groups (4); and encouraging people to think about challenges (2).

The Learning Activity development process needs to be simplified, more flexible and the presentation improved (more interactive).

The process that was piloted was perceived to be too time-consuming and complicated for regular use, particularly for a single lesson (3 interviews, 2 NPCs; n=11). Some repetition in the stages of the process was also noted by one workshop facilitator, conveying the responses of participating teachers. The concept of a LA, as an element of a LS was perceived to be difficult for some teachers to understand (2 NPCs, online course facilitator).
The concept of Learning Activity is hard to understand for teachers. They mostly don’t really understand how long a Learning Activity is, where the borders of one activity are. (Hungary, NPC)

Five NPCs noted that teachers found the participatory design process difficult to engage with, being more used to planning lessons alone but also finding the development of Learning Activities challenging. Four workshop facilitators also confirmed that teachers had found it difficult to engage with some aspects of the process.

*It’s too much work for them. They normally don’t plan activities like this... it’s much more like a toolset for curriculum designers...normally teachers don’t do so much work, they don’t spend so much time.*... (Estonia, NPC)

*Our teachers are not used to cooperating, so the most difficult aspect to understand and to explain to teachers is that they have to make decisions in a group.* (Slovakia, NPC)

Other challenges included: teachers’ lack of ICT skills and competencies (2 interviews, 1 NPC, 1 facilitator), absence of predetermined outcomes (1 interview, 1 NPC), lack of infrastructure (1 interview) and curriculum constraints (1 interview).

The accompanying teacher guide (a paper booklet) was viewed positively (6 teacher interviews).

*It’s simple and it has really good ideas and it helps you to work with this learning design process.* (Finland, teacher)

*...it is well structured, clearly stated and gives the path to a successful implementation.* (Spain, teacher)

Suggested improvements included providing an interactive version (1 interview, 3 NPCs) and translations into national languages (1 interview, 1 NPC). NPCs (5 of 11) also perceived that the toolkit would benefit from more examples demonstrating the different elements of the process.

**Anticipated future uses of Learning Activity development approach vary by country, and are thus context dependent.**

Of the 12 teachers asked about post-workshop activity, five had already implemented the Learning Activities they had created and five planned to do so. Five of the 12 teachers had also shared their experiences of the Learning Activity development process with colleagues. However, other teachers had some reservations about disseminating the ideas. Only three of the 12 teachers said that they would feel confident enough to facilitate the process with colleagues in their schools.
They have showed interest on one hand, but were afraid of using new tools and technology during their lessons. I think some of them are likely to be interested in becoming involved in Learning Activity design but they need some time to use it with confidence. (Hungary, facilitator)

NPCs were asked how the learning development process might be used in the future; their responses differed somewhat:

- In teacher training and professional development (AT, EE, HU, SK)
- By classroom teachers (FR, IT, PT)
- At school level (IT, HU, PT, SK)
- At national level (FR)
- To both design new, and adapt existing, learning activities (HU, PT, SK)
- To develop new learning activities only (FR)
- To support a developmental process from adopting existing learning activities to developing new ones (IT)
- As part of an activity drawing on other parts of the iTEC offer (HU, IT, PT, TR).

The Composer

The Composer is a tool that supports teachers, as well as NPCs and NTCs, in composing LAs and LSs and managing resources such as applications, content, devices, and events. In C5, the primary use of the Composer was as part of the LA design workshops in some countries.

An interesting framework for collaboration and sharing, but requiring significant improvements to be of value to teachers engaged in learning design

Data on the Composer was collected via technology focus groups with teachers (9); Edukata case studies (2) and a focus group with NTCs. It was also mentioned in some pilot case studies (2) and an additional Edukata workshop facilitator survey.

The Composer was felt to have potential and to provide an easy to understand framework to assist teachers writing their own LSs; it can provide inspiration, especially for those creating LSs or LAs for the first time (8 focus groups). The idea of having a library of LSs was viewed positively. The Composer was also seen to be useful for teachers unsure where to find good learning activities and examples of ways to use technology in their teaching.

Among the two groups of teachers who had used the Composer as part of the Edukata process, the features of the Composer believed to be ‘essential’ were:

- the capacity to add your own ideas and tools

---

8 In France the benefit of professional development was recognised but the main driver was perceived to be the classroom teacher
9 The Composer formed part of the Edukata process in two of the case study countries (ES, SK).
being able to publish your ideas for others to see
being able to collaborate with others to develop learning activities\textsuperscript{10}.

The ability to work collaboratively on LA design with other teachers and share ideas via the Composer was viewed positively, although, of course to evaluate how this might work in practice a greater number of users would be required.

\textit{It is online and shared, so this is good space to cooperate. [...] It is also a question how the teachers outside pilot teachers of iTEC get acquainted with the system.} (Slovakia, teacher)

Teachers also liked the idea of having access to a bank of resources which could provide inspiration:

\ldots\textit{when I want to design a new learning activity, then I have somewhere the bank of ideas.} (Slovakia, teacher)

\textit{I think this is good for teachers to get inspiration, so I would recommend this tool. They can also use it (learning activity) as it is or adapt it.} (Slovakia, teacher)

Some teachers liked looking at LAs created by others, at least initially, but others commented that they would prefer to create their own LAs as this offered them greater creative freedom and flexibility:

\textit{Creative teachers would like to create their own activities} (Slovakia, teacher)

\textit{Create new ones is better as we can write exactly what we need} (Spain, teacher).

A teacher in a school that was implementing IB (International Baccalaureate) courses commented that the Composer fitted with this curriculum as it requires collaborative curriculum design and a transdisciplinary approach.

The following features of the Composer elicited the most positive responses amongst NTCs:

\begin{itemize}
  \item accessing a bank of learning activities to stimulate ideas
  \item seeing what tools and technologies other teachers have used to deliver learning activities
  \item publishing your ideas for others to see
  \item the provision of a structured format for writing learning activities
  \item having a central resource in which project activities might be stored.
\end{itemize}

\textsuperscript{10}‘being able to publish your ideas for others to see’ and ‘being able to collaborate on the writing of a learning activity’ were also viewed highly positively by a group of Lithuanian teachers who were asked this question during the technology focus group.
Challenges of using the Composer

Lack of time was one of the challenges felt likely to deter teachers from using the Composer:

…it is time consuming to fill in all parts of the activity and it is a question if they would like to find their time for that. (Slovakia, teacher)

Another teacher, however, suggested that the Composer could save time as it meant teachers did not have to develop their own resources.

Similarly, in the pilot case studies, while teachers were positive about the concept behind the Composer, believing it provided “an interesting framework” (France, teacher), they felt that the present version required considerable development:

...the idea is good, but.. It was very disorganised with all the different parts (Norway, teacher)

The most frequent complaint was around the complexity of the interface or structure of the Composer, which was felt to be likely to be off-putting to teachers. One interviewee felt that the purpose of this tool was unclear and more explanation would be helpful:

...the thought is good, sort of, but I'm a little unsure what I can use [it for]. (Norway, teacher)

In the NTC focus group, time was also reported as the main barrier likely to prevent teachers using the Composer. It was described on several occasions as a ‘heavy’ tool. While it does not work well as a way for teachers to plan day-to-day lessons, NTCs felt it would fit better as a supporting tool for the learning scenario or learning activity design toolkit, as part of a whole school planning process which can help schools to ‘change direction’. This group also noted a potentially confusing overlap between the roles of the Composer and SDE.

In the technology focus groups, technical and design difficulties had made it difficult for some teachers to use the Composer (eg. poor layout, complicated login, translation problems). It was described as “very slow and confusing” and “too complicated” for teachers, especially those not already familiar with iTEC concepts (5 focus groups). In Slovakia, the Composer was felt to offer similar functions to an existing commercial portal\textsuperscript{11}.

Suggested improvements

Teachers in the Edukata case studies commented that it was important that the Composer was reliable and functioned across different platforms. They also felt that

\textsuperscript{11} www.zborovna.sk
improvements to the interface were required to make it more ‘friendly’. In particular, teachers felt that improved search mechanisms and better classification of LAs were necessary, for example:

As it is now [it] needs more indexing, more filters, more searching tools...needs filters by ages, courses, level of innovation maturity, level of difficulty of implementation (Spain-SMART, teacher)

One teacher commented that the Composer might be better integrated into the Edukata process by marrying up the structures of the two tools more effectively. He felt that, currently, the Composer was “not on the same wavelength as Edukata” (ES) and required teachers to rethink the activities they had created during the Edukata workshop to fit into the format prescribed by the Composer.

In the technology focus groups, suggestions to improve the Composer included making use of ‘drag and drop’ to populate the template more efficiently; improving search and browsing functions, and offering more tagging and filtering opportunities; as well as making it available in all national languages.

In a focus group with NTCs, the following suggestions were made to improve the Composer:

- It is not easy for teachers to collaborate on designing learning activities using the Composer; NTCs felt that teachers would welcome the ability to collaborate to co-design activities.
- There need to be more ways to search the learning activities eg searching by keywords, not just 21st Century skills
- Teachers should be able to rate/score learning activities
- It only supports the final presentation of learning activities; NTCs wanted a tool which supported the planning process: “it’s the end step of the design of a lesson, but not the innovation moments...we need a tool that they [teachers] can very, very quick mix and remix [ideas/activities/tools]” and “It doesn’t help you design...you bring all your information into it...there needs to be something which holds everything together...something like a mind mapping tool”.
- More flexibility is needed, for example, teachers should be able to choose different ways of configuring their LA: “The tool doesn’t help me to plan very complex, differentiated ways to work around a topic...there should be more options and more starting points for designing a learning activity”

The SDE

The Scenario Development Environment (SDE) is a prototype recommender system which takes into account the user’s profile (for example school level and subject) and can provide recommendations for resources such as applications, events, widgets and lectures. Users can create their own resources and, for the purpose of testing, a standalone prototype tool was provided which also enables teachers to create their own LS and/or LAs.
Some positive reactions, but feedback to date is very limited

The SDE was used to support the LA development process in one country (FI). In addition, NPCs were asked to recruit 15-20 teachers to test the SDE and complete an online survey. In total, twenty responses (from AT, CH and PT) were received to this survey, designed and administered by WP10\(^{12}\). Perceptions of the SDE were also gathered through the technology focus groups.

The SDE was well received overall; it was perceived to be one of the most useful prototypes generated as part of the project in focus groups in three countries (AT, LT, TR); 12 out of 20 survey respondents rated the SDE as ‘excellent’ and the remainder of respondents rated it ‘good’. All respondents agreed it was easy to interact with the SDE and that they would recommend the tool to other teachers. The SDE and recommender feature allowed teachers to discovered new and interesting resources, an experience they valued.

When rating aspects of the SDE for ‘appropriateness and completeness’ the most highly rated types of resource were OERs, applications and biographies (19 or 20 respondents rated as good or excellent). Least highly rated were articles and posts (14-15 rated these as good or excellent).

The strength of the SDE appears to be in returning a greater variety of educational resources (15 out of 20 respondents) and more precise results (14 respondents) in comparison to Google. There is some suggestion that the SDE may disambiguate responses (find context-relevant examples) better than Google (15 respondents), but the evidence to date is weak and this claim needs to be investigated further.

Suggestions for improvement included: a better interface/layout (2 respondents); wider dissemination (1 respondent); ensuring fewer irrelevant results are returned (1 respondent); and offering the ability to search all resources simultaneously (1 respondent).

In the technology focus groups, feedback on the visual appearance of the SDE was positive. However, some teachers felt that the SDE provided the same functionality offered through the Composer and the People and Events directory, thus making these other tools redundant. Furthermore, it was noted to be particularly useful for less experienced teachers.

\(^{12}\) The SDE evaluation is reported in greater detail in D10.4
3. Impact on learning and teaching

This chapter starts by looking at the impact of iTEC on teachers' pedagogical and technological practices. It then reports teacher feedback on the iTEC tools used during this cycle, before reflecting on the impact on students. It draws on data from the teacher survey, student survey, pilot case studies, questions for NTCs (Widget Store) and SDE survey.

Impact on pedagogical innovation

Pedagogical innovation was the most important feature of iTEC for most teachers, resulting in changes in the roles of students and teachers, and in the uses of technology.

For the majority of teachers in the pilot case studies, the pedagogical innovations of iTEC appeared to be of greater significance than the technical innovations:

There was no big change in technology itself, the pedagogy changed in a radical way.
(ICT Co-ordinator, Austria)

It would be great even without the use of technologies. iTEC is primarily a learning design approach. It gives you a “line” [to follow], and this is where innovation is.
(Teacher, Italy).

The following innovative aspects of pedagogy introduced through the iTEC approach were identified in the pilot case studies:

- More use of technology in lessons (ES, LT, PT)
- Change in the role of the teacher (ES, PT)
- Using learning environments beyond the classroom (LT, PT)
- Working in groups (LT, PT)
- Use of inquiry-based/exploratory learning (AT, FR)
- Involvement of parents in learning (LT, PT)
- Use of the flipped classroom model (ES)
- Support for reflection (AT).

When teachers responding to the survey were asked to rate how different their pedagogy was when implementing the LS in comparison to what they were doing before on a scale of 1-10, the mean and median score was 6; the mode was 713. For around one-quarter of teachers (24%; n=259), the iTEC pedagogy was not markedly different to their previous teaching methods (a score of 1-4). However, for 6%, iTEC was felt to be ‘radically different’.

13 The standard deviation was 2.32
When teachers surveyed were asked how their pedagogy was different when implementing the LS, the most frequent response was to mention changes which had resulted in the role of students (21%: n=254) as they became more independent in their learning and started to become more autonomous and less reliant on their teacher:

*I gave the students more time for their own research. Normally I give them the facts* (Czech Republic, teacher)

*We changed part of the teaching and learning process, making it more active and more participative.* (Spain-SMART, teacher).

According to 14% of respondents, there had been a change in the ways they were using technology within their teaching:

*...the use of technology was more present than in my usual pedagogy.* (Finland, teacher)

*In using of technology. I am a teacher at 1st grade of primary school, it is not usual to use ICT with such young children in our country.* (Czech Republic, teacher)
8% of respondents highlighted the change in their own role as they took on a more facilitatory or guiding role, reflecting changes described by others in the role of students:

I worked much more as a tutor / coach rather than a teacher who transmits content (Italy, teacher)

As a teacher my role was different: I felt like a team leader and innovator instead of being a teacher. (Finland, teacher)

7% referred to a noticeable increase in student motivation in response to this question:

...more effective, stimulating and motivating for pupils, they enjoyed the lessons (Czech Republic, teacher)

The incorporation of more group work was a change noted by 6%:

Facilitating cooperative learning - there is greater interaction between students (Spain-SMART, teacher)

According to 5%, iTEC had changed the way in which they planned lessons:

Usually when I design a learning unit, I start from the subject content and the learning objective and then consider which tools and resources can be used to promote the development of the foreseen competences. In this trial it was all reversed, that is to say I began with the technology to then plan the subject competence to be achieved. The approach was therefore reversed. (Italy)

Other changes noted by a small number of respondents (<5%) included: an impact on evaluation and assessment processes; changes to the learning environment; and collaboration with other teachers and the use of cross-curricular approaches.

While the majority of respondents identified important changes in their pedagogy through iTEC, it should be noted that 9% felt there had been no significant change in comparison to their previous approaches:

The method of working in teams and guided investigation [inquiry-based learning] was already part of the method applied in class, so it has not been different from what I did [previously]. (Spain-SMART, teacher)
One of the most significant changes reported by case study teachers was the change in the role of the teacher, from ‘expert’ to ‘guide’ or ‘coach’ (6 case studies). This change had implications for the teacher-student relationship and impacted on the role of students, especially their development as independent learners. This was noted across all stakeholders: teachers, head teachers, students and external partners:

And then we have teachers who are liberating themselves from the school book. They operate in a more theme-based manner, they get the students involved in getting to grips with their own ideas, their own thoughts, driving them, developing them and picking up the whole subject through that. (Head teacher, Norway)

Yes, it did change. It shifted the pedagogical activity from the teacher to the pupil, the teacher became the guide, the pupil is more in charge of his own learning, research and questioning. Everything that involves drawing away from the expository method, that includes new technologies, granting pupils some autonomy, searching for contents, organising their own work... It makes pupils grow, enhances their commitment, prevents them from looking at the watch the whole time. Classes become more attractive. (Teacher, Portugal)

I think that is where things need to be shaken up: The relationship between teacher and student... And I think that there is fundamentally... that there is a mind-set that needs to change... but it’s delicate... there are some things that can't be changed
easily. [...] But I... I think there is something that happens in this particular environment...In...giving children a sense of responsibility... (External stakeholder, France).

The role of iTEC in developing students as independent learners is also described in the Italian pilot case study. (Appendix D).

Impact on technological innovation

Technological innovation was evident in the use of new tools; student use of technology; and using technology in more creative and collaborative ways.

When teachers surveyed were asked to rate how different their use of technology was when implementing the LS in comparison to what they were doing before on a scale of 1-10, the mean was 6.2; the median and mode were both 7\(^{14}\). For one-quarter of teacher (25%; n=259), their use of technology in iTEC was not markedly different to their previous teaching methods (a score of 1-4). However, for 8.1%, iTEC was felt to be ‘radically different’ (a score of 10).

Aspects of iTEC which case study interviewees felt were particularly innovative technologically included:

\(^{14}\) The standard deviation was 2.46
- Using new technologies (AT, PT)
- Use of a wider range of websites (EE)
- Using a wider range of technologies (NO)
- Using technology to support collaboration (NO)
- Use of social media in the classroom (NO)
- Using technology more regularly (FR)

When teachers surveyed were asked how their use of technology was different when implementing the LS, the most common response, was to refer to the use of new tools within their practice (24%; n=254):

*It was completely different; the use of IWBs and Google environments which are not used in the classroom very often. (Spain, teacher)*

*We used the newly learned technology, and its applications, normally I use books and electronic teaching materials (Finland, teacher)*

19% of respondents mentioned changes in the ways in which their students had made use of technology during iTEC:

*Before, technology helped me to present the content and activities to be done in class and now students use technology to learn for themselves. (Spain, teacher)*

*Students had to use ICT effectively and sort the information. (Czech Republic, teacher)*

11% simply indicated that they had made more use of technology while implementing the LS. 5% said they, or their students, had used technology more creatively and produced different types of outputs:

*It strongly supported pupils’ creativity (Finland, teacher)*

*...allows the development of multimedia projects that otherwise would be impossible. (Spain, teacher)*

The same proportion (5%) said they had used technology in new ways, for example:

*I’ve used it for brainstorming, surveys, self-assessments, vocabulary ... (Spain, teacher)*

Other changes mentioned by a small number of teachers (<5%) included more effective integration into the curriculum; using technology for reflection and assessment; and communication with other teachers.

