iTEC

Designing the future classroom

iTEC teachers' survey and students' Power League activity: Findings and recommendations

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Executive Summary

iTEC is an EC-funded project that aims to develop and pilot inspiring technology-based scenarios of future classrooms through a collaborative process involving all those who participate in the educational system: learners, teachers, researchers, technology industry partners and Ministries of Education. As part of this process, two tools were developed to gather information from teachers and students that could contribute to developing scenarios. A survey was distributed to teachers that enquired about their attitudes and perceptions of the use of technology in classrooms, and an online voting activity was used with students to learn about their preferences for the future classroom. More than 1,200 teachers across Europe completed the survey and the online activity gathered more than 284,000 votes. This report describes the development and distribution of these two tools, outlines the results and findings from both, and offers recommendations for the iTEC project based on these findings.

Summary of findings: Teachers' survey

Teachers' confidence and use of technology

- *Respondents were primarily experienced teachers who see themselves as regular to high users of technology and who have perceptions of high levels of personal competence at using technology.*
- *While teachers generally rank their IT competency as competent to high, many are not using it for a majority of the time in lessons.* It is difficult to ascertain why this is the case; they may be using astute judgment of when technology use is appropriate, have poor access or be unsure how or why to use it in classrooms.
- *Despite a wide variety of usage in the classroom in terms of proportion of use within lessons, a majority feel they are using it more than their typical colleagues do and are also using it in increasing amounts.* Respondents therefore appear to consider themselves to be invested users of technology for learning, regardless of the amount they use it.
- *Teachers use a wide range of technologies with different affordances but find the 'most useful' to be primarily those most associated with teacher-led, didactic classroom practice (eg, IWB, projector).*

Perceptions on enablers and barriers to using technology

- *Teachers who report confidence and competence at using digital technologies may not be as confident or skilled at using new technologies for educational purposes or to promote learning.* More than a quarter still found it difficult to introduce new technologies in their teaching, a very high majority of respondents across all countries desired additional training on using technology in the classroom, and a large cohort would also like evidence of its utility for teaching and learning.
- *Barriers often assumed to get in the way of using technology did not appear to be an overwhelming issue for responding teachers.* Issues such as curriculum restraints

and e-safety concerns were seen to be barriers by some teachers but not by an overwhelming majority. Assessment systems appear to provide a bigger challenge to the use of technology but were not seen to be a barrier by a majority of teachers.

- *Teachers report large variations in levels of technical support, access to technology and supportive teacher networks between participating countries.* This is emphasised by the variability seen in the use of different digital technologies. These may be contributing factors to why more than a quarter of responding teachers find it difficult to integrate new technologies into their teaching, particularly interesting when considering the high reported levels of confidence and competence reported by these teachers.

Value and benefits of using technology

- *Teachers recognised the value of using technology in the long-term but identify a short-term impact on workload.* This point is particularly important for the iTEC project to recognise, as the pilots will be asking teachers to use new technologies and thus increase their workload.
- *Respondents appeared positive about the benefits and value of using technology in the classroom, but areas of teaching and learning that are often more complex (developing critical, intellectual and social skills) were the areas that showed the highest lack of conviction from respondents.* This is important to consider within the project, as these are areas of learning present in many scenarios that may require additional support for teachers.

Summary of findings: Power League Student Activity

- *There is a clear preference from students for the presence and use of technology in schools*. It is unclear how much preference relates to use of technology in learning or is more related to having general access to computer equipment and the internet. Certainly students identified strong preferences in relation to hardware, software, and internet access in schools.
- *There is a related interest and perceived importance of media use and studies.* This suggests that related curriculum content, such as media studies and digital literacy, are also student preferences.
- *Responding students seem to prefer pedagogies, learning activities and content areas that offer alternatives to the more conventional teacher-led learning.* Specific areas that were highly ranked include collaboration, game-based learning, play, project- and discovery-based learning and students working in teams.
- *Students appear to prefer more child-centred, collaborative approaches to learning.* This includes teachers understanding and building links with children's interests outside of school.

