iTEC

Designing the future classroom

Internal Deliverable 5.6 Cycle 4 Evaluation Report

Sarah McNicol, Cathy Lewin

30th September 2013

http://itec.eun.org

Credits

authors | Sarah McNicol, Cathy Lewin

publisher

pictures

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

This document, iTEC Internal Deliverable 5.5, reports on the evaluation of the project's Cycle 4 (C4) large-scale pilots between April 2013 and June 2013.

The focus of C4 pilots was on 'real world' challenges, that is, challenges related to the sociocultural context of students and which are personally meaningful to them. In this cycle, three Learning Stories were presented to teachers, underpinned by a set of eight Learning Activities. The Learning Stories were 'Tell a Story'; 'Create an Object'; and 'Create a Game'. The most popular Learning Story was 'Tell a Story' chosen by 55% of teachers responding to the survey. This Learning Story is easily applicable across a range of subjects and the process of producing stories would already be familiar to the majority of teachers and students. As in previous iTEC cycles, teachers have taken the iTEC resources and used them as sources of inspiration, adopting and adapting elements according to their own needs and situations. As a consequence, each implementation is unique to the teacher.

There were four evaluation questions in C4, assessing the extent to which iTEC Learning Stories, Learning Activities and technologies **benefited teaching and learning** and **were sustainable and scalable** and **fit for purpose,** and assessing the **barriers and enablers to implementation**[1]. A mixed methods approach was used with quantitative data on each teacher's prior experience and context, together with their implementation of the Learning Story, being collected via a 'Teacher Questionnaire'. In C4 the Teacher Questionnaire was substantially revised to focus more explicitly on teachers' perceptions of what they found innovative and of the iTEC technologies. 342 teachers responded to the C4 questionnaire, representing 424 pilots[2] across 19 countries. This represents 49% of 874 pilots conducted in C4. In 13 countries, case study data was also collected[3], which included a lesson observation and interviews with the teacher, students, head teacher and ICT co-ordinator. Teacher focus groups were conducted in ten countries.

A summary of the main findings from C4 is now presented in relation to the four evaluation questions.

1) Do the iTEC Learning Stories, Learning Activities and relevant iTEC technologies benefit learning and teaching?
2) Are the iTEC Learning Stories, Learning Activities and iTEC technologies sustainable, transferable and scalable?
3) Are the Learning Stories, Learning Activities and iTEC technologies fit for purpose?
4) What are the enablers of and barriers to adoption of iTEC Learning Stories, Learning Activities and iTEC technologies?

[1] The fifth evaluation question, evaluating the piloting process itself is reported on in D4.4 produced by WP4.
[2] Some teachers conducted two pilots (ie implemented iTEC with two separate cohorts of learners).
[3] One case study was conducted in each country with the exception of Turkey, where five case studies were conducted.

Do the iTEC Learning Stories, Learning Activities and relevant iTEC technologies benefit learning and teaching?

As in previous cycles, across all countries, the iTEC Learning Stories and iTEC technologies **impacted positively on student attainment, motivation and 21st century skills.** Participation also had a **positive impact on teacher competences, attitudes and motivation**. The majority of teachers were confident that the iTEC Learning Stories, Learning Activities and technologies have the **potential to lead to pedagogical innovation** (87%, n=342) **and technological innovation** (81%, n=342) in the classroom as new digital tools were introduced and technology was used in novel ways, and used more extensively to support pedagogical innovation.

In line with the iTEC approach designed to foster incremental innovation, through the project, teachers are **motivated to expand the range of pedagogies and technologies they use and to develop their teaching in new, innovative ways**, in particular to support learning beyond the classroom.

The iTEC resources were reported to be beneficial for teaching and learning in a variety of ways. These benefits are described below in relation to four assertions:

- iTEC improves student learning outcomes
- iTEC helps develop teacher competences
- iTEC brings about innovative pedagogy
- iTEC brings about innovative technology use

1) <u>iTEC improves student learning outcomes</u>

More than 70% of teachers surveyed (n=326) believed that iTEC led to improvements in students': **creativity, collaboration skills, digital literacy, communication skills, problem-solving skills, independent learning and critical**

thinking. The common reasons given by survey respondents to account for these improvements were: increased opportunities for collaboration (55 respondents, 20%), students' greater responsibility for learning (44 respondents, 16%), increased student motivation (42 respondents, 15%) and the use of technology to support learning (40 respondents, 14%). Additional improvements emerging from C4 case study data were an increase in **students' confidence** (1 teacher focus group, 6 case studies) and **students being better prepared for the job market** (2 teacher focus groups, 4 case studies). As in previous cycles, a positive impact on student engagement was also identified in both survey and case study data (31 survey respondents, 7 focus groups and 12 case studies).

71% of teachers surveyed (n=326) felt that their students' level of **attainment had increased**. A positive impact on attainment was also identified in six case studies and five teacher focus groups. The reasons most commonly suggested to account for this improvement in attainment were: greater **student motivation** (73 respondents, 31%), increased **collaboration** (29 respondents, 13%) and additional **use of technology** (24 respondents, 10%).

2) **iTEC helps develop teacher competences**

As in previous cycles, iTEC had a positive impact on **digital competency** (3 teacher focus groups, 6 case studies) and **teacher motivation** (5 teacher focus groups, 2 case studies). Teachers are continuing to introduce new technologies; to use technologies for different purposes; and to use technologies in a more integrated way throughout their teaching as described below.

3) **iTEC brings about innovative pedagogy**

87% of teachers (n=342) agreed that the Learning Stories and Learning Activities have the potential to lead to pedagogical innovation in the classroom, with 89% agreeing that there had been a noticeable difference in their pedagogy during piloting. The most common explanation given was the changing role of students as they began to take on new roles, as **peer assessors** (1 teacher focus group, 5 case studies), **teacher trainers** (2 teacher focus groups, 2 case studies), **managers of their own learning** (1 teacher focus group, 3 case studies) and **peer tutors** (4 case studies). In some cases, students worked with teacher to **co-design** approaches to learning (2 teacher focus groups, 3 case studies). **Greater student autonomy** (26 survey responses, 5 teacher focus groups, 7 case studies) and **an increase in group work** (24 survey responses, 5 case studies) were also noted.

The **role of the teacher** was also perceived to have changed (27 survey respondents, 4 teacher focus groups, 8 case studies) with teachers stating that they had acted as **coaches, mentors and guides**. Moving away from the front of the class, they have found new ways to support students and to communicate with them as they became more independent in their learning.

Approaches to **assessment** altered through the introduction of technology (2 teacher focus groups, 3 case studies). Teachers mentioned online assessment (online questionnaires, multiple choice questions via the interactive whiteboard), assessing digital artefacts, self- and peer-assessment and easy access to student work. The introduction of **cross-curricular approaches** was felt to be innovative by some teachers (1 teacher focus group, 5 case studies). Facilitating **student reflection** (supported by tools such as TeamUp ReFlex and blogs) was seen to be novel (3 teacher focus groups, 4 case studies). **Mind-mapping** (supported by Popplet[4] and a range of other mind-mapping tools) was noted as innovative by a few participants (12 survey respondents, 1 teacher focus group, 2 case studies).

As in previous cycles, teachers reported using a wide range of types of digital tools. Four out of five teachers said they used five or more different types of digital tools during the implementation. Technology was used on a more regular basis and utilised throughout the learning process by teachers. In addition, student use of technology was noted to have increased and this was considered innovative by some teachers. Student uses included producing **innovative outputs** (2 teacher focus groups, 3 case studies) and supporting **group work** (1 teacher focus group, 3 case studies). Teachers are also changed the ways in which they used technology, in particular to **support learning beyond the classroom** (2 teacher focus groups, 5 case studies) and to **'flip' learning** (2 case studies).

TeamUp was used to support classroom management (2 teacher focus groups, 2 case studies), student engagement (1 teacher focus group, 2 case studies) and effective reflection (3 case studies). Eight of 22 teachers who used ReFlex and expressed an opinion felt that it helped students to reflect deeply and improve their work.

The most important potential benefits[5] of the Widget Store were identified by survey respondents as: accessibility of resources (21 respondents); a structured approach (18 respondents); access to a variety of widgets (13 respondents); ease of use (11 respondents); efficiency and time-saving (11 respondents); and motivational for teachers and students (11 respondents).

4) <u>iTEC brings about innovative technology use</u>

81% of teachers (n=342) felt that the Learning Story they implemented had the potential to lead to technological innovation in the classroom. On a scale of 1 (not at all different) to 10 (radically different) teachers rated how differently their use of technology had been, the mean rating being 6.0 (SD=2.4, mode=7). **34% of teachers felt that this was due to the introduction of new digital tools**. **11% of teachers said that they used technology to facilitate different kinds of learning activities than they had done previously. 10% of teachers said that students'**

[4] http://popplet.com/

[5] Teachers were asked an open question in the survey asking them to identify the potential benefits of the Widget Store. The relatively small numbers of teachers identifying each of the themes reported here reflects the fact that individual teachers have varied views and have experienced iTEC in different ways

use of technology in the classroom had increased and **9% noted that they were now using technology more regularly and in a more integrated way.** When asked what the digital tools enabled teachers to do which was different from their previous practice, 96% identified at least one way in which learning had been enhanced. 49 teachers (15%) referred to new kinds of creative activities, for example the production of videos, games and 3D models. 35 teachers (15%) identified the use of digital tools to facilitate collaboration both between students and between teachers. 31 teachers (9%) felt that digital tools facilitated access to a wider range of research resources.

When asked how their pedagogy had changed, the second most common explanation given by survey respondents was the integration of new technologies[6] (48 teachers, 14%). **Teachers agreed that TeamUp has potential to lead to both technological innovation (63%, n=214) and pedagogical innovation (64%, n=214)** in the classroom. **The majority of teachers who used ReFlex agreed that it has potential to lead to both technological innovation (22 of 27) and pedagogical innovation (23 of 27)** in the classroom. **76% of teachers (n=126) agreed that the Widget Store has potential to lead to technological innovation[7] in the classroom whilst 83% agreed it had the potential to enable teachers to discover new digital tools and services**. Other tools identified as innovative (mentioned by individuals) were: video-editing software, tablets, virtual worlds, project management tools, and mind-mapping software.

Differences between countries[8]: Teachers in Finland, France and the UK were most likely to indicate that technology was being used for new learning activities, while teachers in Estonia most frequently identified the fact that students had a more active role in determining the use of technology, and those in Norway were most inclined to say they were using technology more regularly.

The use of technology to support creative activities was most frequently mentioned by teachers from Estonia, Portugal, Slovakia and the UK. While those from Spain were the most likely to say digital tools had enhanced collaboration, those from Austria most likely to mention the impact on student engagement; those from Italy most likely to refer to student communication; and teachers from Israel most commonly referred to monitoring and increasing the visibility of student work.

TeamUp was used by the largest proportions of teachers in Spain, Israel, Italy, Lithuania, Portugal and Turkey. The Widget Store was used by the largest numbers of teachers in Turkey, Italy, Portugal, Lithuania and France. The iTEC

[6] Technologies that had not been used previously to support learning and teaching.
[7] Teachers were not asked whether or not the iTEC Widget Store has the potential to lead to pedagogical innovation as it is primarily a classroom management tool.
[8] Differences identified are those where at least 20% of teachers surveyed (or at least two teachers if the sample size was less that 10) indicated a particular response.

Composer/SDE has only been used in Austria to date while ReFlex has been used by very small numbers of teachers (responding to the survey) from ten countries.

The factors thought to influence improvements in learning outcomes and attainment varied somewhat from country to country. Increased collaboration was most frequently identified as factor among teachers from the Czech Republic, Finland, Hungary and Italy. Greater student autonomy was most commonly mentioned by teachers from Estonia, Finland, Israel, Norway, Slovakia and Spain. Student motivation was most likely to be identified by teachers from the Austria, Belgium, Estonia, Czech Republic, Germany, France, Lithuania, Portugal, Spain and the UK. The use of technology featured most frequently among the reasons suggested by teachers from Italy and Spain.

Are the iTEC Learning Stories, Learning Activities and iTEC technologies sustainable, transferable and scalable?

Many teachers have plans to use the iTEC technologies, Learning Stories, Learning Activities or other aspects of the iTEC approach again. Some intend to try the approach **with another class**; others are keen to **embed iTEC technologies** as part of everyday practice; and some expect to **design new teaching activities** using the iTEC methodology. iTEC tools and approaches are also being **transferred to other teachers within the pilot schools**, supporting mainstreaming at a local level. Unsurprisingly, **transfer to teachers in other schools has been limited** to date and more support at a national or international level may be required to encourage teachers to disseminate their experiences more widely.

iTEC teachers will continue to use iTEC outputs in the future

86% of teachers responding to the survey said they would use the Learning Stories and Learning Activities again and between 71% and 81% would use the iTEC technologies (TeamUp: n=214, ReFlex: n=27, the Widget Store: n=126) again. Case study data also confirm teachers' intentions to continue to use iTEC resources in the future (5 teacher focus groups, 8 case studies) including re-using the same Learning Story, continuing to embed technologies, and re-using the Learning Actitivies.

There is evidence that iTEC is already being transferred to other teachers in the pilot schools and this activity is expected to increase

87% of teachers said that they would recommend the Learning Stories and Learning Activities to other teachers, with between 70% and 85% indicating they would recommend iTEC technologies (TeamUp, ReFlex, the Widget Store) to others. 83% of teachers said they had shared their experience of Learning Stories and Learning Activities outside iTEC, with 23 of 27 teachers sharing their experience of ReFlex and 63% of teachers sharing their experience of TeamUp. There is some evidence that other teachers in pilot schools have started to make use of iTEC resources (3 case studies) or have expressed an interest in finding out more (8 case studies).

Inevitably, teachers in some schools have found more interest among their colleagues than others with some indicating that colleagues were unlikely to be interested in innovative pedagogies or technologies (1 teacher focus group, 3 case studies). Some head teachers interviewed had become actively involved in disseminating iTEC (5 case studies) whilst others were broadly supportive but less actively involved.

So far, transfer to teachers in other schools has been more limited

Individual teachers appear reluctant to recommend iTEC to teachers in other schools for a variety of reasons (including lack of technical skills and confidence). There were two examples of teachers engaged in such dissemination in the case study data: one presenting at a conference for maths teachers and one about to become a teacher trainer who said they would share their experience with students. Some perceive a centralized approach to dissemination as preferable to a piecemeal approach relying on individual teachers.

Differences between countries: Teachers in Austria and Italy were least likely to use Learning Stories and Learning Activities again and those from the same two countries, plus France were least likely to recommend Learning Stories and Learning Activities to other teachers. Teachers in Austria, the Czech Republic, Spain (SMART), Finland, France, Italy, Portugal and Turkey were least likely to either use TeamUp again or to recommend it to other teachers. Teachers from France and Italy were the least likely to use the Widget Store again and the same two countries, plus teachers from Lithuania, were least likely to recommend it to other teachers.

Differences in sustainability, transferability and scalability across countries are explored in more depth in the National Case Studies presented in D5.4 (to be updated for D5.5, due M46).

Are the Learning Stories, Learning Activities and iTEC technologies fit for purpose?

Overall, the Learning Stories, Learning Activities and iTEC technologies (TeamUp, ReFlex, the Widget Store) were received positively by teachers. The Learning Stories were perceived as **flexible and practical resources which supported innovation**. TeamUp was felt to have value for **student engagement, classroom management and effective reflection**. The Widget Store is seen as potentially useful as a **structured and efficient way to access motivating resources**, providing more support is provided to help teachers to find and use widgets and the range of high quality widgets is expanded. Feedback on ReFlex was positive, but this tool **needs to be piloted more widely**.

The findings are now summarised in relation to four assertions.

Learning Stories and Learning Activities are usable, flexible and enable change in pedagogical and technological practices

The case study interviews suggested that teachers view Learning Stories and Learning Activities as **flexible, practical** and **stimulating** resources, which encourage teachers to **experiment** and make changes to their everyday practices. In particular, the Learning Stories and Learning Activities appear to encourage teachers to make use of **new technologies** (eg widgets, mind mapping software, video editing software) and to **use technologies for new purposes**. 71% of survey respondents agreed that they were able to adapt the Learning Story to meet their needs without help. Examples of the novel ways in which teachers used technologies included: to support the development of innovative outputs (eg games, videos, models); to focus on more challenging aspects of pedagogy, such as reflection; to consider new assessment and monitoring methods; to reconsider their own role; and to work more closely with colleagues from other curriculum areas.

TeamUp has potential to be innovative and beneficial

As described above, around two-thirds of teachers surveyed believe that TeamUp has the **potential to lead to pedagogical and technical innovation**. Providing it is seen to be reliable, it has the potential to support the development of **critical reflection skills** among students as well as having benefits for **classroom management and student engagement**. There were challenges for some teachers in relation to **student resistance** and **insufficient infrastructure**. Suggestions for improvement include linking to other tools (to import student registers for example) and nominating students as expert users.

ReFlex users were positive but it requires piloting at larger scale

ReFlex was only used by a small proportion of teachers responding to the evaluation. Like TeamUp it has the potential to support the development of **critical reflection skills** among students, offering functionality that is not available through other tools. However, as an early prototype tool there are a number of technical and usability problems that need to be resolved (for example, program crashes, difficult to use, time-consuming).

The concept of the Widget Store was positively received; it should be developed further

Positive feedback was received about the Widget Store. It is seen as **providing access to a variety of resources in a structured fashion**, which can **save time** and **motivate students and teachers**. However, teachers **need more support** to use the Widget Store effectively, especially if they are not familiar with using widgets. Work is also needed to ensure that a **good range of high quality widgets** is available and that it is **easy for teachers to find widgets** suitable for their needs (eg across subject areas, languages, age groups).

Differences between countries: Teachers from Germany (SMART), France, Italy and Lithuania were most likely to say they required help in adapting the Learning Story to suit their needs.

Accessibility of resources in the Widget Store was most likely to be identified as a benefit by teachers from Austria, while the structured approach offered was most commonly mentioned as a benefit by teachers from Portugal. Teachers from Italy most frequently mentioned a lack of teacher support as a problem; those from Austria appeared most concerned about the time required to learn to use the Widget Store effectively; and those from France were most likely to mention the limited range and quality of widgets. Overall, teachers from France and Italy appeared least positive in their feedback on the Widget Store.

Teachers from Austria, Belgium, Spain (SMART), Finland, France, Hungary, Italy and Portugal were least likely to be convinced of the potential of TeamUp to lead to both the pedagogical and technological innovation.

The numbers of teachers using ReFlex are too small to detect differences between countries and in C4 The iTEC Composer/SDE was only piloted in Austria.

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

Reiterating findings from previous cycles, conditions for success in relation to the adoption of iTEC Learning Stories, Learning Activities and iTEC technologies are: a positive attitude to change at all levels, access to reliable and sufficient infrastructure, technical support, institutional readiness for innovation and, teacher and student digital competence.

In C4 data on barriers and enablers were collected through case studies and teacher focus groups only. Challenges faced when using iTEC technologies are reported under evaluation question 3 above.

Conditions for success

A positive attitude to change at all levels As in previous cycles a **positive student attitud**e was one of the most important conditions for success identified by teachers (8 teacher focus groups, 10 case studies). A **positive teacher attitude** is also important. Teachers need to be open to new ideas and ways of teaching, willing to learn, and happy to embrace the use of technology in the classroom (5 teacher focus groups, 12 case studies). **Parental support** was identified as an enabler (1 teacher focus group, 7 case studies).

Access to reliable and sufficient infrastructure

Adequate infrastructure in schools (6 teacher focus groups, 11 case studies) and in students' homes (7 case studies) is seen to be important. School policies exploring the use of Bring Your Own Device continues to be explored by individual institutions as a potential enabler (1 teacher focus group, 1 case study).

Technical support for teachers

Adequate **technical support** is an important condition for success (2 teachers focus groups, 7 case studies).

Institutional readiness for innovation

Organisational culture and ethos was considered an important enabler including fit with school ethos (6 case studies), school involvement in similar projects (4 case studies) and a supportive head teacher (6 of 9 head teacher interviews, 78% of survey respondents, 1 teacher focus group, 1 case study). Curriculum fit is important (7 case studies). Sufficient **time to implement** iTEC Learning Stories and Learning Activities within the curriculum was the most commonly cited condition for success (7 teacher focus groups, 10 case studies).

In addition, flexibility in the curriculum and assessment requirements are necessary (5 teacher focus groups, 3 case studies).

Teacher and student digital competence

Adequate student skills in digital literacy and 21st century skills were also identified as enablers (2 teacher focus groups, 9 case studies). Furthermore, **teachers' skills and previous experiences** were also considered to enable change to take place (4 teacher focus groups, 8 case studies).

As the data relating to barriers and enablers is based on a single case study for each country (plus a focus group for some), it is not valid to comment on differences between countries. However, each of the barriers and enablers mentioned in the transcripts or notes for each country are listed within Chapter 4.

Recommendations

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

Scenario development (WP 2)

1. Support the development of a wider range of scenarios at national/regional/local level (matched to local priorities) making use of Eduvista.

Learning Activity (LA) development (WP 3)

2. Ensure that there are clear links between iTEC technologies (eg the Widget Store, People and Events directory) and the LAs.
3. Ensure LAs and Edukata are linked effectively with the iTEC Composer/SDE.
4. Support the development of a wider range of LAs at national/regional/local level, making use of Edukata.

TeamUp/ReFlex (WP 3)

5. Provide guidance / examples to develop students' reflection skills through the use of these tools.
6. Ensure any remaining technical issues are fixed (or provide detailed guidance on dealing with these), then ensure teachers are aware that these tools are now reliable.

Piloting (WP 4)[9]

7. Support MoEs and NPCs to include Initial Teacher Education providers/trainees in a pilot for C5.
8. Consider ways to integrate examples of good practice posted by teachers in partner online communities with the teacher stories included within the iTEC website.
9. Review the videos and examples of student work posted on the 'Students collaborate' Facebook group to determine whether it would be appropriate to incorporate these into the iTEC website to consolidate outputs and raise visibility.

The iTEC Composer/SDE (WP7/WP10)

10. Ensure the iTEC Composer/SDE is linked effectively with LAs and Edukata.
11. Provide guidance on the use of the iTEC Composer/SDE suitable for trainee and newly qualified teachers.

[9] Other recommendations relating to the piloting process are reported in D4.4.

Widget Store (WP 8)

12. Improve the moderation procedure for the Widget Store to ensure that all widgets are of an acceptable quality.
13. Improve resource discovery methods associated with the site (eg search, tagging, categorisation).
14. Work with WP3 to link widgets with each LA (possibly based on the process conducted in Portugal).
15. Provide more support for teachers (including training, written guidance and possible online video demonstrations) to help them to find, use and create widgets. (The work undertaken in Portugal may provide a model for some aspects of this).
16. Work with teachers to develop the range of widgets available (including widgets in national languages).

Scaling up (WP 11)

17. At European level, WP11 partners should develop mechanisms (or support) to facilitate transfer to other teachers beyond the individual school as teachers appear reluctant to do this alone.

Finally, in order to support scaling–up, investment may be required at national level in order to address all or some of the following barriers identified in iTEC pilots. It should be noted that many of the recommendations listed below were also identified in Cycle 3 and data reported in the national case studies report suggests that some recommendations are already being followed up to varying degrees.

18. Recommendations for iTEC MoEs at a national level (see also recommendation 19 – infrastructure and technical support – and recommendation 20 – teacher competence development – below).
    a. Analyse WP4 data in relation to website visitors (unique visits, by country) to determine the reach of iTEC beyond project participants.
    b. Scale up the iTEC process to national level. Evaluation of the iTEC process has shown that it can lead to change and innovation classrooms and that teachers have been enthusiastic and inspired.
    c. Ensure that national support structures are in place to maximise the benefits offered through iTEC processes and resources. Around one third of teachers needed support to adapt the resources to meet their needs. Some possible routes include online resources, links to other projects, school advisors and commercial providers.
    d. Nominate and support teachers who have been involved in several cycles as iTEC ambassadors to share their experiences and support other

teachers, thus ensuring the approach spreads in their own school and other schools. Consideration needs to be given to funding for such a scheme and incentives for teachers and it may be possible to combine the role of iTEC ambassadors with similar programmes (eg eTwinning ambassadors).

e. Facilitate national dissemination and events (eg workshops, meetings, exhibitions) led by iTEC ambassadors.
f. Encourage the development of national and local online communities as they support the uptake of iTEC processes and resources. Local communities of practice provide opportunities for local support and dissemination of practices. This is more likely to happen when there are several teachers from a single school (or cluster of schools) engaged in scenario implementation.
g. Consider offering national teacher incentives, including release from classroom teaching, supporting training and opportunities for accreditation. Time is the biggest perceived barrier for teachers; teachers need to feel their investment is appreciated.
h. Translate iTEC case studies and disseminate them widely through national online communities and CPD networks to maximise reach.
i. Where appropriate, look for opportunities to incorporate iTEC findings into national ICT policy and strategy documents.

19. Infrastructure and technical support

Technical challenges are still the most frequently mentioned barrier.

a. Invest in the development of ICT infrastructure, including the provision of reliable and sufficient access to the internet.
b. Prioritise the provision of ICT technical support and ICT pedagogical support within schools (or across clusters of schools).
c. Review national/regional/local school ICT policies to encourage the use of student-owned devices (BYOD) in school contexts.
d. Review national/regional/local ICT policies to encourage the sharing of resources (especially resources which are costly, but used infrequently eg 3D printers) between schools (and between schools and colleges/universities or other community organisations).