As with changes in pedagogy, while the majority of teachers were able to identify changes in their use of technology during iTEC, 14% said there had been no change:
It wasn't different. We have been using technology for many years in our school. (Spain, teacher)

The most commonly used digital tools were digital resources (80%; n=259) (eg. e-book, educational software, videos/animations and databases); data capture devices (79%) (eg. audio/video recorders and cameras); and communication tools (79%) (eg. email, blogs, Skype and IM). The least frequently used resources were more subject-specific, such as high-tech instruments for science (9%); virtual experiments/simulations (20%) and document cameras/visualisers (24%).
60% of teachers (n=221) said the digital tools they had used included ones they had not used before. Among those who gave details, these new tools were most commonly iTEC tools, particularly TeamUp (24 teachers). Beyond this, teachers referred to a wide variety of tools depending on the learning activities they were implementing, for example, video editing software such as iMove/Moviemaker, Aurasma augmented reality software, robotics software, collaborative writing tools such as GoogleDocs, blogs, EEG, mindmapping tools, programming tools such as Scratch and Construct2, and wikis.

The Lithuanian pilot case study (Appendix D) illustrates how iTEC teachers could make use of a wide range of technologies within their teaching.

When asked what the digital tools they had used had enabled them to do which they could not have done otherwise, 22% of teachers who responded (n=251) said they had enabled presentation and sharing of student work to occur in different ways:

- We managed, through the use of students’ smartphones as hotspots, to connect to the class blog and to the blogs of individual groups and so follow the project’s development which it was possible to see on the IWB. (Italy, teacher)

- To share work in the cloud, allowing parents and the community to become more involved in the project (Spain, teacher).

15% described how digital tools had been used to support student collaboration:
Sharing of products was very easy: using Dropbox every pupil could share his or her products with anyone. (Finland, teacher)

Share documents, photos ... between the students within the group, which was important for the final output. (Spain, teacher)

For 10% of respondents, digital tools had changed the way in which students could access information:

It allowed each student to carry out research rather than the whole class trying to use a single book or magazine. (Spain, teacher)

Changes to reflection and assessment via digital tools was a change mentioned by 8% of respondents:

They granted me a careful observation of the different ways interaction in group work took place and a more considered supervision of the ways of carrying out independent research (Italy, teacher)

To effectively track the progress of teams’ work, their exchange of ideas, their contributions in the form of feedback both within and between different teams. (Spain, teacher)

The same percentage (8%) said digital tools had allowed them, and their students, to engage in new types of activity that would not have been possible otherwise, for example, making videos, creating images and using geo-location games.

Pixton program was used to made neat and nice comic strips. Otherwise they should have been done by drawing and the result wouldn’t have been that nice and motivating. Videoing and editing the videos was also an important part of the project. (Finland, teacher)

8% of teachers reported that the digital tools had provided a means for them to motivate students:

The main thing is that students have enjoyed learning. (Spain, teacher)

7% described changes in teacher-student communication:

Connect and communicate with students in a faster and more direct way (Spain, teacher)

Just 4% said the digital tools they had used had not enabled them to do anything they would not be able to do otherwise.
To investigate the potential of the iTEC approach in supporting more radically innovative approaches, a number of teachers were invited to take part in 'radical pilots' which ran concurrently with C5. These teachers took part in a radical innovation workshop in Brussels on 8th/9th April 2014 where they designed their own scenarios and learning activities using the iTEC toolkit. Teachers were supported in implementing their radical pilots in a variety of ways including webinars, face-to-face visits from technology partners and online peer support communities. The pilots were written up as case study reports by the individual teachers involved.

An analysis of the teacher reports suggest that these radical pilots differed from the C5 pilots in that they involved teachers from more than one country working together to develop, and then implement, activities. Students also communicated with their peers in other countries, for example, acting as evaluators of each other’s work. This naturally presented a number of logistical challenges as teachers and students needed to find ways to communicate and share content. Access to appropriate technical solutions was critical in facilitating this communication.

In many other respects, however, these radical pilots were highly similar to other case studies from C5, and from previous cycles, for example activities included, designing maths games in Scratch and creating a presentation about the local area.

### Radical pilots

**What did the digital tools enable you to do that you could not have done otherwise?**

- Presentation and sharing: 22%
- Supporting collaboration: 15%
- Accessing information: 10%
- Reflection & assessment: 8%
- New activities: 8%
- Motivating: 8%
- Teacher-student communication: 7%

n=251
It was also notable that these radical pilot teachers experienced many of the same barriers as other iTEC teachers, for example, time, basic technical problems; and a lack of resources. The teachers undoubtedly valued the support they had received in conducting these activities from other teachers, their local community and technical partners, as well as from WP4, but it is difficult to claim that this additional support resulted in pilots which could truly be considered pedagogically ‘radical’ at an international level.

Examples of radical pilot case studies are provided in Appendix E and further details and analysis of the radical pilots are available in D4.5.

iTEC technologies

TeamUp

TeamUp has become a familiar tool to iTEC teachers and is viewed positively as a means of supporting both group work and reflection. Of course, teachers need to use their discretion when deciding which classes to use it with, and when to ‘overrule’ the tool.

Feedback on TeamUp was largely positive. Teachers who took part in technology focus groups felt it was an intuitive tool and a good way to form groups and avoid the problem of students arguing about who they wanted to work with. However, they had found it worked better for some groups than others. The reflection feature of TeamUp was also viewed positively (3 focus groups) as this gave students an opportunity to develop communication, critical thinking and reflection skills as well as supporting peer collaboration and sharing. There were still a few technical problems, for example, when teachers tried to use TeamUp with iPads. The need for a webcam to use TeamUp effectively was a problem for some teachers (2 focus groups).

Suggestions to improve TeamUp included adding further project and classroom management tools such as mind mapping software, planning and reporting tools; allowing more ways to personalise student profiles; the ability to use TeamUp without access to a webcam; and integrating TeamUp with mobile devices.

Likewise, pilot case study teachers were generally positive about using TeamUp. One described how its use supported not only reflection and critical thinking skills, but also students’ ability to organise and summarise information; oral communication skills; and team working:

*With TeamUp [...] the pupils were encouraged to gather, organise and understand facts, while managing the information to fit into the 1 minute time frame, all of which was done in group work, where they had to manage different personalities and work collaboratively. They also practised oral presentations, the need for clarity, and good diction.* (Teacher, Portugal)
However, another teacher explained how it was necessary to use discretion with reference to ‘inside information’ about students when using TeamUp:

*TeamUp is very useful when dividing students into groups. [...] At the same time, I need to be careful, because I know that, for instance, there are two students in a class that should never be in the same group. If they do end up in the same group, I have to come up with a trick to separate them. For example, I say that there seems to be too many girls in this group so perhaps we should mix the groups up a bit. So, this is how I try to solve this issue. But this is only this inside information – you simply know that these two, at this stage, are not able to work together effectively. Their being in the same group will hinder the work. (Teacher, Estonia)*

Comments suggested that teachers felt that TeamUp was best suited to lower secondary students.

Of those teachers responding to the survey, 72% had used TeamUp (n=251), with:

- 38% of teachers using TeamUp to form teams only
- 4% using TeamUp to record reflections only
- 30% using TeamUp to both form teams and record reflections.

Among survey respondents, TeamUp was most frequently used by teachers in Austria (11 out of 12), Italy (12 out of 14) and Lithuania (15 out of 19).

82% of those teachers responding (n=180) said they would recommend TeamUp to other teachers and 77% said they intended to use TeamUp again in the future. 67% believed that TeamUp has potential to lead to pedagogical innovation, while 64% felt it has potential to lead to technical innovation. 72% had shared their experience of TeamUp with other teachers outside iTEC.
ReFlex was not widely used; some teachers were unsure how to use it effectively. The evaluation data on this tool is therefore very limited.

Twenty-eight teachers responding to the survey said they had used ReFlex. More than half of these (16 teachers) were from Turkey. There were also 6 users from Austria, 3 from the Czech republic and one each from Finland, Spain (Promethean) and Lithuania.

24 out of 27 of teachers responding agreed that Reflex has potential to lead to pedagogical innovation and 22 thought it has potential to lead to technical innovation. Twenty-two teachers said they intended to use ReFlex again in the future and the same number had shared their experience of Reflex with other teachers outside iTEC. 23 said they would recommend Reflex to other teachers.
Teachers in the technology focus groups had made very little use of ReFlex (mentioned briefly in 4 focus groups); in one group it was described ‘redundant’ because it performed largely the same role as TeamUp. Another felt that training in how to collaborate and share using ReFlex was needed.

**The Widget Store**

The Widget Store faces from competition from existing commercial ‘stores’ already familiar to teachers. Where significant levels of support were made available, teachers used the Widget Store in more creative ways, but this requires a higher level of technical expertise than most teachers currently possess.

Thirty-nine teachers responding to the survey had used the Widget Store. Three-quarters of these came from just three countries: Austria (11 teachers), Italy (9) and Portugal (9). Small numbers of teachers from Estonia (1), France (2) and Spain (7) also made use of the Widget Store. Just under half the teachers who used the Widget Store (19) created their own widgets. The majority of these were from Austria (8) and Portugal (6).

Teachers used a variety of widgets. Unsurprisingly, the iTEC tools (TeamUp, Composer) and tools referred to in the LSs were most frequently mentioned. Online tools which could replace existing basic student equipment, such as the calculator and stopwatch, were also popular. The following Wordle shows the widgets mentioned by survey respondents.
Teachers used the Widget Store in a variety of ways to support their teaching, including:

- **Lesson planning**

  *I used the notepad to remember things we had outstanding and relevant information for the session. (Spain-SMART, teacher)*

- **To create teaching resources**

  *I created concept maps that have helped my students at the beginning and end of the topic (Spain-SMART, teacher)*

- **Integration into wider student support systems**

  *To create a "widget" documents / digital resources created on various platforms in order to integrate them into the student support website. (Portugal, teacher)*

  *I put the widgets in the codes Facebook and Moodle class page for students to use and chose the ones that would be useful to them. (Portugal, teacher)*

Thirty-four teachers commented on the potential benefits of the Widget Store for learning and teaching. Of these, eight mentioned easy access to a repository of useful teaching and learning resources:

*A collection of useful widgets for teaching centrally available (Austria)*

---

15 Note: Many teachers answered this question by commenting on how they had used a specific tool (eg. ‘I used TeamUp to form teams’, rather than reflecting on the role of the Widget Store per se.
It’s very useful having a repository where, at the time of need, you can find what’s necessary for the activities in class to be carried out. (Italy, teacher)

Four teachers referred to the fact that they believed the Widget Store offered access to high quality resources that would meet teachers’ needs:

Application repository of acceptable quality (Portugal, teacher)

Ability to access a range of resources already tested, safe and directed to the specific activity of the moment (Italy, teacher)

For three teachers, the potential of the Widget Store to save them time was an attraction. Other potential benefits included:

- A method for creating widgets
- An innovative approach
- The potential to support the use of mobile technologies in the classroom.

Twenty-eight teachers shared the widgets they found or created with other teachers. Those in Austria (10) and Portugal (6) were most likely to do this.

31 out of 34 teachers responding said they would use the Widget Store again and the same number said they would recommend it to other teachers. Twenty-nine agreed that, providing it contains more useful widgets and is easily accessible, the Widget Store has the potential to lead to technical innovation; to enable teachers to select and use digital tools and services as and when needed; and to be a useful tool enabling teachers to access and gather a wide selection of digital tools and services in one place. Twenty-eight believed the Widget Store would enable teachers to discover new digital tools and services which are useful and will help them to change their practice. Twenty-five felt that the training and support they had received enabled them to make effective use of the Widget Store.
In most countries, teachers in the technology focus groups had simply used the Widget Store to find useful widgets to use with their students. In Portugal, however, several teachers had also created their own widgets and supported their students in creating widgets. Overall, feedback was mixed. In Portugal, where teachers had made greater use of the Widget Store (supported greatly by the NTC), the Widget Store was perceived as “having a lot of potential”. However, others felt that the Widget Store would struggle to compete with similar commercial services that are widely used by teachers (2 focus groups). The fact that widgets were often not linked to the iTEC LSs was a problem as this made it difficult for teachers to find ways to use them in their projects (1 focus group). Many teachers, even those who were generally enthusiastic about the Store, felt that more practical and high quality resources (7 case studies) and an easier navigation system (4 case studies) were needed to make the Store viable. Problems finding widgets to meet their needs meant they would prefer to simply use a search engine to find good tools as they believed this approach would be more effective.

Four NTCs provided feedback on the use of the Widget Store in their countries (AT, IS, IT, PT). Their responses indicate how the ways in which the Widget Store was used by teachers varied between countries and depending on teachers’ technological abilities and confidence. In Austria, the NTC reported that a small selection of widgets proved particularly popular among teachers\(^\text{16}\). Teachers tended to use just one or two widgets regularly rather than exploring a wide range of widgets. In Israel, a difference was noted in the use of the Widget Store dependent on teachers’ technological expertise. Those not yet accustomed to using technology and to integrating it fully in their teaching saw the Widget Store primarily as an

\(^{16}\) Scientific calculator, Geogebra, MathsMan and Biological footprint
organisational tool to store useful resources, while those with higher levels of technical expertise, such as technology oriented pedagogical coordinators, created and added their own widgets. Similarly, in Italy, it was noted that the ways in which it is used need to be expanded beyond using the Widget Store simply to search for useful content. Focussing on the opportunity for teachers to share content would ensure the Widget Store has pedagogical, and not just administrative, value.

According to NTCs, teachers’ levels of digital literacy made using the Widget Store a challenge for some:

*The teachers who are not technologically oriented they had a hard time using a shell and implementing the widgets in their curriculum (IS).*

Furthermore, as one NTC pointed out, while many iTEC teachers had the skills to use the Store, the same would probably not be true of a more representative group of teachers. In particular, creating widgets and embedding content rather than linking to it would be challenging for many teachers. The fact that many iTEC teachers were experienced users of technology brought its own challenges. They often preferred to stick to tools they already knew and trusted; it was difficult to convince these teachers of the added value of the Widget Store. In a similar vein, NTCs also referred to the number of new technologies already available to teachers, both within this cycle of iTEC and more generally in various ‘app stores’. This led to teachers feeling “overwhelmed” (IT) by the number of resources available. Persuading head teachers of the value of the Widget Store was another challenge.

**Suggestions for improvement**

NTCs and technology focus group teachers made a number of suggestions for future developments or improvements to the widget store:

- Improved categorisation of widgets and more information about potential uses of widgets to help teachers find relevant ones (NTCs: IS, PT; TFG: EE, IT, SK, PT)
- An increased number of widgets (perhaps achieved by linking to the SDE or LRE) (NTC: PT; TFG: IT, PT, SK)
- More quality control of widgets (NTC: PT; TFG: EE, IT, NO)
- An improved search facility (NTCs: IS, PT)
- Integrating the widgets store in the LMS/platform to make it easier for teachers to access (NTC: AT)
- The inclusion of widgets which support construction or interaction, not simply content with e.g. simulations, java tools (NTC: AT)
- A rating system to help teachers identify high quality widgets (TFG: LT)
- Greater adaptation to local needs (NTC: IS)
- A ‘widget of the week’ (TFG: IS).

Similar ideas were repeated by the teachers surveyed. Of the 35 teachers who identified potential challenges of the Widget Store for learning and teaching, 7
commented on the need to increase the number and variety of widgets available. A further seven teachers described problems implementing the Widget Store due to technical barriers within the school environment. Four teachers felt that the ways in which widgets were arranged within the Widget Store and the search facilities could be improved, for example:

...easier to search for resources according to curriculum subjects, and within these according to the various themes. (Portugal)

Four teachers commented on the need to ensure the Widget Store is easy to use (perhaps to reflect the current level of teacher skills):

Keeping the access and use of such a low threshold, and easy for teachers, so it is often used. (Portugal).

Two teachers explained why they would be unlikely to use the Widget Store again. One said they had found nothing of interest and the other described problems in the search facilities and cataloguing of resources in the Widget Store. One teacher said they would be unlikely to recommend the Widget Store to other teachers because, in its current incarnation, it would be unable to compete with similar commercial services available. Only one teacher commented on a way to improve the training; this individual said they would have liked classroom training.

Impact of iTEC on student experience

There is evidence that participation in iTEC had a positive impact on students in many ways, including collaborative learning; increased use of technology; more opportunities for independent learning; and motivation. Both teachers and students reported improvements in attainment and 21st century skills.

When asked about differences in their students' experiences when implementing the Learning Story, 20% of teachers responding to the survey question (n=251) noted the opportunities afforded for team working and collaborative learning experiences.

The participatory and cooperative climate in the classroom improved. (Italy, teacher)

Until now, the work was more individualized and less motivating. With group work they had to plan, discuss and make decisions together. (Spain, teacher)

18% referred to the use of new tools and resources:

I've had this class only from the beginning of this year and the students have almost never used ICT in school so for them everything was new. (Italy, teacher)

Pupils learn to use iPads and different apps; they loved to use mobile phones during the lessons. (Finland, teacher)
For 15% of respondents, opportunities for independent learning presented an important difference for their students in comparison to usual classroom practices:

*They have not had the opportunity to work in such an autonomous way previously (Spain, teacher)*

*They have been able to take their own initiative in the choice and use of technologies which they considered most appropriate to achieving the learning objectives; they acted independently and responsibly. (Italy, teacher)*

The same proportion (15%) referred to greater student motivation encouraged through iTEC.