- *Flexibility in learning also factors strongly, both in terms of learning spaces and how, when and with whom learning can happen.*
- *Students demonstrated strong interests in schools helping them become prepared for the world beyond formal education.* Relevant highly ranked areas of education included gaining '21st Century skills' and skills for specific jobs (rather than generic or basic skills), performing authentic tasks and undertaking real challenges.

Recommendations for using these findings within iTEC

The following recommendations can be made based on the findings from the survey and Power League activity:

1. *Acknowledge and challenge teachers' current use of technology in classrooms through scenario and technology development.* There appears to be a strong teacher preference (in terms of utility) towards more conventional, hardware-based and often didactic teacher-led technologies. iTEC scenarios should consider how to challenge the use or application of these often-preferred tools so they are used in more innovative ways that also respond to student preferences for more collaborative, child-centred forms of pedagogy. Additionally, a number of more collaborative tools were not commonly used across most countries and therefore could represent an opportunity to be introduced as innovative where appropriate for learning activities.
2. *Provide training for teachers that includes evidence of the benefits of new technologies for learning and also Incorporates pedagogical, as well as technical, training on the use of technology in classrooms.* Just because technology is used by teachers who are seen to be competent and confident at using different tools, it may not be used effectively in terms of teaching and learning. The majority of teachers also wanted both evidence of benefits and additional training when using new technologies in the classroom, despite their self-perceptions as competent, invested users of technology.
3. *Recognise and facilitate the short-term investment of technology use required by teachers*. Many teachers recognise that a short-term investment in time and resources to use technology will reduce workloads (while also providing many benefits to students) in the long run. iTEC's ability to motivate teachers to commit to the short-term investment with engaging scenarios and adequate support and is an important determinant of long-term success.
4. *Incorporate student preferences into the content, pedagogy and assessment elements of scenarios*. Student preferences should be considered and integrated into the scenario development process, including more opportunities for flexible learning, learning outside the classroom, collaboration, play and game-based learning, authentic learning experiences, and project- or discovery-based learning.

5. *Consider how to employ the enablers many teachers have identified that support use of technology in the classroom.* These enablers include involvement of students in the teaching and use of technology, additional training, and providing evidence on the educational value of using technology. These enablers should be considered during the scenario development process and could also apply to the training and ongoing support provided to teachers.
6. *Involve teachers and students in the development, preparation and facilitation of the iTEC process.* Teachers should be more directly involved in the scenario development process. Additionally, in order to accommodate the overlap and address the tensions between the students' preferences and teachers' realities, future scenarios should re-iterate and further explore how student preferences can be included in the scenarios through additional research and input from learners.
7. *Augment these findings with additional research and data gathering.* The difficulties with bias and representation presented in this survey can be somewhat alleviated through continued research and data gathering from similar studies. Additional involvement of teachers in the iTEC project can provide qualitative data to support or challenge the results found here. Additionally, European Schoolnet is leading on Survey of Schools: ICT and Education, a survey of heads, teachers and students from 35,000 schools in 31 countries (including all iTEC partners). This will provide a complementary data set about digital competence, use and attitudes that will prove useful in subsequent iTEC cycles.
8. *Accommodate for the diversity of access and use of technology in classrooms.* Classrooms within and across countries are widely varied and this local context must be recognised in the development of scenarios, training processes and evaluation. This could include recognition of local context and need during piloting, as well as a wider range of scenarios or options within scenarios.

Introduction

Innovative Technologies for an Engaging Classroom (iTEC) is a four-year, large-scale project that takes an informed look at the potential classroom of the future. The project has funding of €9.45 million from the European Commission and involves 27 project partners across Europe, including 14 Ministries of Education. The project's main aim is to develop engaging scenarios for learning in the future classroom that can be validated in a large-scale pilot and subsequently taken to scale, particularly through the facilitating use of technology. Through a collaborative process involving technologists, researchers, Ministries of Education, teachers and students across Europe, iTEC develops preferable classroom scenarios for the future through analysis of current social, educational and technological trends and input from various stakeholders. These scenarios are refined, piloted and evaluated through five cycles in 1,000 classrooms in 12 countries across Europe.