20. Teacher competence development:

e. Develop national/regional/local pre- and in-service programmes to increase teachers' ICT technical and pedagogical skills. Provide training/guidance for teachers on: managing group working; supporting students' reflection

and peer feedback; assessing 21st century skills such as critical thinking and problem-solving; and supporting students in online environments.

f. Produce national resources to facilitate the development of teachers' ICT skills (guides, screencasts, video tutorials, online helpdesks).
g. Liaise with initial teacher training providers and teachers responsible for mentoring newly qualified teachers to introduce the iTEC Composer/SDE to teachers to support lesson planning during the early stages of their careers.
h. Create opportunities for teachers to meet in face-to-face settings (the inclusion of dissemination/training activities in national teacher conferences through presentations/workshops for example);
i. Foster positive teacher, student and parent attitudes to change and the use of technology to support teaching and learning, and develop strategies to engage head teachers and senior managers.
j. Liaise with other projects that are similar in mission in order to seek mutual benefit and enhancement of impact.

Introduction

This is the fourth of five iTEC evaluation reports 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 Chapters 1 and 2 which consider innovation in iTEC and the impact of the project)
2. To what extent are the iTEC Learning Stories and iTEC technologies sustainable, transferable and scalable? (Addressed in Chapter 3)
3. To what extent are the Learning Stories and iTEC technologies fit for purpose? (Addressed in Chapters 1 and 4)
4. What are the enablers of and barriers to adoption of iTEC Learning Stories and iTEC technologies? (Addressed in Chapter 4)

For Cycle 4 (C4), the fifth evaluation question, "To what extent was the piloting process effective and what were the challenges faced?", is primarily addressed in D4.4. Third Validation report (Le Boniec and Ellis, 2013) as the focus of WP5 has moved from implementation towards innovation and mainstreaming. (See Appendix C for an explanation of the change in focus for WP5).

Context

Nineteen countries participated in C4 (involving up to 874 classrooms): Austria, Belgium (FL), Czech Republic (Associate Partner), Estonia, Finland (Associate Partner), France, Germany (SMART), Hungary, Israel, Italy, Lithuania, Netherlands (SMART), Norway, Poland (SMART), Portugal, Slovakia, Spain (SMART), Spain (Promethean), Turkey, United Kingdom (Promethean) and the United Kingdom (SMART).

Following the second periodic review, the evaluation approach for Cycle 4 was refocused to gather more explicit data on the teacher perceptions and use of iTEC technologies, teacher perceptions of the locus of innovation and teacher perceptions of the impact on learning outcomes and attainment (Ellis et al, 2013).

To gather evaluation data, teachers were asked to complete an online survey[10] on their prior experience and context, together with their implementation of the Learning Story. 342 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. Where an answer was given by at least 20% of teachers (or at least 2 if <10 teachers) from a particular country responding to the survey, this is indicated[11].

[10] The survey was administered directly to teachers by MMU using email addresses provided by the NPCs.
[11] Represented by 'country code'>20%

Information about the sample, plus more detailed analysis can be found in Appendix B and Appendix D.

Thirteen countries participated fully in pilot case study data collection, 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 and was provided with a set of guidelines[12] on conducting the case studies and interview schedules to standardise the process across sites. The NPCs transcribed and translated raw data for the case study and returned this to WP5 together with their classroom observation notes.

Ten countries conducted a focus group with a small number of iTEC teachers towards the end of C4. These focussed on teachers' use of iTEC technologies. NPCs were provided with guidance and a set of questions for the focus group within the C4 Evaluation Guide. An independent scribe made notes at the focus group and sent these to WP5.

As in Cycle 3 (C3), case study teachers were not required to produce a multimedia story but some did choose to do so, or to produce blogs and/or videos (see Appendix B for a list).

Further details of the methodology are provided in Appendix E.

Following pre-piloting and development by Work Package 3, iTEC presented eight Learning Activities (LAs) for piloting in Work Package 4 together with three Learning Stories (LSs) (Aalto University, 2013).

In C4 the LAs were:

- Learning Activity 1: Dream – Introducing, understanding and questioning a design brief
- Learning Activity 2: Explore (Benchmark/Observation) – Collecting information in relation to the design brief
- Learning Activity 3: Map – Creating a mindmap to understand relations between the collected information
- Learning Activity 4: Reflect – Recording audio-visual reflections and feedback
- Learning Activity 5: Make – Creating a design
- Learning Activity 6: Ask – Performing workshops with people who may represent future users of the design
- Learning Activity 7: Show – Publishing and presenting designs to an audience
- Learning Activity 8: Collaborate – Forming ad-hoc collaborations with learners of other schools

The three LSs designed to support the implementation of the package were:

[12] The C4 Evaluation Guide, available at: http://itec.eun.org/web/guest/deliverables

- Learning Story 1: **Tell a Story** – Narrating an academic topic through audiovisual means. (188 teachers surveyed representing 233 pilots, see case studies 1-8 in Appendix A for examples)
- Learning Story 2: **Create an Object** – Developing a tangible design. (73 teachers surveyed representing 86 pilots, see case studies 9-12 in Appendix A for examples)
- Learning Story 3: **Create a Game** – Constructing a playful activity. (55 teachers surveyed representing 69 pilots, see case study 13 in Appendix A for an example).

As in the previous cycle, while it was recommended teachers perform the LAs as close to the descriptions as possible, the LSs were considered examples and teachers were free to amend them or to create their own story, adapted to the local context and a teacher's pedagogical objectives. In addition, some teachers created their own LS drawing on the resources provided (27 pilots).

Teachers were encouraged to use one of the following iTEC shells[13], to support the implementation of the Learning Story:

- Moodle
- dotLRN
- Promethean ActivInspire
- SMART Notebook

Teachers were also encouraged to use a number of iTEC technologies. TeamUp is a prototype tool, developed by Aalto University, designed to organise students into groups by interests and also enabling students to record reflections. ReFlex, another prototype tools developed by Aalto University, enables students to build up a series of reflections about their learning activities which are subsequently displayed on a timeline. The Widget Store provides a means of curating resources (widgets) and moving them easily between learning platforms. Teachers are able to create their own widgets to add to the store. Users can rate and review the widgets. (See Appendix C for further details).

Within each LA, a number of tools are suggested to teachers, as 'required', 'important' or 'nice to have'. These are summarised in Table 1.

Learning Activity	Suggested tools
Dream	Required: reflection (TeamUp, ReFlex) Important: team formation (TeamUp), collaborative editing and publishing (Google Sites) Nice to have: blogging (Blogger, Corkboard.me)
Explore	Required: media recorder, camera, note taking equipment

[13] For further details, please see http://itec.eun.org/web/guest/shells

	Important: collaborative editing, bookmarking tools TeamUp, ReFlex, iTEC Widget Store
Map	post-it notes, Bubbl.us, CmapTools, Popplet, Mindmeister, Freemind, TeamUp, ReFlex
Reflect	Required: audio/video reflection tools: TeamUp, ReFlex, Redpentool, Voicethread
Make	Important: media editing (Prezi), reflecting (TeamUp, ReFlex) Nice to have: DIY kit, programming environment (Scratch, iTEC Widget Store), construction kit, 3d editing (Sketchup), 3d printing
Ask	Required: media recorder, note taking tools: audio recorder, video recorder, post-it notes
Show	Required: video editing, media recording (Audacity), video publication (YouTube, Vimeo, dotSub), reflection (TeamUp, ReFlex) Important: media sharing (iTEC Widget Store)
Collaborate	Required: online discussion, media publication, publication Important: blogging tools: iTEC students collaborate Facebook group, iTEC teacher community are potential networks for sharing outcomes and for establishing collaboration beyond the walls of a school and borders of a country.

Table 1: Ideas for using technology in each LA

Chapter 1 of this report examines innovation in iTEC, both in terms of technology and pedagogy. Chapter 2 considers the impact of iTEC on teachers and students and highlights the benefits which have resulted. Chapter 3 considers the ways in which iTEC will be sustained, embedded and transferred. Finally, Chapter 4 discusses the barriers hindering the adoption of iTEC and the factors which enable its implementation. As the impact, benefits, challenges and enablers associated with iTEC have been a common theme in the evaluation of each cycle, we have collected less data on these aspects at classroom level in C4. Therefore, we discuss these in less depth than previously, except where new themes have emerged in this cycle (See Lewin et al, 2013a for further details of previous cycles).

Chapter 1: iTEC and Innovation

This chapter considers the ways in which iTEC was seen as innovative by teachers, and by other stakeholders including students, in terms of both technology and pedagogy.

How innovative is iTEC for teachers?

Even among the more innovative teachers, the iTEC LS approach is seen as novel (4 teacher focus groups: BE, IS, IT, PT; 5 case studies: ES, IS, NO, PT, SK); teachers' comments indicate that they see the LSs as flexible, practical and stimulating; they encourage teachers to experiment and make changes to their practice:

> *Learning stories are innovative as it is, and it made me renew my pedagogy, […] LS descriptions remind you to apply more details, which you may skip. For example reflection – it was very helpful to emphasise this learning activity. (Lithuania, teacher interview)*

> *That to my mind is the beauty and the strength of iTEC. It encourages you to use technology but pedagogically speaking, there are multiple ways of doing so. You do not have to use the full range of technologies to be innovative, even within the iTEC project as I found out when talking to international colleagues. (Austria, ICT co-ordinator interview)*

This echoes findings from a survey of NPCs conducted by WP4 in which five NPCs (EE, IT, NO, SMART, SK) indicated that the LSs (and associated LAs) helped to promote innovative approaches among teachers (Le Boniec and Ellis, 2013).

Nevertheless, for some teachers (2 teacher focus groups: IS, IT; 3 case studies AT, BE, EE), the iTEC approach is relatively similar to their normal way of working. This is, perhaps, unsurprising as teachers' comments suggest that many of those selected to participate were chosen partly because innovation was something which would be familiar to them:

> *For some teachers it would definitely be innovative, but for many it is not. (Estonia, ICT co-ordinator interview)*

> *Interviewer: How has your experience of using the iTEC resources and/or technologies changed the way you think about teaching and learning?*
> *Teacher: To be honest, not much actually. iTEC has given me the opportunity to go beyond what has been the daily business in our school, so to speak. My approach to teaching was has been iTEC-like all along, maybe one of the reasons [the NPC] engaged me in the project to begin with. (Austria, teacher interview)*

Innovation in technology use

In the survey, teachers were asked how different their use of technology to support learning and teaching was when implementing the Learning Story on a scale from 1 (not at all) to 10 (radically different). The mean response was 6.0 (SD=2.4) and the mode was 7. This suggests that the majority of teachers did make noticeable changes, but were not completely out of their comfort zone.

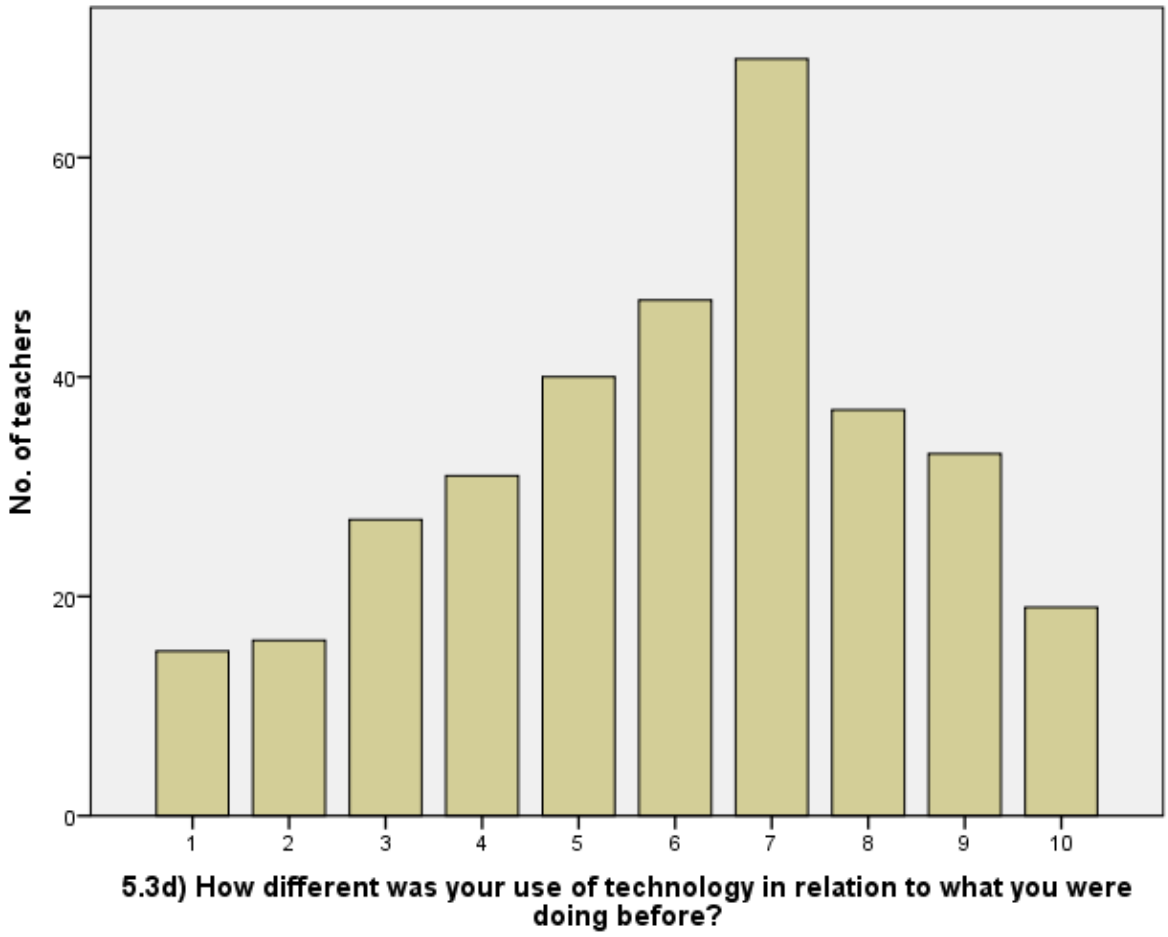


Figure 1: Difference in use of technology (n=342)

81% of those responding to the question (n=331) agreed that the LS they had used had the potential to lead to technical innovation.

Of the teachers responding to the question, “In what ways was your use of technology to support learning and teaching different when implementing the Learning Story?” (n=332), 86% (284) indicated there had been some change to their use of technology.

The most common change[14] identified was the use of **new technologies or tools** (112 or 34%; BE, CZ, EE, ES-SMART, FI, FR, IT, LT, PT, SK, TR, UK-PR, UK-SMART >20%):

> *The use of the iPads was new, as well as the use of some tools like Popplet[15], TeamUp... (Belgium, teacher)*
>
> *For the first time, used a video camera. (Estonia, teacher)*
>
> *Usually we use computers and CD players. With iTEC I used with my students not only the computer, Notebook, tablet but also widgets and programs that I didn't know. (Italy, teacher)*
>
> *We started using new tools such as SketchUp[16] (Slovakia, teacher).*

11% of teachers (35; FI, FR, UK-PR >20%) said they had used technology to facilitate **different learning activities** than was normally the case (this is explored in greater detail below).

> *Some tasks, such as reflection or showing the work produced by students, were carried out using ICT. Normally I do not use ICT for the accomplishment of these tasks. (Portugal, teacher)*
>
> *For children participating, the project was completely new, they had previously only used the computers to find information (Hungary, teacher)*

10% (32; EE >20%) said that students now had **greater autonomy** and, in some cases, a more active role in deciding when, how and which technologies were used, leading to increased use by students:

> *The students had to use ICT tools for themselves (Estonia, teacher)*
>
> *I began handing the technology directly to the pupils instead of taking sole control of it myself (UK, teacher).*

9% of teachers (29; NO >20%) said they were now using technology **more regularly** and in a more integrated way throughout the teaching and learning process.

> *We used technology in every step: pupils searched for all the information about the content from internet, videos, by email or from experts who visited our school. They*

[14] Teachers were asked an open question in the survey asking them to identify In what ways their use of technology to support learning and teaching was different when implementing the Learning Story. The relatively small numbers of teachers identifying each of the themes reported here reflects the fact that individual teachers have varied views and have experienced iTEC in different ways

[15] A mind mapping tool (http://popplet.com/)

[16] A 3D modelling program (http://www.sketchup.com/)

learned to send emails to experts. They also used iPads for the first time and shot a video and edited the video by using iPads. They reflected their learning using TeamUp tool. (Finland, teacher)

I have never used so many applications at the same time in the study of a learning unit as well as I have done to implement the learning story (Italy, teacher)

The majority of teachers surveyed said they used between 6 and 10 different types of digital tool during the pilot of the LS. Four out of five teachers used a minimum of five different types of digital tools. In addition, 70% of teachers used an iTEC shell (Moodle, dotLRN, Promethean ActivInspire, SMART Notebook or another).

The types of digital tools most commonly used by iTEC teachers have changed relatively little during the four cycles. In C4, digital capture devices, digital resources and communication tools were the most frequently reported (see Table 2).

Type of digital tool used[17]	% of teachers reporting use C4 (n= 329)	% of teachers reporting use C3 (n= 336)	% of teachers reporting use C2 (n = 261)	% of teachers reporting use C1 (n = 231)	% overall
Data capture device	88% (1)	74% (1)	72% (3)	88% (1)	78%
Digital resources	80% (2)	66% (3)	86% (1)	72% (4)	75%
Communication tool	71% (3)	67% (2)	75% (2)	74% (=2)	72%
Mobile devices	66% (4)	46% (5)	46%	50%	47%
TeamUp	65% (5)	38%	62%	59%	53%
Collaboration tool	63%	49% (4)	65% (=4)	71% (5)	62%
Music/photo/video/ slide sharing sites	63%	44%	65% (=4)	55%	55%
Media authoring tool	63%	35%	59%	74% (=2)	56%
Interactive whiteboard	59%	45%	63%	52%	53%
Game based learning	35%	27%	30%	27%	28%
Student information system	25%	20%	23%	N/A	22%
Virtual experiments and simulations	23%	14%	18%	7%	13%
Document camera/digital visualiser	21%	15%	13%	24%	17%
Learner response system	20%	9%	23%	N/A	16%
High tech instruments for science	7%	4%	8%	8%	7%

Table 2: Digital tools used (C1-C4)

Use of innovative iTEC technologies

TeamUp

TeamUp is a prototype tool that has been available for teachers to use since Cycle 1. Between C3 and C4, the user interface was updated to improve consistency.

[17] This list was derived in conjunction with WP2 (in relation to the scenario mapping tool) and WP10 in relation to the functionalities and devices vocabularies in order to align with other work packages.

Of those responding to the survey questions concerning TeamUp (n=329):

- 33% (107) of teachers used TeamUp to form teams only
- 2% (8) used TeamUp to record reflections only
- 30% (99) used TeamUp both to form teams and record reflections
- 35% (115) did not use TeamUp.

TeamUp was used by the largest proportions of teachers in Spain, Israel, Italy, Lithuania, Portugal and Turkey, where at least three out of four used it.

Overall, 64% agreed TeamUp has the potential to lead to pedagogical innovation[18] and 63% agreed TeamUp has the potential to lead to technical innovation[19]. The positive impact of TeamUp was also mentioned in survey responses from two NPCs (AT, IS) in D4.4 (Le Boniec and Ellis, 2013).

Benefits of TeamUp

In the qualitative data, some benefits of TeamUp were identified. These reaffirmed the findings from previous cycles:

- Classroom management (accepted by students as a neutral team selector) (2 teacher focus groups: BE, HU; 2 case studies: BE, EE)

  Forming groups with it is painless. Usually students start asking questions like "Why do I have to work with him/her?", "Why this?", "Why that?" etc., with TeamUp the Computer God made the decision. (Estonia, teacher interview)

- Student engagement (1 teacher focus group: AT; 2 case studies: AT, IS)

  In the classroom we use this thing called TeamUp a lot, which is actually kind of fun, because it creates new groups every time. The lesson starts with being funny. Once we started using it, it was fun, engaging (Austria, student focus group)

- Supports effective reflection (3 case studies: BE, IS, PT)

  She used TeamUp especially for group reflection. I understand from what the students are saying that this was very innovative to them – the fact that they reflected through a digital tool and not only doing reflection with the regular teacher-student class upfront lessons. (Israel, lesson observation)

[18] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: AT, BE, CZ, ES-SM, FI, FR, HU, IT, PT

[19] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: AT, BE, CZ, EE, ES-SM, FI, FR, HU, IT, PT, TR

Problems experienced using TeamUp

Again based on the qualitative data, some problems were identified which reiterate the findings from previous cycles. These are listed below.

- Technical issues or unreliability, especially on mobile platforms (as reported in Kallesen et al, 2013) (3 teacher focus groups: AT, BE, PT; 1 case study: AU[20])

  …it has some bugs, is not working on tablets (Flash etc). (Belgium, teacher focus group)

- Resistance from students (2 teacher focus groups: EE, HU)

  Using Teamup is useful for creating groups when you wish to create the impression that the groups were actually set up by the software, but it is not always easy to have students believe that. They rather like to work in groups that they set up themselves. (Hungary, teacher focus group)

- Lack of infrastructure (2 case studies: AT, LT)

  Sometimes we can't to use TeamUp at home, as it didn't work without microphones. (Lithuania, student focus group)

Students' limited reflection skills and lack of time were each mentioned as problems in one case study each.

Suggestions for improvements

There were some suggestions for ways to improve TeamUp from the qualitative data.

- Link to other tools

  It would be nice if it were connected with eKool[21] so that I would not have to retype the lists of students. (Estonia teacher focus group)

- Involvement of students

  The biggest problem was with the TeamUp, for all of us, was that it sometimes takes time, not everyone has a computer, and not everyone understood it. So the teacher tutored a child from each group who will be responsible for the TeamUp and he did it for us. (Israel, student focus group)

[20] Comments may relate to previous versions of TeamUp; teachers are not always explicit.
[21] Estonia's e-school service which allows teachers to enter grades, assessments and attendance information, as well as set homework etc.

Case study: Use of the TeamUp

In the case study school in Israel, the teacher led a discussion about the use of TeamUp among students. This gave them an opportunity to reflect on how they had used the tool and what they had liked, and disliked, about it. Initially, many students saw the time they spent reflecting using TeamUp as time wasted; some felt frustrated because they did not feel they were learning during the time they spent reflecting. However, after using TeamUp for several weeks, their opinions changed and they began to see its value as a project management tool.

They came to see TeamUp "not only as a technical tool but also as a way of learning". It helped the students to reflect on their work so far and to plan the next stages.

"TeamUp really helped us in planning - think about what we did and what we are going to do at the next meeting. It made me think about the process and not just on the object [learning output]."

Reflecting on their work was also motivational for students, as it made them aware of the progress they had made, as well as what was left to do:

"It also stimulates you to work, because you know that if you do so you will have a lot to record and hear the progress of yourself."

Students also felt that reflecting on their work as a group helped them to "connect to the group".

Although students commented that the process was more important than the tool itself, they felt that documenting their reflection in some way was crucial. While this could be achieved using pen and paper, they believed that the act of recording (and listening back to) their reflection made them think about their statement more and encouraged them to make their points more clearly than they might do in a written document:

"But if you write it on a page, maybe you invest less time on the phrasing. But if you must also speak and hear yourself talk, then you must put it right."

"You hear just what you say, and what intonation, so it requires you to speak more to the point, concisely and clearly."

There were some technical issues to be overcome as students did not each have their own computer and some were unsure how to use TeamUp. To overcome this problem, the teacher tutored one student from each group, who was then responsible for supporting the other group members in their use of TeamUp.

ReFlex

Only 8% of teachers used ReFlex (27 out of 329 responding). These included a small number (between 1 and 4 teachers) from: Austria, the Czech Republic, Spain – Promethean, Finland, Hungary, Israel, Italy, Lithuania, Turkey and UK – SMART.

23 out of 27 believed that ReFlex has potential to lead to pedagogical innovation and 22 agreed ReFlex has potential to lead to technical innovation.

When asked about the benefits of ReFlex for learning and teaching, eight teachers said it **helps students to reflect**, to think more deeply about the learning process and therefore to improve their work.

> *The children thought about their ideas and formulated them. As a result, they developed systems that were working, and constantly revised their work. (Hungary, teacher)*

> *Makes the student more aware of the learning process (Spain, teacher)*

Eight teachers had experienced **technical and usability problems** with ReFlex.

> *It didn't work well. It was very difficult to use, it had no folders, you couldn't delete your recordings, you couldn't organize your recordings, the program crashes a few times. (Finland, teacher)*

Five felt that students' **poor reflection skills** were a barrier when using ReFlex:

> *It is not always easy, at look at our own work from 'outside', the children often find it difficult to formulate their ideas (Hungary, teacher)*

ReFlex was felt to be excessively **time-consuming** by five teachers.