*They were so engaged that they stayed beyond school hours for 6 afternoons in order to bring their work to a close (Italy, teacher)*

*It has been noticeable that they are more motivated to work and eager to learn more. (Spain, teacher)*

A smaller number of teachers felt the new ways of studying, or new types of tasks, represented a change for their students (6%):

*They experienced new ways to study and think. (Finland, teacher)*

6% mentioned student involvement in the design and organisation of their learning as a notable change:

*They have been involved in all stages of the development of the project, including those who normally will not participate (defining objectives and evaluation criteria, evaluation process... (Spain, teacher)*

Other differences mentioned by small numbers of teachers (<5%) included peer-to-peer learning; opportunities for creativity; and the use of the flipped classroom model (see Estonia pilot case study (Appendix D) for an example of the flipped classroom model in practice).

Just 3% of respondents felt there had been no notable change in their students' experience when implementing the LS.
Student comments from the pilot case studies echoed these teacher perceptions of a noticeable impact on students:

*Interviewer: Would you like to do more learning in this way? Why/why not?*
*Student: Yes! For sure. But, as already said, we really enjoy changes, and discover more new ways. (Student, Italy)*

As reported in C1-C4, case study teachers in C5 believed that iTEC, and the use of technology in teaching and learning more generally, had a positive effect on student motivation. This was mentioned in seven pilot case studies and often linked to the development of greater student autonomy. The Portuguese pilot case study below is a notable example of this link between autonomy and motivation. Exceptional improvements were noted among marginalised students.
Portuguese Pilot Case Study

The Portuguese case study pilot focused on research into the region’s geological and paleontological heritage. During the observed class, computers with Internet connection and Google Earth installed were used.

The key aspect emerging from this teacher case study was the high degree of success being achieved in motivating disengaged pupils and establishing a virtuous circle throughout the community of staff, students and parents alike: “when the pupils’ feedback is positive, when we look into their eyes and find that they are more interested, it drives us, and makes us try a little harder”. Both teachers involved commented on the motivational aspect, noting significant behaviour changes in pupils with a high ‘failure’ rate: “when we went on the field visit, some of the most irresponsible pupils did everything to get their parents’ permission to go, and even asked us to call them”.

Student ownership of the learning process and the development of sophisticated reflexive skills were also noticed:

We were also challenged to work with some pupils with a high failure rate, they are not into school work (11 of the 29 pupils in the class have a high failure rate). With this project, and especially during the field visit and the work in the computer room, I felt that the pupils were more motivated to participate in school life. On the other hand, as they wished to participate in some of the iTEC project’s activities, especially those that involved using digital devices, they were more focused and committed. They knew it was part of the rules laid down at the beginning, that if they behaved inappropriately they would not be allowed into the digital classroom. And I think that that encouraged them to behave appropriately [...] This very week, they stayed until late at school, on Monday; classes begin at 8 in the morning, and they stayed until late in the afternoon. And some asked for permission to call their parents, because they wanted to stay on [...] It was all very surprising, we were very surprised. (ICT Co-ordinator, Portugal).

It is already very interesting to see how [pupils] can structure ideas, interact in the group, listen and respect other people’s opinions...They began learning to listen, argue, which was something they were not used to doing; they learnt to address their own views in a relative manner and to accept the ideas of others. Then they began gathering different points of view, reflecting and making decisions. This is very innovative and beautiful to see in the pupils (Portugal, teacher)

Collaborating in the ways required by iTEC activities was a new experience for many students (3 case studies), for example, collaborating throughout a project, not just sharing final outputs:
[Usually] you are collaborating only when your work is finished. But in iTEC you can share experience during the project. (ICT Co-ordinator, Lithuania)

Students in one pilot said that the emphasis on group work had improved relations between students in the class:

_Pupil A:_ Because there used to be some problems in the class, and now...
_Pupil B:_ Well, there are still a few, right...
_Pupil A:_ Yes, but in this particular group there might have been problems before, and because of the... anyway, we learnt to sort out our problems and concentrate on other things... (Students, France)

However, for a number of students (2 case studies), learning to work in groups successfully was one of the most challenging aspects of iTEC:

My classmates have already mentioned it [the most challenging aspect], organising the group. Our group is a little complicated, because we have two people who skip school a lot. We’re 5 in the group and only 3 work. We do everything. We talked to them so they would work more, get involved more. The talk didn't do much difference. (Student, Portugal)

Two pilot case study teachers described how they had seen students’ team working skills develop through iTEC:

…I think their ability to work together and co-operate has improved […] when I think back, there were some students who preferred to let others do things for them, although they pretended to be involved in the group work, but when I look at them now, they are all contributing to the work. (Teacher, Estonia)

…as far as group work is concerned, they enhanced their capacity to do collaborative work. Now they can listen to other people and accept their opinions. (Teacher, Portugal)

Another way in which iTEC was felt to impact on students was in creating more active and authentic learning experiences which would reinforce students’ subject knowledge:

Reciting things by heart like what’s in the soil isn’t really any use, but on the other hand, to say: “THAT is something I’ve seen before, in this context, and I can reuse that, hang on a second... I’m seeing it differently this time, I can make a comparison; hey, I discovered that before, so now I’ll read this”. (Teacher, France).

One interviewee felt that the use of technology helped to ‘smooth over’ differences in student ability, giving those who might struggle in more traditional lessons an opportunity to demonstrate their abilities:
What appears fundamental to me, is that it smoothes over [...] the purely intellectual differences... I mean, the quantifiable differences, and looks at the student’s talents. I think that this way of learning is actually quite new, and may allow the children who are struggling the most to express themselves without necessarily ignoring the children who naturally shine. (Head teacher, France).

Another made a similar point, describing the impact on a student with a particular difficulty:

And the most remarkable point is that one of my students has a difficulty with his speech—he can’t speak properly but it was surprising to see that he was able to speak English in two videos - he voiced them using a web tool. And nobody knew that he was so good at working with computer programmes. He is more sociable and confident now. (Teacher, Turkey)

1,293 students responded to the open-ended survey question: ‘For me, the best thing about iTEC lessons is…’. The responses were coded according to the main themes mentioned. 17% of students gave very general answer such as, “It was nice!” (FI) or “It helps us” (FR). Of those who gave more detailed responses, the most frequently occurring theme was the use of technology (37%). Some mentioned particular technologies, for example:

The use of new Technologies and programs such as Edmundo, Aurasma [...] Prezi (Student, Italy).

Able to learn to work with different types of programs: blog, TeamUp, Popplet... (Student, Portugal)

However, the majority of students simply referred to the use of technology in general terms, for example:

You can use a lot of technology, and explore a variety of internet sites which you have not previously heard of. (Student, Estonia)

The use of computers for learning (Student, Spain-SMART).

The next most frequently occurring theme was collaborative working (24%). Examples include:

Cooperation of several people on one thing (Student, Slovakia)

17 7.7% of responses were coded as ‘other’. In the majority of cases these are responses which are unclear or refer to a very specific activity the students took part in.
Group work. It’s something that is useful in the world of work, but is not taught in school. Working on this project with other people has been very constructive (Student, Italy).

For 9% the novelty of the iTEC way of working was notable:

*To be able to experiment with new forms of learning... (Student, ES-SMART)*

*Learn and understand new things with a new type of study and learning (Student, Italy)*

Smaller numbers referred to the output of the activity (4%), for example, creating a presentation, game or comic, or to the increased level of autonomy they had enjoyed in these lessons (3%).

It is interesting to note some differences between countries. While overall, technology was the most commonly mentioned theme, in Lithuanian (49%), France (37%) and Slovakia (22%), collaboration was the theme most frequently referred to by students.\(^\text{18}\)

### For me, the best thing about iTEC lessons is...

<table>
<thead>
<tr>
<th>Theme</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>36.5%</td>
</tr>
<tr>
<td>Collaboration</td>
<td>23.7%</td>
</tr>
<tr>
<td>General</td>
<td>16.6%</td>
</tr>
<tr>
<td>Novelty</td>
<td>8.7%</td>
</tr>
<tr>
<td>Other</td>
<td>7.7%</td>
</tr>
<tr>
<td>Output</td>
<td>3.6%</td>
</tr>
<tr>
<td>Autonomy</td>
<td>3.2%</td>
</tr>
</tbody>
</table>

n=1,293

**Impact on attainment and student skills**

In the teacher survey, 73% of teachers (n=248) agreed that the implementation of the LS had led to improvements in their students’ levels of attainment (as indicated by their assessment data); just 3% disagreed.

\(^{18}\) Countries/partners with <30 responses to this question are not included in this analysis.
According to 20% of respondents (n=240\(^\text{19}\)), it was greater motivation which had led to improvements in students' attainment levels:

*They could concentrate on this one topic for several days. So they were focused. They also found the topic personally interesting.* (Finland, teacher)

*Motivation of the students is completely different. [This way of learning] is very attractive to them and they make more effort.* (Spain, teacher)

18% felt the improvement in students' digital literacy had resulted in improvements in attainment levels:

*They have improved their digital competencies* (Spain, teacher)

*Students learned how to use iPads very quickly; only a few of them had touched it before. Also using different sorts of applications was new.* (Finland, teacher)

The fact that students were expected to work more autonomously led to higher attainment levels according to 13% of respondents:

\(^{19}\) It should be noted that some respondents who disagreed with the statement made positive comments about the effect on students' attainment.
Students have been involved more actively compared to more "traditional" methods of learning and assessment. Their participation in the formation and management of teams has led to an increase in responsibility and team spirit, with a substantial improvement in the levels of involvement (improving delivery times of tasks, including improvements in their projects, development of a collaborative attitude instead of the usual competitive one ...) (Spain)

The increased levels of collaboration between students was believed to contribute to attainment levels by 12%:

*In the group there are always some students who do not know quite what to do and another student will explain; they seem to learn better [this way] than when I explain even, with the same words.* (Spain, teacher)

Finally, 7% said the practical focus of iTEC had been important in this respect.

Of those responding (n=247), the following percentage believed that the implementation of the iTEC Learning Story had led to improvements in 21st century skills:

- Digital literacy: 88%
- Collaborative skills: 88%
- Creativity: 86%
- Communication skills: 86%
Independent learning skills: 86%
Problem-solving skills: 79%
Critical thinking: 73%.

In addition, 90% believed that there had been an improvement in students’ levels of interest and engagement.

Digital literacy skills were also mentioned in three pilot case studies, in particular, in relation to the use of technologies for learning rather than for play or entertainment:

...at this age (8-10 years old) they use technologies to PLAY. And this is fair, but it’s important for them to know that technologies can be used for other purposes as well, e.g. to create a conceptual map, having the chance to work and rework on it thanks to the digital tools. (Teacher, Italy)

One pilot case study teacher (PT) believed there had been an impact on critical thinking.

These findings were echoed in the student survey responses. Students were asked to indicate whether they ‘agreed a lot’; ‘agreed a little’ ‘disagreed’ or were ‘unsure’ in response to a series of statements related to potential impacts of ITEC lessons on their attainment, 21st century skills and motivation.

Overall, statements with highest levels of agreement were:

- I can work better in teams with other students [collaboration] (88% agree)
- My teacher is using different methods to help me to learn [changes in pedagogy] (88% agree)
- I can now use a wider range of new technologies [digital literacy] (86% agree)
- I am now more confident using ICT [digital literacy] (85% agree)

(\(n=1,488\))

While statements with lowest levels of agreement were:

- I have spent time outside lessons working on iTEC activities [engagement] (70% agree)
- I can better solve problems I face in my learning [problem solving] (77% agree)
- The skills I have learnt help me to perform better in creative activities [creativity] (77% agree)
- The skills and knowledge I have gained will help me to do better in my assessments [attainment] (78% agree)

(\(n=1,444\))

### Student survey responses (1)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Agree a little</th>
<th>Agree a lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>My teacher is using different methods to help me to learn</td>
<td>56</td>
<td>39,4</td>
<td>50,1</td>
<td>47</td>
</tr>
<tr>
<td>I can now take responsibility for my work myself, rather than waiting for instructions from my teacher</td>
<td>5,8</td>
<td>6,5</td>
<td>31,7</td>
<td>36</td>
</tr>
<tr>
<td>I am now more confident using ICT</td>
<td>6,9</td>
<td>8,5</td>
<td>34,5</td>
<td>43,5</td>
</tr>
<tr>
<td>I can now use a wider range of new technologies</td>
<td>5,4</td>
<td>8,7</td>
<td>31,2</td>
<td>34,5</td>
</tr>
<tr>
<td>I can work better in teams with other students</td>
<td>4,8</td>
<td>7,3</td>
<td>29,9</td>
<td>40,1</td>
</tr>
<tr>
<td>I communicate better with other people, for example, my teacher, my parents, students from other classes</td>
<td>6,2</td>
<td>10,8</td>
<td>36</td>
<td>58,1</td>
</tr>
</tbody>
</table>

n=1,488
Analysis suggests that there may be differences in student response depending on country and age group, but that the nature of these differences is complex and difficult to determine given the wide variation in number of responses and age ranges from different countries.

### Student survey responses (2)

<table>
<thead>
<tr>
<th>Statement</th>
<th>No response</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Agree a little</th>
<th>Agree a lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>The skills I have learnt help me to perform better in creative activities</td>
<td>8</td>
<td>11,8</td>
<td>31,9</td>
<td>45,4</td>
<td>8,5</td>
</tr>
<tr>
<td>I can better solve problems I face in my learning</td>
<td>3</td>
<td>12,7</td>
<td>40,3</td>
<td>36,7</td>
<td>7,3</td>
</tr>
<tr>
<td>I now understand what I’m good at and how I can improve my learning</td>
<td>7</td>
<td>9,4</td>
<td>33,6</td>
<td>46,8</td>
<td>7,2</td>
</tr>
<tr>
<td>The iTEC lessons seem to pass quickly</td>
<td>2</td>
<td>8,9</td>
<td>25,3</td>
<td>57,9</td>
<td>5,8</td>
</tr>
<tr>
<td>I would like to have more lessons like this</td>
<td>3</td>
<td>8,4</td>
<td>21,8</td>
<td>61</td>
<td>3</td>
</tr>
<tr>
<td>I have spent time outside lessons working on iTEC activities</td>
<td>5</td>
<td>19,2</td>
<td>28,2</td>
<td>42,1</td>
<td>8,5</td>
</tr>
<tr>
<td>The skills and knowledge I have gained will help me to do better in my assessments</td>
<td>7</td>
<td>11</td>
<td>32,2</td>
<td>45,3</td>
<td>3</td>
</tr>
</tbody>
</table>

n= 1,444
4. Sustainability, transferability and scalability

This chapter considers the potential for sustaining the iTEC approach in schools beyond the project and of successfully transferring it to other schools at both a local and national scale. It reports data collected via the teacher survey and pilot case studies.

Benefits of iTEC

Many iTEC teachers report perceived benefits in terms of increased student autonomy; student motivation; teachers’ and students’ digital literacy skills; and student involvement in group work.

As in previous cycles, teachers taking part in the survey were asked to state the most important benefit of iTEC. Their responses are interesting because they suggest reasons why they may continue to use the iTEC approach and they also give an indication which features they may be likely to promote to colleagues.

The most frequent benefit mentioned was iTEC’s impact on student autonomy and the development of 'learning to learn' skills among students (15%; n=234):

*An invaluable help in the teaching and learning process and another lens from which to guide students in their own discovery (Spain, teacher)*

*The development of independence in and responsibility for their study (Italy, teacher)*

For 12% of respondents, the most important benefit was a positive effect on student motivation:

*Students were very motivated to do this project and use ICT. (Finland, teacher)*

The same proportion (12%) identified the impact on digital literacy skills as the most important benefit; there were examples of teachers referring to the development of both students' skills and their own:

*It was very interesting because I learned a lot about new technologies. (Teacher, Spain)*

*Students learn how to use new technology to learn. In best cases they used the new skills also at home. (Teacher, Finland)*

The emphasis on group work was referred to by 10%:

*Promote cooperative learning and working in order to achieve common goals, a sense of respect and responsibility for the assigned tasks and deadlines (Teacher, Italy)*
Encourage and promote group activities... (Teacher, Spain)

The novelty of iTEC and the fact that it encouraged both teachers and students to adopt new approaches was another benefit which teachers mentioned (9%):

Complex, modern and attractive way of presenting a topic (Teacher, Czech Republic)

The push provided to embark on a methodological change (Teacher, Spain)

For 6%, the impact on teacher-student relationships was the most important benefit:

Changing role of teacher and student. Relations between the two become more fluid. Learning is more creative and student participation in the learning process is more positive with the possibility to create materials and design activities. Interaction improves and there are more possibilities of communication in the school environment. (Teacher, Spain)

Greater engagement in the teacher/student relationship. Increased motivation on both parts. (Teacher, Italy)

5% indicated that iTEC had given teachers opportunities to reflect on their practice in depth and develop as educational practitioners:

It makes us reflect on the process of teaching / learning and the need to adapt to the times. (Spain)

Other benefits mentioned by small numbers of teachers (<5%) included greater opportunities to collaborate with other teachers and the development of cross-curricular approaches.
Dissemination and transfer of the iTEC approach

The vast majority of iTEC teachers say they would use the approach again, and would recommend it to other teachers. However, they report that the response from colleagues is mixed; a lack of skills, confidence and an unwillingness to embrace innovative practices are perceived to be significant barriers to the wider adoption of the iTEC approach.

91% of teachers responding to the survey question (n=241) felt that the definition of the iTEC approach\(^20\) was an accurate description of the project, based on their personal experience. Among those who gave a reason for disagreeing\(^21\), teachers most frequently commented on the incompatibility of the aims of iTEC and the current educational system in their country:

...our educational system is not yet ready for it (Teacher, Slovakia)

91% (n=241) of teachers surveyed agreed that the iTEC approach has potential to lead to pedagogical innovation and 95% agreed it has potential to lead to innovation in the use of technology in the classroom.

---

\(^20\)The iTEC approach is designed to bring about change in classroom practice, in order better to equip young people with the competences and attitudes to meet the opportunities and challenges of 21st century society and the workplace. The approach is based on scenarios of the future classroom and the systematic design of engaging and effective Learning Activities using innovative technology supported pedagogical approaches.

\(^21\)When those who did not agree were asked to explain how it differed, nine teachers responded that they did, in fact, agree with the definition.
It is worthy of note that the French pilot case study draws attention to the possibilities generated by working with partners whose values challenge the received values of schools.