In order to ensure the contributions from those most closely involved with education, the project uses different tools to elicit and understand the perspectives of teachers and students. Specifically, a teachers' survey and online ordering activity for students have helped capture and contribute these participants' attitudes toward the use of technology in education and the future classroom[1]. A review of current research documenting teachers' attitudes fed into the first iTEC cycle of scenario development in 2010[2], and data and analysis from both survey tools contributed to the second cycle in early 2011.
The aim of this document is to report the findings from the survey and Power League activity, in order to provide evidence for future scenario development and stimulate future iTEC discussions through project recommendations. It will also document the process of developing, conducting and analysing the tools used. While this report is primarily intended for audiences involved in iTEC, others working in the field may find the information useful.[3]

Teachers' Survey

Purpose of survey

The development of iTEC scenarios should be a collaborative process focused on building consensus from a range of relevant stakeholders in the project. Therefore, eliciting teachers' views provides some necessary contextual background to the development of iTEC scenarios and ensures that the experiences of teachers influence their creation. The tool chosen to capture these views was an online survey of teachers in at least 1,000 classrooms across Europe which focused on their attitudes to the uses of ICT for teaching and learning. According to the iTEC Description of Work, the survey's aim is to "gather teachers' and students' attitudes towards the role and use of ICT in schools" (Task 2.3). Thus, the survey both provides a mechanism to capture a wide range of teacher attitudes and perspectives

[1] The development and analysis of the survey tools is managed by Futurelab, a UK-based not-for-profit that is the lead organisation for the iTEC Work Package responsible for developing scenarios. For more information on the organisation, see www.futurelab.org.uk
[2] The research review can be found here: http://itec.eun.org/web/guest/scenarios
[3] Further information about the iTEC project can be found here: www.itec.eun.org.

that can help shape the scenario development process and ensure this important perspective contributes directly to scenarios.

Survey Development

Background research

In preparation for the survey and to provide teacher input to the first cycle of scenario development, a desk-based literature review on teachers' attitudes was conducted[4]. The review found that previous research examined teachers' technical use and competence but there were fewer studies focused on teachers' attitudes towards using technology for teaching and learning. It stated:

> Research looking specifically at teachers' perceptions of ICT use across Europe is somewhat limited. Much of the early research on using ICT in education has explored technical competence rather than teachers' attitudes and motivation to using ICT (Gulbahar & Guven 2008). Korte & Hüsing state 'there is a lack of information on the actual use of ICT for learning in schools', particularly on its qualitative impact on pedagogy and teaching methods (2007, p1).

Thus, the survey set out to illuminate teachers' perspectives on how they use technology, as well as what supports and prevents that usage and what benefits they feel technology can offer to teaching and learning within schools.

Methodology and design

The iTEC Description of Work broadly defines the survey's scope: "a survey will be designed to determine the attitudes of teachers to the role and use of ICT" (Task 2.1).
Ideally, the survey should elicit teachers' attitudes on issues that would be most useful for the scenario development process. In particular, teachers' perceptions on the use of ICT for learning, what inhibits and supports its use and when it is useful and beneficial were seen as critical areas of understanding for the project. Therefore, three areas were prioritised. These were teachers' uses of digital technology; barriers and enablers to using technology in classrooms; and perceptions of the value and benefit to using technology in classrooms. A small amount of background data for participating teachers was also gathered.

The survey format and questions related to these three areas were developed iteratively between October 2010 and January 2011[5]. An online format for the survey was selected for ease of distribution to teachers across multiple countries, as research showed that the majority of schools have access to computers and the internet. The survey needed to be short in order to produce a good response rate so was designed to be completed in less than 20 minutes.

All iTEC partners working within the iTEC Work Package 2, the project management team and Manchester Metropolitan University (MMU) were asked to feedback on the survey's

[4] The full review can be found here: http://itec.eun.org/web/guest/scenarios
[5] For the final survey questions, see Appendix A: Teacher survey questions

content. The MMU team was involved in order not to replicate the Work Package requirements related to project evaluation they were leading. European Schoolnet provided significant guidance on survey content from past similar European surveys, including lists of subjects and technologies. Comments were received from UNI-C (Denmark), DGIDC (Portugal), European Schoolnet and MMU and integrated where feasible. For example, a suggestion to include a number of 'open' questions where teachers could write in responses would have been useful to implement but was not possible due to lack of resources for additional translation.