ReFlex was only mentioned in one case study and one interview, and most comments were complimentary, but brief. This is the only detailed comment from the qualitative data:

> *I was surprised that students liked ReFlex. They took it up very quickly and were very enthusiastic: it doesn't do so much, but it is simple. Everyone felt: that is nice and innovative because we haven't an app for this. Students mentioned on their own some applications for other courses. (Belgium, teacher focus group)*

The iTEC Composer/SDE

The iTEC Composer/SDE has been developed in iTEC to support new approaches to planning. In C4 it was piloted in Austria only. Comments from the Austrian case study and teacher focus group suggest that the tool has potential for use among trainee

and newly qualified teachers and would also allow more established teachers to share ideas:

> *The Composer tool seems to have the potential of being the legacy of iTEC especially for younger teachers how just starting their career. Their lessons planning should be improved by the Composer tool (Austria, ICT co-ordinator interview)*
>
> *This makes it easier for us to share with colleagues (Austria, teacher focus group).*

The Widget Store

Use of the Widget Store

Of those teachers responding to the survey question, 'Did you use the Widget Store?' (n=330), 38% (126) said they had done so. Out of those who had used the Widget Store, 27% (34) said that they created their own widgets. The Widget Store was used by the greatest numbers of teachers in the following countries: Turkey (22), Italy (21), Portugal (15), Lithuania (14) and France (10) (See Appendix D for a full breakdown by country).

In contrast to the essentially negative feedback from NTCs reported in Kallesen et al (2013), the feedback directly from those teachers who had used the Widget Store was largely positive:

- 83% agreed it had the potential to enable teachers to discover new digital tools and services[22]
- 81% agreed it had the potential to enable teachers to select and use digital tools and services[23]
- 79% agreed the widgets store was a useful tool[24]
- 79% said they would use it again[25]
- 79% said they would recommend to others[26]
- 76% agreed it had the potential to lead to technical innovation[27].

From comments in the qualitative data, it seems likely that the Widget Store was used, in the main, by the more innovative and digitally competent teachers during C4 and its reception among a wider group of teachers may differ somewhat.

[22] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: FR, IT
[23] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: ES-SM, FR, IT
[24] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: ES-SM, FI, FR, IT
[25] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: FR, IT
[26] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: FR, IT, LT
[27] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: FR, HU, IT

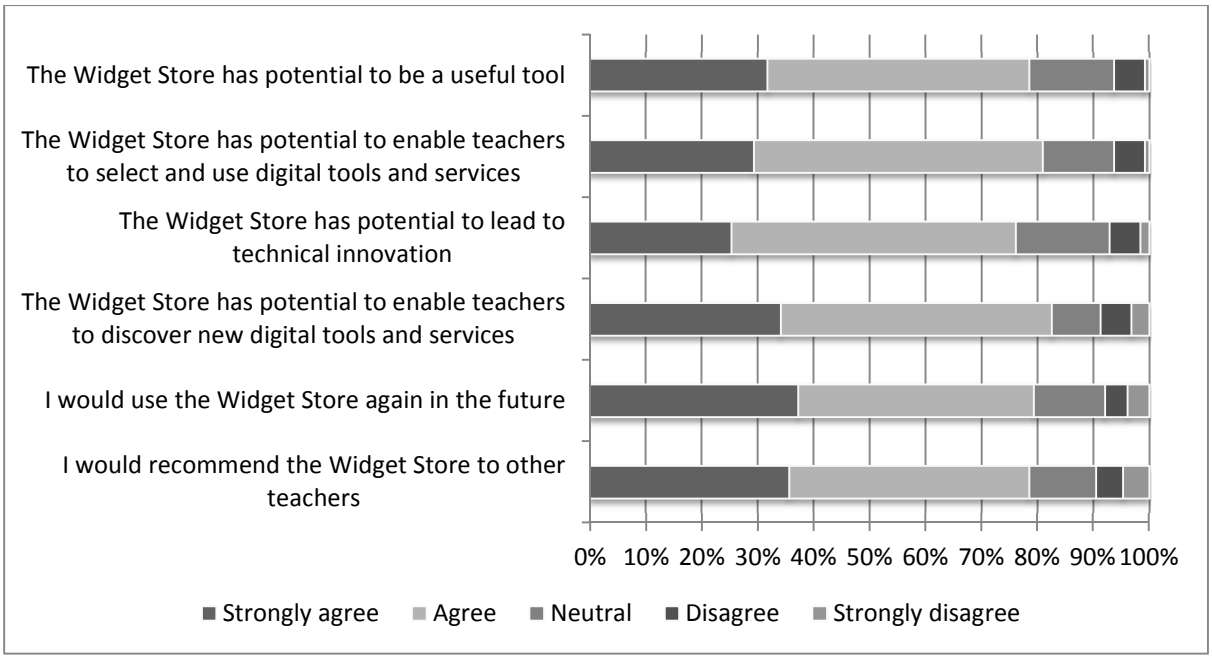


Figure 2: Potential of the Widget Store

The Wordle below shows the widgets most frequently mentioned by teachers responding to the survey. TeamUp was easily the most commonly used (39 teachers), followed by Popplet (15), Six Thinking Hats[28] (11) and Bubbl.us[29] (9).

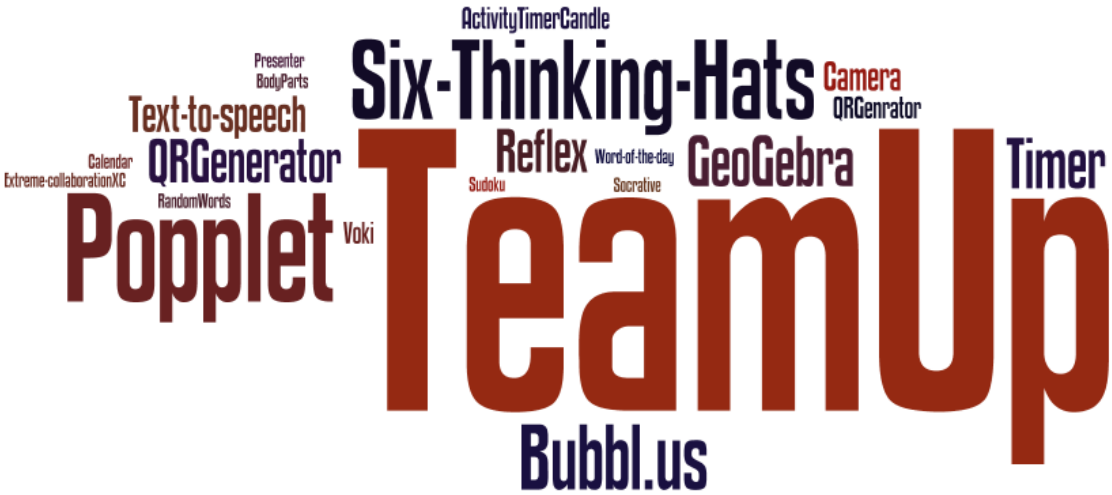


Figure 3: Widgets used (includes all widgets mentioned by at least 2 teachers)

[28] http://exchange.smarttech.com/details.html?id=c22fce6f-b61f-4bf2-a3ad-cd714228ee82
[29] Brainstorming app (https://bubbl.us/)

Benefits of the Widget Store

The potential benefits of the Widget Store for learning and teaching which were most frequently mentioned among survey respondents[30] (n=125) are listed below.

- Accessibility of resources (21 respondents, AT >20%)

  All meaningful and "useful" tools together in "a place"; you can choose what you want to use. (Austria, teacher)

  Provides effective access to educational content anywhere. (Turkey, teacher)

- A structured approach to organising and discovering widgets (18 respondents, PT >20%)

  You could easily find new widgets which are suitable for school. (Finland, teacher)

  Provide students with an organized environment for learning. Teachers can easily organize an environment that contains several elements that are "ready to use" by students (videos, applications, text, etc..) (Portugal, teacher)

- Access to a variety of widgets (13 respondents)

  Easy access to many different programs that can help to support teaching and learning methods in different subjects. (Norway, teacher)

  Provide teachers with a variety of applications in different areas. (Spain, teacher)

- Ease of use (11 respondents)

  Ready-made and free tools which are easy to use. (Finland, teacher)

  Makes innovative technical tools available and simple (France, teacher)

- Efficiency and time-saving (11 respondents)

  Saves time because it provides the possibility of finding the required resources in the same place, which you can easily reach. (Turkey, teacher)

  All tools listed in one place, so less time spent (Lithuania, teacher)

- Motivational for students and teachers (11 respondents)

[30] In response to an open-ended question on the benefits of the widget store.

Carry out the business of teaching and learning in a more entertaining and profitable and unusual way for both the students and the teacher (Italy, teacher).

Innovative and engaging tools (UK, teacher)

Other potential benefits mentioned by smaller numbers of teachers included: supporting innovation and new pedagogies (10); can be linked to existing resources and tools (9); adaptability for different subjects, activities and learning platforms (7); and potential for encouraging sharing amongst teachers (5).

Problems encountered using the Widget Store

The most frequently mentioned potential challenges[31] of the Widget Store for learning and teaching (n=114) are listed below. With the exception of teacher support, which was not mentioned explicitly in the case studies and focus groups, the same issues appear in both the qualitative and quantitative data.

- Lack of teacher support (18 respondents, IT >20%)

  Initial difficulty in understanding how to use and utility. (Italy, teacher)

  To have better tutorials (Spain, teacher)

- Difficulties selecting the 'right' widgets (16 respondents; 1 teacher focus group: IT; 1 case study: LT)

  Widget Store is full of widgets. How to find right widgets for my use? (Finland, teacher)

  The number of widgets provided by the project were huge and it was sometimes difficult to be able to understand what are the ones with a higher added value. (Italy, teacher focus group)

- Time required to learn how to use effectively (15 respondents, AT >20%)

  It takes time to mastering applications. (Lithuania, teacher)

  [You need to] devote time to familiarising yourself with their potential application. (Spain, teacher)

- Limited range and quality of widgets (14 respondents, FR >20%; 3 case studies: NP, PT, TR)

[31] In response to an open-ended question on the challenges of the Widget Store.

It's always difficult to find something suitable – at any rate I didn't find anything that was absolutely right. (Norway, teacher interview)

Using widgets is somewhat difficult because I sometimes am not able to find suitable widgets for my lesson sequences. (Turkey, teacher interview)

Other challenges mentioned by small numbers of teachers in the survey included; difficulty accessing the Widget Store (7); a lack of widgets which match the needs of teachers and students (eg different age groups) (7); lack of infrastructure[32] (6) difficulty integrating widgets into iTEC shells and other school learning environments (6); language barriers[33] (5) and unreliability of widgets in the Widget Store (5).

Suggestions for improvement

The qualitative data offered some suggestions for improvements to the Widget Store.

- Improve moderation of the Widget Store contents:

  It is not really clear enough yet and it should be screened more on quality. (Belgium, ICT co-ordinator interview)

- Make it easier to find suitable widgets:

  …if they were categorised, then yes [I would use it]. (Estonia, teacher interview)

  I'm sure the apps are available in a different way from the way I saw them. But I think it's difficult in the Widget Store to find out what's most suitable. When I download an app on my phone or on my tablet, I read what the app is about first, then I see how many stars it has and read the comments, and then I make a quick search at a forum. That's how I find out whether I want to have an app on my phone or not. It was difficult to find information in this App Store, and it wasn't easy to see how it looked visually either. So I think that if the App Store is developed more then there may be lots of useful things there. (Norway, teacher interview)

- Offer more training or support:

  …at first, I worked…to see how it worked, how they could be used, etc.. Then I made a mini-training teacher saying this is what you can do with these widgets …this is how they can be integrated. Then, the teacher is prepared for these widgets to be included in the project. (France, ICT co-ordinator interview)

- Simplify basic features of the Widget Store

[32] Also mentioned in 1 case study.
[33] Also mentioned in 2 case studies

The NTC interviewed for the Portugal Widget Store case study felt that some procedures which currently have to be done manually could be set to an automatic default to make it simpler for teachers, for example, file naming and file format options.

- Embed in learning platforms

When asked what the impact would be if the Widget Store was embedded in the school's learning platform, case study interviewees felt that this would make it easier to motivate teachers and students to use it:

> *For teachers, it would be right there! No need to explain and disseminate new technology. They would just be encouraged to use it. The role of the ICT coordinator would change consequently. It would no longer be his/her main objective to raise awareness for new technology, but to simply try out if it works properly within the platform. (Austria, ICT co-ordinator interview)*

> *Through widgets embedded in our local platforms it could be really easier to motivate our students. (Turkey, teacher interview)*

Continued use of the Widget Store

In the case study schools, there were some examples of teachers continuing to use widgets in their classroom beyond C4 (1 teacher focus group: IT, 2 case studies: ES, IS):

> *I'd like it to become available so I can explore it and use it with other classes ... in fact I use them rather a lot, I always try to use them wherever's possible, I search for applets to solve various things. (Israel, teacher interview)*

> *The SMART Widgets we can use them in any class, in any other project, I think they are going to be very useful. (Spain, teacher interview)*

Case study: Use of the Widget Store in Portuguese schools

The approach to the Widget Store adopted by the Portuguese iTEC team was prompted by the feeling that there was not enough information and support in Portuguese to enable teachers to use the Store successfully. In particular, they felt that teachers needed practical examples showing them how to use widgets.

The approach taken was to establish an 'advanced group' comprised of teachers from previous iTEC cycles. A closed online community was created specifically for the group. As these teachers all had previous experience of iTEC, they already understood the approach, language and so forth, which was an advantage.

A manual was prepared, in Portuguese, including examples of how to use widgets and a mapping of widgets onto each of the LAs. The NTC felt that teachers were most in need of highly practical guidance and support. This was partially provided by the documentation, but also available via the online community. The latter was found to be a particularly efficient way to deal with common problems as the whole community could read suggestions and solutions, meaning the technical co-ordinator did not need to respond individually.

Widgets were new to most of the teachers. It therefore required time for them to master using the Widget Store. The widgets most commonly used included: Windows Live MovieMaker, YouTube and Blogger. Overall, a wide variety of widgets were used, although some only by a small number of teachers, for example, Timetoast, Kidblog, iMindmap, MindMeister and Goanimate.

Although not all the teachers had the technical skills to create their own widgets, some did do so, for example, using Geogebra. However, some of the advanced skills required in relation to creating more complex widgets are probably beyond even the more skilled teachers.

Even though some teachers did not use the Widget Store at all in C4, exposure to it means they are likely to be better prepared to do so in Cycle 5 (C5). Time was an issue for some and it was difficult for the Portuguese iTEC team to provide training for teachers in the use of the Widget Store in time for the start of C4. In C5, dedicated training on the use of the Widget Store will be delivered to all teachers. The Portuguese manual will also be updated for C5 following input from teachers.

Other tools

A number of other tools were identified as being innovative in the classroom in the case studies and focus groups (each of the following were mentioned as innovative in one or two case studies and/or focus groups).

- Video editing software

  They had to learn how to use video editing software which they hadn't used before (Portugal, teacher focus group)

- Tablets

  The use of tablets as devices was experienced as very innovative: it was easy to work in small groups and to compare results. (Belgium, teacher focus group)

- Virtual worlds

  Students used edMondo online 3D virtual world to create digital prototypes of their creations, in order to deal with geometry problems in the digital domain: a more 'trial

and error' environment in which they can undo/redo things with ease and no waste of time and... kitchen ingredients! (Italy, teacher interview)

- Project management tools

Used timeline tool developed by her husband. This was designed as business project management tool (organising time, resources etc), but [the teacher] found it also works for education. (Israel, lesson observation)

- Mind mapping software

Popplet software was very interesting, you can create there different stories. For example, you can choose your favourite animal, and create your own Popplet of knowledge about it. (Lithuania, student focus group)

The impact of innovations in technology use

Enhancements through digital tools

In response to the question, "What did the digital tools enable you to do that you could not have done otherwise?", 96% of teachers (315 out of 327) identified at least one way in which students' learning had been enhanced. The most common response was that the digital tools had allowed new types of **creative activities** to take place, for example, the production of videos, games and 3D models. 15% of teachers (49; EE, PT, SK, UK-PR >20%) referred to this.

We have created a virtual reality simulation… (Italy, teacher)

The class could make two movies using phones. This is definitely a qualitative leap compared to the PowerPoint approach (Hungary, teacher)

For 11% of teachers (35; ES-SMART >20%), digital tools had aided **collaboration**. This did not only refer to collaboration between students, but also between teachers involved in iTEC:

Feel part of a common project, being able to share and collaborate better with colleagues. (Italy, teacher)

Improve performance of group work (Spain, teacher)

9% of teachers (31) felt that digital tools had helped to improve **research activities,** making a wider range of resources more easily available:

The possibility to gather a greater variety of information from very different media into one project (Finland, teacher)

> *…used for research and data collection on the net, it could have been much more difficult to do [with another] method (Hungary, teacher)*

In addition, 9% (31; AU>20%) thought that the use of digital tools had driven the improved **student engagement in learning** which they had witnessed:

> *Students more interested to create interactive stories than usual to tell. (Lithuania, teacher)*

> *First of all, I would mention the motivation. Pupils love activities connected with using modern tools and creating a PC game was a thing that was really motivating for them. So from my point of view, the greatest thing was the interest. (Czech Republic, teacher)*

Other ways in which the use of digital tools had enhanced learning included: better communication between students (closely linked to the increase in collaborative activities) (19 or 6%; IT>20%); easier monitoring of students by teachers (19 or 6%; IS>20%); improved student reflections, for example using blogs or TeamUp (19 or 6%; IS>20%); and making students' work visible beyond the school, for example on the school website (15 or 5%).

Innovation in pedagogy

In the survey, teachers were asked how different their pedagogy was when implementing the LS in comparison to what they were doing before on a scale from 1 (not at all) to 10 (radically different). The mean response was 6.0 (SD=2.2) and the mode was 7. As in the case of technological innovation, this suggests that the majority of teachers did make noticeable changes, but were not completely outside their comfort zone.

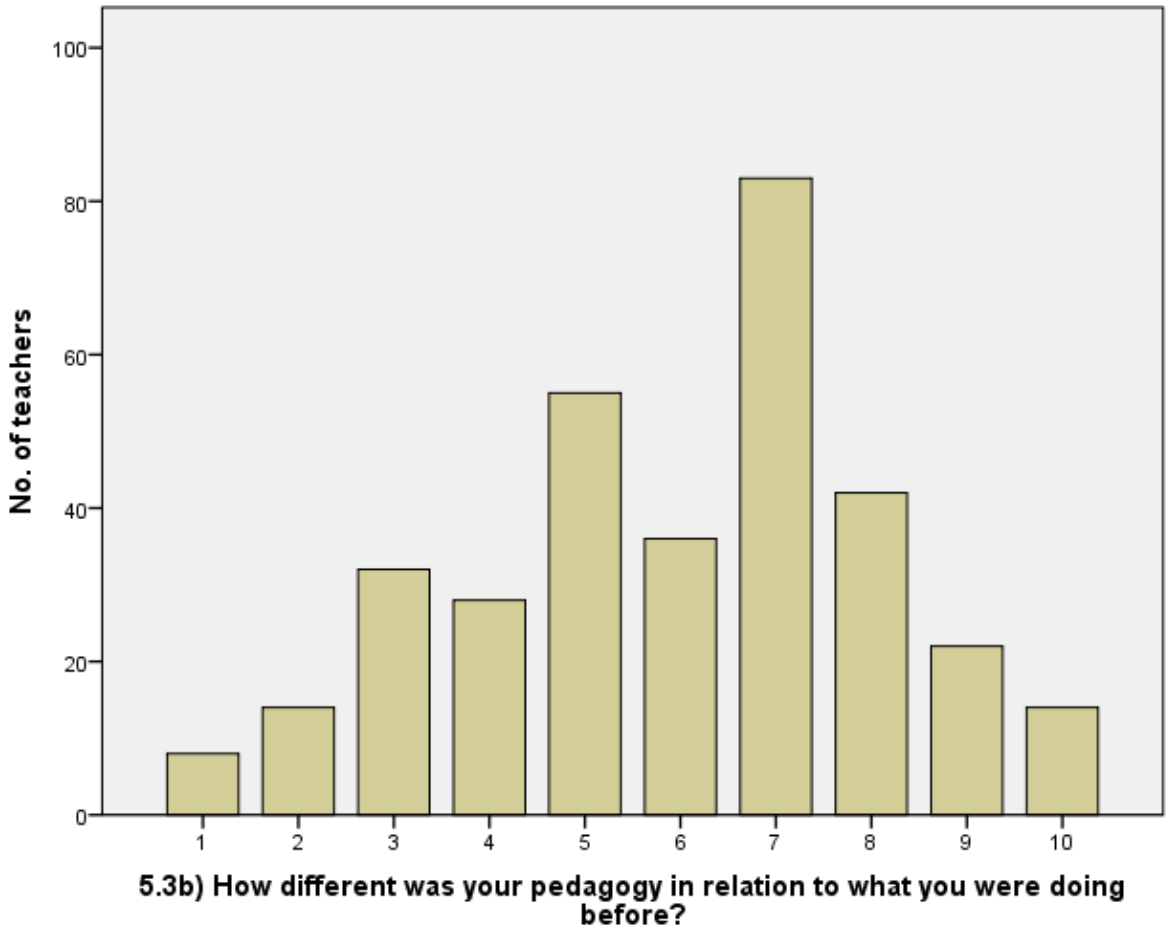


Figure 4: Difference in teachers' pedagogy (n=342)

87% of those responding to the question (n=331) agreed that the LS they had used had the potential to lead to pedagogical innovation in the classroom.

Of the teachers who responded to the question: "In what ways was your pedagogy different when implementing the Learning Story ?" (n=332), 89% said there had been a noticeable difference, with 12% indicating that their **overall approach** had changed as a result of using the LSs, although they did not give specific details:

There are several methods that I just met for the first time (Hungary, teacher)

I followed a process for instructional content different from others (Italy, teacher).

The following section outlines the mains ways in which teachers and students found iTEC to be pedagogically innovative[34].

[34] Note: other teachers may also have used the methods described, but did not necessarily identify them as being an innovative aspect of their practice in the interview or focus group transcripts.

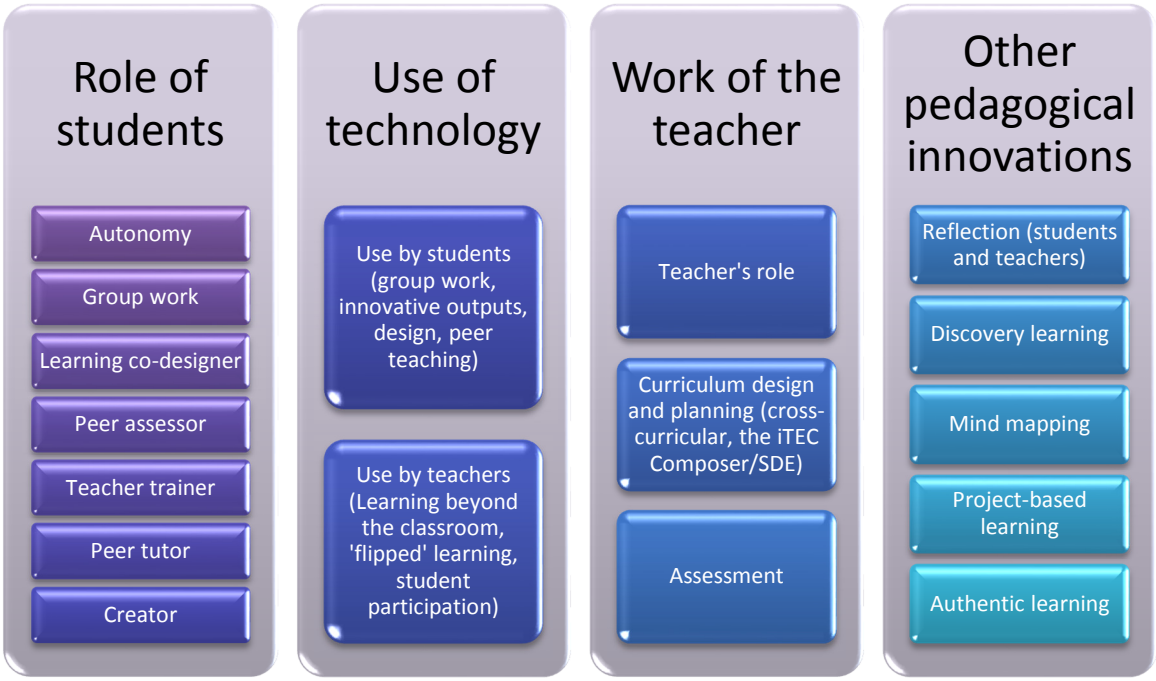


Figure 5: Summary of pedagogical innovations in iTEC

Innovation in the roles of students

According to the teacher survey responses, the most common way in which implementing the LS had made a difference to pedagogy was in changing the role of students in the teaching and learning process (91 or 27%; n=332; BE, CZ, EE, FR, IT, NO, PT, ES-SMART, TR, UK-PR >20%). This theme was also noted in the NPC survey conducted by WP4 (Le Boniec and Ellis (2013) noted this in relation to LT, NO and PROM).

The level of detail given in teachers' survey responses varied; some simply indicated that the approach was more student-centred:

> *Significantly more student-centred and practical lessons have been processed. (Turkey, teacher)*

Of those who did provide more detailed descriptions, greater autonomy for students (26) and more group work or collaboration between students (24) were the most common responses. Five teachers indicated that they had not merely allowed students greater autonomy, but had actively engaged them in the design and organisation of learning activities. More detailed descriptions of the ways in which the role of students changed during C4 were derived from the qualitative data.