**Pilot Case Study: France**

The French pilot case study is an adventurous and ambitious example of how iTEC, when extended to its logical conclusion, can link pedagogic/technological innovation within school with imaginative and innovative social/production practices being generated beyond school by, for example, the FabLab approach. The observed session was part of the iTEC Cycle 5 scenario "Personalised learning paths" and was organised in the form of “highly-mobile group work” within the Earth and Life Sciences curriculum area. Overall, the project required pupils to initiate an idea; develop specifications for a prototype (in this case, of a ‘soil making machine’); submit their project and documents to peers and external experts; and liaise with the local ‘FabLab’ to enable real-world production of the machine they had designed.

The teacher noted the transformative culture of possibility espoused by FabLab staff: “Anything was possible... There is no notion of property, you see”. In the teacher’s view, operationalizing such a culture transformed the learning experience. The pupils “naturally” took increasing control, exploring beyond conventional subject boundaries and implicitly challenging schooling (and learning) as a time- and place-bound process by working freely in their ‘own’ time. The teacher, meanwhile, was forced to “break away from [subject] disciplines ... and, ultimately, from the traditional ways of transmitting knowledge”.

91% of teachers responding to the survey question (n=244) said they intended to use the iTEC approach again, and 92% said they would recommend it to other teachers. During C5, iTEC was already being widely disseminated with 86% of those surveyed claiming to have shared their experience of iTEC with other teachers outside the project.
Continued use by pilot teachers

In two pilot case studies, teachers who had participated in several iTEC cycles said they had continued to use, or adapt, activities from previous cycles:

*From time to time, I use them [Learning Stories]. We use the older Learning Stories – for instance, we made small games with form 7. So, they keep recurring depending on what I am teaching and how suitable they are for a particular situation. So, I do use them.* (Teacher, Estonia)

*It is partly based on the previous cycle, really. The one with gaming. So it is really quite similar to that.* (Teacher, Norway)

A number of teachers commented that they intended to continue to use the iTEC Learning Activities (4 case studies):

*Yes, I’m absolutely sure that I will continue with the things that I have tried out and that have proved to work well. I will use them with other classes and students.* (Teacher, Estonia)

*Next year I will try the resources again in my own classes, I will give tasks to my students to prepare on the problematic points in learning English* (Teacher, Turkey)

*Yes, I’m already using it. Let me give you an example...* (Teacher, Portugal)

When asked how they intended to use the iTEC approach again in the future, 41% of survey respondents (n=245) mentioned trying the approach with a different class;
24% said they would repeat the activity they had used in Cycle 5 and 25% said they intended to create new activities. 21% mentioned using the same technology again and 6% said they planned to try out new technologies within their use of the iTEC approach in the future.

Transfer to teachers outside the project

While 81% of teachers responding to the survey question (n=244) agreed that the iTEC approach could become part of their own routine practice, only around half (52%) agree that such methods could become part of the routine practice of other teachers in their school. In addition, 43% agreed they could become part of routine practice for the majority of teachers in their country. While it is worth noting the high proportion of neutral responses to these questions, presumably because teachers felt unable to comment on the practices of other teachers, there will clearly need to be wider changes within the teaching profession in a number of countries if iTEC is to be widely adopted.
More than half the respondents who had shared the iTEC approach with teachers outside the project said that their colleagues had shown an interest (54%; n=209).

*They thought that we have done a great job and they were interested in technologies we have used in our project.* (Finland, teacher)

*They like “products of iTEC classes” and some of them would like to use digital tools we have used in iTEC classes.* (Czech Republic, teacher)

In a few cases, teachers commented that their colleagues had already started using the iTEC approach:

*Some have tried to use the learning stories in their classes and others have used some of the technology and digital tools recommended in the project.* (Spain-PROM, teacher)

In around one-third of cases (32%) respondents reported the response from colleagues had been mixed. Teachers said that some of their colleagues were interested, but others appeared reluctant, or that there was broad interest, but concern about practicalities. A lack of ICT skills and lack of time were two the most common concerns raised by colleagues, along with inadequate infrastructure in some schools and general scepticism about the effectiveness of the approach:
They said it was interesting but did not have good computer skills and therefore it looked like something that would take them more time than they have available (Spain-SMART, teacher).

To most it seems an interesting project but they believe it is difficult to integrate into regular classroom practice. Some find it very complicated, lacking a basic digital competence. (Spain-SMART, teacher)

Some do, some do not. Greater difficulty lies in not knowing how to use the technologies and lack of computers and networking in schools. (Portugal). Colleagues also involved beyond my project have shown interest, but also scepticism and in some cases unwillingness to innovation (Italy, teacher)

Similar reasons were offered to explain the absence of interest from colleagues reported in 14% of cases:

Not much [interest], because of the poor equipment of our school and the amount of work required from me, they would not use this approach (Czech Republic, teacher)

---

Were colleagues interested in the iTEC approach?

- Yes: 54%
- No: 14%
- Mixed response: 32%

n=209
In the case studies too, the level of interest displayed by colleagues varied considerably, with some interviewees reporting wide interest within their schools (3 case studies), while others were met with scepticism (3 case studies):

I noticed that our colleagues from Science involved in the project wanted to see the website, and they praised it a lot, they found it very interesting from the educational perspective. They asked if this would be replicated in the future, and mentioned that the site visit could follow through in the future. Therefore, they showed plenty of interest. (ICT Co-ordinator, Portugal)

And the people I've talked to about it, such as the physics teacher for example, are very interested. [...] So there may be some teachers who are particularly interested. And there may also be some individual teachers who are a little sceptical, but it's always like that. But the general response has been positive. (Teacher, Norway)

I have talked about it with two of my colleagues. Yes, yes. But as for the others, they're not really interested because... for some people it's a little bit too different from... um... from what they know [...] and their response is: "Oh goodness, that's a bit...", they're not comfortable with it... (Teacher, France)

Some pilot case study teachers believed that iTEC was already having an impact on teaching practice within their school and hoped that this would grow in the future (2 case studies):

I believe it is impacting on teaching practices at the school, I do believe. The way the iTEC pupils talk about how learn, the way lessons are delivered, it gears the other teachers to some change in their teaching practices. But this is a big school, it has over 100 teachers, so I expect this to grow in waves; we still have a small group, a limited group, but I hope it will expand. And particularly that it may grow beyond the science group, to other subject groups. (Head teacher, Portugal)

However, not all teachers were willing to change their current practices, preferring to, “stick to what they are used to, their comfort zone” (Head teacher, Portugal).

Some believed that training would be helpful to encourage more teachers to begin to use iTEC approaches (2 case studies). However, two head teachers commented that they believed it was best to spread the iTEC message through “contamination” (PT) rather than as a top-down directive, as a policy imposed by the school board was likely to be rejected by teachers. A better approach was to slowly ‘lure’ (PT) teachers to the project my making them ‘envious’ (FR) when they saw what was happening in other classes:

---

22 In some cases, different views on this question were expressed by interviewees from the same school.
But if it had been an order from the school, something official from the head teacher, "Let's do it!"; despite all of the respect they have for me, and I for them, it would still have been something imposed (Head teacher, France)

Conversely, in another school, the head teacher emphasised the importance of involving the school board:

The school board is also the key figure in introducing innovative ideas. And it works when somebody from the board is involved and has to know about the project. (Head teacher, Estonia)

While many iTEC teachers are highly proficient users of technology, for many of their colleagues, using technology to support teaching and learning is not an everyday activity. The pilot case study from Turkey (Appendix D) demonstrates how using a range of readily available technologies, including those already familiar to students, can help to transform teachers’ attitudes towards the role of technology in the classroom.

Potential impact on stakeholders

Teachers believed that wider implementation of the iTEC approach would impact on teachers’ motivation, professional collaboration and digital literacy skills. They also believed student motivation, autonomy, collaboration skills and digital literacy would be improved.

Impact on teachers

In the teacher survey, respondents were asked what the impact on teachers would be were the iTEC approach to become part of routine practice within their school. 21% (n=234) responded by making general references to changing practices, such as “modernises teaching” (Estonia) or “new ways of thinking” (Finland). Among those who gave more detailed responses, the most common answer (13%) was a potential impact on teachers’ motivation which would, in turn, improve their practice and encourage engagement in professional development:

They will be more motivated in their work (Finland, teacher)

It would help [them] to continually improve themselves (Turkey, teacher)

For 7% of respondents, the potential for greater cross-curricular collaboration was seen as an important potential impact:

Better collaboration between departments (Spain-SMART, teacher)

Introducing the iTEC approach would make greater demands on teachers’ digital literacy skills according to 6%. This was a potential challenge as it would require
some teachers to significantly improve their existing ICT skills. However, a further 6% of teachers felt that introducing the approach would lead to more, or better, use of technologies:

*Adaptation and improvement in the use of information technology within the classroom (Spain-SMART, teacher)*

Other impacts on teachers mentioned (<5%) included increased workload; resistance from some "teachers who will not change" (Spain-SMART); the change in the role of teachers who become "facilitators" (Czech Republic); and more opportunities for creative pedagogy.

**Impact on students**

Teachers were also asked what the impact on students would be were the iTEC approach to become part of routine practice within their school. 29% (n=239) made very general comments about the positive impact, for example "good" (France) or "interested" (Austria). For 26% of teachers, the potential for iTEC to motivate their students was seen as an important impact:

*More motivated and engaged students (Teacher, Portugal)*

*A new way to become inspired and learn (Teacher, Finland)*

Increased student autonomy and opportunities to develop independent learning skills was noted as a potential impact by 14%:

*More independence and responsibility for their learning (Teacher, Czech Republic)*

Improvements in students' collaboration and communication skills was identified as a possible impact by 10%:

*Growth of co-operative competences (Teacher, Czech Republic)*

Greater use of ICT, often linked to a corresponding impact on students' digital literacy skills, was referred to by 7% of respondents:

*More...understanding of technology (Norway, teacher).*

Furthermore, 6% of respondents thought that students' creativity skills would be improved and 4% referred to opportunities for authentic learning which "responds to the real world in which they live" (Spain-SMART). This notion of authentic learning was also described in the Norwegian pilot case study (Appendix D).
Impact on families

Finally, teachers were asked what the impact on families would be were the iTEC approach to become part of routine practice within their school. This was a question that relatively few teachers appeared to have considered prior to the survey and few gave detailed responses. 25% (n=239) felt the impact would be broadly positive, for example, "parents would be delighted" (Spain-Prom). 12% indicated that there could be greater interest or involvement in school activities from parents:

Very positive, since they could be involved more directly in curriculum development in a more participatory way and collaborate in the development of their children’s learning experience (Spain, teacher)

Increased interest in the school's work (Norway, teacher)

11% referred in some way to opportunities for family learning, especially in relation to digital literacy skills:

Improving digital skills (Spain-SMART, teacher).

Increases the ability to use virtual environments (Turkey, teacher)

Improved communication between school and home was another potential impact according 6% of respondents:

Better communication with school (Spain-Prom, teacher).

The generally positive impact of the iTEC approach on student motivation and its subsequent spin off into better relations between school, student and family was also strongly noted in the Portuguese pilot case study (Appendix D).

However, although answers to this question were largely positive, 4% of teachers indicated there was likely to be a degree of resistance from parents, at least initially, as "some parents are still very traditional with regard to teaching methodology" (Spain-SMART). In addition, a small number (2%) referred to issues around the digital divide. This was felt to present challenges to the iTEC approach because, "most [families] cannot afford technological resources" (Spain-SMART).

Enablers

Student and teacher attitudes; access to technology and other resources; and support from the iTEC team and from other teachers are all felt to be important enablers for teachers.

The teacher survey asked respondents to describe the most important factors that had enabled them to implement the LS. The most frequent response (30%; n=238)
was the reaction and attitude of their students. The fact that students had reacted positively and were keen to try the approach was crucial:

*The students’ motivation for using technology in the classroom and their determination to overcome “technical” difficulties which arose* (Spain, teacher)

*Seeing that students participated more actively in the learning process.* (Italy, teacher)

Adequate access to appropriate technology and resources was also important, being referred to as an enabler by 17%.

*Having the right technical and operational resources* (Spain, teacher)

*Availability of the hardware and software needed.* (Finland, teacher)

The support which teachers had received from the iTEC project, for example via their National Co-ordinator or iTEC online forums, was another enabler (13%):

*The well managed seminar that took place in Florence and that enabled a good understanding of the overall project.* (Italy, teacher)

*The resources shared across networks associated with the project: iTEC website, Promethean forums, Innova Education Blog.* (Spain, teacher)

In addition, 11% referred to support they had received from other teachers:

*The most important factor was that I implemented my learning story with my colleague.* (Finland, teacher)

*Collaboration with teachers with whom I created my learning story.* (Spain, teacher)

Interestingly, 8% of respondents referred to aspects of their own personality, such as openness to change or determination, as an important factor in helping them to implement the Learning Story:

*My own motivation to enter the classroom with the feeling I was going to perform a different task.* (Spain, teacher)

*The willingness to learn something new, facing the challenges there might be during the process.* (Finland, teacher)

Support from school leadership was seen as important by 7%. A number of other factors were referred to by small numbers of teachers (<5%), including teachers’ (digital) skills; the fit between iTEC and the curriculum; and support from families.
A focus on head teacher views

Head teachers viewed iTEC as a change agent which could help to drive improvement in their schools. While few were actively involved in the implementation of the project, they were concerned with the resulting management and leadership issues.

Given the critical role played by head teachers in implementing change with a school, it is worth focusing on the reactions of head teachers interviewed as part of the C5 pilot case studies. As might be expected, one convergence of opinion to emerge is around the need to temper a broadly positive response to iTEC and the important change that it is generating with sensitivity towards the school level management of change.

iTEC as change agent

On the general question of whether the iTEC experience is leading to change, there was a broad and positive consensus of opinion that sometimes highlighted change in relation to curriculum matters; sometimes focused on motivational impact; sometimes addressed improving outcomes, sometimes looked at pedagogical innovation and at other times highlighted general changes in teaching and learning culture.

In terms of curriculum, the Lithuanian head teacher indicated how the iTEC experience was driving development both within and across different subject areas:

The most important factors that enabled me to implement the Learning Story were...

- Student teachers: 30%
- Access to technology/resources: 17%
- iTEC support: 13%
- Other teachers: 11%
- Teacher personality: 8%
- Management support: 7%

n=238
This project allows for 21st competencies development for students. It is important not only [in relation] subject matters, but also [in relation to] integration between subjects, [and] competencies development (i.e. ICT, collaboration, creativity). This is the best way to develop core competencies... The main school vision and strategy for many years is ICT integration.

For the Austrian head, there was value in the iTEC fit with the broad direction of curriculum change within the International Baccalaureate: “Yes, iTEC is a key technology in the change of IB curriculum”. This is described in greater detail in the Austrian pilot case study (Appendix D).

In general, the head teachers commonly highlighted the fact that stimuli provided, both by specific tools within the iTEC toolkit and by the overall approach, were significantly enhancing student motivation:

Yes, what we have seen here is very exciting, I think! It is a very interesting project, and we have talked about how we have never seen the students so involved for a whole period. […] I think this is the project which we have seen the most 100 per cent response to. (Head teacher, Norway)

The Portuguese head teacher, reviewing experience in perhaps the most difficult local context evident in the submitted data, particularly emphasised change in pupil motivation due directly to iTEC. This took two forms: technology-led and pedagogy-led. Firstly – and notably – the Portuguese head teacher recognised a productive paradox whereby the everyday familiarity of disadvantaged students’ with ICT was serving as a leveller in their relationship with staff members:

Yes, of course. First, they want to show teachers that they [the teachers] don’t know everything, to make them more modest. Then they show the pupils, especially the ones with less self-esteem, that they are closer to the teachers, that in some cases they know as much as their teachers.

This active, collaborative and interdisciplinary approach to teaching and learning that iTEC inevitably generated was also referred to by the French head teacher:

Well, forgetting the tools, there is a way of... of... learning, teaching, of... of... with a new method, a new formula, which I think goes further than the evaluation of skills, and calls upon talents... the talents of each child... it’s the students themselves who are going to be much more active participants. That’s a word that comes up often, but in this case, it’s really true, you know.

Dissemination

All heads recognised the value of disseminating their experience with iTEC among senior colleagues at local, regional and national level. In general though, they
seemed more inclined to use conventional channels than their staff who were directly involved with iTEC (where social media tools inherently facilitated dissemination):

*Pedagogical conferences; events closing the school year will show the impact of iTEC (Head teacher, Austria)*

**A focus on management issues**

As might be expected, head teachers were exercised by the management and leadership implications of the iTEC approach. Keen to support innovation, they were happy to steer it but without becoming too involved in the detail or impinging on teachers’ professional autonomy. Tension between head teachers’ roles as agents of change and managers of staff resistance to change was a shared concern:

*Some of the traditional teachers usually do not prefer methodological changes, this will be up to me to bring them into 21st century teaching methods (Austria)*

In most cases, heads cultivated specific committed staff who were effectively functioning as iTEC champions. Within the Estonian school for example, three teachers were involved in iTEC and this number, the head believed, was sufficient to encourage teachers to respond to the stimulus of iTEC at their own pace. It is important, the head stressed, to remain hands-off and respect the freedom of teachers to experiment. The Norwegian head was unequivocal: “that's why I want a resources person like [Teacher J] to be the person who leads”.

Irrespective of the level of general resourcing, iTEC related budget matters also concentrated the minds of head teachers. This was the case across a spectrum from the ‘fairly well-off’ French school where the head circumspectly recommended restraint – “You see. So, I think that... well, I don't really like the saying ‘il est urgent d'attendre’ (it's urgent that we wait) but I think that we're a year away still [from being able to commit financially]” – to the Portuguese school where “first we need funds to buy equipment for the school, the money we don't have”.

**Challenges and iTEC**

Perceived challenges to the wider adoption of iTEC include a lack of technical resources in some schools; inadequate internet access; financial barriers; and curriculum and time constraints. The level of students’ digital literacy skills and resistance among some teachers are also likely to present barriers.