Survey questions and statements were carefully worded, so to be easily translated and understood across languages and cultures. Most questions involved a statement and corresponding Likert scale to capture responses and were therefore 'closed'. However, a few questions offered the opportunity for teachers to write in an alternative option (via an 'Other' response).

Survey distribution

Once the survey format and content had been agreed, the English version was sent to European Schoolnet for translation. The survey and an introductory page of information summarising the project and how to take part were translated into the 12 languages of the pilot countries (in addition to English)[6]. The decision to offer the materials in 13 languages was made in order to focus on obtaining responses from the pilot countries and because of budgetary limitations. Once the survey was translated, the versions were uploaded into online survey packages. Survey Monkey was used for 12 versions and Survey Gizmo was used for the Hebrew version, as Survey Monkey could not support right-aligned text.
The survey was distributed to teachers and schools in Europe in all countries participating in the iTEC project (including countries that are iTEC Associate Partners). While the materials were translated into 13 languages, teachers in other countries participating in the project were encouraged to participate in a language they were familiar with, if able. The decision to elicit responses from countries participating in iTEC, rather than inviting all countries across Europe, was taken in order to focus input into the project from those taking part directly in iTEC and for the practical reason of being able to use the partner network to increase the potential responses.

Links to the survey materials were hosted on the iTEC web site, where teachers could select the language version they preferred. This section on the iTEC web site contained links to all the materials in the various languages. The link to the iTEC survey page was distributed through wide-reaching and varied methods via project partners and country networks. Distribution methods included email bulletins, teacher platforms, newsletters, web site promotion and social networking sites like Facebook and Twitter. For some distribution channels – such as web site promotion or postings on teacher bulletins – it was difficult to estimate circulation or how many teachers received or accessed the materials. Despite this,

[6] See Appendix B: 'List of translated languages and participating iTEC countries'

it is clear that the survey materials were distributed to well over the required 1,000 classrooms. The following table provides a summary of distribution[7]:

Partner or Organisation	Method(s)	Circulation, where known	Languages
European Schoolnet (EUN)	EUN newsletter, EUN teacher newsletter, iTEC newsletter, EUN project bulletins and networks, Facebook and Twitter postings	30,000+	Mostly English (Newsletters in FR, DE and EN)
iTEC country partners and national coordinators	iTEC monthly update and contact with all country contacts. Various methods via national coordinators (Including contact through existing networks in Turkey, national educational portal in Hungary, Moodle course in Portugal, and direct emails to teachers or schools in Belgium and Israel)	3,500+	Various
Promethean	Promethean Planet, Promethean's web site for teachers and social networking channels	237,476[8]	EN, PT, IT, FR, DE, NL
SMART	Distributed through SMART education consultant networks	Approx. 520 schools	English

Table 1: Summary of survey distribution

Survey results

Participant data, including information on representation and bias

The survey generated 1,231 completed responses from teachers across countries participating in iTEC. The table below provides completed response numbers for different language versions of the survey. This table also shows the countries that respondents were from in each language version. While responses in each language are predominantly from the country where the language is most commonly spoken, the versions in German, French, Dutch, Norwegian, Slovak and English reflect votes from multiple countries. In this report, responses have been analysed according to language rather than country, as the number of respondents from different countries in the same language do not provide large enough samples to be representative or provide reliable insights.

[7] See Appendix C: 'Distribution of survey and Power League' for full list of distribution efforts

[8] Figure based on number of teachers registered on Promethean Planet in Portugal, France, the Netherlands, Germany, Italy and the UK (as the information was available in Portuguese, French, Dutch, German, Italian and English and targeted at teachers in Europe).