Greater autonomy

The development of independent learning and increased autonomy for students was the most commonly mentioned change in the role of students resulting from iTEC (5 teacher focus groups: IT, IS, LT, PT, UK; 7 case studies: AT, IT, LT, NO, PT, SK, TR). This was clearly a challenge for both students and teachers initially, but had important benefits according to both groups:

> *Students have been working much more autonomously. They had to tell a story with a video or create a product which pushed them to work alone. After the initial technological shock the students started to work autonomously and to construct their own pathway. (Italy, teacher focus group)*

> *Students were autonomous and creative, because they chose the topic by themselves; they have their own way of how to make an object. (Portugal, teacher interview)*

> *Surely this way took me out of my comfort zone, I usually do not give students space and time to work collaboratively, plan their own activities and progress in their learning. (Slovakia, teacher interview)*

> *…you give them free rein throughout the project. People work at very different speeds and do very different things. So I have to give up some control here. I must. I have to rely on the students to actually do the job even though I can't see them all the time. (Norway, teacher interview)*

Group work

Another of the most frequently mentioned pedagogical innovations was the use of group work (5 case studies: AT, ES, IT, SK, PT). Teachers and students reflected on the advantages, and the challenges, of working in teams rather than as individuals:

> *All students in all groups have found students with different capabilities, and students can get better results, but it has been as group work. So students have learnt how to work in a group in a different way; in groups they have understood that it was not the group that they choose and nobody has felt bad. (Spain, Headteacher interview)*

> *That is also one major difference. In those lessons we tend to collaborate more often. We would like to do this a lot more, but in most lessons, there is no room for that. (Austria, student focus group)*

> *But, while in the 'normal' Maths lessons every student has their own computer (and every student does their own thing), today we worked in groups: we connected our computers for doing things together, working on the same figures. It's more pleasant, and it also requires less work, because more students work on the same task... (Italy, student focus group)*

Student as co-designer of learning experiences

In some cases, there was evidence that students are starting to develop a role as co-designers of their learning experiences, working together with teachers to develop new approaches to learning and assessment (2 teacher focus groups: AT, HU; 3 case studies: AT, IS, TR):

> *Most of the challenges…have been solved easily working together with the students. That may be another game changer of iTEC! Students are welcomed in the process of designing the change in the classroom. (Austria, teacher focus group)*

> *In those lessons, we do a lot more and we contribute to the lesson a lot more than in a normal lesson. Sometimes we get the feeling of being in charge and that is great. (Austria, student focus group)*

> *What was nice was that we developed answers to the grading issue together with the kids. (Israel, teacher focus group)*

Peer assessors and advisers

In five case studies (AT, EE, FR, UK, TR) and one teacher focus group (IT), students were involved in assessment and giving feedback to their peers:

> *Another interesting aspect was evaluation. Teachers explained to the students that they would have been assessed. They introduced self-assessment and tried to let the students participate in the assessment process, sharing methods and criteria so that they can understand what assessment means. (Italy, teacher focus group)*

> *An important step in this process was not only the feedback given by the teachers, but also by the peers. Each group commented on the other group's work and that way, experiences have been shared. (Austria, lesson observation)*

> *They enjoyed presenting their outcomes and giving feedback to others. (Estonia, lesson observation)*

Students as teacher trainers

Students could be seen to be acting as teacher trainers, especially in supporting teachers in their use of technology (2 teacher focus groups: AT, IS; 2 case studies: IS, NO):

> *I flow with the kids' desire to use their iPads, and many of the kids have more advanced iPad versions than the version of the teacher. I have to be willing to their being even more updated than I am. (Israel, teacher focus group)*

New ideas crop up during the process and new ways of putting things together that mean you have to act quickly. For instance students discover lots of new programs that are appropriate to use. (Norway, teacher interview)

Interestingly, my students adapted to it a lot faster than I did. So my challenge was to keep up. But I consider that to be a good thing. Why can't we learn something from our students? (Austria, teacher focus group)

This practice was also reported to WP6 by NTCs (Kallesen et al, 2013)

Peer tutors

There were also examples of peer-to-peer teaching among students and the use of students as 'experts' within the classroom (4 case studies: BE, IS, LT, NO):

We learnt and told each other about our animals. (Lithuania, student focus group)

The role switch (students becomes a teacher and has to explain something) is also great. (Belgium, teacher interview)

…another innovation was my idea to enlist experts within the classroom to discuss the prototype and expand the idea of an expert from within the class that can offer himself as an expert. (Israel, teacher interview)

Students as managers of learning

Through the introduction of independent learning, and also group work, students in some classes started to take greater responsibility for the management of their own learning, for example, resource selection, task allocation and time management (1 teacher focus group: EE; 3 case studies: ES, NO, PT):

Students also "re-group" themselves within a group – who has which tasks, who is responsible for making movies, who looks up information etc. (Estonia, teacher focus group)

For the video, my group only used MovieMaker, we used a camera to take photos to the solids. We were going to use PowToon[35], but because we didn't really have a good command of it, and the time we had left was not enough to do a reasonable job, we decided to give up on that idea and ended up just using MovieMaker… One of our challenges was a bit like managing group work, what each one of us had to do. I am the coordinator: I kept the paperwork and was responsible for the messages. (Portugal, student focus group)

[35] An animated presentation creation tool (http://www.powtoon.com/)

Designer and creators

The fact that students were expected to act as designers, producers or creators was felt to be innovative (2 teacher focus groups: LT, UK; 1 case study: HU).

> *Defining the mother's gift as a product, it is also an innovative teaching way. (Hungary, lesson observation)*

> *…more creative for students than standard formats. (UK, teacher focus group)*

> *Students improved their creativity through the project activities, used higher order skills. They were like authors and inventors. (Lithuania, teacher focus group)*

Innovative uses of technology

In teachers' survey responses, the second most common way in which the LS had an impact on pedagogy was in the use of **new technologies** (48 or 14%; n=332; BE, CZ, FR, LT, UK-SMART >20%):

> *By the provision of more sophisticated technological tools. (France, teacher)*

> *Working with a wide variety of online programs (Lithuania, teacher)*

> *I used technological tools more often. (Turkey, teacher)*

Again, the qualitative data provides a richer description of the innovative ways in which teachers used technology to transform their pedagogy.

Use by students

The fact that not only the teacher, but also students, made use of technology within the lesson was innovative for some:

> *In the way students used the technology, not only the teacher. (Spain, ICT co-ordinator interview)*

> *We have worked with computer, not only near the board, we have learnt more software (Lithuania, student focus group)*

> *We are also using the computer in the iTEC course while we use paper, notebooks, and books in normal classes. (Turkey, student focus group)*

The following are more specific examples of the innovative ways in which technology was used by students.

- To produce innovative outputs (eg mind maps, videos) (2 teacher focus groups: BE, LT; 3 case studies: EE, FR, PT):

  Technologies enriched learning activities, helped to propose learning materials in a more interesting, new ways. For example, students used Popplet while working in five small groups, and created mind maps, which helped to summarise knowledge in their topic. (Lithuania, teacher focus group)

  It's innovative in the sense that we had never done anything of that kind. So you never made any videos, but then it's not something teachers generally do with their pupils. In that sense it is innovative. (Portugal, teacher interview)

  - Yes, we do PowerPoint and other presentations all the time.
  - But it was the first time we had done something quite like that…the wall thing. (Estonia, student focus group)

- To support group work (1 teacher focus group: BE; 2 case studies: IT, TR)

  Also the tablet is stimulating this social learning: "I have seen something here, let me show it to you." With a laptop or computer it is more complex to show something to someone. Now with a tablet it is easy. (Belgium, teacher focus group)

  And also the students' use of Facebook for communicating and planning activities together. (Italy, teacher interview)

  Also their attention to the course has been realised more than before with their communication among each other by using e-mail. (Turkey, ICT co-ordinator interview)

- To design (1 case study: IT)

  Moreover, the digital domain enabled them to model geometrical shapes by inserting numerical parameters, letting them work with an optimal degree of precision. Then, when students achieved 'geometric principles compliant' figures, they 'switched to the physical domain by printing their prototypes and then producing 'the real thing': cake decorations. (Italy, teacher interview)

- To support peer-to-peer teaching (1 case study: SK)

  Usually I use technology in physics for demonstration purposes only. Different is when students use technology as part of the teaching their peers. (Slovakia, teacher interview)

Use by teachers

Technology was also used in innovative ways by teachers, for example to support learning in other locations around the school or at home (2 teacher focus groups: IS, IT; 5 case studies: BE, IS, IT, LT, NO):

> *One of the main advantages is that the technology does not have to be in the classroom all the time (Belgium, ICT co-ordinator interview)*

> *Another important aspect was the continuum of the activity outside the classroom and the morning school time. The learning process has been expanded outside the formal school learning context. (Italy, teacher focus group)*

> *Students are working at home while implementing LS 'Storytelling', and use online and other available technologies there. (Lithuania, lesson observation)*

In particular, teachers in two case studies (IT, TR) spoke about the notion of 'flipping' learning:

> *Another innovation is... a different use of time: school and home time. Students have done a lot of work at home, working and communicating together and with me by using Facebook, and documenting the process by using a blog. They were not used to this kind of activity... and me too. I had already used blogs, but not in the normal curricular activities (only in special extra-curricular activities), and not in this way: it's a new kind of homework, in which students have to reflect on what they do in the schoolwork. This also means to free some of the school time in order to use it in new, more effective ways, that is what you just observed today. And I think this is also innovation. (Italy, teacher interview)*

Innovation in the role of teachers

Just as the role of the students changed as a result of implementing the LSs, so too did the role of the teacher (27 or 8% of survey respondents; n=332; CZ >20%). The same theme featured in four teacher focus groups (AT, IS, TR, UK) and eight case studies (AT, BE, IT, LT, NO, PT, SK, TR) as well as in the NPC survey analysed by WP4 (Le Boniec and Ellis (2013) reported a change in the role of teachers in CZ and IS). When teachers gave further explanations of this change, most said they were now acting as a 'coach', 'mentor' or 'guide':

> *Instead of teaching a subject, I guided them into learning and creating knowledge for themselves (Finland, teacher).*

> *I worked totally differently with this project. It was a student-driven project where I went into a mentor role. (Norway, teacher)*

The program has changed my role as a teacher. What is central is that I have had to learn to give up being the focus of the work in class. Instead of "directing" everything, I am now working with groups of students, assisting the groups, beginning not from the place where I am, but rather from the place where they are. In the past, even when I used PowerPoint, it was all about me and what I wanted to teach. By accepting that I don't have to stand in front of the class, I have learned to shift the responsibility for learning to the learner. (Israel, teacher focus group)

Teachers became side-by-side learners with their students. (Turkey, headteacher interview)

This could be challenging for teachers; they had to be able to respond more spontaneously and find a way to support groups and individuals working on different tasks, and often working beyond the classroom too:

We often have difficulties letting go our 'old ways' and this is the ideal way to experience that the pupils don't need the teacher in every aspect. This supporting role of the teacher changes a lot. It is definitely ground-breaking. (Belgium, headteacher interview)

…as a teacher you need to be ready for the fact, that you're are not in control of everything. (Austria, teacher focus group)

The workflow is more continuous and, moreover, it's not teacher-directed but, instead, planned together. I have to say that it's also a bit more strenuous way of teaching than the "traditional" one: your work as a teacher doesn't stop in the morning, you also have to be "connected" in the afternoon, and sometimes after dinner too... (Italy, teacher interview)

It could also be a challenge for students to adapt to the change:

I think sometimes it would be good to have a bit of 'policing' in our classroom. To wear the normal class teacher's hat. At least we'd pay more attention. (Portugal, student focus group)

Curriculum design and lesson planning

The innovative pedagogies, encouraged by iTEC, also required new approaches to lesson planning and curriculum design. A case study teacher described some of the challenges they experienced in this regard:

It was a challenge to me to be more precise and accurate while preparing for the lessons, to manage time precisely, foresee difficulties and possible problems, to provide help for my students on time. (Lithuania, teacher interview)

Cross-curricular approaches

The introduction of cross-curricular approaches were felt to be an innovative aspect of iTEC (1 teacher focus group: IS; 5 case studies: AT, HU, IT, NO, TR). In some cases, the teacher worked with colleagues who were specialists in other fields, but in other instances, an individual teacher covered several areas of the curriculum. Both teachers and students identified benefits of this approach:

> *I think that it was a complex activity, and thus it involved fields of diverse subjects, since it had everything from reading and music, crafts, drawing; all this was connected... (Hungary, teacher interview)*

> *The pilot teacher in charge, invited three of her colleagues to collaborate with her, the English teacher, Geography and Arts. Each of them had their own ideas what story should be told and approached [the pilot teacher] for assistance. (Austria, lesson observation)*

> *You get a lot out of it, and if you use Minecraft you can learn mathematics. We learn RLE [religion, life philosophy and ethics] when we make the buildings, so it's very special…We wrote our Padlet in English so that everyone could see it and all that, and so we could improve our grades in English. (Norway, student focus group)*

Assessment

Approaches to assessment changed through the implementation of the iTEC LSs, both in the introduction of technology to conduct assessment, and in changes to the assessment criteria teachers used (2 teacher focus groups: IS, IT; 3 case studies: FR, IS, NO):

> *When we did end-of-year evaluation, what was unique was that the questionnaire was computerized, digital. This somehow enabled us to do a deeper, more significant process of evaluation than we had done in other years. (Israel, teacher focus group)*

> *They'll get an assessment from me where I evaluate the Padlet part on the basis of how it communicates and documents the work. I evaluate the actual building by comparing it with the original – how well it has been accomplished and how complicated the original is. I look at how good they've got at using the program and how well the building resembles the original with regard to proportions and angles and the like. And I also look at the short presentation they gave yesterday where they could say something about their work effort. But of course it's not easy to measure the learning outcome. (Norway, teacher interview)*

There were also indications that some teachers had changed the ways in which they monitored students throughout the project (1 teacher focus group: LT; 3 case studies: BE, FR, IT):

I did not know Popplet. The innovation for me in my lesson was the fact the pupils could brainstorm and that I could see their work anytime, without having to sit with them I had an idea of what they did. (Belgium, teacher interview)

To evaluate their experience, I made using a IWB Flipchart with the use of interactive boxes in the form of multiple choice…at the end of the session, each student responds anonymously [using a learner response system]…we see immediately whether the concept has been understood or not, and then later we can have a more precise analysis of individual students who failed on a particular topic. It is possible to return to this topic with a small group of students… (France, teacher interview)

Other pedagogical innovations

Student reflection

Student reflection, often supported by TeamUp, was innovative for some. Although reflection could be challenging for students who were not accustomed to the process, the benefits for developing students' 'learning to learn' skills were seen as important (3 teacher focus group: BE, IS, IT; 4 case studies: IS, IT, PT, TR):

They evaluate themselves constantly, the learning process is very high. They are learning and not preparing an exam. (Belgium, teacher focus group)

Reflection was a main benefit and innovative way of learning since we felt we had to think about each and every step along the way. (Israel, student focus group)

Teacher reflection

Although this was not frequently mentioned, one case study teacher (FR) said that they had begun to reflect more deeply on their own practice:

Reflection on learning: we ask more questions as we analyze more precisely our sessions being in the project. It forces the reflection in the teaching we practice. (France, teacher interview)

Discovery learning

A number of teachers and students (1 teacher focus group: IS; 4 case studies: BE, IT, LT, TR) saw the introduction of discovery learning and experimentation as innovative:

With iTEC, I am out of the classroom, with the students, using iPhones and iPads, discovering things as we go. (Israel, teacher focus group)

We can experiment. (Belgium, student focus group)

At the explore activities we felt like real scientists. (Turkey, student focus group)

Project-based learning

Project-based learning was another innovative approach for some (2 case studies: NO, SK):

Student: That we have a long time to do it. That we're allowed to work without this and that having to be finished, like we can play. That we, like, can choose to do it at home when we have time for it, instead of having only like a week to do it in. So you have plenty of time and can put time aside for it.
Interviewer Do the rest of you think that there has been less pressure with this than usual?
Students: Yes. (Norway, student focus group)

It was different…Interesting [...]We could pick up the topic what to do. This is possible only when we work on projects. (Slovakia, student focus group)

Mind mapping

Mind mapping was a new technique for some teachers and students (1 teacher focus group: LT; 2 case studies: BE, LT; 12 teacher survey responses):

It is a new method – mind mapping, where students in small groups have created by themselves mind maps (Lithuania, teacher interview)

We used Popplet for mind mapping and the colours of Popplet were used for making priorities and sorting the ideas. (Belgium, teacher focus group)

Figure 6: Group of students using mindmapping software

Authentic learning

Finally, authentic learning was identified as an innovative approach by one case study teacher (IT):

> *The C4 Learning Story inspired me in connecting the concepts of the subject I teach (Maths/Geometry) to 'real world things'. In this school (a secondary school of hotel management and catering) students are more interested in practical activities than abstract ones, such as Geometry: they don't feel these as useful for their future employment. That's why I decided to use the LS for linking Geometry concepts to a 'real' commitment: Cake Design. The object created in the LS had to be a decorated cake. Decorations had to respect some given geometrical properties. In order to do that, students have to deal with geometrical concepts such as translations, rotations, Pythagoras and other theorems, and so on. (Italy, teacher interview)*

The ways in which the innovation evidenced through the C4 evaluation data relates to the iTEC Innovation Maturity Model is described in Appendix F and the case studies in Appendix A indicate where there clear links to the Model.

Chapter 2: Impact of iTEC

As the majority of the impacts identified in C4 have already been established through the evaluation of previous cycles, these are described briefly in this report. Further details can be found in Lewin et al (2013a).

Teachers	Students
• Motivation • Digital competency • Collaboration • Teacher-student relationships	• Creativity • Motivation • Collaboration • Digital literacy • Problem-solving • Independent learning • Critical thinking • Attainment • Confidence • Life skills

Figure 7: Summary of the impact of iTEC on teachers and students

Impact of iTEC on teachers

In addition to the impact on teachers' pedagogy discussed in Chapter 1, iTEC has also had a positive influence on teachers' digital competencies and motivation. A theme to emerge more strongly in C4 was the impact of iTEC on relationships with other teachers and students[36].

Motivation

Increased teacher motivation resulting from participation in iTEC was mentioned in five focus groups (BE, HU, IS, LT, TR) and two case studies (BE, TR); as in previous cycles, iTEC offered teachers fresh perspectives on their practice:

> *Participating in the iTEC project stimulated and allowed me to create my own teaching system and to produce new ideas as well. (Lithuania, teacher focus group)*

Digital competency

Again, reiterating findings from previous cycles, there was improved digital competence among teachers, and also increased confidence in using new

[36] The latter is discussed under 'Impact on Students: Collaboration' as this impacts on both groups.

technologies (3 teacher focus groups: IS, TR, UK; 6 case studies: BE, ES, FR, LT, NO, TR):

> *The project invites me to use more new technologies and suddenly you feel more comfortable and they can be used more easily. This is what I found. (France, teacher interview)*

Collaboration with other teachers

In C4, iTEC offered opportunities for greater collaboration with other teachers; this was usually within the same school (4 teacher focus groups: HU, IS, PT, UK; 5 case studies: AT, BE, IT, NO, TR). (See Chapter 4 for further details on mainstreaming within schools):

> *Working with ITEC has motivated me to engage other colleagues. It awakened a strong desire not to deal with this project on my own. The challenge is to untangle the frameworks in which we work. (Israel, teacher focus group)*

> *The teachers started communicating beyond different classes and years. (Belgium, headteacher interview)*

Impact of iTEC on students' learning outcomes

When asked 'In what ways was your students' experience different when implementing the Learning Story?, 97% of teachers responding to the survey (319 out of 328) said that their students' experience had altered.

In the survey, teachers were also asked whether they thought that the implementation of the LS had led to improvements in the skills or attitudes of their students.

- 89% agreed **creativity skills** had improved[37]
- 87% agreed **interest and engagement** had improved[38]
- 87% agreed **collaborative skills** had improved[39]
- 87% agreed **digital literacy skills** had improved[40]
- 86% agreed **communication skills** had improved[41]

[37] Countries in which at least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed were: AT, BE, IT

[38] Countries in which at least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed were: AT, IT

[39] Countries in which at least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed were: BE, FI, IT, NO

[40] Countries in which at least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed were: BE, DE-SM, FI, UK-PR.

- 80% agreed **problem solving skills** had improved[42]
- 79% agreed **independent learning skills** had improved[43]
- 73% agreed **critical thinking skills** had improved[44]
- 71% agreed **level of attainment** had improved[45] (n=326).

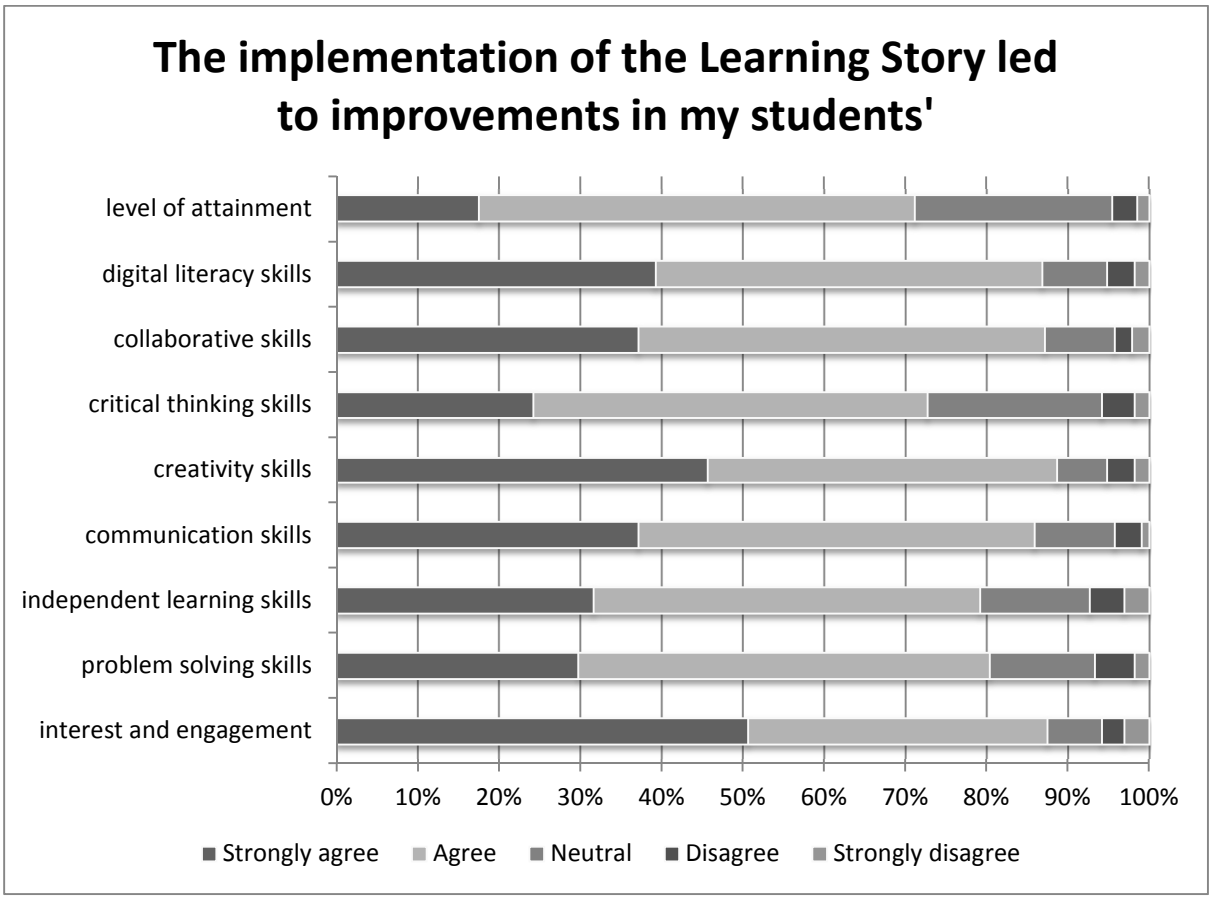


Figure 8: Impact of iTEC on student skills, engagement and attainment

Other skills which teachers believed had improved included self-confidence (4), organisational skills (4), self-expression (3) and empathy (3).

[41] Countries in which at least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed were: AT, BE, FI, IT

[42] Countries in which at least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed were: AT, BE, ES-SM, IT, NO, UK-PR

[43] Countries in which at least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed were: AT, BE, FI, IT

[44] Countries in which at least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed were: AT, DE-SM, EE, ES-SM, FI, FR, HU, IT, NO, UK-PR.

[45] Less than half of the teachers agreed or strongly agreed that there was a positive impact on students' attainment in: BE, DE-SM, UK-PR.

The case studies offered more detailed descriptions of the ways in which students' skills, attitudes and attainment had improved.