If iTEC is to be adopted more widely, it is clear that there will be challenges to be overcome. In the teacher survey, respondents were asked, “What common challenges facing teachers can the iTEC approach help to overcome?”. Teachers interpreted this in different ways, with some answering the question as it was intended, while others described the challenges they had faced when implementing iTEC. Due to this confusion, it is not possible to analyse the responses to this
question fully. Considering the countries for which more detailed translations are available however (CZ, ES, FI, IT), there are responses indicating that teachers believe the iTEC approach can help to overcome problems of: a lack of interest in learning among students; lack of teacher skills and interest in implementing new pedagogies and making use of new technology; and the restrictions of current curriculum structures:

The rigidity of the syllabi that thanks to the interdisciplinary approach of iTEC can be broken down, encouraging critical thinking. Methodological standardization makes it difficult to focus on diversity; the participatory and collaborative approaches of iTEC overcome (or at least improve) this (Spain, teacher)

If you’ve never done a project, iTEC guides you through step-by-step (Spain, teacher)

The iTEC approach would help teachers develop critical thinking and problem solving skills, goals that are difficult to achieve in a context of traditional teaching (Italy, teacher)

Lack of student motivation is considerably improved with the ITEC approach. (Spain, teacher)

In the pilot case studies, a lack of technical resources was frequently mentioned as a barrier (4 case studies), although most interviewees believed that the situation would improve and this would be less significant in the future:

The school doesn’t have many technological resources, and we’re trying to solve the problem, at least in part. When I took office as the director of the school board it was my intention to improve the school's communication network, and we’re working on it. We’re also going to allocate the scarce funds to purchasing some equipment, video-projectors, computers... (Head teacher, Portugal)

The computers and the necessary hardware and equipment in our school are not so good and they are old. (Teacher, Turkey)

However, as one head teacher pointed out, the speed of technological development meant that schools struggled to keep up to date and made it tricky to decide when was the best point to purchase a technology:

...in a year’s time we will be needing wifi video projectors that are compatible with the tablets. So I stopped the purchase [of video projectors]. I said: "Stop the video projector purchase until the...": because if in three months’ time, someone says: “Finally, they’re on the market!” I don’t want us to have... You know? Because we have roughly thirty video projectors to change... (Head teacher, France).

Internet access speed and reliability was another problem faced by schools (4 case studies):
Sometimes the WLAN fails, because about 500 students are working parallel over the day.... (ICT Co-ordinator, Austria)

We need more devices, more reliable and broader internet connection. Good Internet access would make our job much easier. (Teacher, Portugal)

Closely linked to technical barriers, financial barriers, particularly a lack of funds to purchase new technology, were mentioned (4 case studies). Examples included:

The school has only the financial challenges, but we are trying to do our best. When it is possible we always purchases new software. (Headteacher, Lithuania)

Interviewer: Which aspect of iTEC have you found the most challenging? 
Teacher: Money! – we are lucky to be funded by EUN and ENIS. (Teacher, Austria)

The use of BYOD was mentioned as a possible solution to this problem (LT, TR), but in another pilot, this was not felt to present a workable solution because of security and insurance issues (FR).

Prescribed curricula and accompanying testing meant that teachers often struggled to incorporate iTEC activities into their day-to-day practice (4 case studies):

Then universal curricula, detached from the schools’ individual contexts, also make things hard, because teachers practically only worry about following the curricula and preparing the pupils for the National Exams. The schools should enjoy more autonomy in managing the curricula. (Head teacher, Portugal)

It doesn’t seem possible to make such kind of works in all lessons because of the intensive school programme and the exams. (Teacher, Turkey)

Due to the way the curriculum was arranged, teachers were used to focussing on their own subject areas, rather than thinking about learning and knowledge more widely:

Often teachers don't understand, or don't make an effort to understand that knowledge is one, and the subjects are only a part of overall knowledge. Subject contents are not tight; in fact the work performed [...] was broadly interdisciplinary. (Head teacher, Portugal)

The lack that ICT was not a national curriculum subject for all years in some countries was another challenge:

In our school the primary grade students have ICT lessons. From grade 2 our students can choose or English language lessons, or ICT lessons. In grade 3 and 4 ICT becomes after school activity. This is because in our national curriculum we do not have such
subject and it is difficult to find additional lessons in main curriculum. This makes different from other schools. (Head teacher, Lithuania)

Time was the other barrier referred to in case study interviews (2 case studies). This could be a barrier in a number of ways, including the limited length of lessons; lack of time within the curriculum to complete the project; and teachers’ preparation time required:

The teacher points out that the session is too short (55 minutes) and isn't suitable for this sort of learning activity. (Lesson observation, France)

…it took a lot of time to prepare all the dialogues, videos, mind maps, animations (Teacher, Turkey)

Student skills presented a further barrier in some schools (2 case studies), in particular, the disparity in levels of digital literacy within a class sometimes made it difficult to design activities suitable for all students without additional support:

The goal, taking into account that this was a very heterogeneous class, was to get everyone ready to work with digital tools fit for iTEC. Since there were pupils who didn't even know how to copy and paste a picture, pupils who don't have computers at home. Others, on the contrary, were fully prepared to use digital technologies, and were very motivated. So, we tried to develop minimum IT skills in all pupils, which also involved sharing knowledge and working collaboratively. (ICT Co-ordinator, Portugal)

Finally, as noted previously, while the case study teachers themselves displayed highly positive attitudes towards the use of technology in learning, a number of interviewees felt that there was likely to be resistance among other teachers in their school if iTEC were to be scaled up (5 case studies). In the majority of schools, it was felt that while there were teachers who were likely to welcome innovation, there were also those who preferred to stay within their comfort zone and perhaps lacked the skills needed to make use of new technology effectively in their teaching:

And the teachers must feel motivated to take part, if they don't feel motivated it is very hard, it is hard to get anything out of them. Besides, some feel insecure about digital technologies, we must try to reassure them. (Head teacher, Portugal)

There are teachers who go along with changes faster and there are those who are more traditional. (Head teacher, Estonia)

It's: "Oh, I couldn't do that... I'm not good at that, um..." The classic response is: "Okay well, um... How do you record something? That's something I can't do!" um... Or: "how... or for um... to do a search, oh the students do that better than me, it’s embarrassing", you know? (Teacher, France)
Those who are digitally skilled and those who aren’t digitally skilled. So there’s great difference in that. (Head teacher, Norway)

Therefore, it was not just the presence of technology in schools which was important, but also teachers’ attitudes:

*I said to my pupils today, we can have all the technology in the world, but if the teacher is not in tune with the iTEC spirit, all of the technology available will take you nowhere.* (Teacher, Portugal)

The majority of interviewees agreed that change was likely to happen slowly (5 case studies) as teachers see colleagues doing interesting activities and want to get involved and also as the new generation of teachers, more familiar with newer technologies and pedagogies, replace older teachers more used to traditional methods:

*Gradually it will happen so. I think the new generation teachers will do this more easily as they are able to use technology more effectively.* (Teacher, Turkey).
Conclusions and recommendations

There were four evaluation questions in Cycle 5, assessing the extent to which iTEC Learning Stories and technologies benefited teaching and learning and were sustainable and scalable and fit for purpose, and assessing the barriers and enablers to implementation.

The main conclusions are as follows.

1. To what extent do the iTEC Learning Stories and relevant iTEC technologies benefit learning and teaching?

There is evidence that participation in iTEC had a positive impact on students in many ways, including collaborative learning; greater use of technology; more opportunities for independent learning and greater student autonomy. Both teachers and students reported improvements in attainment and 21st century skills, including digital literacy. In addition, iTEC was reported to have a positive impact on both student and teacher motivation.

Pedagogical innovation was the most important feature of iTEC for most teachers, resulting in changes in the roles of students and teachers, and in the uses of technology. However, technological innovation was also evident in the use of new tools; increased student use of technology; and the use of technology in more creative and collaborative ways.

2. To what extent are the iTEC Learning Stories and iTEC technologies sustainable, transferable and scalable?

The vast majority of iTEC teachers said they would use the approach again, and would recommend it to other teachers. However, those who have already shared their experiences with colleagues report mixed responses. A lack of skills, low levels of confidence and an unwillingness to embrace innovative practices among some teachers are perceived to present significant barriers to the wider adoption of the iTEC approach.

Teachers believe that wider implementation of the iTEC approach would impact on teachers’ motivation, professional collaboration and digital literacy skills. They also believe student motivation, autonomy, collaboration skills and digital literacy would be improved through wider implementation.

Anticipated future uses of the LA development approach vary by country, and are thus context dependent. They include use in teacher training and professional development; use by classroom teachers; and adoption at school level and at national level.
3. To what extent are the Learning Stories and iTEC technologies fit for purpose?

The Learning Activity design process has potential to develop innovative and creative teaching practices in the classroom. However, it needs to be simplified, made more flexible and the presentation improved, including making it more interactive.

Overall, the iTEC technologies were perceived as interesting, but requiring significant improvements were they to be adopted more widely. TeamUp has become a familiar tool to teachers and is viewed positively as a means of supporting both group work and reflection, providing teachers use their discretion when deciding which classes to use it with, and when to ‘overrule’ the tool. ReFlex has not been widely used. Some teachers are unsure how to use it effectively and the evaluation data on this tool is therefore very limited. The Composer is viewed as an interesting framework for collaboration and sharing, but requiring significant improvements to be of value to teachers engaged in learning design. The SDE has elicited some positive reactions, but feedback to date is very limited. The Widget Store faces from competition from existing commercial ‘stores’ which are already familiar to teachers. Where significant levels of support have been made available, teachers have used the Widget Store in more creative ways, but this requires greater technical expertise than most currently possess.

4. What are the enablers of, and barriers to, the adoption of iTEC Learning Stories and iTEC technologies?

Student and teacher attitudes; access to technology and other resources; and support from both the iTEC team and other teachers were all identified as important enablers for teachers engaged in iTEC.

Perceived challenges to the wider adoption of iTEC include a lack of technical resources in some schools; inadequate internet access; financial barriers; and curriculum and time constraints. The level of students’ digital literacy skills and resistance among some teachers are also likely to present barriers.
A number of recommendations arise from the findings reported in this report.

**Dissemination and mainstreaming (national and international level)**

iTEC partners should **communicate the potential of the iTEC approach** for the development of innovative digital pedagogies scaling up innovation in classroom practices, embedding technology in pedagogy and positively impact on motivation and learning outcomes, clearly to all stakeholders, particularly teachers and school leaders to support further uptake by teachers who have not yet tried iTEC. Dissemination should take place through awareness raising and also professional development opportunities.

European Schoolnet, MoEs and other partners should investigate the potential for **integrating iTEC outputs within professional development and initial teacher training**.

**Dissemination and mainstreaming (school level)**

Teachers, supported by school leaders and through professional development, should create opportunities for students to take **greater responsibility for their learning**, work collaboratively, **engage in authentic learning experiences and develop their 21st century skills** through the adoption of digital pedagogy. This demands a shift in teacher and learner roles. It also demands a positive attitude towards change. The iTEC approach can support this pedagogical shift.

Teachers and students, supported by technology providers, should look for opportunities to **integrate the use of technology throughout their teaching and learning**.

Teachers should be provided with **opportunities to engage in collaborative processes for learning design** in order to innovate and develop digital pedagogies suitable for 21st century classrooms, rather than continuing to work in isolation.

Teachers involved in iTEC should ensure they **share their experiences with other teachers, within their school and beyond**. They should be supported in doing so by school leaders.

Teachers should establish and maintain **connections with colleagues** in their own school, and beyond, to share and develop digital and pedagogical knowledge and skills as a community. School leaders should facilitate this, through for example embedding professional network participation in the school culture, and they should also ensure that teachers have sufficient time for effective networking.

School leaders should explore ways of **integrating the use of the iTEC approach within their school planning** to encourage the development of innovative pedagogies and technologies.
Tools and technologies

Aalto should work with EUN to integrate the learning activity design process into the Future Classroom Toolkit, ensuring this is simplified, made more flexible and the presentation improved, including making it more interactive.

If possible, WP3 should continue to maintain TeamUp as this is seen as valuable by teachers. There is very limited feedback on ReFlex, but it may be worth integrating some aspects of this tool in any future development of TeamUp.

Findings related to the Composer indicate do not indicate sufficient support for further development in its current form, they do suggest it would be worth exploring ways in which elements of the Composer can be used to support the learning activity design process, particularly collaboration between teachers in learning design.

The value of a bank of LSs and LAs is recognised by teachers and there is support for maintaining this, whether via the Composer or in another format.

The Widget Store faces significant competition from commercial competitors. The evaluation suggests that it may have value for more technically advanced teachers who wish to create their own widgets, but this is likely to require significant support.

There is insufficient data to recommend wide-scale take-up of the SDE. However, it would be beneficial to conduct a larger scale study, particularly in the countries which viewed it favourably.

Technology providers should develop awareness of current pedagogical practices (through working more closely with practising teachers) so that forthcoming developments can better meet teachers’ needs.

Research

The evaluation suggests that the iTEC approach has a number of potential benefits, but European Schoolnet and MoEs should explore options for the large-scale systematic validation of the iTEC approach.

While there is evidence that iTEC has had an impact in classrooms, further research is needed to determine whether the approach supports more radical innovation in teaching and learning, and if so what types of additional support are teachers likely need to develop their pedagogy further.

Learning from the evaluation of iTEC should be summarized by WP5 and other partners and made available to assist other evaluators of large scale international projects like iTEC.
References


Appendix A: Overview of the iTEC piloting process

Structure of the piloting process

In iTEC, a Learning Story (LS) is a narrative overview of learning developed from the educational scenario. A LS provides an exemplar of how the Learning Activities (LAs) may work together. The LA is a concrete description of a learning sequence that can be used in teaching and learning. A LA can be supported, either partially or completely, by a set of technological tools.

To organize access to schools by native-speaking educationalists, familiar with national policies and priorities, each ministry identified a National Pedagogic Coordinator (NPC) and a National Technological Coordinator (NTC) who arranged and supported the pilots. In a number of countries, it has been possible to identify persons able to combine these two roles, but where this has not been the case, the co-ordination of the piloting process and the data collection visits for the evaluation are undertaken by the nominated NPC.

In the final cycle of the project, coordinators for each participating partner facilitated the learning design process (rather than this being facilitated centrally), running workshops for LS and LA development that involved a wide range of stakeholders including students and head teachers. In this cycle, coordinators were asked to incorporate an iTEC tool for learning design into the LA development process and to encourage teachers to use other iTEC tools either in their classroom activities or through workshops.

Data collection and analysis

The data collection and analysis undertaken by Work Package (WP) 5 at the end of a cycle represents the end product of a process to which many iTEC colleagues make substantial inputs. The ministries of education play the leading role in the setup and oversight of the pilots and the collection of the data. During the first three cycles, the evaluation focussed on classroom impact, and good evidence for the positive impact of iTEC Learning Activities was gathered. In year three more attention was paid to gathering evidence in support of up-scaling and the end of cycle evaluation activities were adapted accordingly. In year four, attention was again focussed on the potential for mainstreaming, along with studying the iTEC process itself and collecting additional data about the impact on students.

a) In C5, NPCs were offered the choice of conducting either a ‘pilot case study’, or an ‘Edukata case study’.

i) **Pilot case study** (teacher interview, headteacher interview (where possible), ICT co-ordinator interview (where possible), student focus group and lesson observation report).
NPCs were asked to visit the case study school towards the end of C5. NPCs were required to supply raw data only (interview recordings transcribed and translated). The case study selection criteria were amended to ensure that NPCs identified teachers using iTEC technologies and a nationally developed scenario.

ii) Edukata case study (facilitator survey, group interview with workshop participants, follow up interviews with teachers and other stakeholders)

NPCs were asked to supply the transcribed and translated raw data to WP5, along with any workshop resources, photographs etc which they thought would support the evaluation. The follow up interviews were conducted either face-to-face or remotely (Skype/phone).

b) A technology focus group discussion was carried out by NPCs at the end of C5 with a small sample of their iTEC teachers to capture:

- teachers’ use of iTEC technology, focusing on the iTEC technologies;
- benefits of iTEC technology, including pedagogical change;
- challenges of iTEC technology and how they could be resolved.

NPCs conducted the group discussion in their own language, working according to a set of guidelines provided by WP5. The main points of the discussion were recorded by an independent scribe and returned to the WP5 team.

c) An online teacher questionnaire was completed by all pilot teachers towards the end of the cycle (either directly by WP5 or via NPCs).

In C5 some adjustments were made to the teacher questionnaire to capture more specific feedback on the iTEC tools and also to focus on the impact of iTEC and the potential for mainstreaming the iTEC approach.

d) An online student questionnaire was completed. (A link to the questionnaire was sent to NPCs to distribute to teachers who were asked to encourage their students to respond).

This short questionnaire gathered students’ reflections on the perceived impact of iTEC on their C21st skills, attainment and motivation.

In C5 additional data was collected directly by WP5. This included:

- Additional interviews with teachers about their experiences of the Edukata process (ES, FI, IS);
- A focus group with NTCs to gather feedback on the Composer;
- Interviews/written feedback from NTCs about experiences of using the Widget Store in their country;
- Case study interviews with the NTC/NPC from Estonia about their use of the scenario and learning activity process;
• A short survey for NPCs gather additional feedback on the Edukata process;
• A survey of P&E Directory users was also designed and analysed by WP5. This covers teachers/stakeholders from across several iTEC cycles so is reported separately within D9.4 (P&E Evaluation Report)

In addition, WP10 collected data about the use of the SDE independently. Brief details of which are included in this report.

Scenario development

As stated above, in a change from previous cycles, in C5 scenarios and associated LAs were developed nationally making use of standalone toolkits for scenario development and learning activity development. This resulted in the development of 22 scenarios which were ranked by a scenario selection committee according to a series of criteria. Partners were encouraged to use one of the top ranking scenarios, but the decision about which scenario(s) to implement locally was left to each partner. In some countries, the learning activity development (Edukata) process took place at a national level, whereas elsewhere it was focused on individual schools.

iTEC tools

WP3 provided ‘TeamUp’ as a technical prototype, together with a brief visual user manual to accompany it. This tool enables teachers to generate teams, either teacher-defined or randomly generated. TeamUp also offers the facility for teams to record 60-second newsflashes about their progress to support reflection. Following its use in C1, further development was undertaken with regard to facilitating reflection and visualising team formations, with additional improvements to the user interface. Between C2 and C3, a number of identified problems were resolved.