Language	Number of completed responses	Country
Turkish	439	Turkey – 99.8% Austria - .1% Belgium - .1%
Portuguese	327	Portugal – 99.7% Belgium - .3%
Italian	131	Italy – 100%
Slovak	126	Slovakia – 89.5% Czech Republic – 10.5%
English	73	Finland – 40.5% United Kingdom – 13.1% Israel – 11.9% Spain – 10.7% Czech Republic – 4.8% Other (each less than 2%) – 19%
German	43	Austria – 83% Germany – 14.9% Czech Republic – 2.1%
Estonian	41	Estonia – 100%
Hungarian	26	Hungary – 93.3% Slovakia – 3.3% Spain – 3.3%
French	13	France – 91.7% Switzerland – 8.3%
Hebrew	6	Israel – 100%
Lithuanian	3	Lithuania – 100%
Norwegian	2	Norway – 50% Denmark – 50%
Dutch	1	Belgium – 50% The Netherlands – 50%
Total:	1231	

Table 2: Summary of survey responses

As demonstrated in the table above, there is a very uneven spread of responses across countries and therefore a significant bias towards certain countries' responses. This unequal spread can be explained by a number of factors, including variation in distribution in different countries. Partners in participating countries and technology-specific partners distributed survey information in different ways through networks of varying size and

effectiveness. Some country partners did not have access to significant networks of teachers.

Additionally, teachers who were invited to participate decided whether or not to complete the survey themselves, which means there is a self-selection bias. As such, teachers with strong opinions on the subject or high levels of motivation may have been the ones to complete the survey, meaning the responses may be skewed towards a certain type of teacher. Therefore the responses cannot be generalised to make wide-reaching statements about attitudes of teachers across Europe.

Weighting the responses according to ratio of responding teachers to correct the bias and accommodate the unequal representation was considered but determined to be ultimately ineffectual, as the samples that would benefit from weighting were too small to achieve any meaningful presence.

While any analysis must consider these issues of unequal representation and bias, the data from the survey can illuminate areas of strong agreement or disagreement across all responding countries. Additionally, significant differences between countries with high response rates can be considered. Those language versions with few responses (<40) were not significantly considered during the analysis. Additionally, due to issues of survey bias, statistical analysis of data was not undertaken.

Demographic information

The survey collected basic demographic data from teachers, including country, age of students they teach, subject taught, and how many years they have been teaching[9]. The following information provides a snapshot of teachers who completed the survey. Those who responded were primarily:

- *Teaching ages 11-18*: Nearly 85% of respondents said they used technology the most with students age 11 and above. The age group with the highest percentage (42.8%) was 11-14.
- *Experienced teachers*: More than 80% of respondents had more than 5 years' teaching experience. More than 60% said they have been teaching for 10+ years.
- *Teachers from a variety of subjects:* The most commonly chosen subjects were early years[10], languages, information technologies, mathematics and business studies and the sciences.

[9] For full summary of data collected, see http://itec.eun.org/web/guest/scenarios

[10] The popularity of the 'early years' choice of subject contradicted teachers' responses to the ages of students they taught in certain surveys (especially Portuguese, Slovak, and Turkish). Therefore, this may be an area where translations were incorrect and will be reviewed before the second run of the survey.

Current usage of technology in the classroom

Teachers were asked about their current usage of digital technologies in the classrooms. Teachers rated themselves and their use of digital technologies with the following results:

1. *85% of teachers ranked their digital technology skills as competent, good or expert.* Teachers were asked to rank their personal competence at using technology ('How do you rate your skills with digital technology in general?') on a 5-point scale (Non-user, Novice, Competent, Good, or Expert). Responding teachers reported high levels of confidence, with 85% rating their general skills with digital technologies as competent, good or expert and 50.8% choosing either good or expert. This pattern held true across all language versions with slight variation (Italian, English, Estonian and German responses showed slightly higher levels of confidence, and Portuguese and Turkish responses were slightly lower).

2. *Teachers' responses on the amount of time they used technology in the classroom were varied.* Teachers were asked how often they used technology in the classroom ('What proportion of time on average do you use digital technologies in your lessons?') and chose a response from a range of percentages (0-20%, 21-40%, 41-60%, 61-80%, 81-100%). Just over 55% of teachers used technology in lessons 40% or less of the time, while 44% use digital technologies in 41-100% of their lessons. Certain survey respondents showed lower than average usage: in the German survey responses, 70% of teachers used technology in 40% or less of lessons and in the Turkish responses, 67% used technology in 40% or less of lessons. Others showed higher than average usage: 57.6% of Slovak respondents and 61.3% of Italian teachers reported using technology in between 41-100% of lessons.