Creativity skills

As in previous cycles, a high proportion of teachers believe that iTEC has had an impact on students' creativity skills (in C1-C3, 90% agreed students developed creative skills). In C4, it was the types of outputs which students were expected to produce (eg videos, products, games) which were frequently thought to promote creativity skills (6 focus groups: HU, IT, LT, PT, TR, UK; 7 case studies: AT, ES, HU, IT, LT, SK, TR):

> *Allow for creativity, innovative ways to create portfolios of work. Raised engagements resulted in higher levels of progress. (UK, focus group)*

Engagement and motivation

Again, in common with previous cycles, students became more deeply engaged in their work as a result of iTEC (7 focus groups: BE, HU, IS, IT, PT, TR, UK; 12 case studies: AT, BE, ES, FR, HU, IS, IT, LT, NO, PT, SK, TR) (82% during C1-C3):

> *Willingness and motivation of students increased (Turkey, Head teacher interview)*

Collaboration skills

The impact of iTEC on students' collaboration skills again echoes findings from previous cycles (7 focus groups: AT, BE, EE, HU, IS, IT, TR; 13 case studies: AT, BE, EE, ES, FR, HU, IS, IT, LT, NO, PT, SK, TR) (in C1-C3, 90% thought there were more opportunities for collaborative work):

> *We found iTEC more enjoyable than our other lessons because we worked as a group and everybody in our team always help each other and we learned a lot of things and we shared our experiences with each other. (Turkey, student focus group)*

However, a theme which emerged more clearly in C4 than previously was the way in which iTEC also strengthened collaboration between teachers and students, impacting on both groups. Teachers had to place greater trust in students and be prepared to learn alongside them:

> *Somehow it strengthens the partnership with the kids, the way we prepare and create things, and we do it together: this works wonderfully. (Hungary, teacher interview)*

Digital literacy

Improvements to students' digital literacy skills was yet another theme which was repeated from previous cycles (2 focus groups: LT, PT; 10 case studies: AT, BE, ES, HU, IS, IT, LT, NO, PT, TR):

I knew some basic things on the computer, but since the project I know a lot more about file sharing and Googledocs (Israel, student focus group)

Communication skills

As in C1-C3, iTEC was felt to develop students' communication skills (2 focus groups: LT, TR; 6 case studies: ES, FR, IS, IT, LT, TR) (in C1-C3, 85% agreed students communicated with each other in new ways):

Students also had to prepare instructions – this is tricky for gifted kids they assume everyone know what they do, so it's good for them to think about what other people will understand, or misunderstand (Israel, teacher interview)

Problem-solving skills

Problem-solving skills had not emerged as a strong theme in in previous cycles, but did appear in the C4 data (1 teacher focus group: TR; 7 case studies: AT, EE, ES, FR, IT, NO, PT). The types of problems students had to solve related not only to the subject-related task they had been set, but to also the use of technology to support their learning:

I could work more or less with Windows MovieMaker but whenever I didn't know what to do I used to go on YouTube to watch tutorials, how it was done, or if there weren't any I had to find it out on my own… (Portugal, student focus group)

It is all very intuitive. We did not get a special training for using them. Just playing around and figuring it out, like we do with everything else. During the iTEC project we used the interactive whiteboard quite a bit but we figured out how to use it on our own. (Austria, student focus group)

Independent learning skills

Previous cycles had seen an increase in student autonomy and independent learning (in C1-C3, 85% agree students engaged in active and independent learning) and the same was true of C4 (6 focus groups: EE, ES, LT, PT, TR, UK; 11 case studies: AT, EE, ES, HU, IS, IT, LT, NO, PT, SK, TR):

Students are more responsible for their learning; they now plan their own activities and this is leading them to a new level of engagement. (Italy, teacher interview)

Critical thinking skills

Critical thinking skills had rarely been mentioned directly in the data in previous cycles and the same was true in C4 (2 case studies: FR, TR).

Attainment

In C4, the percentage of teachers believing students' attainment had improved was slightly higher than in previous cycles (71% compared to 63% overall for C1-C3) and the impact of iTEC on attainment was mentioned in five teacher focus groups (HU, IS, LT, PT, UK) and six case studies (AT, IT, LT, PT, SK, TR). However, most of the comments are simply general references to improvement, for example:

> *The students obtained new knowledge, learning results were perfect. (Lithuania, focus group)*

Some comments implied that it was a more active approach to learning which helped students to gain a deeper understanding and retain knowledge:

> *We do not forget by learning actively. That was the main benefit. (Turkey, student focus group)*

> *Students made videos, they make footage of experiments, they made learning resources with videos for physics. The children were very active. If this practice helps children to understand content, then this practice is very good. (Slovakia, headteacher interview)*

Confidence and life/workplace skills were themes which did not feature strongly in the survey data and had not emerged as strong themes in C1-C3, but were considered important in some C4 case studies.

Confidence

Teachers felt that students' confidence, in both ICT and subject-related skills and knowledge, increased as a result of iTEC (1 teacher focus group: UK; 6 case studies: AT, IT, LT, NO, PT, TR):

> *Above all the students' usage of ITEC technologies developed confidence in their abilities. (Turkey, headteacher interview)*

> *Helped to bring all elements of lesson together, students more confident in topic after using iTEC technology. (UK, teacher focus group)*

> *It's worth noting a boy who otherwise has difficulty expressing himself because of poor language. But when we forget the language part of it, he really shows what he can do. So he clearly benefits from showing what he can do and then he gets good grades, right? Normally he struggles because the language inhibits him both orally and when he writes. (Norway, teacher interview)*

Skills for the workplace and future life

iTEC helped to create authentic learning contexts to allow students to develop skills they would need beyond school (2 teacher focus groups: HU, IT; 4 case studies: AT, ES, IT, PT):

> *iTEC technologies enhance an authentic learning approach. It links the learning experience to concrete tasks and elements from real life contexts. That helps the school to get in touch with the real world. (Italy, teacher focus group)*

> *If they only work in the traditional way, as they would before, we would be preparing them for something which is not what is waiting for them when they enter the job market, because it's not what they would have encountered many years ago. They have to be prepared to be autonomous, dynamic, because they're going to leave school and get a job like we once did, some at least, and their parents will probably have to prepare themselves for several jobs in the course of their lives, and they will have to deal with those technologies in their lives and their professions. (Portugal, teacher interview)*

Why did attainment and learning outcomes improve?

The most common reason given to account for these improvements in all learning outcomes (except attainment)[46] (n=282) was **increased collaboration**; 20% (55; CZ, FI, HU, IT >20%) of teachers felt that this had helped to improve learning outcomes:

> *The collaborative work helps them to progress from their starting points to a positive outcome, which enhances their independence, and their dependence on the group at the same time; they develop a better understanding of themselves in any work when working in teams. Now they understand the benefits of having different criteria and points of view, and are able to arrive at a shared understanding (Spain, teacher)*

The fact that students took greater **responsibility** for their learning was mentioned by 16% (44; EE, ES-SMART, FI, IS, NO, SK >20%) of teachers:

> *Acquisition of educational and behavioural autonomy, improved self-control and sense of action. (Italy, teacher)*

According to 15% (42; CZ, DE-SMART, FR, PT >20%) of teachers, increased **student motivation** helped to improve learning outcomes:

> *Commitment was total and all students were involved in the project. (France, teacher)*

[46] The reasons given could relate to any (or all) of outcomes listed above with the exception of attainment which is considered with separately below.

The **use of technology** was the other commonly mentioned factor; it was identified as having an important role in improving outcomes by 14% (40; ES-SMART, IT >20%) of teachers:

> *Tools enabled them, and forced them, to deal with issues that are not dealing with in normal learning (Israel, teacher)*

When asked specifically why they believed students' attainment had improved (n=232), many of the same factors were mentioned, with **student motivation** (31% or 73 teachers; AT, BE, EE, ES-SMART, LT, PT, UK-SMART >20%), **greater collaboration** (13% or 29 teachers) and the **use of technology** (10% of 24 teachers) being the most important factors:

> *Students were very motivated, even 'weaker' children achieved great results! (Germany, teacher)*

> *The method of teamwork has empowered students, valuing the contribution of all at various levels of competence (Italy, teacher)*

> *…better understood in depth with the help of technology to make the association with the daily life of students […] use of technology, has led to significant improvements in the realization of gains. (Turkey, teacher)*

Among those who did *not* think their students' attainment had risen, a wide range of possible reasons were given, but these often related to students' lack of skills in critical areas such as creativity, digital literacy, collaboration or independent learning (9 out of 18 providing reasons):

> *The team collaboration was difficult, team lacked responsibility (Slovakia, teacher)*

> *They will not send a document by email if they can give it to you by hand. (Spain, teacher)*

The other responses cited were practical problems such as lack of time and inadequate access to technology.

Chapter 3: Sustainability, transferability and scalability

In the teacher survey, the percentages of respondents who would use tools or resources again were:

- 86% would use Learning Stories again[47] (n=331)
- 81% (22/27*) would use ReFlex again (n=27)
- 79% would use the Widget Store again (n=126)
- 71% would use TeamUp again[48] (n=329).

The percentages who would recommend each tool or resource to other teachers were:

- 87% would recommend Learning Stories[49] (n=331)
- 85% (23/27*) would recommend ReFlex (n=27)
- 79% would recommend the Widget Store (n=126)
- 70% would recommend TeamUp[50] (n=329)

When asked whether they had shared their experience with teachers outside iTEC:

- 83% had shared experiences of Learning Stories[51] (n=331)
- 85% (23/27*) had shared experiences of ReFlex (n=27)
- 63% had shared experiences of TeamUp[52] (n=329).

[47] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in AT, IT.
[48] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: AT, CZ, ES-SM, FI, FR, IT, PT, TR
[49] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in AT, FR, IT.
[50] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in: AT, CZ, ES-SM, FI, FR, HU, IS, IT, PT, TR
[51] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in AT, FI, HU, IS
[52] At least 20% of teachers (or at least two teachers if the sample size was less than 10) were neutral, disagreed or strongly disagreed in AT, ES-SM, FI, FR, HU, IS, IT, PT, SK, TR, UK-PR

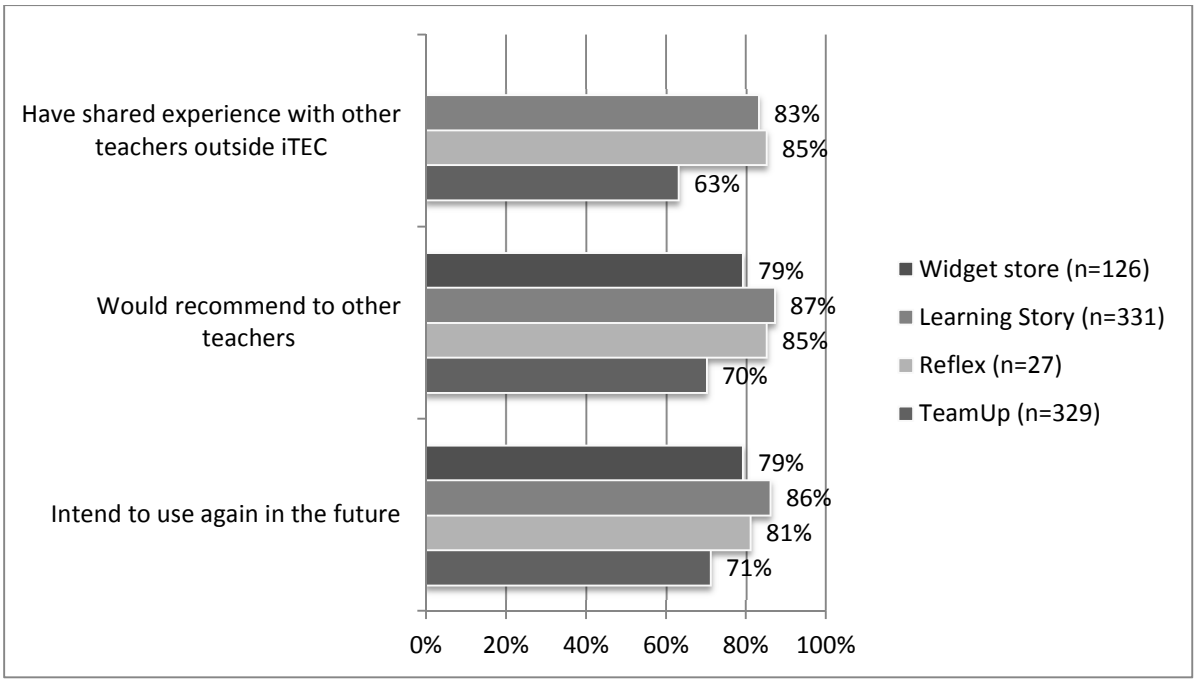


Figure 9: Continued use and transfer of iTEC methods and tools

*Note small base figure for ReFlex

Continued use of iTEC tools and approaches

In five focus groups (BE EE, IT, LT, UK) and eight case studies (BE, ES, FR, IS, IT, LT, PT, TR), teachers said they had continued, or intended to continue to use, aspects of iTEC, including reusing the same LS with another class; embedding technologies as a part of everyday teaching practice; and reusing the pedagogies supported through iTEC to teach other curriculum topics.

> *New ways of using technology through iTEC project now being embedded into wider teaching. (UK, teacher focus group)*

> *Sessions to prepare for an iTEC project requires a big investment in time and preparation. Once it's ready, it's ready, it is reusable in general, it is positive. I think I do it again this scenario. (France, teacher interview)*

> *Also some of the widgets that they have been using in the last pilot has become a permanent tool in their practice. (Italy, teacher focus group)*

An important feature of the iTEC approach for some was that, although resources, content and approaches might take time to develop initially, they could usually be reused for other lessons (3 case studies: ES, FR, LT):

> *Yes, it has the potential to change my future practice because now I have learnt about other ways to get my objectives, other ways to work in groups with my students,*

other ways to do collaborative work, and I'm going to use it in my future lesson (Spain, teacher interview)

Transfer to other teachers in the pilot school

In three case studies (AT, EE, TR), there was evidence that other teachers within the case study school had started to make use of iTEC within their own teaching:

I see that more of my colleagues tend to use iTEC technologies and Learning Stories simply because the students ask for it. (Austria, ICT co-ordinator interview)

But in my school I have introduced quite a lot of ideas. A good example is mathematics, where they are making Learning Stories. There are also teachers who have started to use TeamUp. (Estonia, teacher interview)

In eight case studies (BE, ES, FR, HU, LT, NO, SK, TR), other teachers were reported to be interested in finding out more about iTEC, although they had not actually adopted any iTEC methods or tools to date:

While the project was being prepared, it already had an influence. There were discussions about it, what is to be done, what are the frameworks, so colleagues started to familiarize themselves with the whole iTEC program. They also got to know about the methodology, namely the project as a method, as well as its elements, such as groupwork, pairwork, and other elements. They were curious and open regarding the method. If the program is well received, perhaps other colleagues will become interested in introducing it. (Hungary, headteacher interview)

The teacher responsible for 'equality in educational' at the school was very interested by what she saw from the other teacher. When the means are available then the project spreads to the other teachers. (Belgium, ICT co-ordinator interview)

Other colleagues have asked me, they have seen and are interested in the scenario (France, teacher interview)

In four case studies (IS, NO, PT, TR), iTEC teachers said they intended to share their experiences with colleagues, although they had not done so as yet:

So in the next session I'll share this, and then I'm pretty sure that someone will be inspired. Not to do exactly the same perhaps, but to think along these lines. I think people will do that. (Norway, teacher interview)

However, in one focus group (HU) and three case studies (IS, IT, TR), teachers said their colleagues were unlikely to be interested in adopting iTEC approaches:

> *To share my experience inside my school is a bit more difficult: most of the teachers are not tech-comfy, and I think that iTEC activities are not for all, at least for now... (Italy, teacher interview)*

Five headteachers (AT, BE, LT, SK, TR) indicated they would actively support the dissemination of iTEC to other teachers in their school:

> *We take more time in our meetings too so that this vision is supported by the whole team. I want the teachers to present what they did and what the results were to their colleagues. This way their colleagues can see for themselves what happened in those other classes. This might be a solution to bring more teachers in. (Belgium, headteacher interview)*

> *I will encourage them to use it and lead the process of changes and take leadership in it. (Austria, headteacher interview)*

> *We have organized a workshop for the language teachers about iTEC teacher experience in our school. (Lithuania, headteacher interview)*

Comments from the remainder of the headteachers interviewed indicated that they were broadly supportive, but less actively involved in encouraging teachers to adopt iTEC approaches. The case studies did not contain any clear examples of iTEC directly influencing school policies as yet.

Case study: Scaling up iTEC within a school

School A, a mixed 11-16 secondary school in the UK. The school is moving towards providing one-to-one devices for all students, so iTEC fits in well with its future plans. Teachers at School A first became involved in iTEC during Cycle 2. During this cycle, just one teacher from the design and technology department, Teacher B, was involved. She had first become aware of iTEC through attending an IWB course delivered by Promethean.

For Cycle 2, Teacher B used iPod Touch technologies to investigate how these could be used to support GCSE revision. The pilot was a success with a noticeable impact on student grades between the mock exam and the actual exam.

News about iTEC spread and in Cycle 3 Teacher B was joined by three colleagues, including staff from the maths department who used the Design a Game LS. Teacher B chose the Redesign the School LS in this Cycle, working with two classes of 13-14 year old students to redesign an aspect of the school for a student with different needs. The maps produced by one of the groups were used for Year 6 induction sessions, making them visible throughout the school. Teacher B's involvement in iTEC training at an international level has also raised the profile of the project in the school.

In Cycle 4, School A's involvement in iTEC expanded greatly to include a total of 12 teachers across 8 subjects. LSs included:

§ Science: Students use iPads and a range of apps to create digital stories about famous scientists and their impact on the world

§ Design & Technology (1): Students choose an iconic product (e.g. Lego, the Anglepoise lamp, the Mini etc.) and then create a digital story using iPad apps of their choice

§ Design and technology (2): Students have the design brief of 'creating an affordable luxury brand'. They must complete tasks such as designing logos, product ranges and adverts

§ English: Students use iPads to create digital stories on their current topic of Shakespeare.

§ Food Technology: Students research, plan, produce and edit a 5-minute TV cooking programme

§ Maths: Using ActivInspire with ActivExpression devices and other voting software

§ ICT: Using Scratch to enable students to design and create computer games.

Professional development is a key component of iTEC for School A; teachers participating receive a certificate for their CPD folder. For Cycle 5, the school hopes to deliver a whole school training session around team planning which will, hopefully, lead to even more staff taking part.

Link:
http://community.prometheanplanet.com/en/user_groups/itecprom/b/itecprom_teacher_blog/archive/2013/06/12/trentham-high-school-cycle-4-update.aspx#.UbrQLdimXpc

Transfer to teachers outside the school

While teachers commonly shared their experiences with others involved in iTEC, there was a noticeable reticence to disseminate iTEC to teachers beyond their school who had not been involved in the project (5 case studies: AT, BE, EE, PT, SK):

> *I believe this will be a lot harder to achieve because I am not that secure about using technology […] I will tell my friends but I don't see myself 'selling' this outside the school. Because when these people would ask more technical questions I would have to refer to my IT co-ordinator. (Belgium, teacher interview)*

> *I am not sure about sharing experiences beyond my school at the moment. (Estonia, teacher interview)*

> *Do I think it would be interesting and useful? Yes, I think it would be. But when it comes to receptivity I think it's more complicated. […] There were some weird [terminology in iTEC]. Lots of new [terminology]. Ultimately there are unimportant things, but it's a lot of new information. You hear a lot of stuff you don't know what it means. It ends up being too much information. Generally speaking, it wouldn't work if*

the teachers hadn't received any support right from the onset. I has to be something carefully planned, if is going to be generally applied. (Portugal, teacher interview)

I have not done any mainstreaming of iTEC beyond my school since we are in competition with other schools as far as getting students is concerned. (Austria, headteacher interview)

Nevertheless, there were a small number of examples where this had happened: one teacher had presented their work at a conference for maths teachers and another who was going to become a teacher trainer said they intended to tell their students about iTEC. Others indicated that they believed that dissemination should take place, but this needed to be organised centrally, rather by individual teachers:

More visibility on expositions and meetings for people working in education. For example at the colloquium for head teachers that is begin organised annually. Every school shows what they have achieved in the past year. That is where iTEC should be made visible. (Belgium, teacher interview)

I believe that the research and knowledge-based communities in and around City T's schools are very interested in being part of something bigger and in disseminating this to a wider audience. At the same time there are 53 primary and lower secondary schools in City T, so it's clear that sharing with other schools is a challenge. (Norway, headteacher interview)

Despite an apparent reluctance to share their experiences beyond their school, many teachers were clearly comfortable discussing their activities with other iTEC teachers via online communities. By the end of C4, the iTEC Teacher Community[53] had 843 registered users and 133 forum participants. According to analysis conducted by WP4, popular topics included examples of use of the LAs and LSs and teachers' own stories and practices, technologies used to implement the activities such as iTEC technologies and in particular widgets, but also other social media tools, online virtual environments and hardware such as tables and 3D printing. Sharing of experiences and looking for advice were the main aspects attracting teachers to the community. Some forum users also asked technical questions and few looked for peers with whom to collaborate (Le Boniec and Ellis, 2013).

In addition to the international iTEC Teacher Community, individual countries, or iTEC partner organisations, also run their own online communities for iTEC teachers. The posts relating to C4 activities in the communities of three partners (Promethean, SMART and Portugal DGE) were analysed. Table 3 below summarises the types of posts they contained[54].

[53] http://itec.eun.org/web/guest/forum;jsessionid=C5E861E2265B03B32ED2B5F799311806
[54] One post may contain more than one type of activity.

Name of community	Type of post							
	Examples of good practice	Descriptions of pedagogical or technological change and innovation	Examples of sustainability	Technical problems or challenges	Pedagogical problems or challenges	Solutions to problems	Administrative	Other
Promethean: iTECPROM Forums	23	0	0	3	1	5	12	1
Promethean: iTECPROM Blogs	5	2	3	0	0	0	3	0
SMART: iTEC SMART	9	1	0	0	0	3	28	0
SMART: iTEC Spain	51	6	0	9	0	13	27	16
DGE: Building Learning Scenarios	99	6	0	5	5	37	50	3
DGE: Technical questions forum	2	5	0	10	0	0	4	0
DGE: Widgets & Widget Store	1	3	0	1	0	0	6	0

Table 3: Number of each type of post in partner online communities

Although the way in which each community was used varied depending on the structure and intended purpose, overall these communities were most commonly used to share ideas and examples of good practice. They were also used to support collaborative problem solving within the online community, but this was a less frequent activity (except in communities expressly intended for this purpose). There were a limited number of descriptions of obvious pedagogical or technological change and innovation[55].

There was some interaction to be seen within the online communities as teachers commented on each other's ideas; asked for further information; compared descriptions to their own experiences; or suggested solutions to problems mentioned. However, this was not as extensive as might have been expected. The number of responses to posts ranged from 0 to 20. The average number of responses (and 'reactions[56]' where applicable) for each of the communities is shown in Table 4 (this excludes administrative posts and announcements).

[55] It is acknowledged that some of the examples of good practice may also represent pedagogical or technical innovation for teachers, but this was not made clear.
[56] In Edmodo, members can give 'reactions' to posts using emoticons.

Name of community	Average number of responses	Average number of reactions	Total number of posts included
Promethean: iTECPROM Forums	3.8	N/A	25
Promethean: iTECPROM Blogs	0.4	N/A	7
SMART: iTEC SMART	1.2	0.9	13
SMART: iTEC Spain	N/A	1.6	104
DGE: Building Learning Scenarios	N/A	1.0	165
DGE: Technical Questions Forum	N/A	2.7	16
DGE: Widgets & Widget Store	N/A	7.2	10

Table 4: Interaction within online communities

It is impossible to determine what impact reading about examples of good practice and solutions to problems had on other teachers; within the 340 posts analysed, there were seven examples of teachers commenting about their plans to adopt an idea they had read about from another teacher.

Older students, as well as teachers, also have an opportunity to share their work via the iTEC 'Students collaborate' Facebook group. Although there are almost 1,300 members of this group, in practice, the majority of the posts are made by a small number of teachers (most commonly from ES, PT and TR during C4). Work posted on the site clearly does not have a high profile as yet; most of the posts are 'liked' by less than ten people.

For further details about sustainability and scalability, particularly at regional and national levels, please refer to the National Case Studies report (presented in D5.4).

Chapter 4: Enablers and challenges facing teachers and schools

As the enablers and challenges identified in C4 echo those established through the evaluation of C1-C3, this section presents a brief summary. Further examples of the enablers and challenges described can be found in the evaluation reports for the previous cycles (Lewin et al 2012, 2013b, 2013c).

The following table summarises the factors which were identified by teachers as both barriers and enablers to using iTEC Learning Stories, Learning Activities and iTEC technologies. It is based on the frequency with which these themes appeared in the focus group and case study transcripts. However, it should be noted that this is based on a small sample of qualitative data and there was not a marked difference between the importance of various factors. The fact that the same factors could act as both barriers and challenges was also reported in D4.4, "…once they had been addressed, these challenges were then seen as enablers bringing about change in the classroom" (Le Boniec and Ellis, 2013).