WP3 also provided ‘ReFlex’ as a technical prototype, together with a brief visual user manual to accompany it. This tool is intended to enable students to record individual audio updates on their personal learning progress. It is visually quite similar to TeamUp, and shares many features, such as the 60 second limit for the recordings, but lacks any team functionalities. Students can use ReFlex as a learning diary that also helps the teacher follow what the students are doing. ReFlex is intended to be used to facilitate one-on-one guidance sessions between the teacher and the student, although new uses may arise in the pilots. ReFlex also has a ‘time capsule’ feature, where the student can record a note and send it to the future as a milestone or learning goal. Even the student cannot listen to their time capsule until the set date.

WP8 provided the Widget Store. The aim of the Widget Store is to create a ‘one-stop shop’ for widgets that can easily integrated into iTEC learning environments. The widgets can be used in iTEC LSs, or as resources for other learning activities. Teachers can both use pre-designed widgets from the store, or create their own widgets and add them to the store. In C5, the widget store was piloted in half the participating countries, with the SDE being piloted in the others.
WP7 provided the ‘Composer’, a tool that supports teachers as well as technical and pedagogical coordinators in accomplishing two main tasks: composing LAs and LSs; and managing resources such as applications, content, devices, and events. In C5, this was used in some countries as part of the learning activity design workshops.

WP10 provided the SDE (Scenario Development Environment). The Scenario Development Environment (SDE) is a prototype recommender system which takes into account the user’s profile (for example school level and subject) and can provide recommendations for resources such as applications, events, widgets and lectures. Users can create their own resources and for the purpose of testing a standalone prototype tool was provided which also enables teachers to create their own scenarios and/or Learning Activities. It also has a bookmarking feature.

Support for NPCs/NTCs and teachers

The NPCs and their pilot schools were supported by WP4. Following the review of the teacher community in C1 and C2, the online community was merged with the iTEC website and the registration process was simplified. The new site was relaunched in September 2012. The majority of the site is freely accessible and teachers only needed to register (through a simple process) to contribute to forum discussions. In addition, a greater focus was then placed on providing resources for teachers, giving teachers’ work more visibility and making the benefits of participation clearer. Teachers could find out about: educational scenarios; LSs and LAs; iTEC technologies; the effective use of technologies to support teaching and learning; how to participate in pilots; and training opportunities. EUN also kept frequent contact by email via the NC mailing list to inform them of upcoming events, teacher training opportunities, teacher community, reporting, etc.

Although they are education experts, NPCs are not necessarily professional researchers. Work Package 5 (WP5) provided support for the data collection element of their role through induction briefings and the provision of a detailed Evaluation Handbook that was updated to reflect the experience gained in C4 and to outline changes introduced to data collection process. Data collected in C5 included one teacher online survey (about their current uses of ICT and about the implementation of the LS); one student online survey; one teacher focus group; and one case study (pilot or Edukata).

Technical support for the pilots was provided by WP6. WP6 supported the NTCs in the use of the technologies developed in iTEC or used by partners, such as the Promethean and SMART Technologies. Webinars were organised (e.g. relevant widgets supporting specific LAs), and guidelines (documents and video) were circulated and made available online on the iTEC website (http://itec.eun.org/web/guest/technologies). Manuals for all the iTEC technologies were updated, and technical support for the pilots was provided by WP6 in a forum for the NTCs. In January 2014 WP6 organised a workshop for the NTCs to present the additional/revised iTEC technologies available in year 4 (Widget Store, SDE, P&E Directory).
Promethean Planet is a free online community created by teachers, for teachers. Promethean Planet is a teaching, sharing and support community for teachers to connect, create, and change the classroom. It has over 1.9 million members, 100,000 resources which have been downloaded 30,000,000 times. Since September 2011 Promethean has had a dedicated iTEC online community with its own pages within Promethean Planet in English, and localised in Spanish and Portuguese. Promethean Planet has over 1.9 million members with the majority of members being from the teacher community. The Promethean Planet iTEC home page has been set up to allow for easy access to resources such as the Eduvista toolkit and pilot classroom lesson activities alongside direct links to the teacher community, teacher blogs, forums, wikis and EUN platform. The iTEC landing page has been visited more than 250,000 times, the iTEC Community pages have been visited 50,363 times and the iTEC blogs have been visited 21,697 (data up to 24th Apr 2014).

In C5, Promethean also piloted ClassFlow, an “all-in-one” teaching tool for creating and orchestrating interactive multi-media lessons across a connected learning environment. This resource has its own support community.

SMART created a SMART Implementation Ideas Document in both English and Spanish. They also ran Initial training workshop with all pilot teachers in Spain and the UK. Edmodo online communities were set up and teachers were also supported via email and by posts in the SMART blog. Midterm online webinars were recorded and made available via YouTube. SMART also undertook evaluation of the online communication and support.
## Appendix B: Analysis of data by country

<table>
<thead>
<tr>
<th>Country</th>
<th>Teacher survey responses</th>
<th>Teachers in pilot</th>
<th>No. of pilots</th>
<th>Response rate</th>
<th>Student survey responses</th>
<th>Edukata facilitator survey</th>
<th>Edukata interviews</th>
<th>Pilot case study interviews</th>
<th>Technology focus group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>13</td>
<td>13</td>
<td>17</td>
<td>100%</td>
<td>0</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Belgium</td>
<td>1</td>
<td>9</td>
<td>9</td>
<td>11%</td>
<td>0</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>22</td>
<td>22</td>
<td>44</td>
<td>68%</td>
<td>140</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Estonia</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>83%</td>
<td>14</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Finland</td>
<td>22</td>
<td>25</td>
<td>26</td>
<td>88%</td>
<td>144</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>France</td>
<td>14</td>
<td>26</td>
<td>26</td>
<td>54%</td>
<td>56</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Hungary</td>
<td>15</td>
<td>22</td>
<td>21</td>
<td>68%</td>
<td>23</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Israel</td>
<td>2</td>
<td>7</td>
<td>16</td>
<td>29%</td>
<td>0</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Italy</td>
<td>14</td>
<td>16</td>
<td>17</td>
<td>88%</td>
<td>227</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Lithuania</td>
<td>19</td>
<td>37</td>
<td>44</td>
<td>51%</td>
<td>84</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Norway</td>
<td>6</td>
<td>12</td>
<td>12</td>
<td>50%</td>
<td>31</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Portugal</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>100%</td>
<td>203</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Promethean</td>
<td>PT 1; ES 8</td>
<td>BE 2; EI 1; ES 9; FI 2; PT 7; UK 6</td>
<td>BE 2; EI 1; ES 12; FI2; PT 7; UK 6</td>
<td>PT 14%; ES 89%</td>
<td>FI 22; UK 3; ES 23</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Slovakia</td>
<td>18</td>
<td>43</td>
<td>43</td>
<td>42%</td>
<td>148</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

---

23 As listed in project management table
24 Conducted by WP5
25 Interview with workshop facilitator conducted by WP5 and written feedback from teacher
<table>
<thead>
<tr>
<th>SMART</th>
<th>ES 25</th>
<th>ES 27; UK</th>
<th>ES 22; UK</th>
<th>ES 93%</th>
<th>ES 210; UK 2</th>
<th>✓</th>
<th>✓ 26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>64</td>
<td>70 27</td>
<td>80</td>
<td>91%</td>
<td>160</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>TOTAL</td>
<td>259</td>
<td>385</td>
<td>439</td>
<td>67% 28</td>
<td>1,488</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

26 Plus additional interview with workshop facilitator conducted by WP5

27 The exact number of teachers is not available for Turkey, so an estimate was calculated based on the average number of pilots per teacher in other countries during this cycle.

28 The response rate is 62% if the estimated figure for Turkey is omitted.
Appendix C: Contextual information about participating teachers and their schools

Almost half the teachers responding (48.1%) had at least 16 years’ experience working as a teacher. Only 11.9% were in their first five years of service.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is my first year</td>
<td>3</td>
</tr>
<tr>
<td>1-2 years</td>
<td>5</td>
</tr>
<tr>
<td>3-5 years</td>
<td>23</td>
</tr>
<tr>
<td>6-10 years</td>
<td>61</td>
</tr>
<tr>
<td>11-15 years</td>
<td>43</td>
</tr>
<tr>
<td>16-20 years</td>
<td>60</td>
</tr>
<tr>
<td>more than 20 years</td>
<td>65</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
</tr>
</tbody>
</table>

Table C1: How long have you been working as a teacher (where possible exclude extended periods of absence e.g. career breaks)?

More than two-thirds of teachers responding to the survey (69.6%) had been involved directly in national or international ICT initiatives or projects in the last 2 years and a similar percentage (70.4%) said their school had participated in these types of initiatives. 79.2% of respondents said their school’s senior leaders were supportive of the use of ICT in the classroom.

Overall, iTEC teachers responding to the survey rated their level of competency in the use of ICT in learning and teaching very highly; the average rating was 8 out of 10. 61.2% rated their level of competency as 8 or greater, with 11.5% rating their competency level as 10 (very high). Only 16.9% rated their level 5 or below.

Due to changes in the registration process from Cycle 2, information about teacher gender, subject taught and age range of the cohort was collected via the pilot management tool provided by Work Package 4.
Appendix D: Pilot case studies

1. Austria pilot case study

The observed session was in ICT/Handicraft/Technology and involved 12 students aged 15-16. Technologies used were a self-built 3D printer, EEG and Lego Mindstorms, along with the iTEC technologies TeamUp, Reflex and the SDE. The view of the Teacher M in the Austrian case study is that the main impact of the iTEC experience is on changing pedagogy: ‘both Austrian Scenarios are highly innovative, trendsetting […] The most innovative aspect of iTEC is the CHANGE of PEDAGOGY”. However, the development of particular iTEC technologies and resources is also viewed as significant: “The design of the SDE and the Widget store are the real success stories of the iTEC project”.

A very interesting comment made by Teacher M refers to the way in which iTEC incidentally supported more effective learning across different curriculum areas such as the Mobile Lernbegleiter Project and the International Baccalaureate (where “it meets the goals of science teaching exactly”). The degree of reflection facilitated by the iTEC experience was identified as being a notable feature. In effect, iTEC tools were integrated into the session, serving to bring cutting edge technology and progressive pedagogy together in a way that had “a big impact…Pedagogy radically changes (Inquiry based teaching) and 21st Century technology is brought into teaching”.

The iTEC approach was also warmly welcomed by the students: level of engagement; flexibility of timings and tasks; a less traditional teacher role; teamwork; increased reflection; and the up-to-date nature of technology, were all the subject of comment.

*Lessons run “different”. We can use more time to workout the workload of the day, usually we don’t do so much “reflecting” in our lessons. New technologies (3D printing and EEG are simply “cool” to use. [The] technology we use in iTEC lessons is on top, and comparable to our work out of school, even if it is very expensive we need this for our future work…Usually there is a lot of teacher centered work, in iTEC teachers work as coaches in the back…simply ‘coooool’*

The only negative factor, noted by both teachers and students was limited wireless access at certain busy times.

In general, teacher M’s praise for iTEC is generous, with iTEC being described as “the most innovative and most successful Austrian ICT Project in the last 10 years”. The degree of nation-wide commitment to the project is identified as a significant factor, helping iTEC innovations to gain respect within teacher M’s school.
2. Estonia pilot case study

The session observed was an English lesson and the innovation deployed was the ‘flipped classroom’. Learners used technologies such as the quiz creation tool Blubrr, the games-based learning system Kahoot, and feedback tool Todaysmeet as well as the iTEC technology, TeamUp.

Teacher M generally sees her goal as a teacher to be one of “preparing students for the life [so that] they are able to use different IT devices and platforms” and sees the iTEC experience as a positive one: “From the point of IT, it has been quite successful because in course of it we have used and tried different devices and programmes that both the school and children themselves have”. She remains mindful, however, of the value of what she calls “traditional” methods and believes that while dissemination of innovation is important it is not necessary “to change the teaching habits of 60 teachers”.

Describing her class as made up of “open-minded children [who] are willing to try new things and always say what they think,” Teacher M acknowledged that the fact that they were already familiar with the flipped classroom technique and that this familiarity was significant. Students were also used to the iTEC tool TeamUp and, for example, no longer questioned why they found themselves allocated to particular teams. In such a familiar setting they were able to act autonomously and choose their own tasks and tools, something they were clearly trusted to do by Teacher M:

*Every cycle has its inherent innovation. It’s really difficult to evaluate this innovative quality. I think it is really innovative, because it is learning in a different way and the students had a lot of freedom. I only hinted at different tools and asked them to think about the tools we have used in class etc. As for the choice of topics and how to compile the tasks – I occasionally had a look at the process and asked for clarifications about the questions and tasks, but they had very specific and concrete reasons for their questions and I had to agree with these as long as they were able to justify their actions and choices.*

As such, the flipped classroom technique used by Teacher M represents a very significant departure from a traditionally didactic, teacher-led, approach: “The importance of conducting the learning is diminishing, because they are already used to working in groups and discussing things. So, the time the teacher spends on talking gets smaller and smaller”. She has shared her experience with colleagues at her school who, while “not overly eager to join in”, have made use of the techniques. She has also taken part in dissemination by means of a national conference. Interestingly, Teacher M draws attention to two ways in which iTEC learning stories and technologies challenge traditional teacher authority:

*First, the teachers should be ready and willing to let students use their own devices… I think that we as teachers fear it a bit too much. So, this is one thing – a teacher needs to allow different kinds of technology to be used. Another challenge is to overcome the fear that if I do something different, I won’t manage to cover a part in the
textbook. Let it be that way – I do not need to read that particular text that’s in the
textbook, I can find the input somewhere else. That is a big challenge.

In terms of student comment, there was recognition that the flipped classroom was a
familiar aspect of Teacher M’s repertoire. Noting that while other teachers “seldom”
use such a method, they said that they “do such things quite often” in Teacher M’s
class. On the question of using IT in such lessons the attitude of learners was
positive: “it’s interesting, you learn something new” and skill development was hands-
on: “a user manual is the first one into the trash bin”. Learners recognised the value
of variety:

We would like to study that way also in the future, but not always because it might
get boring. Using the computer is good because in other lessons we have to write all
the time and the teacher is delivering a “monologue” in front of the class. Here, we
can explore and learn new things.
3. France pilot case study

The French pilot case study provides an adventurous and ambitious example of how the iTEC experience, when extended to its logical conclusion, is capable of linking pedagogic/technical innovation within the school with imaginative and innovative social/productive practices being generated, for example, by the FabLab approach. What is more, it shows how it is possible to do so in a way that stretches the learning experience of Year 7 learners in quite a remarkable manner.

The case study presents a detailed and well-illustrated account of a sophisticated and reflexive investigation being carried out by quite young pupils. The observed session was part of the "Personalised learning paths" scenario and was organised in the form of “highly-mobile group work” within the Earth and Life Sciences curriculum area. Overall, the project required pupils to initiate an idea; develop specifications for a prototype (in this case, of a 'soil making machine'); submit their project and documents to peers and external experts or professionals; and liaise with the local ‘FabLab’ to enable real-world production of the machine they had designed. Furthermore, they were expected to develop criteria to assess both their own learning and the successes and failures of the project itself. iTEC tools used were Widget Store and TeamUp. Among other technologies deployed were Padlet, Evernote, Arduino, and smartphones.

Teacher F noted the transformative culture of possibility – and its potentially far-reaching consequences – in the vision espoused by the member of FabLab staff:

> With him we could really discuss the subject openly, without any preconceptions like, "Well you don't know how to do that... so we can't do that". Anything was possible...the interesting thing with FabLab (which I didn't realise) is also that, um... there is a pooling of resources, so people can reuse our work. There is no notion of property, you see. Like "I did that, okay, but um... to do that I needed help, so now that I've benefited I should let others draw benefits too.

In the teacher’s view, operationalizing this culture within the class transformed the learning experience of both pupils and staff. The pupils, in the ‘flipped classroom’, “naturally” took increasing control of their learning experience, exploring beyond conventional subject boundaries and implicitly challenging schooling (and learning) as a time- and place-bound institution by working freely in their ‘own’ time. Teacher F, meanwhile, was forced to “break away from [subject] disciplines a little and, ultimately, from the traditional ways of transmitting knowledge”.

These outcomes were seen as consonant with the FabLab approach as outlined by the FabLab staff member – “I come from a school which is a little bit self-taught; always two steps forward one step....Make a mistake, start again, note it down” – and with the principles of iTEC as understood by both him and the teacher. Interestingly, both felt that such a radical approach depended on using open source materials and thus clashed with cherished notions of private property: “I think that the
biggest problem is the ‘I found this resource, and I’m going to use it!’ And then it all starts, right? The property issue, um...whoa!” (Teacher F).

Pupils welcomed having “more freedom to express ourselves” and even at their young age quickly became adept in high order group work processes: “the feeling of all working together, we were all, um... like we were each a cog in the wheel”; “I think I will remember, this experience, doing a project, and...well...that it is "totally amazing", I have to say it again, "totally amazing!" However, this pilot case study demonstrated that even practice as exciting, imaginative and advanced as this can easily be jeopardised by weak or intermittent internet connectivity.
4. Italy pilot case study

The Italian pilot case study was based on a session in which student pairs, having created “models” to explain different measurements systems, presented their models to each other using Apple TV and the Airplay protocol. The “Create a Model” Learning Scenario was composed of five different learning activities and students had previously used iPad Apps to make measurements, take photos and videos, create maps, movies, cartoons, and animated stories. TeamUp – even though viewed as somewhat lacking in flexibility by the teacher (“Sure... TeamUp allows to assign your personal “meanings” to the students icons, but I found it somewhat too ‘close’”) - had been used to form groups in a way that took into account individual learning style. This latter factor struck the teacher as a very significant benefit of the tool:

My iTEC experience led me to take into account individualization, and led my students to be the protagonists of their own learning process, e.g. in choosing the apps.

Indeed, this capacity for individualisation generated what became the key challenge for the teacher: increased learner autonomy:

And this was a thing that I wasn’t used to before. Before the Learning Scenario I used to select the tools for them. The “Adapt” LA led me out of my “comfort zone”. It’s about “individualization”... This new approach, focused on individualisation, led me to frequent adjustments: I was used to drawing the line, and now I had to follow students line... something that I wasn’t used to.

For 8-9 year olds, the reflections recorded were very sophisticated. Students were not only able to describe accurately what they had done in the session but also to reflect on individual and group challenges and how they were overcome:

The main challenge was to choose the right app for getting the task right... Sometimes it’s difficult to be in agreement, and it also depends on the things you have to do. When we’re not in agreement, then we find a new way until we both agree.