3. *Despite the range of technology usage in classrooms (see question above), 60.2% of teachers felt their use of technology surpassed that of their colleagues.* Teachers were asked to compare their usage of technology to other teachers in their school ('How does this compare to the typical usage of other teachers within your school?') and respond on a 5-point scale (Much more, A little more, Similar, A little less, A lot less). More than half of teachers (60.2%) felt their use of digital technologies was greater than the typical usage of teachers in their school, though certain countries diverged from this. Only 44.4% of Turkish respondents felt they used technology more than colleagues, whereas respondents in Estonian, German and Italian reported significantly higher percentages. It is interesting to compare responses in some languages between this question and the previous one. Though responses in German showed lower than average usage according to proportion spent using technology in class (See Point 2 above), 81% of those respondents reported using technology more

than their colleagues, suggesting a lower than average use of technology in the responding schools[11].

4. *More than half of teachers (56.9%) reported an increase in their use of technology from the previous year.*
   Teachers were asked to compare their usage this year to the previous year ('How does this proportion compare to this time last year?', responding on the same scale as the previous question). More than half of teachers (56.9%) said their use had increased from the previous year. There were variations between surveys. Those whose use had increased more than average included German (73.9% said their use had increased), Italian (72.4%) and Slovak (63.1%) language respondents, while those in the English survey reported a lower increase (only 44% had increased their use from the previous year).

5. *Teachers reported using a wide range of technologies in an average term but reported a smaller scope of technologies that they found 'most useful'*.
   Teachers were provided with a list of 18 digital technologies and asked to choose which ones they use in an average term and which one technology they find most useful in the classroom. They could also choose 'Other' and write in additional technologies in this question. The top responses are shown in the following two tables[12].

Q: What digital technologies do you use in an average term? (choose all that apply)	**Number of total responding teachers using this technology**
1. Computer projection (including document cameras, ie, mounted camera attached to a digital projector allowing documents and other objects to be projected)	**86.8%**
2. Digital resources (such as: databases, electronic books, online textbooks animations, videos etc)	**71.1%**
3. Digital media tools (such as: video camera, audio recorder) and music/photo/video/slide sharing sites (such as: YouTube, Flickr)	**63.1%**
4. Text communications tools (such as: email, IM and text messaging)	**59.9%**
5. Interactive whiteboards (such as: Promethean, Smartboard, Polyvision)	**43.5%**
6. Collaboration tools (such as: blogs, wikis, bookmarking)	**38.3%**
7. Virtual Learning Environments/Learning management	**35%**

[11] Of the 43 teachers responding to the German survey, 83% were from Austria, 14.9% were from Germany and 2.1% were from the Czech Republic.
[12] The complete list of technologies can be seen in Appendix A: 'Teacher survey questions'

systems (such as: Blackboard, Moodle, Angel)	
8. National or regional educational school portal	**34.6%**

Table 3: Digital technologies teachers use in average term

As this table shows, teachers used a wide range of digital technology, covering hardware, software and online tools. This diversity involves a range of different affordances technologies can provide: teacher-led learning, collaboration, authorship and media creation and sharing. Those technologies that were rarely used across all surveys were high-tech instruments for science (3.7% reported using them in an average term), digital tools that help you organize your work (such as: Diigo, Bubbl.us) (9%) and podcasts (9.3%). Responses to this question showed high levels of variation across surveys in terms of how many teachers used the different technologies. However, it is not as simple as identifying one country that demonstrates low usage across all technologies. For example, Turkish responses are lower than average for some technologies (only 11.9% of teachers reported using IWB's and 8.4% reported using national or regional educational school portals), but usage of mobile technologies (31.1% of teachers said they used them) and computer projection (87.3% used this) were higher than average.