	Order of importance as an enabler	Order of importance as a barrier
Teacher, student and parent attitudes	1st	3rd
Technical infrastructure and support	2nd	4th
Organisational culture and ethos (at school and ministerial levels)	3rd	1st
Student and teacher skills	4th	2nd

Table5: Summary of enablers and barriers identified

Enablers

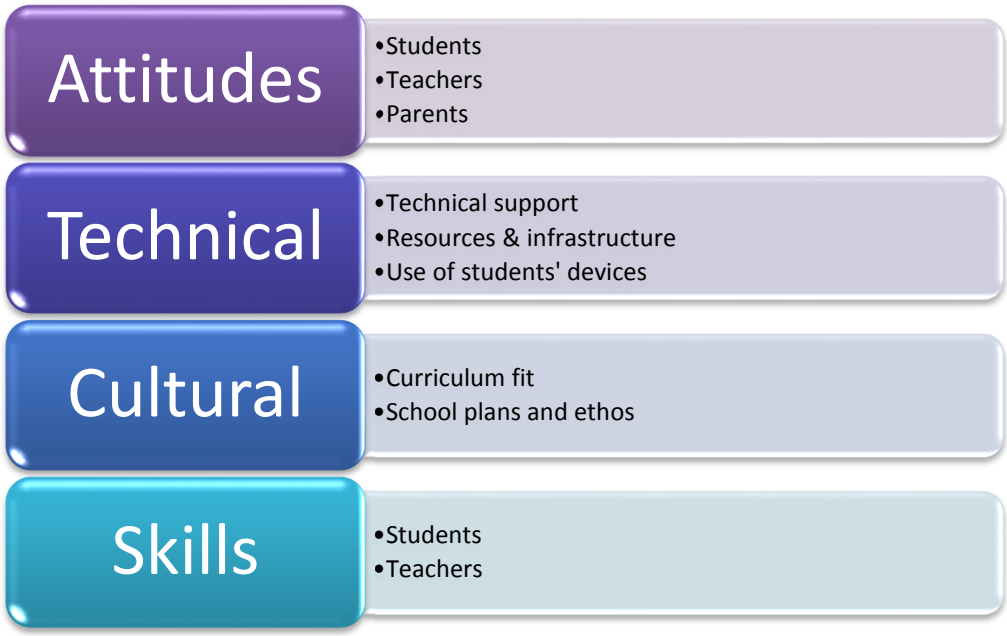


Figure 10: Summary of enablers of the iTEC approach

Attitudinal enablers

Student attitudes

Positive student attitudes towards the use of technology and towards pedagogies supported by iTEC contributed to success and, it was believed, would help to support further innovation in schools (6 teacher focus groups: AT, EE, IS, IT, LT, TR; 9 case studies: AT, BE, HU, IS, IT, LT, NO, PT, TR):

> *…let's not forget the students. They are going to be the driving force behind change as well as their parents. If it works for them, is fun and contributes to the learning success, it will change the practice of teaching sooner or later. (Austria, Teacher interview)*

Teacher attitudes

Teachers needed to be open to new ideas and ways of teaching; willing to learn; and happy to embrace the use of technology in the classroom (1 teacher focus group: IS; 7 case studies: AT, EE, ES, IS, LT, NO, TR):

> *There's something special about [the case study teacher]. The fact that he dares to do it. It's a bit typical of him, but more teachers will perhaps gradually dare to do things. (Norway, ICT co-ordinator interview)*

Parental attitudes

Parental support was also identified as an enabler (7 case studies: AT, BE, ES, LT, NO, SK, TR):

> *Yes, family involvement has been there from the beginning. Families have understood that students creating videos is part of the 'learn to learn' competency. Families view what we are doing very positively (Spain, headteacher interview)*

Technical enablers

Use of students' own devices

The fact that many students had access to technologies at home was seen as an enabler (7 case studies: AT, BE, IS, IT, NO, PT, SK):

> *Students have done a lot of work at home, working and communicating together and with me by using Facebook, and documenting the process by using a blog. (Italy, teacher interview)*

The use of BYOD (Bring Your Own Device) was discussed in a small number of cases (1 teacher focus group: HU; 1 case study: NO), although there is evidence this approach has been used more widely as Le Boniec and Ellis (2013) also report its use in France and in schools supported by SMART:

> *…students have phones, so they used their phones instead of the designated common platform, which they did not really use. (Hungary, teacher focus group)*

> *The one thing that has made it possible is that a lot of the students have brought their own PCs to school […] Of course we can't make them do it, but we say that if they have the chance and if they want to bring their own then that's fine. If they don't have a PC they can borrow one from the school, and in general it works. There are usually enough PCs for everyone. And each year there's an increase in the number of students who have their own PCs – which in fact is a good thing. (Norway, teacher interview)*

Technical support

Yet another factor which enabled the implementation of iTEC was the availability of adequate technical support (5 case studies: BE, ES, FR, NO, TR):

> *What has helped me to use the iTEC technologies, is to have the support of our ICT advisor. As soon as I had a technical problem, he would respond, otherwise I would have been faced with problems that I could not have overcome one in my class. He found me some solutions on technical issues of the project. (France, teacher interview)*

Resources and infrastructure

Access to sufficient technical resources and a robust infrastructure was a further enabler (1 teacher focus group: AT; 3 cases studies: AT, NO, TR):

> *Technical requirements were not big trouble for us. There are devices in our school such as computers, printers, projectors, cameras, video cameras available. (Turkey, headteacher interview)*

Cultural enablers

Curriculum fit

A good fit between the philosophy of existing curricula and the aims of iTEC was reported to be an enabler (7 case studies: AT, BE, HU, LT, NO, SK, TR):

> *The national curriculum is focused on ICT implementation in education. As iTEC project is about ICT use in education it fits with the Lithuanian national and schools' curricula. (Lithuania, ICT co-ordinator interview)*

Fit with school plans and ethos

Similarities between aims of iTEC and the ethos and future plans of the school were another enabling factor (6 case studies: AT, BE, ES, IS, NO, TR):

> *iTEC fits in with the school vision: we formulated a vision which is obligated to develop an independent learner who will function well in the technological society we live in, and we address the different needs of individual learners (Israel, headteacher interview)*

School involvement in other projects which were complementary to the aims of iTEC also supported its implementation (4 case studies: FR, HU, NO, TR):

> *…our starting point is a development project we had some years ago called 1001 Mirrors. So of course ICT was part of the project and it was also basically part of the curriculum […] It's quite simply about getting the students to be active […] And to get them to be so strongly involved that they develop one skill or another that they learn well and can communicate to others. And putting various computer tools to use, well, this is of course completely in line with this pilot project. (Norway, ICT co-ordinator interview)*

Interviews were conducted with headteachers from nine countries (out of 13) and in six of these (AT, BE, HU, LT, NO, TR), the headteacher was clearly actively involved and highly enthusiastic about iTEC[57].

> *I am convinced that we need to participate in this project. We take more time in our meetings too so that this vision is supported by the whole team. (Belgium, headteacher interview)*

In addition, 78% of survey respondents (n=342) agreed that their senior leaders were supportive of the use of ICT in the classroom.

Skills-related enablers

Student skills

Comments referring to the existing skills, or previous experiences, of students most commonly related to ICT skills, but there were also examples of other twenty-first century skills (1 teacher focus group: IS; 6 case studies: BE, HU, NO, PT, SK, TR):

> *We already knew how to work with the devices because we have them at home. (Belgium, student focus group)*

Teacher skills

Likewise, teachers' skills and prior experiences in both the use of ICT and innovative pedagogies could act as an enabler (5 case studies: FR, IS, LT, NO, TR):

> *This teacher is really a resource person in ICT and leads his colleagues in the teaching of computer science at the school. (France, ICT co-ordinator interview)*

[57] This may be true of others too, but it is difficult to say for certain from the transcripts.

Challenges

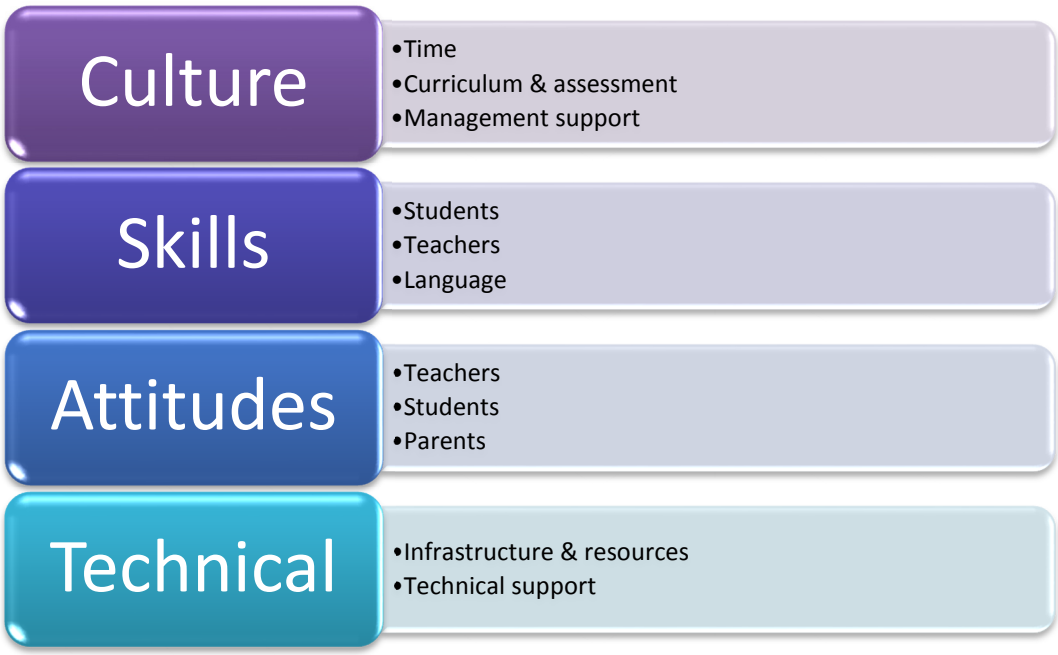


Figure 11: Summary of changes facing iTEC teachers and schools

Cultural challenges

Lack of time

Finding time to implement iTEC within the curriculum was identified as a barrier (7 teacher focus groups: EE, HU, IS, IT, LT, PT, UK; 10 case studies: BE, EE, ES FR, IS, LT, NO, PT, SK, TR). This was also identified as the most significant barrier facing teachers in D4.4 (Le Boniec and Ellis, 2013):

> *Work in the classroom was not enough to finish projects/assignments in time (Portugal, teacher focus group)*

Curriculum and assessment

Barriers were presented by inflexible curricula and assessment requirements (5 teacher focus groups: HU, IS, IT, PT, UK; 3 case studies: NO, SK, TR):

> *The state educational programme is not flexible enough (Slovakia, headteacher interview)*

Lack of support from school management and ministry

There were a small number of examples of a lack of support from the school headteacher (1 teacher focus group: IS; 1 case study: IT) and at a ministerial level (1 teacher focus group: IS; 1 case study: ES):

> *There is a gap between the Ministry's declared desire to move ahead and the willingness of supervisors to get engaged. They sometimes actually oppose what we are doing, and the teachers have understood this. Sometimes the teachers move ahead without informing supervisors, to avoid their opposition. (Israel, teacher focus group)*

> *I have to register the poor involvement of the head teacher in the iTEC activities. (Italy, lesson observation)*

Skills

Student skills

A lack of student skills was a challenge; this included lack of ICT skills, team working, independent learning and reflection skills (2 teacher focus groups: HU, IS; 8 case studies: BE, IS, IT, LT, NO, PT, SK, TR):

> *I found it difficult to use the ITEC tools, particularly the teamwork, with the students who have learning and concentration disabilities. I had to separate them out sometimes. (Israel, teacher focus group)*

Some teachers felt that the age of their students meant they would inevitably struggle with some of the LSs (4 case studies: FR, HU, LT, TR):

> *Reflection as the method is very popular, but it is not easy for primary students to evaluate their own work (Lithuania, teacher interview)*

Teacher skills

A lack of ICT skills, or relevant previous experience of using ICT within the classroom, was a challenge for some teachers (4 teacher focus groups: EE, IS, TR, UK; 5 case studies: BE, IT, NO, PT, TR).

> *But the problem with doing things like this is that we're dependent on the computer skills of the various teachers, on how interested they are in taking these things up. It varies. (Norway, ICT co-ordinator interview)*

Likewise, Le Boniec and Ellis (2013) found that, "some teachers were also challenged by the use of technologies and by the change they were expected to introduce in their pedagogy".

Language skills

A reliance on the use of English was identified as a barrier (3 case studies: FR, IS, TR):

> *iTEC technologies make the learning and the teaching process easier but generally it is hard to find or to create Turkish resources. (Turkey, teacher interview)*

Attitudes

Teacher attitudes

A lack of teacher enthusiasm and limited motivation for innovative practices and the use of ICT in the classroom was noted (5 teacher focus groups: AT, EE, IS, TR, UK; 9 case studies[58] AT, BE, ES, FR, IT, NO, PT, SK, TR):

> *The other main challenge is the fear of my colleagues of trying out something new. I guess only time will take care of that. (Austria, ICT co-ordinator interview)*

Student attitudes

Although most students were enthusiastic about iTEC, negative attitudes were also reported (5 teacher focus groups: EE, HU; IS, IT, UK; 4 case studies: ES, IS, NO, PT), but in most cases this appeared to be a case of some students needing time to adjust to new methods:

> *It varies a lot. Some students love working in this way. Others can't really express it, but they just can't manage to control themselves completely. (Norway, teacher interview)*

Parental attitudes

Parental attitudes presented a barrier (1 teacher focus group: IS; 1 case study: SK):

> *We encounter opposition from some parents who are worried about their kids spending so much time on the computer at home. They don't distinguish between their kids' Facebook usage and the creative and useful work with the computer that we are doing through ITEC. (Israel, teacher focus group)*

[58] These comments referred to other teachers in the school, not the case study teachers.

Technical challenges

Inadequate technical infrastructure and resources

An inadequate technical infrastructure and limited resources was another commonly mentioned barrier (6 teacher focus groups: AT, HU, IS, IT, LT, PT; 10 case studies: AT, BE, ES, HU, IS, IT, LT, PT, SK, TR). WP4 have also identified insufficient access to technologies, or to the internet, as a serious challenge for teachers in C3 and C4 (Le Boniec and Ellis, 2013):

> *We haven't got so many computers. This has been the main challenge. (Turkey, ICT co-ordinator interview)*

> *The main difficulty was internet connection. Sometimes it does not work well, and it has slowed our work (Italy, student focus group)*

Lack of technical support

A lack of technical support was a problem especially when teachers were dealing with immature technologies or experienced compatibility issues which they did not have the technical expertise to rectify (2 teacher focus groups: HU, UK; 4 case studies: FR, IT, PT, TR):

> *We don't have an ICT coordinator, so I have to deal with external people for solving technical problems, it's not a fast way to work. Most of the time I have to do it by myself. But it takes a lot of additional time. (Italy, teacher interview)*

Next steps for WP5

Eduvista and Edukata require systematic evaluation. The toolkits will be evaluated through observation at workshops, focus groups with NPCs and the collection of data from teachers and other stakeholders who have engaged in the process (short email surveys). Eduvista is being evaluated currently and will be reported separately in D5.4.

In Cycle 5, Eduvista will be used to create national scenarios. It will, therefore, be necessary to pay particular attention to **evaluating the effectiveness of scenarios which have been developed nationally rather than centrally.**

More evidence needs to be gathered on the use of iTEC technologies which have not been widely used to date, such as the iTEC Composer/SDE, ReFlex and People and Events directory. These tools will be evaluated through the large scale pilots in Cycle 5. The teacher survey will be revised to include questions on new technologies and tools. NPCs will be asked to conduct a further focus group with teachers at the end of C5 to discuss the potential of the iTEC technologies for innovation in learning and teaching.

As the end of the project approaches, further data needs to be collected to support the effective sustainability, transfer and up-scaling of iTEC. This will partially be achieved via the national case studies, but consideration also needs to be given to sustainability and transfer at a local level and via the routes available to technical and associate, as well as ministerial partners.

Conclusions and recommendations

There were four evaluation questions addressed in C4, 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?**

Impact on teaching

iTEC has had an impact on teachers' pedagogy and in particular on the ways in which they use technology within their teaching. Even teachers who felt themselves to be innovative prior to iTEC, were motivated to expand the range of pedagogies they use and develop their teaching in new ways, in particular to support learning beyond the classroom. Teachers' digital competency has improved and they are using new technologies; using technologies for different purposes; and using technology in a more integrated way.

Teachers have taken on new roles, as coaches, guides or mentors. Moving away from the front of the class, they found new ways to support, and communicate with, students as they, in turn, became more independent in their learning. iTEC has also encouraged teachers to work collaboratively and to develop cross-curricular approaches to teaching. Approaches to assessment have also changed as technology is introduced into this process and assessment criteria changed to reflect the new types of learning outcomes encouraged by iTEC.

Impact on learning

More than 70% of teachers surveyed believed that iTEC has had an impact on:

- Creativity skills as students produce new types of outputs (eg 3D models, videos), acting as designers, producers and creators
- Student interest and engagement, particularly through the use of digital tools. Teachers also noted students were more actively involved within lessons. iTEC was thought to motivate even those students who were usually less engaged.
- Collaborative skills as students work in teams rather than as individuals. Many teachers (and students themselves) attribute the improved learning outcomes they have witnessed to more collaborative working.
- Digital literacy as students are introduced to unfamiliar tools and make use of technology to produce innovative outputs and work collaboratively.
- Communication skills

- Problem solving in relation to both subject knowledge and the use of technology.
- Independent learning as students work more autonomously, with support and guidance, rather than direct instructions, from their teacher.
- Critical thinking, linked to improvements in students' self-reflection skills.
- Attainment, which teachers attributed to better student engagement, greater collaboration and the use of technology.

Through the development of these skills, the role of students is changing noticeably as they are taking on roles of learning managers, peer tutors, peer assessors and even teacher trainers.

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

The majority of teachers participating in iTEC are keen to use the approach again, and the case studies suggest students are enthusiastic too. Many teachers have plans to use the technologies, LSs or overall iTEC approach again. There is evidence that iTEC is already being transferred to other teachers in the pilot schools and this activity is expected to increase. Inevitably, teachers in some schools have found more interest among their colleagues than others. Headteachers interviewed were broadly supportive and some have become actively involved in disseminating iTEC.

Despite evidence of a willingness to share experinces within online teacher communities, transfer to teachers in other schools has been more limited to date. Individual teachers appear reluctant to do this and some see a centralized approach to dissemination as preferable to a piecemeal approach.

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

Learning Stories

LSs were viewed as flexible and practical and they stimulated teachers to experiment and make changes to their practice. They appeared to encourage teachers to make use of new technologies and to use technologies for new purposes, for example, to support the development of innovative outputs (eg games, videos, models); to focus on more challenging aspects of pedagogy, such as reflection; to consider new assessment and monitoring methods; to reconsider their own role; and to work more closely with colleagues in other curriculum areas.

TeamUp

Around two-thirds of teachers surveyed believe that TeamUp has the potential to lead to pedagogical and technical innovation. TeamUp has been shown to have benefits for student engagement, classroom management and effective reflection.

Providing it is seen to be reliable, it has the potential to support the development of critical reflection skills among students.

ReFlex

ReFlex was only used by a small proportion of teachers responding to the evaluation. It needs to be piloted more widely, but like TeamUp it has the potential to support the development of reflection skills among students, providing technical problems can be solved.

Widget Store

Positive feedback was received about the Widget Store. It is seen as providing access to a variety of motivating resources in a structured way which can save time. However, teachers need more support to use it effectively, especially if they are not familiar with widgets. Work is also needed to ensure that a good range of high quality widgets are available and it is easy for teachers to find widgets suitable for their needs.

The iTEC Composer/SDE

The iTEC Composer/SDE was only piloted in Austria in the C4 large scale pilots resulting in limited data regarding this tool[59]. However, it appears to have potential to support planning, especially among trainee and newly-qualified teachers.

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

The **barriers/challenges** seen to be most important were:

- Organisational culture (at school and ministerial level)
- Student and teacher skills
- Teacher, student and parent attitudes
- Technical infrastructure and support.

In essence, the same four factors could also act as enablers.

- Teacher, student and parent attitudes
- Technical infrastructure and support
- Culture and ethos of the curriculum and the school
- Student and teacher skills.

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

[59] Work packages 7,8, 9 and 10 conducted a teacher workshop in Bolton, UK, in June 2013 in order to gather feedback on the iTEC technologies. These data have been analysed and reported by the work packages concerned and are not considered here.

Scenario development (WP 2)

1. Support the development of a wider range of scenarios at national/regional/local level (matched to local priorities) making use of Eduvista.

Learning Activity (LA) development (WP 3)

2. Ensure that there are clear links between iTEC technologies (eg the Widget Store, People and Events directory) and the LAs.
3. Ensure LAs and Edukata are linked effectively with the iTEC Composer/SDE.
4. Support the development of a wider range of LAs at national/regional/local level, making use of Edukata.

TeamUp/ReFlex (WP 3)

5. Provide guidance / examples to develop students' reflection skills through the use of these tools.
6. Ensure any remaining technical issues are fixed (or provide detailed guidance on dealing with these), then ensure teachers are aware that these tools are now reliable.

Piloting (WP 4)[60]

7. Support MoEs and NPCs to include Initial Teacher Education providers/trainees in a pilot for C5.
8. Consider ways to integrate examples of good practice posted by teachers in partner online communities with the teacher stories included within the iTEC website.
9. Review the videos and examples of student work posted on the 'Students collaborate' Facebook group to determine whether it would be appropriate to incorporate these into the iTEC website to consolidate outputs and raise visibility.

The iTEC Composer/SDE (WP7/WP10)

10. Ensure the Composer is linked effectively with LAs and Edukata.
11. Provide guidance on the use of the Composer suitable for trainee and newly qualified teachers.

Widget Store (WP 8)

12. Improve the moderation procedure for the Widget Store to ensure that all widgets are of an acceptable quality.

[60] Other recommendations relating to the piloting process are reported in D4.4.

13. Improve resource discovery methods associated with the site (eg search, tagging, categorisation).
14. Work with WP3 to link widgets with each LA (possibly based on the process conducted in Portugal).
15. Provide more support for teachers (including training, written guidance and possible online video demonstrations) to help them to find, use and create widgets. (The work undertaken in Portugal may provide a model for some aspects of this).
16. Work with teachers to develop the range of widgets available (including widgets in national languages).

Scaling up (WP 11)

17. At European level, WP11 partners should develop mechanisms (or support) to facilitate transfer to other teachers beyond the individual school as teachers appear reluctant to do this alone.

Finally, in order to support scaling–up, investment may be required at national level in order to address all or some of the following barriers identified in iTEC pilots. It should be noted that many of the recommendations listed below were also identified in Cycle 3 and data reported in the national case studies report suggests that some recommendations are already being followed up to varying degrees.

18. Recommendations for iTEC MoEs at a national level.
    j. Analyse WP4 data in relation to website visitors (unique visits, by country) to determine the reach of iTEC beyond project participants.
    k. Scale up the iTEC process to national level. Evaluation of the iTEC process has shown that it can lead to change and innovation classrooms and that teachers have been enthusiastic and inspired.
    l. Ensure that national support structures are in place to maximise the benefits offered through iTEC processes and resources. Around one third of teachers needed support to adapt the resources to meet their needs. Some possible routes include online resources, links to other projects, school advisors and commercial providers (see D5.4 for further details).
    m. Nominate and support teachers who have been involved in several cycles as iTEC ambassadors to share their experiences and support other teachers, thus ensuring the approach spreads in their own school and other schools. Consideration needs to be given to funding for such a scheme and incentives for teachers and it may be possible to combine the role of iTEC ambassadors with similar programmes (eg eTwinning ambassadors). (see D5.4 for further details).

n. Facilitate national dissemination and events (eg workshops, meetings, exhibitions) led by iTEC ambassadors (see D5.4 for examples of dissemination activities).
o. Encourage the development of national and local online communities as they support the uptake of iTEC processes and resources. Local communities of practice provide opportunities for local support and dissemination of practices. This is more likely to happen when there are several teachers from a single school (or cluster of schools) engaged in scenario implementation. (see D5.4 for examples of online dissemination and support activities).
p. Consider offering national teacher incentives, including release from classroom teaching, supporting training and opportunities for accreditation. Time is the biggest perceived barrier for teachers; teachers need to feel their investment is appreciated.
q. Translate iTEC case studies and disseminate them widely through national online communities and CPD networks to maximise reach.
r. Where appropriate, look for opportunities to incorporate iTEC findings into national ICT policy and strategy documents (see D5.4 for examples).

Finally, in order to support scaling–up, investment may be required at national level in order to address all or some of the following barriers identified in iTEC pilots:

19. Infrastructure and technical support

Technical challenges are still the most frequently mentioned barrier.

k. Invest in the development of ICT infrastructure, including the provision of reliable and sufficient access to the internet.
l. Prioritise the provision of ICT technical support and ICT pedagogical support within schools (or across clusters of schools).
m. Review national/regional/local school ICT policies to encourage the use of student-owned devices (BYOD) in school contexts.
n. Review national/regional/local ICT policies to encourage the sharing of resources (especially resources which are costly, but used infrequently eg 3D printers) between schools (and between schools and colleges/universities or other community organisations).