Interestingly, the variety of responses to different learning activities within the scenario is testament to its capacity for individualisation

The best moment was... the end: when we got the job done and showed it to the others. We really enjoyed this moment. (another student) I really enjoyed the beginning, the creative stage, when we were discussing about what to do and how to do it. (another student) I really liked the creation stage of my story (he created a cartoon about measurements).

The degree of autonomy in learning experienced by these children, however challenging to the teacher is clearly highly valued:
When you can work in your own way, you have a better learning. (Another student) I really like to do things every time in a different way... Yes! For sure. But, as already said, we really enjoy changes, and discover more new ways.
5. Lithuania pilot case study

The stimulus for the activity carried out in the Lithuanian case study school was a digital product development scenario. The activity was based around digital mapping from co-ordinates derived from small sculptures. Technologies used included iPhones, Edmodo for communication tasks and Dropbox for sharing images and presentations.

Aspects of the iTEC experience highlighted in the pilot case study relate to the way, according to the ICT co-ordinator, it supports the “school strategy and vision of ICT integration across the curriculum” and to the fact it established an on-going processes of collaboration: “Because you are [often] collaborating only when your work is finished. But in iTEC you can share experience during the project”. In effect, iTEC allowed the full and creatively collaborative use of tools that were already familiar but not fully used: “It was innovation in methodological approach. We have a lot of tools, but we do not know sometimes how to use them. This project lets [us] do this”.

This was a view shared by Teacher B: “We are trying to do this project in such way that it could be used for other students and during other lessons. You're saving lesson time”. Pedagogic benefits of the iTEC process and particular resources, notably TeamUp, are also recorded. As in other case studies, positive effects of using technology extend throughout the learning community and as far as parents: “Before this activity I used a lot of oral presentations and textbooks. After this work, I can present the same information using ICT. Also involving students in this activity has increased learning motivation. Even the parents get involved, helping children to do presentations, you can see the crafts that parents contributed”. Enhanced collaboration is an important outcome: “We already share naturally...during the conferences, seminars. Also because we choose the topics related to the project”.

As well as generally welcoming an emphasis on group work and “much more” technology-based pedagogy students, like staff, also recognised collaboration – both within class and between different schools – as the most important aspect of the iTEC experience: “At the beginning we needed to learn to collaborate, to work in groups with new people... I liked collaboration. I felt great. It was very useful for me. I liked that we worked with students from other schools”.

1. Norway pilot case study

In the Norwegian case study, the observed session was based on the scenario Teaching by Programming and an associated Learning Story Code to Learn. It involved a group of 16 – 18 years old students working in groups of four. The teacher used the game creation programme Construct 2 to teach the principles of programming, and to work with the creation of learning games. A range of technologies were used in this activity. iTEC technologies Composer, People and Events Directory, SDE, were used alongside WordPress (blog), Google Drive (joint writing), Facebook (group work), Mindomo (mind maps), and MS Photo Story.

The teacher described how learners developed both increased autonomy and an enhanced capacity for meaningful collaboration as a result of their participation in the iTEC experience. Also, through blogging in English they were able to tap into supportive peer and staff communities and have “some contact with ... in a mentor-like fashion, other teachers in the subjects which they are creating games for”. Equally, the teacher has felt benefit from peer support networks established as part of the iTEC experience, having taken part in a teachers’ workshop in Oslo: “ It was great to get some information and meet other teachers...since I used to be the only one who was involved with programming and games...Yes, so it was really great”. Interestingly, the teacher identifies the supportive scope of iTEC, saying it “really is a European project” that has introduced extensive innovations:

Yes it is innovative in many ways, to a very large extent, both in relation to here and more generally. I have the impression that a lot of traditional teaching still goes on, and this is a long, long way from that. Think about the fact that we have writing on shared documents, blogging, social media, Facebook groups and contacts and things like that. I also use some of these tools in mainstream teaching, but not so .... in [the same] a way.. Not in a way that produces synergy effects that combine so many different tools.

Students welcomed the change from “classroom-based lessons” which are regarded as “not very exciting”. Supported by the collaborative forum available to them, they have developed a repertoire of skills with an extensive range of ICT tools which they are able to deploy in interrelated ways. The iTEC experience has led to “more fun group work”, satisfaction in working to self-imposed deadlines and learning both by getting things right and wrong: “It's really satisfying working for half an hour and then trying out the game and seeing that everything works...It's also kind of fun when things don't work as they should either”.

Students could clearly see the real world applicability of the ICT skills that they were learning: “…there's Construct, which even if there isn't coding like this in the real world or in working life, then it's [still useful]... You mostly learn about what you can do, even if it is very simplified”. They were also enthusiastic about applying such skills in their working lives.
2. Portugal pilot case study

The Learning Story in this case focused on research into the region's geological and paleontological heritage. Technologies used during the observed class were computers with Internet connection and Google Earth installed. TeamUp and Composer had been used in other sessions.

In evaluation terms, the key aspect emerging from these interviews was the high degree of success being achieved with the iTEC experience in motivating disengaged pupils and establishing a virtuous circle throughout the community of staff, students and parents alike: “when the pupils’ feedback is positive, when we look into their eyes and find that they are more interested, it drives us, and makes us try a little harder”. More to the point, this extremely positive outcome was achieved in a school environment where significant material disadvantages had been inherited.

Both the Teacher J and ICT co-ordinator commented at some length on the motivational aspect, noting significant behaviour changes in pupils with a high ‘failure’ rate:

*The pupils were more motivated to participate in school life...as they wished to participate in some of the iTEC project's activities, especially those that involved using digital devices, they were more focused and committed...For example, when we went on the field visit, some of the most irresponsible pupils did everything to get their parents’ permission to go, and even asked us to call them. (Teacher R).*

Student ownership of the learning process and the development of sophisticated reflexive skills were also noticed. Basically, the iTEC experience has succeeded in facilitating outcomes that are consonant with the school cluster aim of “having students as researchers in the centre of the teaching/learning process”. According to Teacher J the benefits of this approach are unequivocal:

*It is already very interesting to see how [pupils] can structure ideas, interact in the group, listen and respect other people's opinions...They began learning to listen, argue, which was something they were not used to doing; they learnt to address their own views in a relative manner and to accept the ideas of others. Then they began gathering different points of view, reflecting and making decisions. This is very innovative and beautiful to see in the pupils*

In order for full integration of the approach to be achieved, however, “the school must improve its technological conditions”.

All of the students who took part in the student interview were agreed in seeing major benefits in the iTEC approach to learning. Most interestingly, they were also very clear about the motivating effects of the iTEC approach for disaffected learners within the class: “Our group is a little complicated, because we have two people who skip school a lot. We’re five in the group and only three work”. Indeed, students showed subtle recognition of how the emphasis on group collaboration could positively
influence complex aspects of learner motivation: “The talk didn’t do much difference. …It was the group work. It was hard in the beginning … two weren’t doing much, but now they are clearly better”.

They also identified how the deployment of new technologies shifted the balance of classroom activity increasingly towards them as autonomous learners and enhanced their toleration of difference: “the difference in outlooks can be good, it can foster interesting discussions, help us think in a different way, get new ideas”.
3. Turkey pilot case study

Learning Story: Creating conversations/dialogues to teach the use of modal verbs

The class created dialogues, devised animations or videos to demonstrate these and uploaded their recordings to YouTube.

Cycle 5 was the first experience of iTEC for this upper secondary level teacher. Using technology in the classroom was something new for him, “I was a bit afraid at the beginning because of the computer work”, but he was keen to be involved in iTEC to ensure his pedagogy remained up-to-date.

This school is not well-equipped in terms of new technology; the computers are old and the internet connection slow. To compensate for this, some student brought in their own devices and the class made use of a range of readily available technologies including TeamUp, Reflex, Dvolver, Prezi, Animato, Weebly, Camtasia studio 8, Goanimate, PowToon and Movie Maker. They used these technologies at various stages of the project: to form the teams; to record their work in a blog; to create characters; to make the videos; to create mind maps; to design a website to present their work; and carry out dubbing. The teacher found that the students were able to support each other in their use of technology and also helped him in programs when they were more familiar with programs than he was: “My students helped me a lot”.

Although this class used less advanced, readily available technologies, involvement in the iTEC project had a clear impact on this teacher:

“It changed the way I look towards the use of computer in teaching and learning. Now I don’t think that it is a waste of time but the best way to go into the worlds of the students of today […] I will not be afraid of the computer work.”

Furthermore, the headteacher believed that the teacher’s involvement in iTEC would have an impact on teachers throughout the school:

“Now they [teachers across the school] become more aware that computer work is inevitable in education.”
Appendix E: Radical case studies

In addition to the Cycle 5 pilots, WP4 (supported by technical partners) co-ordinated a series of ‘radical pilots’. 19 teachers were recruited and supported centrally to create scenarios that were deliberately intended to be radical or disruptive. The radical pilots ran from April to June 2014. Teachers were presented with state-of-the-art technologies from industry partners (including some prototypes) and asked to develop ideas which could be completely new or based on existing iTEC scenarios, LSs and LAs. The following case studies illustrate the types of activities implemented in schools during these pilots.

1. 3D tourist guide

*Students introduce their city to students in other countries and learn about other towns using 3D objects*

**Countries**: Turkey, Hungary, Czech Republic

**Subjects**: English, Science, ICT, Geography, Art, Culture, Natural Sciences, Geography, Social Studies

**Technologies**: Corinth Classroom Beta, computers with Windows 8, 3D projections, smartphones, ipads, tablets, cameras, Windows Movie Maker, Audacity, Coggle, Popplet, Munzee, Photopeach, Google Drive and Maps, Linoit, Tripline, Kizoa), Class Dojo, photo editing software (Fotor, MS Autocollage, Notegraphy)

**The students**: Turkey: 17 students, aged 14 to 15; Hungary: 10 students aged 16-17

**The teachers:**

Teacher H is an English teacher in Turkey who has taken part in iTEC from Cycle 4 onwards. She co-ordinates eTwinning projects in her school and makes regular use of technology in her teaching. She is an iTEC Ambassador and regularly shares her experiences of iTEC with colleagues in her region.

Teacher T is an English teacher in Hungary at a vocational school with students coming from very difficult social and financial backgrounds. She has been involved in many projects related to the use of ICT in education, including previous iTEC cycles.

**Background**

Students from different countries introduce their city to each other by creating a PowerPoint which is a tourist guide supported by 3D objects. They go outside the school to take photographs; upload them Google Maps; and make interactive maps.
by using Corinth Classroom software. They also take part in an international treasure hunt game.

The aims included improving student communication and team working skills; improving student knowledge about different countries and cultures; and developing cross-curricular subject skills and knowledge.

The learning activities

1. Brainstorm ideas to select places to visit, cultural artefacts, restaurants and traditional food etc in the city
2. Mind mapping to organize ideas
3. Visit places of interest to take pictures of monuments, sights, statues etc
4. Compare students’ content with 3D content available
5. Create interactive maps, adding Corinth items into presentation and making videos
6. Create QR codes for landmarks and make treasure maps for other students
7. Class/school competition on knowledge about the region

Impact on students

Students enjoyed experimenting with a new way of learning. Teachers and students had to work together to overcome technical difficulties. Some students found team working to be a challenge.

The group of students in Hungary is often very difficult to motivate and are rarely among those invited to participate in projects. However, the teacher reported that they gained a great deal in self-esteem and a sense of achievement from working on a project which they knew would be shared with outside the school.

"Taking photos for making a tourist guide and enriched it with 3D objects and comparing our statues with Czech Republic’s and Hungary’s statues made it more enjoyable (Student, Turkey)"

"I can understand subjects easily if I am active during the process. We did a lot of work together so I did not get bored (Student, Hungary)"

Challenges

The main challenges were technical difficulties, in particular, sourcing computers with Windows 8 needed to use Corinth, and overcoming language difficulties because Corinth does not have all language options. Lack of time was also identified as a challenge.

Enablers
Support from Corinth was critical, as was help from other teachers and parents in overcoming practical and technical difficulties.

Links

**Pinterest sites:**
http://tr.pinterest.com/ozgeenalbantoglu/3discover-your-world/
http://www.pinterest.com/evatoth547727/3discover-the-world/

**Turkey video sightseeing tour:** https://vimeo.com/99523536

**Turkey PowerPoint tour:**  http://www.slideshare.net/osske/corinth-ppt

**Czech Republic PowerPoint tour:**  http://www.slideshare.net/osske/brno-for-tec-plot

**Turkey videos:**
http://vimeo.com/97727035
http://vimeo.com/97740853
http://vimeo.com/97822970
https://vimeo.com/99536370
2. Algebra Games

*A ‘shared programming’ activity in which students from two countries design, programme and evaluate online maths games.*

**Countries:** Spain & Portugal

**Subject:** Mathematics

**Technologies:** SDE, Scratch, ClassFlow, eTwinning platform, Agueiro platform,

**The students:** Spain: 20 students, 13-15 years; Portugal: 26 students, 11-13 years

**The teachers:**

Teacher M (Spain) has worked as a secondary teacher for 24 years. As the ICT Coordinator for her school, she has advanced digital innovation skills. She not only uses technology in her own classes, but also supports other teachers in doing so.

Teacher S (Portugal) is experienced in the use of technology and has participated in iTEC from cycle 4 onwards.

Teacher G (Spain) has been a Maths teacher for 16 years and is currently a ICT pedagogic adviser in the regional Teachers’ Training and Resources Centre.

**Background**

‘Algebra games’, is based on the Cycle 3 iTEC Learning Story, ‘create a game for learning maths’. The topic chosen for the game was ‘Introduction to algebra’. The main objective was to introduce, by means of programming, a game to teach basic algebra in a context which would be engaging.

Initially, Teacher M was working alone, but after participating in the Future Classroom Scenarios workshop at EUN in April 2014, two other teachers decided to become involved: Teacher S from Portugal, whose students also programmed games and shared these with the students from Spain; and Teacher G who participated as an expert and evaluator of the games. The shared learning activities were published on the SDE.

**The learning activities**

The sequence of activities was as follows.

1. Explanation of the scenario and choosing a logo (1 session).
2. Organisation of work groups and of the collaborative space (1 session).
3. Review of existing knowledge of algebra and incorporation of new content to be used in the games (2 sessions).

4. Creation of an evaluation rubric for analysing existing games and application of this rubric (2 sessions).

5. Preparation of the cloud workspace (Agueiro platform) (1 session).

6. Analysis (through videos selected from YouTube) of games programmed in Scratch (2 sessions).

7. Design of a prototype game by each group and publication of prototypes in Agueiro (2 sessions).


9. Presentations of games to other students and experts from University of Vigo (1 session)

10. Video conference with expert (Teacher G) (1 session).

11. Portuguese students evaluate the games created by Spanish students (1 session).

12. Spanish students evaluate the games created by Portuguese students (1 session).

Impact on students

According to teacher reports, students’ collaboration and communication skills improved, for example, being able to evaluate each other’s work; time management; and online communication. The following quotes from the eTwinning platform blog illustrate the impact of the project on students.

The iTEC project seemed very interesting to me and I enjoyed it very much. My fellow students and I worked on this project and we were very happy to do so. It was pretty educational. I loved your [Portuguese students’] games; they were very interesting and also well worth the time, effort and persistence. In addition, I liked Scratch very much. At first, it seemed difficult, but once you get used to it, it soon seems easy. I really enjoyed this experience. (Student, Spain)

In my opinion, iTEC project served to help me learn more about the equations, develop the ability to work in Scratch and work better in a group with other students. I think my group worked well, there were no problems and we shared the work without any disagreements. In addition to the school computers we used to accomplish the project, also we used our mobile phones to solve some exercises about
equations, which was quite fun. At the end of the project would love to make a video call via Skype with our colleagues in Spain. (Student, Portugal)

The students worked in a highly independent way: they selected the level of difficulty for their games and took decisions about which aspects of their games they each wanted to tackle. The students had to adapt their initial expectations about the game to the reality of their levels of knowledge of programming and to the time that was available.

The scenario was enriched through the inclusion of games made by students from two different countries. Students from both groups were able to compare their games. They agreed that the games produced by the Spanish students were more complex in terms of programming, but those produced by Portuguese students incorporated more complex mathematical content, despite the fact that these students were younger. This has given both classes areas to focus on and try to improve in the future.

Challenges

Students and teachers from several countries working together collaboratively in real time as a challenge, as was finding a suitable platform for the students to save their work, share it, and communicate with students in the partner country. The network bandwidth of the school sometimes presented problems.

In addition, there were many new skills which the students needed to learn in a relatively short time, for example, learning to program in blocks.

Enablers

Platforms such as the eTwinning platform or Google Docs, which allow file storage and communication online were important to the success of the project.

Links

SDE
http://www.itec-sde.net/es/experiences/53

AGUEIRO
https://www.edu.xunta.es/agueiro/view/view.php? t=YIk57AtPM2cLnpEfZshT
https://www.edu.xunta.es/agueiro/view/view.php?t=WXTdbUZLmPN1ux8fYS2o

Classflow
http://cfsha.re/1gWxunQ
http://cfsha.re/1mMi3rF
http://cfsha.re/1gdjegL
http://cfsha.re/1jWY6eH

eTwinning
http://new-twinspace.etwinning.net/web/p104525/welcome
http://new-twinspace.etwinning.net/c/portal/layout?p__id=33184477

Scratch
http://scratch.mit.edu/studios/377098/

Example of a student game
3. Comparing virtual and actual representations of the cardiorespiratory system

Engaging students in learning through the use of a wide range of technologies and different approaches to learning

Countries: Portugal

Subject: Biology and Geology

Technologies: Blogger, Google drive, Google Docs, Cacoon, Dropbox, Picasa, TeamUp, Windows 8, Skype, email, Movie Maker, CamStudio, Presentation software, Corinth Classroom B Augmented anatomy, tablets, webcam, camera, camcorder, widgets

The students: 16 students, 14-16 years old. It was a class that did not have a great predisposition in ICT and to group work

The teacher: Teacher R has been a science teacher for 18 years and has used technology within her teaching for 10. She has experience of several European projects, including involvement in iTEC form cycle 2 onwards.