Q: What one digital technology do you find the most useful?	**% of teachers who found this technology 'the most useful'**
1. Computer projection (including document cameras, ie, mounted camera attached to a digital projector allowing documents and other objects to be projected)	**30.5%**
2. Interactive whiteboards (such as: Promethean, Smartboard, Polyvision)	**16.6%**
3. Virtual Learning Environments/Learning management systems (such as: Blackboard, Moodle, Angel)	**12.2%**
4. Digital resources (such as: databases, electronic books, online textbooks animations, videos etc)	**12.1%**
5. Digital media tools (such as: video camera, audio recorder) and music/photo/video/slide sharing sites (such as: You tube, Flickr)	**6.0%**
6. Collaboration tools (such as: blogs, wikis, bookmarking)	**4.8%**
7. Virtual experiments and simulations	**4.4%**
8. Text communications tools (such as: email, IM and text messaging)	**3.1%**

Table 4: Digital technologies teachers find most useful

This question also elicited varied responses across the different surveys. In the interests of brevity, only a few notable results will be shared here. Computer projection was selected as the most useful technology by 53.5% of Turkish respondents, which may contribute to its high overall ranking. There was huge variance in teachers' who perceived IWB's to be the most useful technology, and this variance does not appear to be directly related to how widely used the tool was in all countries. For example, some countries with high reporting of

overall usage of interactive whiteboards also show higher than average responses to it being the most useful. In Italy, 89.1% of teachers report using IWB's in a typical term and 56.8% of respondents said it was the most useful one. However, this pattern does not hold across all surveys. In Portugal, 50.4% of teachers reported using IWB's in an average term yet only 1 respondent (.4%) felt it was the most useful tool.

It is interesting to compare these responses to those in Table 3. There is a striking shift of preference as the perceived utility of technologies appears to veer towards tools often used to support more teacher-led, didactic interaction. For example, while more interactive technologies like collaboration tools and digital media tools were used by high numbers of teachers in an average term, they were clearly not seen as the 'most useful' tools available (only 4.8% and 6.0% of respondents respectively selected them in this question). It is impossible to ascertain how teachers actually use the technology they find most useful, but computer projection, interactive whiteboards, and learning management systems are often tools directed and led by teachers. While there is nothing inherently wrong with a teacher-led classroom and pedagogy, it is notable that the more collaborative, student-led affordances of technology are much more rarely seen to be 'most useful.'

Barriers and enablers to using technology in classrooms

In order to better understand teachers' perceptions about the barriers and enablers to using technology in classrooms, a set of statements examining various potential challenges and supports were presented. Teachers were asked to respond to the statements on a 6-point scale (Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree, No Opinion)[13]. Their responses are as follows:

1. *Teachers were split on whether they felt they have enough technical support to introduce new technologies.*
   Of those responding, 44.9% agreed they had sufficient technical support in the classroom, while 37.3% disagreed. The responses varied significantly between different language versions. There was stronger agreement in the surveys in Estonian, English, German, Italian, Slovak and Turkish, while 52.7% of respondents in Portuguese disagreed.

2. *A large majority of teachers (73.4%) agreed that the use of digital technologies supports delivery of the curriculum.*
   There was generally a similar pattern across all countries, though respondents in Portuguese dissented slightly more than others (21.1% disagreed with the statement, as compared to the overall average of 13.5% of respondents disagreeing).

3. *Just over 70% of all responding teachers said they would like evidence of the educational value of a new digital technology or activity before using it.*

[13] A full list of statements is available in Appendix A: 'Teacher Survey Questions'.

There were some variations in responses to this question, as this was seen to be particularly important in the Turkish (78.7% agreed and only 6% disagreed) and Portuguese surveys (74.8% agreed and 7.5% disagreed). However, in the German language survey, only 32% agreed, 27% neither agreed nor disagreed and 23% disagreed.

4. *More than half of teachers (53.3%) said they did not find it difficult to see how they can integrate digital technologies they have not used before in their teaching.*
However, 28% said they did find it difficult to see how they can integrate digital technologies they had not used before in their teaching. There was a similar pattern across all language surveys.

5. *Nearly half (45.2%) of teachers did not feel that assessment requirements limit their use of digital technology, but 33.5% felt that these requirements were limiting.*
There was a similar response in all countries except in the Turkish-language survey, where 54% agreed (25.5% of which strongly agreed) and 27% disagreed. There was also a relatively high percentage of teachers selecting 'Neither agree or disagree' (19.1%) in that language.