20. Teacher competence development:

o. Develop national/regional/local pre- and in-service programmes to increase teachers' ICT technical and pedagogical skills. Provide training/guidance for teachers on: managing group working; supporting students' reflection

and peer feedback; assessing 21st century skills such as critical thinking and problem-solving; and supporting students in online environments.

p. Produce national resources to facilitate the development of teachers' ICT skills (guides, screencasts, video tutorials, online helpdesks).
q. Liaise with initial teacher training providers and teachers responsible for mentoring newly qualified teachers to introduce the iTEC Composer/SDE to teachers to support lesson planning during the early stages of their careers.
r. Create opportunities for teachers to meet in face-to-face settings (the inclusion of dissemination/training activities in national teacher conferences through presentations/workshops for example);
s. Foster positive teacher, student and parent attitudes to change and the use of technology to support teaching and learning, and develop strategies to engage head teachers and senior managers.
t. Liaise with other projects that are similar in mission in order to seek mutual benefit and enhancement of impact.

References

Aalto University (2013). Cycle 4 Full Pilot Material. http://itec.aalto.fi/2013/01/cycle-4-full-pilot-material/ Accessed 16 Aug 2013.Cranmer, S., Perrotta, C., Oldfield, A. and Payton, S. (2012). D2.2: Summary Report of Scenario Development Process. http://itec.eun.org/web/guest/deliverables. Accessed 29th September 2013.

Ellis, W. with Van Assche, F., Ayre, J., Wastiau, P. & Blamire, R. (2013). Exploitation Plan. Available at: http://itec.eun.org/web/guest/deliverables. Accessed 29th September 2013.

Kallesen, K., Ingesman, L., Højsholt-Poulsen, L., and Sillaots, M. (2013). D6.7: iTEC WP6 Activities.

Le Boniec, M. and Ellis, W. (2013). D4.4: Third Validation Report on Large-scale Piloting. Available at: http://itec.eun.org/web/guest/deliverables. Accessed 29th September 2013.

Lewin, C., Ellis, W., Haldane, M, and McNicol, S. (2013a). Evidence of the impact of iTEC on learning and teaching http://itec.eun.org/c/document_library/get_file?uuid=456bbe19-0ddc-422b-9884-89eb034c2d99&groupId=10136 Accessed 19 Aug 2013.

Lewin, C., McNicol, S., Haldane, M., Blamire, R. (2013b). Cycle 3 Evaluation Report. http://itec.eun.org/web/guest/deliverables. Accessed 29th September 2013.

Lewin, C., Manchester, H, Haldane, M., Wilby, C. (2013c). Cycle 2 Evaluation Report.http://itec.eun.org/web/guest/deliverables. Accessed 29th September 2013.

Lewin, C., Haldane, M., Manchester, H. (2012). Cycle 1 Evaluation Report. http://itec.eun.org/web/guest/deliverables. Accessed 29th September 2013.

Appendix A: Case Study Stories

1. Tell a Story: Digital stories

Overview: The main goal was to create a digital story which would be presented to teachers, students and parents.

Keywords:	student as manager of learning	student as producer or creator
	cross-curricular learning	bridging formal and informal learning

The project: The teacher collaborated with colleagues in geography, arts and English. Students in each class were divided into groups using TeamUp. Each student had their own netbook. Students first developed their project plan and the script for their story. They then gathered photographs, edited them in an order to fit the story and selected background music. Storyboards were used to pay attention to timing and interactions. Some students used equipment at home to edit their stories. Both teachers and fellow students gave feedback on the stories. Students then presented their stories to parents.

The teacher

The teacher is extremely competent in the use of ICT. She is also recognised as being highly innovative in her approach to teaching and has been involved in previous iTEC cycles.

The students

The students live in a disadvantaged region. They are confident ICT users who are happy to explore new technologies and enthusiastic about the use of technology in the classroom.

Innovations

** Students collaborated more than in other lessons.*

** Students felt they contributed to the lesson and had the feeling of "being in charge" (student)*

**Students used more technological tools than is normally the case.*

Problems	*Solutions*
A good infrastructure is required to fully exploit all the tools available	The teacher is also the ICT Co-ordinator, so was able deal with any technical issues
The learning story was a long term activity which took 8-12 sessions to implement	The teacher was able to incorporate it within the existing curriculum

Additional notes:

Country: Austria

Subject(s): English, Geography, Arts and IT

Location: Classroom (+homework)

Student group: 19 students, 13 years old

Resources required: Netbooks, TeamUp, headsets, video recording tools, PowerPoint, Windows Movie Maker.

Assessment: The digital stories were evaluated by teachers according to seven elements: 1) the main message of the story should be easily remembered by any audience 2) creation of suspense and drama 3) whether the content moves the audience emotionally 4)whether the student's voice rhetorically meets the requirements 5) the role of the background music 6) the use of narrative 7) tempo and rhythm of the story should be audience friendly.

2.Tell a Story: Fact or fable?

Overview: The main goal was to create an iMovie to demonstrate the answer to a question and present it to the class.

Keywords: supports a variety of routes to learning; technology in support of familiar approaches; student as producer or creator; use of mind mapping

The project: Each group of students chose a 'hypothesis' (eg Why are bananas curved? Why is it dark at night?). They researched the questions using iPads and books and planned a creative presentation. They recorded iMoves on their iPads which they presented to the class. The class voted for the best one.

The teacher

The teacher is comfortable with pedagogies such as group work, but less confident in the use of new technology.

The students

The students are confident users of technology. They are familiar with iPads from using them at home, but are not used to using them for learning. They can be a challenging class.

Innovations

* *The use of iPads was novel for students and the teacher, affording greater flexibility*
* *The use of Popplet as a tool for mind mapping*

Problems	*Solutions*
Taking the class to the ICT suite is time-consuming and disruptive	With iPads, students can stay in their usual classroom
Students have access to a limited range of textbooks in school	The iPads allow them to draw together information from a much wider range of sources
The teacher does not possess a high level of ICT competency	The school's ICT Anchors support teachers who want to integrate technology into their teaching

Additional notes:

Country: Belgium

Subject(s): World orientation

Location: Classroom

Student group: 2 classes aged 10-11 years

Resources required: Popplet, iPads, iMovie, TeamUp

3.Tell a Story: Storytelling

Overview: The main goal was create a story on a topic of their choice

Keywords: student chooses resources/tools, alternate routes through tasks, student as producer or creator

The project: Students brainstormed ideas for story topics and then "brought it to life" (student) using the technologies of their choice. At the end, they presented their story to the class.

The teacher
The teacher has been involved in previous iTEC cycles and is familiar with introducing technical innovation in the classroom.

The students
The students have been involved in previous iTEC cycles so were familiar with the overall approach.

Innovations

** Students selected their own topic and chose their own tools (including tools in beta versions)*

** The project involved students using "an abundance of gadgets" (teacher).*

**TeamUp makes group formation simpler.*

Problems	*Solutions*
Some tools are not suitable for all subjects	The students selected tools which could be used across a range of subjects.
Students experimented with new tools which were unfamiliar to them	Students saw themselves as "pioneers" (student) and adopted a trial and error approach.

Additional notes:

Country: Estonia

Subject(s): English

Location: Classroom (+homework)

Student group: 15 students aged 16-17 years

Resources required: laptop, projector, speakers, Padlet, Meograph (4 dimensional storytelling), PhotoPeach (slideshow creator), PowerPoint, Prezi, Text-to-Speech widget, TeamUp, YouTube

Links: Blog: http://iteclillekyla.blogspot.com/

4.Tell a Story: Simple electrical circuits

Overview: The main goal was to build a simple electrical circuit and prepare questions and answers about this for students in another class. Students also prepared videos demonstrating the solutions to their questions.

Keywords: higher order thinking skills, student as producer (creating models), institutionally embedded technology, assessment evidence generated throughout

The project: The purpose the project was to encourage students to think about how electrical circuits work, build a simple electrical circuit and create challenging questions on this type of circuit for other students. They also used the IWB to build other circuits virtually. Challenging questions, created under teacher supervision, were addressed to students from a partner class via a videoconferencing session. To demonstrate the answers to their challenging questions, students created videos. These videos were shared with the partner class via the Internet.

The teacher

The teacher is seen as a leader in ICT at the school and is clearly an experienced user of new technologies.

The students

The students are motivated and were interested to be taking part in a project. They particularly enjoyed used the interactive whiteboard and clickers to answer questions.

Innovations

** Students created teaching resources for another class.*

** Students used images and videos to demonstrate answers to questions as well as devising explanations.*

**Learner response system was used for formative assessment of the students' learning.*

Problems	*Solutions*
Discovering and integrating the use of a number of technologies (eg widgets, video, interactive diagrams) was complicated	The ICT Co-ordinator helped the teacher to find resource, solve technical problems and support the students
It was very time-consuming to prepare for the project	The time required needs to be seen as a long term investment; now the work is prepared, it can be used again with other classes
Young students can find it difficult to use video cameras	Tablets were used to shoot the videos.

Additional notes:

Country: France

Subject(s): Science (primary)

Location: Classroom

Student group: 21 students aged 6-7 years

Resources required: IWB, camera, ActivInspire, widgets (6 thinking hats, bubbl.us)

Assessment: The teacher prepared an interactive quiz about electrical circuits. Students respond anonymously so the teacher can see immediately whether the concept has been understood. The teacher can later find out which students are struggling and provide additional support as necessary.

5.Tell a Story: My pet

Overview: The main goal was to encourage students to investigate and share their experience about pets and animals. A secondary aim was that students would develop the ability to communicate and cooperate, and to better understand their environment.

Keywords: supports a variety of routes to learning; student as manager of learning; student as producer or creator; use of mind mapping

The project: The theme was selected in consultation with the students. Students discussed which animal they wanted to research and interest-based groups were formed using TeamUp. Students carried out research, supported by their teacher and parents and then created mind maps. They also created cartoons or other visual stories of their information. They filmed their pets and made videos using Animoto.

The teacher

The teacher is very keen on using new technology to support pedagogy, although her level of computer literacy is not high. She has taken part in previous iTEC cycles so is familiar with the iTEC approach and technologies.

The students

The students are Class 2 primary students.

Innovations

** Use of mind mapping techniques (supported by Popplet)*

** Parents became more involved in supporting students' learning beyond the classroom*

**The teacher incorporated a wide range of tools from her growing 'toolkit' of technologies.*

Problems	*Solutions*
Difficulties using TeamUp because of the age of the students and lack of technology (eg microphones)	Students managed to perform the reflection activity, although they tended to give a narrative account rather than reflecting on their work
Lack of advanced technology (eg 3D printers)	The teacher selected a Learning Story and tools which were appropriate for the infrastructure available.
Teachers need detailed instructions about how to implement the Learning Story and how to introduce technology	The Learning Stories were translated into Lithuanian, so the teacher had detailed descriptions to work from.

Additional notes:

Country: Lithuania

Subject(s): Knowledge of the World

Location: Classroom (+homework)

Student group: 18 students, aged 8-9 years

Resources required: Popplet, TeamUp, Animoto video creation tool, Toondoo comics creator, Blabberize text and picture manipulation tool

Links: Project description: http://lemill.net/community/people/miride/collections/itec-projekto-4-etapo-pilotiniu-mokyklu-ataskaitos/content/webpages/vilniaus-ryto-vidurines-mokyklos-projektas-mano-augintinis-pagal-scenariju-papasakok-istorija-mokytoja-virginija-karuziene

Film about the project: http://www.youtube.com/watch?v=BquhxxdPf9g

Description of learning activities:
http://linoit.com/users/rytoantrokas/canvases/Projekto%20dienora%C5%A1tis

Project website for the school community: http://mano-augintinis.jimdo.com/

6.Tell a Story: Geometric solids

Overview: The main goal was to create a presentation about the areas and volumes of solids

Keywords: student as manager of learning, bridging the gap formal & informal learning, student as producer or creator, specific subject content

The project: Students worked in groups to create their video (using video and still footage) and then edit it to create a presentation to deliver to the class.

The teacher

The teacher has been involved in previous iTEC cycles so she is familiar with the approach. She is enthusiastic about ICT, but is not an expert.

The students

The students were well-motivated and have taken part in previous iTEC cycles so they too are familiar with this way of working.

Innovations

** Students create videos as an output*

** Students give presentations to the class*

**Students use new technologies eg MovieMaker and technologies not available in school (eg Camtasia)*

Problems	*Solutions*
Negative attitudes towards mathematics among some students	Even those who struggle maths become more involved because there are other tasks where they are more confident eg writing blogs, translating
Lack of technology and insufficient technical support	The NTC provided support and the teacher sometimes used her own equipment. Students used their own tools at home.
Students found it difficult to manage their time effectively	The teacher provided checklists of tasks they had to complete, but needed to continue to refer the students to these. In some groups, a student was nominated 'group co-ordinator'.

Additional notes:

Country: Portugal

Subject(s): Mathematics

Location: Classroom (+homework)

Student group: 22 students aged 13-17 years

Resources required: IWB, Prezi, MovieMaker, PowToon presentation software, TeamUp

Assessment: The teacher followed each team's presentation by providing oral feedback.

7.Tell a Story: Telling a story using video

Overview: The main goal was create a short video telling the story of an aspect of British history. The student videos were based on their investigations into different storytelling techniques.

Keywords: timely data on achievements, student as producer or creator, cross-curricular learning, networked technologies for collaboration

The project: The teacher introduced the project by showing some examples of amusing history videos. Students then searched for similar videos on the Internet and post examples, with their comments about them, on their group blogs. Students then planned their own short video (2-5 minutes), drawing on the ideas they have seen in different videos. They showed their work to the other students, who provided feedback and ideas for improvement.

The teacher

The teacher has been involved in Cycle 3 and was able to use her previous experiences as the basis of her planning for this cycle. She had gained some experience of using technologies in the classroom, but learnt to use new tools during Cycle 4.

The students

This group of students had also taken part in Cycle 3, so were familiar with the approach. The students were reported to be highly engaged in the activity and some also worked outside school with family support.

Innovations

** The use of new technologies, eg video recording and editing equipment and software.*

** Greater creativity among students as they are free to design their own video (only limited by the length allowed).*

**Student use technology to provide each other with instant feedback on their ideas, using learner response systems, or sending text or images using the SMART Extreme Collaboration add-on.*

Problems	*Solutions*
Technology was not always reliable	The teacher had developed her digital competency through Cycle 3, so was better prepared to deal with technical problems. The project was prioritised for technical support within the school.
Students' reflection skills need to be developed	The use of the Six Thinking Hats widget encourages students to reflect on their work from different perspectives.
Teachers have limited time available to innovate	The teacher had based her planning for Cycle 4 on that used for Cycle 3, resulting in minimal

	additional work and she saw the approach as one which could be applied “in any subject and any level”.

Additional notes:

Country: Spain

Subject(s): Social Studies in English (British history) (bilingual school)

Location: Classroom (+homework)

Student group: 25 students aged 11 to 13 years

Resources required: SMART interactive whiteboard, SMART Document Camera, SMART Notebook collaborative software, SMART Response VE interactive response software, Extreme Collaboration, student laptops, blogs

Assessment: Students used the system of two stars (positive aspects) and a wish (something to improve) for self-assessment, and to give feedback to other students. In giving feedback to others, they graded each other’s work from 1 to 5 using the following assessment criteria:
1 - How visually interesting is the story? (How much do you like it?)
2 - How funny is it? (How much do you have fun watching the story?)
3 - How instructive is it? (How much have you learnt from it?)

Links: Teacher blog: http://itec-mp.blogspot.com.es/
Example of student blog: http://thehistoryf.blogspot.co.uk/

8.Tell a Story: Lifecycle of a butterfly

Overview: The main goal was to research and create a visual story representing the lifecycle of a butterfly using story or video creation software.

Keywords: technology used within current approaches; resources matched to learner needs; student as creator; classroom-located, teacher-directed

The project: At the start of the project, students learnt new computer skills as some had no previous experience of using technology. Using the story of *The Very Hungry Caterpillar* by Eric Carle as inspiration, they then researched information about the lifecycle of a butterfly and produced a visual story online. Students were provided with the basic elements of the story, but encouraged to use their imagination to produce their own narrative.

The teacher

The teacher is interested in the use of technology, particularly to support creativity among students. She combines technology with traditional teaching methods.

The students

The class was smaller than usual, which allowed the teacher to try out more innovative approaches.

Innovations

** Use of new technologies to produce stories, "we use paper, notebooks and books in normal classes" (Student).*

** ICT was taught to younger students (8-9 years)than is usually the case.*

**The teacher had access to training opportunities beyond her locality (eg webinars) which helped to develop her skills.*

Problems	*Solutions*
Students hesitant to generate their own ideas	The use of new technologies and non-written approaches encouraged students to experiment
Lack of reliable technology in school and absence of technology in students' homes	Teacher was able to work with students individually using her own device as the group was small and resources improved during the course of the project.
Some Internet resources blocked by MoE filters	Negotiating to address this issue, but in the short term teachers used own mobile devices.
Students' ICT skills were limited	At the start of the project, the teacher introduced them to using basic technologies and there are now plans to extend ICT teaching to the first four grades of the school. The teacher selected tools which would be easy to use for this age group.

Additional notes:

Country: Turkey

Subject(s): Turkish and Leisure Activities

Location: Classroom

Student group: 13 students aged 8-9 years

Resources required: MS Word, Voki avatar creator, Popplet mind mapping software, SketchUp 3D modelling program, Storybird, GoAnimate, Little Bird Tales

Assessment: The teacher gave the students feedback firstly on their preparatory work and ideas, including spelling, and then on their use of technologies so they were able to make improvements to both aspects.

Links: Blog: http://mersinmimarsinanortaokuluitec2h.weebly.com/index.html

9.Create an Object: Construction of 3D models of holy buildings

Overview: The main goal was to learn about sacred buildings in general, and about the particular building they had chosen to work on. Students also learnt how to use a 3D drawing program, some used the computer game Minecraft to construct in 3D, everybody also learned some aspects of mathematics.

Keywords: student as manager of learning | student as producer or creator | cross-curricular learning | use of feedback

The project: The teacher introduced the project by showing the students a Prezi with different sacred buildings. Students had to choose a building, and find its measurements. They used Padlet to document all the work, the work process and the product. They were to make a plan for the work and talk to other students about this plan and get their responses. They were to create the building in Google Sketchup or Minecraft, and present it to the rest of the class. 3D versions of the students' models will be printed with the help of the local university.

The teacher

The teacher is clearly creative and was described as "highly skilled and very absorbed" by the school's headteacher, but he had limited experience of the technologies used and was open with students about this fact.

The students

The students were well-motivated, well-disciplined and keen to succeed. The teacher believed he could rely on them without keeping a constant check on what they were doing.

Innovations

** The teacher felt he moved 'out of his comfort zone' by engaging with new technologies he had little experience of.*

** Working on a longer term project and managing their own schedule was novel for students.*

** Experimenting with new industrial technologies not normally used within a school.*

**Using both a dedicated 3D construction software and a computer game to create the objects*

Problems	*Solutions*
Neither the teacher nor the students were familiar with some of the technologies used	The teacher encouraged the students to search for solutions to problems they were experiencing on YouTube.
A limited number of computers available	Students who have their own machines bring them to school to use.
The challenge of monitoring students working independently	The teacher adapted their methods of tracking students, for example, asking them to send their Padlets (which documented their progress) electronically.
Difficulty installing software on school computers	Permission was secured from the ICT co-ordinator to install Google SketchUp

Additional notes:

Country: Norway

Subject(s): RLE (religion, life philosophy and ethics), Mathematics

Location: Classroom (+homework)

Student group: A class of 14-15 year olds working in groups of 2 to 5.

Resources required: Google SketchUp 3D modelling program, Minecraft game, Padlet, Google Earth

Assessment: The teacher evaluates students' Padlets on the basis of how they communicate and document the students' work and evaluates their models by comparing them with the original – how well the buildings resembles the originals with regard to proportions and angles etc and how complicated the originals are. He also takes students' presentations into account.

Links: Lesson plan - http://prezi.com/uarr5s7ldtdd/itec/

10.Create an Object: Geometric cake decorations

Overview: The main goal was to decorate a cake by creating decorations with given geometrical properties.

Keywords: student as manager of learning, student as producer or creator, cross-curricular learning, bridging formal and informal learning

The project: Students used edMondo online 3D virtual world to create digital prototypes of their creations. They experimented with geometry problems in the digital domain where it is easy for them to undo/redo with ease and no waste of ingredients and time. The digital domain enabled them to model geometrical shapes by inserting numerical parameters, letting them to work with an optimal degree of precision. When students had created suitable prototypes, they printed these and used their designed to produce real cake decoration. For homework, students documented the process using a blog. They used Facebook to communicate within their teams.

The teacher

The teacher teaches mathematics in a secondary school of hotel management and catering

The students

The students are most interested in practical, vocational subjects than in academic ones such as mathematics.

Innovations

** Use of the 'flipped classroom' where students communicated with each other and the teacher from hoping, freeing up class time for other activities*

** Use of companion virtual (3D online platform) and physical (school kitchens) labs to create prototypes and then final products*

**Use of blogs to support student reflection*

Problems	*Solutions*
Lack of ICT support within the school	The case study teacher is technically skilled and dealt with the technical issues herself, although this was timeconsuming.
Lack of interest in ICT among other teachers in the school results in isolation	The teacher is part of an online teacher network with teachers from other schools, so is able to share experiences and problems with teachers there.
Students' lack of interest in mathematics	The Learning Story helped to engage students by linking maths to a practical activity.

Additional notes:

Country: Italy

Subject(s): Mathematics (geometry)

Location: Virtual (3D online platform) and physical (school kitchens) labs (+homework)

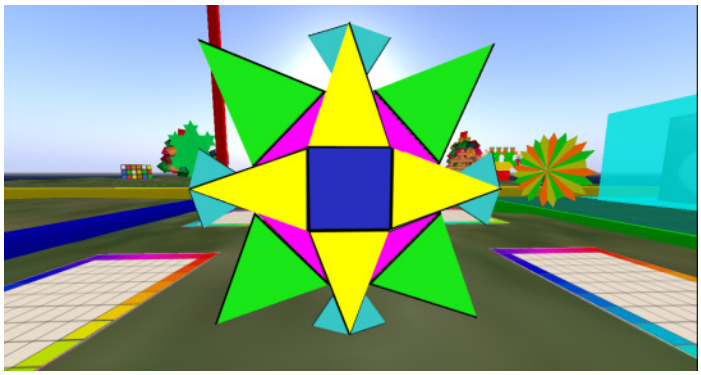
Student group: 16 students aged 15-16 years

Resources required: Blogger, TeamUp, Facebook, Popplet, Calendar, YouTube, edMondo 3D online virtual platform, video projector

Assessment: Students who are more skilled cake designers gave feedback on the prototypes.

Links: Video: http://youtu.be/3Nux5lg38Dk

Blog: http://cavalcantitec.blogspot.it/



11.Create an Object: Videos about physics

Overview: The main goal was to create a video about a chosen aspect of physics.

Keywords: student as consumer of technology student as manager of learning

The project: Students had to choose an aspect of physics and make a video about this showing their experiment.

The teacher
The teacher teaches informatics as well as physics, so she has very good ICT skills and a positive attitude towards the use of ICT.

The students
Many of the students were seen as being talented and creative.

Innovations

** Students were able to manage their own learning, "I usually do not give students space and time to work collaboratively, plan their own activities and progress in their learning" (Teacher)*

** Technology was used by students, not just by the teacher (for demonstrations).*

**Many students used video technology for the first time and some continued to experiment with this outside school.*

Problems	*Solutions*
Students' ICT skills were limited	The teacher took charge of some aspects (eg video processing) in order to complete the project within the timescale, but will teach these to new skills to students next year.
Inflexibility of the curriculum	The teacher adapted the LS to accommodate it within the curriculum
It may be difficult to persuade other teachers to adopt the iTEC approach	With the support of the headteacher, the case study teacher will introduce iTEC to subject committees and ask teacher for feedback.

Additional notes:

Country: Slovakia

Subject(s): Physics

Location: Classroom (+homework)

Student group: 13 students, 12-13 years old

Resources required: PCs, notebooks, video recording equipment and editing software

12.Create an Object: Love-box

Overview: The main goal was to create a 'love-box' for Mother's Day

Keywords: technology used within current teaching approaches mind mapping learner as consumer of technology learner as producer or creator

The project: Students decided what presents their mother would like by interviewing teachers (what gifts made them happy as mothers) and mind mapping. They then created a love-box with gifts of a modelling clay figure, paper flower, letter and drawing. The love-box was presented at a celebratory event, where they also presented poems, songs and the whole process of preparations for the event, including some videos of the interviews they have conducted. Students created a card inviting their mothers to the event using a word processor. For many pupils it was the first occasion to use a word processor. (9-10 year old pupils)

The teacher

The teacher was already familiar with iTEC technology. This is the fourth year in which she has taught the class involved in the project. This was the last topic taught for the class- a "farewell project".

The students

The students are from disadvantaged backgrounds. They have previously been involved in projects including iTEC and eTwinning.

Innovations

** The school has close links with families and the community, so the project involved other teachers, parents and the local cultural centre*

** Use of video interviews and mind mapping tools to help decide the contents of the love-box*

**Pupils are involved in the decision making of what gifts are made*

**Thinking about Mother's Day gifts as products and about mothers as target audience*

Problems	*Solutions*
Lack of technical resources (eg IWB, computers in the classroom)	The teacher uses her own laptop and the class uses computers in the school library. Activities such as mind mapping were done as a whole class activity.
Students' have limited ICT skills and do not have a computer skills class	The teacher provided a lot of support for the students; for example, so typed the message in their invitation, but they chose the font, colour, image etc.
Many parents do not have email addresses	Instead of sending invitations in an e-mail attachment, those children whose parents did not have email addresses printed out the invitations and gave them to their parents in an envelope.