Background

The aim of the pilot was to motivate students by providing them with contexts in which they become creators of knowledge, programmers, communicators, presenters, and self-reflectors.

The learning activities

1. Introducing the project, explaining evaluation criteria, creating teams, distributing tablets, setting up blogs etc
2. Each team creates a display of what they already know about the morphology and physiology of the circulatory system. Some team members then swap groups to allow sharing of ideas between groups. Students record their reflections using TeamUp and blog about their experiences.
3. Students conduct research on historical models and concepts related to the topic.
4. Students take part in an experimental activity (dissection) in the lab; they make sketches and take photographs and write a report on their findings. These are shared with other teams using Google Drive
5. Students explore the various virtual 3D models of organs of the human body available on "Corinth Classroom" and compare these with the sketches and photographs they made during the practical experiment.
6. Students propose improvements to the 3D models in Corinth Classroom.
7. Students create a presentation about the project which they present at a whole school event and share online.

Impact on students

Teacher R reported that most students showed commitment and worked productively. She felt that students themselves were surprised by the ways in which they were able to overcome challenges themselves. They felt the project allowed them to develop important skills for the future.

This work was also good for our further knowledge about the heart, because of the experimental activity and also the comparison with Corinth Classrooms virtual model. (Student, Portugal)

We really liked this project and we learned a lot, in a different way than in other class. Not only do we learn subjects from this class, but we also learned to master the new technologies. (Student, Portugal)

Challenges

There were problems installing the necessary applications due to limitations on internet access. In addition, the fact that Corinth Classroom requires Windows 8 also presented an obstacle as few devices in the school have it installed and there is a lack of funds to make the necessary updates.

Enablers

The motivation and engagement of students and technical support available within the school were identified as the main enablers.

Links

http://itecsaboia.blogspot.pt/
http://sistemacardiorrespiratorio.blogspot.pt/
http://investigandoocoracao.blogspot.pt/
http://itecradical-equipabanana.blogspot.pt
4. Collaborative, digital research and presentation

*Combining sensitive peer evaluation with collaborative digital research to develop reflective presentation and investigative skills.*

**Countries:** France

**Subject:** French

**Technologies:** Search engines, ClassFlow, LibreOffice Impress presentation software,

**The students:** 2 classes of 28, Year 8 (12 year old) students

**The teachers:**

Teachers A and S teach French in a Junior High School in France. This is their first experience of iTEC although one of the teachers also takes part in a working group exploring the use of ICT in French lessons.

**Background**

For both teachers, the use of digital technologies such as video-projectors to assist in learning is already embedded. This pilot therefore moves beyond a focus on the mere use of technologies to considerations of how they might usefully assist in the learning process through, for example, allowing the sharing of resources and presentations across classes and to encourage supportive and collaborative work both within and between individual classes.

**The learning activities**

The sequence of activities developed over 4 lessons, as follows:

**Lesson 1:**

1. Explanation of the project, its goals and time-frame.
2. Brainstorming of the main topic to identify sub-themes to be researched by the students.
3. These sub-themes were then allocated to smaller research units within the class of 28.

(In parallel, another class were following the same procedures but working on a different topic so that the classes could then come together – see below – and teach each other.)
4. After a discussion about online research skills, the students were then ready to begin exploring and collating relevant information for their group's study.

Lesson 2:

5. The students, still in their smaller, research groups, began creating their presentations using LibreOffice Impress (free Presentation-writing software).

6. The students also prepared for Lessons 3 and 4 by developing questions to ask the other class about their presentations.

7. Both classes then used the school's VLE to store copies of the presentations and these were subsequently integrated with ClassFlow so that each class could access the other's presentations in preparation for Lessons 3 and 4.

Lessons 3 & 4:

8. The use of technologies made sharing the presentations more effective – students could comment on and ask questions about a particular part of the research that members of the other class had done. Students supported evaluation of each other's work on the basis of questionnaires they had created.

Impact on students

Teachers noted how the students were more empowered: whilst being supported at the beginning of the project, they had then developed its trajectory, researching in ways that interested them and that they thought would return relevant and useful information for their particular audience.

Students were also positioned in the role of assessor or evaluator of others' work, so encouraging the development of critical but supportive skills. The emphasis on teachers leading the activities was reduced and allowed for a greater element of student control. For example, the teachers noted that students “have been very self-
sufficient and interactions between both classmates and students from the other class have been quite dynamic.”

A further result of this was that “they were more careful about their work than usual.”

Challenges

The teachers felt that the main challenges were logistical: the school had designated ICT rooms rather than portable, personal ICTs that might have allowed for more flexible forms of learning.

Enablers

Support from the head teacher was recognised as being vital as was a collaborative relationship between teachers.

Technology-wise, the ability to share resources and presentations across classrooms facilitated student interaction and feedback/evaluation.
5. iTEC in teacher training

*Providing future teachers with the knowledge, skills and confidence to use augmented reality in the classroom.*

**Countries:** Spain

**Subject:** Technology and Education

**Technologies:** 3D modelling computers with Google SketchUp; mobile devices (Android and IOS for the AR, with the program Aurasma); mobile devices and computers to work with SMART amp in groups.

**The students:** 33 trainee teachers (university students aged 18-25)

**The teacher:** Teacher S teaches in a university, educating trainee teachers on a course for Educational Technology for Pre-school and Primary school. He has run several training activities during iTEC.

**Background**

The objectives were: to improve learning by the use of 3D objects (by means of augmented reality) and to prepare future teachers for the use of future technology and increased collaboration in the classroom.

**The learning activities**

1. Preparation class: explanation of the project and group formation
2. Technology lessons (AR, SMART Amp, Google Sketch Up)
3. Collaborative group work
4. Presentation
5. Evaluation

**Challenges**

“[Getting] past future teachers mental barriers. They have just witnessed traditional teaching and this kind of projects opens their minds in a way that they will be able to replicate them when they become teachers.”

**Enablers**

Student motivation and the use of experts as necessary.

Students with high levels of technical skill supported those who were less confident.
6. Promoting reading using augmented reality

*Using augmented reality to promote reading and change the ways in which students access information*

**Countries:** Spain

**Subject:** MFL

**Technologies:** Aurasma, ClassFlow, TeamUp, Edmodo, Flipgrid

**The students:** 12-13 year old gifted and talented students. This group is piloting the introduction of mobile devices in the school.

**The teachers:** Teacher C is deputy head teacher at an international school. He is responsible for adapting the curriculum to new technologies introduced in the school and organising internal development sessions. He has been involved in iTEC from cycle 3 onwards.

**Background**

The aim was to use Aurasma and other technologies to promote reading to students. Students were supported in understanding the process of creation as a way of learning and transformation.

**The learning activities**

1. The group discussed different ways to express the same idea using different artforms/media.
2. Using ClassFlow, students shared ideas for the main ingredients to tell a story and made a collaborative storyboard.
3. The students formed groups using TeamUp and discussed the best ways to present their idea and by creating a micro story of a maximum of 140 characters; a video associated with the same story of no more than 30 seconds and an aura that integrates both narrative aspects in the school environment.
4. As part of the process, the students shared Flipgrid videos to reflect the steps used to tell their story.
5. Students presented their stories and videos to a Year 11 (15-16 years) creative writing group.
6. Again using ClassFlow, students brainstormed ideas to promote reading to students.
7. Students recorded two 30-second videos talking about their two favourite books in the school library. They also recorded videos of their teachers talking about their favourite books.
8. They then made auras of these books.
9. Using the Edmodo platform, the group carried out a peer assessment exercise.
10. For one day, all students were given permission to bring a mobile device to school to view the auras. Instructions on how to install Aurasma were provided in an Edmodo tutorial created by students.

Impact on students

The pilot encouraged content creation and sharing among students. It also facilitated teamwork and helped students to use technology for a specific purpose.

The use of augmented reality has made us make links between what we know and what we share. (Student, Spain)

It is the best way to link media and the real world. (Student, Spain)

Challenges

Limited access to wifi was a barrier when using augmented reality.

Enablers

Support from other teachers in the school was an enabler.

Links

Google site: https://sites.google.com/site/menudaspalabras/
Micro stories: http://padlet.com/port15/sfkj4whhgj
7. Researching energy

A student-centred approach to learning about energy, making use of diverse learning environments

Countries: Portugal, Lithuania (and France)

Subject: Physics and chemistry

Technologies: ClassFlow; E-ON Simulation Programs; Pordata database; Eco-EDP energy efficiency test; SDE; TeamUp; Keynote; Edmodo; Facebook, iPads.

The students: Lithuania: 28 students, 13 years old; Portugal: 9 students, 12-13 years

The teachers:

Teacher V (Lithuania) is a physics expert teacher who has participated in many international projects and has considerable experience using innovative technologies in her teaching.

Teacher C (Portugal) has taught physics and chemistry for 16 years. She has participated in iTEC from cycle 3 onwards and has used technology in her teaching for 10 years.

Background

The main aim of this pilot was to promote energy awareness and inspire changes in behaviour by identifying what society and individuals can do to change their energy consumption.

Science teachers from Portugal and Lithuania and a French teacher from France decided to work together on the theme of energy. The idea would be to use different digital learning resources for the study of energy by analyzing real data on the development of renewable energy. The teacher of French used the theme in a more investigative way, while the two physics teachers developed activities exploring the scientific component of the concepts linking energy and using the resources listed by the ClassFlow platform.

ICT and English teachers in the schools were also involved to help using digital resources and materials only available in English.

The learning activities

1. Dream (1 session)
• The teacher introduces the activity to the class, including the schedule and evaluation criteria.
• The students form groups and take part in a brainstorming about their initial ideas for the project.

2. Explore
• The teacher organizes a session using the E-ON website.
• Students explore the site and gather information for the project.
• While doing so, they regularly reflect on their progress using TeamUp (Lithuania) or Facebook (Portugal).

3. Working with experts outside the school (1 session)
• Students in Lithuania had an opportunity to meet alternative energy experts in an innovation company Eksponentė. They talk with experts on wind energy.

4. Make (2-3 sessions)
• Students conduct research activities suggested by the teacher who uses the ClassFlow platform to record results and share practical suggestions for classroom activities.
• Students create Keynote presentations (Lithuania) or brochures (Portugal).
• Students continue to reflect on their progress.

5. Show (1 session)
• Students present the final product to the class, the teachers, staff and external experts involved.
• They share their work with the iTEC community through the iTEC Facebook group.

Impact on students
Students found the pilot motivating. Those in Lithuania particularly liked working with outside experts. Students gained technological, citizenship and research skills.

*I think it was important to participate in iTEC project because we used many tools to study energy (Student, Portugal)*

Challenges
The main challenge was lack of time. The fact that the ClassFlow app was not available in the Portuguese App Store prevented this class from making greater use of iPads in the activity.

Enablers
The availability of relevant technologies and the support of other teachers in the working group.
8. Water in the local river

*Using students’ own devices to collect data outside school and create presentations for other students.*

**Countries:** Estonia

**Subject:** Chemistry

**Technologies:** GoogleDrive, GoogleMaps, Classflow, SensorTag app, TeamUp, iPads, cameras, students’ smartphones

**The students:** 6 students, 14-15 years old

**The teacher:** Teacher S teaches rafts and home economics, chemistry, and ICT in an elementary school. She has used technology in her teaching for 14 years and has taken part in several European projects, including the first three cycles of iTEC.

**Background**

The main aim of the activity was to develop students’ research skills and knowledge of local ecosystems through outdoor learning.

**The learning activities**

1. Using Classflow, the teacher tested students’ knowledge about water and introduced the key issues. She explained how to take water samples and collect data. The students created a document in Google Drive.

2. Students used small sensors and the Sensor Tag app to collect data on water (including humidity, temperature and atmospheric pressure) from a local river. They measured the pH readings and marked the sampling location with GPS using a smartphone. They calculated the flow rate of the river using a stopwatch and float and measured the depth using a stone, twine and tape measure. They saved the data in Google Drive.

3. Working in groups, students analyzed the data and created a presentation using a web tool. They added their map, mindmap, charts, graphs, drawings and photographs.

4. Students shared their presentations with the rest of the class in Google Drive.

5. Students presented their work to younger students in the school using ClassFlow²⁹.

---

²⁹ It was originally hoped that they would present their work to students in other countries, but this was not possible during to timing issues.
Impact on students

The pilot was motivating for students and they became more interested in their local environment as a result. The teacher felt they became more confident as independent learners and their co-operation skills improved. She also reported that they were able remember more because their learning was related to their own experience. They also became more aware of the ways in which smartphones can be used for learning, as well as for entertainment.

*It was a bit harder than usual because we had to work harder ourselves. But it was interesting. (Student, Estonia)*

*I remember what I have learned better (Student, Estonia)*

Challenges

Time was the main challenge as this activity took considerable planning. There were also technical barriers as some students’ smartphones were older models and could not be used with the apps.

This pilot also demonstrated the logistical challenges of trying to work with other teachers, especially those in another country.

Enablers

Teacher and student motivation and an inspiring learning story were identified as enablers.
Appendix F: Methodological notes

Overview of data sources

The table below indicates the main sources of data used to answer each of the evaluation questions.

<table>
<thead>
<tr>
<th>Data collected</th>
<th>To what extent do the iTEC Learning Stories and relevant iTEC technologies benefit learning and teaching?</th>
<th>To what extent are the iTEC Learning Stories and iTEC technologies sustainable, transferable and scalable?</th>
<th>To what extent are the Learning Stories and iTEC technologies fit for purpose?</th>
<th>What are the enablers of and barriers to adoption of iTEC Learning Stories and iTEC technologies?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edukata case studies</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Edukata questions for NPCs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>NTC focus group (Composer)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pilot case studies</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>SDE survey</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Student survey</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Teacher survey</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Technology focus group</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Widget Store questions for NTCs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

General comments

As with almost all social research, it is acknowledged that the ‘Hawthorne Effect’ may be evident in this evaluation, meaning that changes reported are partly due to involvement in the project rather than the intervention itself. As Chiesa and Hobbs (2008) point out, the Hawthorne Effect describe changes due to a number of aspects of involvement in study, including the novelty, being observed and knowing that improvement is intended as an outcome.

Furthermore, social desirability bias (Crowne and Marlowe, 1964) may have an impact on responses, meaning that participants may be inclined to answer in a way
they anticipate will be viewed as favourable by others. In particular, in this evaluation, many teachers developed close relationships with their national co-ordinators who provided training and support throughout, and also administered the evaluation. It must therefore be acknowledged that this may have had an impact on the responses received.

Quantitative data

The teacher survey was delivered online using SurveyMonkey. In some cases (where NPCs felt this was a more effective approach), a link was sent to NPCs who then forwarded this to their pilot teachers. Elsewhere, emails were sent directly to teachers, using emails provided by the NPCs. Follow up emails were sent to teachers who did not respond initially (both by NPCs and WP5). Given the staggered nature of C5, it was left to NPCs to decide when would be the best time to make the survey available to teachers between February and the end of May.

Teachers who had responded at least as far as question 5.1 were included in the analysis (in C1-C3 teachers were only included if they had completed most of the survey). 259 teachers completed the questionnaire.

The data elicited through the teacher survey has been dealt with in two ways. The closed questions were analysed using SPSS, while open-ended questions were analysed by Nvivo and Excel. The process for analysing the open-ended questions differed slightly from that adopted in previous cycles. As teachers responded to the survey in their national language, full translations were made for responses from ES and IT. These were then coded in Nvivo, along with responses from CZ and FI where teachers answered in English. This allowed a more detailed coding structure to be established for each question than was possible in previous cycles. The majority of quotes used from the teacher questionnaire are therefore taken from these languages where more reliable translations are possible. For the remainder of countries, open-ended responses were translated into English using Google Translate. These responses were then coded, as accurately as possible, in Excel based on the coding structures established. However, it should be noted that it was not possible to accurately code all responses as some did not translate into English easily.

The student survey was administered by teachers who received the SurveyMonkey link via NPCs. This was available between February and May 2014. 1,488 responses were received. Responses were included if students had responded to at least the first six questions. As with the teacher survey, the closed questions were analysed using SPSS, while open-ended questions were analysed by Excel. Google Translate was again used to translate student responses from national languages into English. These were then coded thematically. It is acknowledged that this method may have resulted in occasional errors in translation.

It should be noted that, when responding to open ended questions, respondents are unlikely to have listed all the differences, benefits and challenges etc, but the ones
that they feel are most important. This has resulted in a wide range of responses to all open ended questions as individuals perceive the relative importance differently.

In the main report, analyses have included descriptive summaries of aggregated data from survey questions, acknowledging that there may be bias in the data at country level due to differing numbers of teachers participating in each country. However, it is likely that the variation within a country in terms of teacher practices is large, although of course at the country level (and in some cases regional level) policies and the curriculum will influence teachers.

**Qualitative data**

In C5, qualitative data from the case study interviews and case study reports were coded thematically in Nvivo based on a conceptual framework adapted from the SITES2 study (Kozma, 2003, p13). Selected quotations are used to exemplify the reported findings. In addition, each pilot case study and the more detailed Edukata case studies are summarised individually.

The analysis of qualitative data is based on a total of 9 teacher focus groups; 6 Edukata case studies (7 facilitator surveys and 13 interviews from 4 countries) and 8 pilot case studies (described in 8 teacher interviews, 7 head teacher interview transcripts, 6 ICT co-ordinator interview transcripts, 8 student interview transcripts; 1 external partner interview; and 7 lesson observations);

Case study interviews and teacher focus groups were designed to be semi-structured in nature and NPCs were free to make minor adaptations as appropriate, for example, including their own prompts. Therefore, whilst numbers of case study reports or interviewees mentioning various themes are provided throughout this report to allow a comparison of the relative frequency with which they were mentioned, the diversity in the conduct of the case studies, means these should be interpreted as illustrative, rather than statistical, figures.

There was a significant variation in the depth and quantity of the data provided from the pilot case studies interviews. While some provide very full comment, offering carefully considered reflections on the part of the interviewees, other examples are less detailed and interviewees’ responses much more perfunctory. This unevenness in the qualitative data provided should be kept in mind, as the discrepancy militates strongly against generalisation.

The case studies were purposively selected by the NPCs according to two criteria, namely that the case study teacher should be using iTEC technologies and a nationally developed scenario. The case studies are therefore not intended to be representative of the country in which they were conducted.
References