Additional notes:

Country: Hungary

Subject(s): Mother's Day project

Location: Classroom and cultural centre

Student group: 21 students aged 9-10 years

Resources required: Word processors, bubbl.us mind mapping tool, video camera

13.Create a game: Creating learning aids for 'the human body'

Overview: The main goal was to create a game or learning aid to support the teaching of the human body.

Keywords: student as manager of learning | student as user of technology | related areas of content within subject domain | timely data on learners' experiences

The project: Students created games to be used as teaching resources within the school courtyard and classroom for the human body (skeleton and muscles, breathing, and skin). They also had to write instructions to explain how the game should be used. Students chose their topic and divided into groups according to their interests.

The teacher

The teacher has a high level of digital competency and is recognised as being innovative within her school. She is accustomed to project-based learning. She was also involved in cycle 3 so is familiar with the iTEC approach.

The students

The students are gifted children. They are keen to learn, but some have difficulties working with others effectively. Most have access to technology at home.

Innovations

** The use of a digital tool (TeamUp) for student reflection*

** Students nominated themselves as experts to support their peers in particular fields (eg entrepreneurship, creativity, spelling and grammar, ICT).*

**Use of a project management tool designed for business to organise the project, including a timeline and milestones and allowing actual implementation to be compared to the project plan.*

**A community-facing approach was taken, meaning that the product belongs to the community and therefore all students have a say and all files are shared*

Problems	*Solutions*
Language barriers (finding information in Hebrew)	The teacher taught an introduction to the class so they would be familiar with the basic concepts and better able to identify search terms.
Some technology (eg Sixqs and Googledocs) were unfamiliar to students and prototype technologies were not always reliable	Students with good ICT skills were designated to help others.

Difficulties with teamworking approaches	TeamUp helped students to "connect to the group" (Student) and learn to listen to each other more.
Challenging and complex project	Sixqs timeline app helped manage and simplify processes.

Additional notes:

Country: Israel

Subject(s): Biology (human body systems)

Location: Classroom (+homework)

Student group: 10 years old

Resources required: TeamUp, Google Docs, Sixqs digital scenarios network

Links:

Digital scenario 1: Project plan, teacher diary and students' reflection: http://www.sixqs.com/sixqs-site/scenario-view.xsp?id=3939

Digital scenario 2: Discussing the prototype versions and storing final version: http://www.sixqs.com/sixqs-site/scenario-view.xsp?id=3948

Appendix B: Evaluation data collected

Table B.1: Overview quantitative data collected in C4

(CO – Create an Object, TS – Tell a Story, CG – Create a Game, O – other)

Partner/Country	No. pilots	No. evaluations	No. pilots represented by evaluations	Response rate (%)	CO	TS	CG	O
Austria	76	17	29	38%	2	9	5	1
Belgium	38	7	12	32%	0	2	0	5
Czech Republic	14	7	14	100%	3	1	3	0
Estonia	30	13	25	83%	1	11	1	0
Finland	56	22	23	41%	0	10	11	1
France	21	16	16	76%	3	11	2	0
Hungary	41	27	31	76%	13	9	5	0
Israel	39	8	15	38%	1	1	2	4
Italy	28	22	22	79%	5	13	1	3
Lithuania	101	35	48	48%	0	29	5	1
Norway	23	12	13	56%	1	10	1	0
Portugal	35	26	26	80%	2	15	1	8
Promethean/Spain	7	1	1	14%	0	1	0	0
Promethean/UK	68	12	19	28%	3	7	1	1
Slovakia	20	13	15	75%	4	7	2	0
SMART/Germany	5	4	4	80%	3	0	1	0
SMART/Netherlands	1	0	0	0%	0	0	0	0
SMART/Poland	2	0	0	0%	0	0	0	0
SMART/Spain	73	38	45	62%	9	22	6	1
SMART/UK	6	5	5	83%	2	1	1	1
Turkey	190	57	62	33%	21	29	7	0
Totals	874	342	424	50%	73	188	55	26

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.

Table B.2: Overview of qualitative data collected in Cycle 4

Country	No. focus groups	No. case studies	Videos
Austria	1	1 (Teacher interview, IT Co-ordinator interview, Headteacher interview, Student interview + lesson observation)	
Belgium	1	1 (Teacher interview, IT Co-ordinator interview, Headteacher interview, Student interview + lesson observation)	
Czech Republic	N/A	N/A	
Estonia	1	1 (Teacher interview, IT Co-ordinator interview, Student interview + lesson observation)	
Finland	N/A	N/A	
France	0	1 (Teacher interview, IT Co-ordinator interview, Student interview + lesson observation)	1 multimedia teacher story
Hungary	1	1 (Teacher interview, Headteacher interview, Student interview + lesson observation)	
Israel	1	1 (Teacher interview, Headteacher interview, Student interview, photos, lesson observation + Skype interview)	
Italy	1	1 (Teacher interview, Student interview + lesson observation)	http://www.youtube.com/watch?feature=player_embedded&v=sPH2RdstFHs
Lithuania	1	1 (Teacher interview, IT Co-ordinator interview, Headteacher interview, Student interview + lesson observation)	http://www.youtube.com/watch?v=gCZncwC-6ik&feature=player_embedded http://www.youtube.com/watch?v=BquhxxdPf9g&feature=player_embedded http://www.youtube.com/watch?feature=player_embedded&v=Go7EdNHDNag http://www.youtube.com/watch?v=Hm1n1A0TOjg&feature=player_embedded
Norway	0	1 (Teacher interview, IT Co-ordinator	http://itec.eun.org/web/guest/tea

		interview, Headteacher interview, Student interview + lesson observation)	cher-stories
Portugal	1	1 (Teacher interview, Student interview + lesson observation)	
Slovakia	0	1 (Teacher interview, IT Co-ordinator interview, Headteacher interview, Student interview)	
Spain (SMART)	N/A	1 (Teacher interview, IT Co-ordinator interview, Headteacher interview, Student interview + lesson observation)	
Turkey	1	5 (5 Teacher interviews, 4 IT Co-ordinator interviews, 4 Headteacher interviews, 6 Student interviews + 3 lesson observation3)	
UK (SMART)	1	N/A	
Promethean (Spain & UK)	N/A	N/A	
Totals	10	17	

Appendix C: 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 (LSa) 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. The use of technology is explained explicitly in the LA guidance which has been prepared for teachers.

In addition to the above, a greater emphasis has been placed on levels of innovation in relation to technology and pedagogy, together with evidencing how the technology has enabled the pedagogy to change. In addition, short case studies have been produced to exemplify how the LSs and LAs have been interpreted and implemented at national levels.

To organize access to schools by native-speaking educationalists, familiar with national policies and priorities, each ministry has identified a National Pedagogic Coordinator (NPC) and a National Technological Coordinator (NTC) who arrange and support 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.

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. As stated in D11.5.2, The Exploitation Plan, in the third year of the project the evaluation work under WP5 was refocused to provide more evidence for exploitation and up-scaling. Previous cycles have focused on classroom impact, and over the first three cycles good evidence for the positive impact of iTEC Learning Activities has been gathered. In year three more attention was paid to gathering evidence in support of up-scaling. To this end, the end of cycle evaluation activities were adapted to include the elements described below.

a. A focus group discussion to be carried out by NPCs at the end of C4 with a small sample of their iTEC teachers to capture:

- teachers' use of iTEC technology
- 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 TFG1 discussion were recorded by an independent scribe and returned to the WP5 team.

b. One case study from each country in C4 (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 C4. In C4, NPCs were required to supply raw data only (interview recordings transcribed and translated). The case study selection criteria were amended to ensure that NPCs identify teachers using iTEC technologies/radically innovative scenarios/nationally developed scenarios. The data collection instruments were reviewed and revised to ensure that there is a greater focus on the teacher's use of iTEC technology and changes to their teaching practices.

c. Teacher questionnaire (a link to the online questionnaire is sent to all pilot teachers towards the end of the cycle)

In C4 substantial adjustments were made to the teacher questionnaire to capture feedback on the most recent iTEC tools to be introduced (Widget Store, ReFlex) and also to focus on what teachers perceived to be innovative in relation to the pedagogy and technology. An open question asking teachers to explain why they agreed or disagreed with a statement relating to the improvement of students' attainment as a result of iTEC. An additional question probing on perceived impact on students' skills (digital literacy, collaboration, critical thinking, creativity, communication, independent learning, and problem solving) was also added.

Questions added to explore the locus of innovation were:

- In what ways was your pedagogy different when implementing the LS? (open-ended)
- How different was it in relation to what you were doing before? (Scale from 1=Not at all to 10 = Radically different)
- In what ways was your use of technology to support learning and teaching different when implementing the LS? (open-ended)
- How different was it in relation to what you were doing before? (Scale from 1=Not at all to 10 = Radically different)
- In what ways was your students' experience different when implementing the LS?
- What did the digital tools enable you to do that you could not have done otherwise?

Scenario development

The ten detailed scenarios[61] (narrative descriptions of innovative pedagogical approaches to learning including technological tools) developed for the fourth cycle by Work Package 2 (WP2) were produced following an adaptation of the process used in Cycles 1, 2 and 3 (Cranmer, Perrotta, Oldfield and Payton, 2012). In C4, the pilot activities focused on 'real world' challenges. Educational trends were developed and analysed as they had been in the first two cycles. In a change from the first two cycles, the educational scenarios were drafted by WP2 and based on innovative practice collated from iTEC partners and desk-based research rather than being generated initially through collaborative workshops. In addition, five workshops were undertaken with groups of learners in four countries to elicit their suggestions for educational scenarios. Subsequently, the scenarios were refined through a collaborative workshop involving teachers and pedagogical experts from beyond the iTEC project team. The feedback from the learner workshops was also shared.

The ten detailed scenarios were then analysed and, through a participatory design process, 8 LAs and 3 LSs were developed. Following participatory design workshops, with focus groups (involving teachers, students and experts) and other activities to produce prototypes, two packages of LAs were pre-piloted with teachers. The results of the pre-pilot informed revisions of the LSs and LAs prior to the full pilots (April 2013 – June 2013). As in previous cycles, the LSs and LAs, along with tools and other resources are thus the outputs of an iterative process with a high level of user engagement, drawing on the significant pedagogical and technological expertise available to the consortium.

iTEC tools

WP3 also 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

[61] Audio/video feedback; Create a model; Digital producers; Digital tools for effective, engaging science; GPS Enabled Learning Games; Hackspace; ICT Journey; IWB Journey; Mindmapping the soil; Supported through Change

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 shells. 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.

WP7 and WP10 provided the 'iTEC Composer/SDE', 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.

Support for NPCs/NTCs and teachers

The NPCs and their pilot schools are 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 need to register (through a simple process) to contribute to forum discussions. In addition, a greater focus has been placed on providing resources for teachers, giving teachers' work more visibility and making the benefits of participation clearer. Teachers can 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 maintained frequent contact by email via the NC mailing list to inform them of upcoming events, teacher training opportunities, teacher community, reporting, etc. On average, biweekly messages were sent in C4.

Although they are education experts, NPCs are not professional researchers. Work Package 5 (WP5) has 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 C3 and to outline changes introduced to data collection process to reflect the emphasis for C4 on innovation and mainstreaming. Data collected in C4 included one teacher online survey (about their current uses of ICT and about the implementation of the LS); one teacher focus group; and one case study (lesson observation and interviews with teachers, students and the head teacher). In addition, National Case Studies were conducted; while these do not focus exclusively on C4, where relevant comments were made within these interviews, they are included in the analysis.

Technical support for the pilots is 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. A particular focus of C4 has been the

Widget Store. Webinars have been organised (e.g. relevant widgets supporting specific LAs), and guidelines (documents and video) have been circulated and made available online on the iTEC website (http://itec.eun.org/web/guest/technologies). These guidelines also focus on free online tools to supplement the evolving iTEC technology. Manuals for all the iTEC technologies have been updated, and technical support for the pilots was provided by WP6 in a forum for the NTCs.

The Promethean Planet iTEC project community page is an online place is where Promethean provides its pilot teachers and wider community with the latest information to keep up to date on the iTEC project. It contains blogs, forums, a file gallery and a wiki. Teachers are encouraged to join the conversations by commenting on a blog article or posting in the forums. Teachers can also find resources from previous cycles, learn about future cycles, register for events and training sessions and meet Promethean's iTEC coordinators and iTEC teachers. Promethean has also run several face-to-face workshops for teachers, in addition to online workshops. Topics covered during the workshops included ideas for implementing the C4 learning stories and learning activities; technologies for C4 including Internet based tools and the widget store; the shell of ActivInspire; and the Promethean Planet iTEC online 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 D: Additional analysis of survey data

Subject group

Table D.1: Subject group of survey respondents

Subject	N	%
STEM	162	47%
Humanities	99	29%
Primary	31	9%
Other	3	1%
Not specified	47	15%

Notes: Some primary teachers gave a subject area, while others gave their subject as 'Primary'. PE is categorised as Humanities.

Gender

Of those which were not anonymous (n=306, full n = 342) 67% were female and 33% male.

Length of service

As in previous cycles, the majority of teachers who participated were experienced, with only 15% of respondents indicating that they had been teaching for five years or less. The median length of service was 11-15 years. 50% of respondents indicated that they had between 6 and 20 years of service.

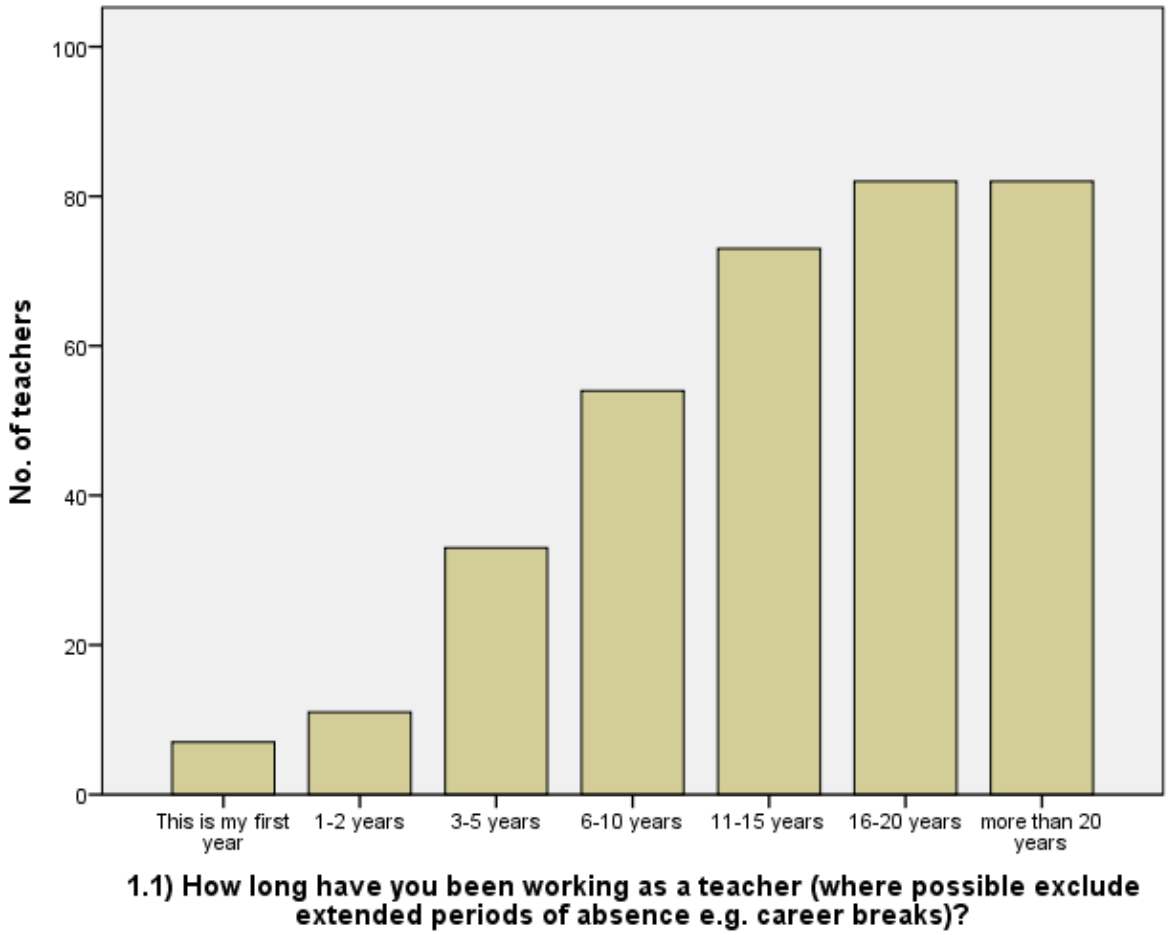


Figure D.1: Length of time as a teacher for survey respondents

Involvement in ICT initiatives

64% of teachers responding to the survey indicated that they had been involved in other national or international ICT initiatives recently, suggesting that they had positive attitudes to technology and innovation.

73% of teachers indicated that their school participated in other national or international ICT initiatives (for example, eTwinning, EU or industry funded projects, innovative schools, other research projects). 78% of teachers felt that their senior leaders were supportive of the use of ICT in the classroom.

ICT competency

Teachers were asked to rate their level of competency in using ICT in teaching and learning on a scale from 1 (none) to 10 (very high). The mean response was 7.6 (SD = 1.7) suggesting that the majority of teachers participating in Cycle 4 were confident

users of technology. Only 5% of teachers rated their level of ICT competency in teaching and learning as 4 or less.

Table D.2: Use of the Widget Store by country

Country	Used Widget Store	Didn't use Widget Store	Total
AT	8 (47.1%)	9 (52.9%)	17
BE	2 (28.6%)	5 (71.4%)	7
CZ	0 (0%)	6 (100.0%)	6
DE-SM	2 (50.0%)	2 (50.0%)	4
EE	1(8.3%)	11(91.7%)	12
ES-PR	1 (100.0%)	0 (0%)	1
ES-SM	6 (15.8%)	32 (84.2%)	38
FI	9 (40.9%)	13 (59.1%)	22
FR	10 (62.5%)	6 (37.5%)	16
HU	7 (25.9%)	20 (74.1%)	27
IS	2 (25.0%)	6 (75.0%)	8
IT	21(95.5%)	1 (4.5%)	22
LT	14 (43.8%)	18 (56.3%)	32
NO	2 (16.7%)	10 (83.3%)	12
PT	15 (57.7%)	11 (42.3%)	26
SK	1 (8.3%)	11 (91.7%)	12
TR	22 (42.3%)	30 (57.7%)	52
UK-PR	1(9.1%)	10 (90.9%)	11
UK-SM	2 (40.0%)	3 (60.0%)	5

Appendix E: Methodological notes

Teacher survey

The teacher survey was delivered online using SurveyMonkey. Emails were sent directly to teachers, using emails provided by the NPCs. Follow up emails were sent to teachers who did not respond initially and in most countries NPCs also emailed teachers to encourage them to participate. The survey was available to teachers from late May/early June[62] until early July. However, term ended in early to mid-June in a number of countries, meaning many teachers were not available after this time, so the response rates from some countries were slightly lower than WP5 would have liked.

Teachers who had responded at least as far as question 5.3d were included in the analysis (in C1-C3 teachers were only included if they had completed most of the survey). 326 teachers completed the questionnaire. Israeli teachers did not complete q5.3a-q5.3d as an erroneous skip page logic was in place.

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 Excel. As teachers responded to the survey in their national language, open ended responses were translated into English using Google Translate. Where it was not possible to make sense of the response in this way, NPCs' help was sought, but it is possible that some responses do not translate into English accurately and thus occasional errors in understanding may result.

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 the 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.

In addition to the aggregated data, the report indicates those countries where a particular theme was identified by at least 20% of teachers in the survey responses (or at least 2 if there were less than 10 responses in total). However, when interpreting this data, it should be noted that many of the sample sizes are very small, so the data should be treated as descriptive. It is not possible to provide a statistical comparison based on the country samples available.

[62] The exact date varied for each country.

Qualitative data

Qualitative data from the case study interviews and case study reports were coded thematically in Nvivo using a conceptual framework adapted from the SITES2 study (Kozma, 2003, p13). Selected quotations are used to exemplify the reported findings.

The analysis of qualitative data is based on a total of 10 focus groups and 17 case studies (described in 17 teacher interviews, 13 head teacher interview transcripts,13 ICT co-ordinator interview transcripts, 19 student interview transcripts and 19 lesson observations). One case study was conducted in 12 of the countries submitting case studies; five case studies were conducted in Turkey. All five of the Turkish case studies were included in the analysis, but to avoid skewing the findings towards a single country, in counts of case studies Turkey is counted only once even if a theme appears in more than one Turkish case study.

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.

The case studies were purposively selected by the NPCs according to three criteria, namely that the case study teacher should be using:

1. iTEC technologies
2. radically innovative scenarios
3. nationally developed scenarios.

The case studies are therefore not intended to be representative of the country in which they were conducted.

Although no formal case study was conducted for the UK, a face-to-face interview with one of the pilot teachers was carried out by a researcher from WP5. This interview did not follow the format of the case studies, so is not included in the main analysis but is drawn on for the scaling up case study. An additional interview was also conducted (by Skype) with the Portuguese NTC which was used as the basis of the Widget Store case study.

Appendix F: Innovation and the iTEC Innovation Maturity Matrix

When examining the evaluation data in the light of the Innovation Maturity Matrix, the evidence gathered is strongest in relation to the role of students. It was rare for students to be simply 'consumers' (Stage 1). More usually, they could be seen to be 'users' (Stage 2) or 'producers' (Stage 3) as they used technologies to create games, objects and multimedia stories. Some were also using technology to help them to become managers of their own learning, for example, allocating roles and managing resources (Stage 4). There were also a few examples of students starting to act as co-designers of the learning journey (Stage 5), although such activities do not appear to be making use of intelligent content and analytics as yet.

While some projects remained within the classroom (Stage 1), there were also examples of technology being used to support more agile approaches as students worked beyond the confines of the classroom, and of the school day. Technology was commonly used to support a variety of routes to learning (Stage 2) as students were able to choose from different options available. However, while 70% of teachers made use of an iTEC shell, institutionally-embedded technology to support the flow of content and data (Stage 3) was limited. Often, when teachers had succeeded in offering a more integrated approach to extending learning and teaching beyond the classroom, this made use of technologies which were not officially supported by the institution (eg Facebook).

Appendix G NPC Workshop Minutes

Flash meeting/recording: http://fm.ea-tel.eu/fm/f299c3-33043

On: 14th March 9am-10am

Presented by: Maureen Haldane

Attendees: Dulce Pinto (PT), Leonardo Tosi, (IT), Silvana Winer (IS), Limor Riskin (IS), Monica Macedo (FR), Jorund Skaug (NO), Giovanni Nulli (IT), Ildiko Csordas (HU), Mehmet Muharremoglu (TR), Miroslav Michalko (SK), Pasi Kurtilla (FI), Andrea Benassi (IT), Ainhoa Marcos (SMART), Karine Aillerie (FR), Axel Zahlut (AT), Paula Abrantes (PT)

Apologies: None

INITIAL PRESENTATION:

The document to support NPCs was renamed to reflect the substantial changes that took place as a result of refocusing the evaluation from the classroom to strategic impact. It was named 'C4 Evaluation Guide' to differentiate it from the handbook that had previously been used (in C1-C3). The document was slimmed down as far as possible. An annotated version was sent to NPCs (with comment boxes) to draw their attention to the main changes. The comments were covered in the Workshop.

- New objectives for C4 (and C5) as a result of refocusing from classroom impact to strategic impact
- Change from 3 case studies to 1 case study per country, raw data only
- Teacher multimedia stories optional rather than mandatory
- Evaluation of scenario development process
    - NPC survey
    - NPC focus group
- Evaluation of impact of iTEC on policy and practice
    - Recommending interviewees
    - Participating as an interviewee if appropriate
- Additional activity for C4 evaluation – teacher focus group
    - Conduct teacher focus group on iTEC technologies

  - Arrange for independent scribe to record content of discussion
- Amendments to teacher questionnaire
- Revised interview questions and new prompts
- New lesson observation note sheet for recording observed lesson

In addition, NPCs were encouraged to focus on the potential of iTEC technologies rather than the bugs/usability issues likely to be present due to prototype status.

ISSUES RAISED:

Pasi asked when the teacher questionnaire would be available noting that teachers in Finland would be starting holidays at the beginning of June. This information was passed to Cathy Lewin.

Monica and Leonardo raised issues about the deadlines and the additional tasks required for WP2 and WP4 during the piloting period. Maureen advised that WP5 was aware of this and that she hoped that NPCs would do their best. In addition, the evaluation workload had been reduced (ie from three case studies to one case study, administration of teacher survey by WP5).

There was a short discussion about the term ‘radically innovative’.

Silvana and Hermann raised issues about the widget store, the scenario development process and the iTEC Composer/SDE. This information was passed to the relevant WP leaders.

In addition, Maureen received comments on the Evaluation guide (in relation to the teacher focus group) and made some further amendments to the guide before circulating a final version.