6. *Nearly half of respondents felt that using digital technologies would increase workloads in the short term but a majority agreed it would not increase workloads in the long term.*
Nearly half of teachers (48%) felt that using digital technologies would increase their workload in the short term. However, only 23.5% felt it would increase their workload in the long term (57% disagreed that there would be a long-term increase). This pattern held true across all countries, except in the Turkish language version, where a majority of respondents disagreed that use of technology would increase in both the short- and long-term.

7. *Teachers overwhelmingly agreed (82% agreed or strongly agreed) that they would like more training in how to effectively use digital technologies for learning.*
This pattern was similar across all countries. This question also elicited the highest percentage of 'Strongly agree' responses, with 30.7% overall choosing this.

8. *There were more respondents that said they do participate in supportive teacher networks around digital technologies (44.6%) than those saying they do not (31.6%).*
There were variations across different languages, with Slovak, Italian and Estonian respondents reporting higher involvement in supportive teacher networks.

9. *There is wide variation in teachers' access to technology in their classrooms. Nearly half of teachers (48.9%) said they have sufficient access to hardware and software in their classrooms, but 37.4% of respondents do not feel they have sufficient access.*
   This pattern was similar across most countries, with particularly high percentages reporting sufficient access in the Italian and Slovak surveys. However, respondents in Turkish dissented with this statement, with 36% agreeing and 48% disagreeing.

10. *Only 28.5% of teachers said they choose not to use some digital technologies due to e-safety concerns; 49.2% said this did not impact their use in the classroom.*
    There was variety across different surveys. In response to the statement 'I choose not to use some digital technologies because of e-safety concerns,' strong dissent was seen in surveys in German (out of 46 responses, not one teacher agreed with the statement) and Portuguese (69% disagreed). However, others responding in Slovak and Turkish showed higher levels of agreement (35% and 43%, respectively).

11. *More than half of teachers (53.2%) agreed that students in their class help them with the use of digital technologies during lessons.*
    Teachers were more likely to agree with this statement in the Estonian, Italian, Portuguese, Slovakian and Turkish surveys; however, teachers in the German language survey were more likely to disagree (39.1%) or neither agree or disagree (37%).

Benefits and value of using technology in classrooms

In the final section of the survey, teachers were presented with a list of statements outlining different possible benefits of using technology in the classroom and asked to choose from the same scale as in the previous section.

Statement	% who agree or strongly agree
1. It improves students' digital technology skills (eg use of online resources)	92.1%
2. It motivates students to learn more	89.7%
3. It improves performance in the subject	81.9%
4. It improves students' personal skills (eg initiative, persistence)	78.5%
5. It improves students' intellectual skills (eg problem-solving)	72.5%
6. It improves students' social skills (eg teamwork, communication)	69.9%
7. It improves students' critical skills (eg evaluating a resource for bias)	67.2%

Table 5: Teachers' perceptions of the benefits and value of using technology

Teachers overwhelming agreed with each statement on the benefits of using digital technologies, a result that was seen across all country responses. While more than two-thirds of respondents agreed or strongly agreed with each statement in this section, significant minorities also disagreed, neither agreed nor disagreed or registered no opinion on the final three statements. Significant dissenting or non-committal minorities were recorded for the statements 'It improves students' social skills' (11% disagreed and 18% neither agreed nor disagreed) and 'It improves students' critical skills (8.5% disagreed and 22.2% neither agreed nor disagreed).

Power League activity

Purpose of activity

Power League is an online tool designed to stimulate discussion by asking students to place items within a theme in order of preference[14]. Students from classrooms in countries participating in the iTEC project were invited to take part in a Power League activity that asked them to think about the classroom in 5 years' time. The aim of the activity was to gather and analyse students' perceptions of what they would prefer to see in future classrooms, with particular emphasis on use of technology.

Developing and piloting the activity

Methodology and creation

Power League asks users to choose between two competing options from a thematic list. Gradually, as more and more users make their choices, a ranking (or league) is established that shows the emerging overarching preferences within the list of ideas. The options are presented randomly from a pre-determined list and after a sufficient number of 'wins' and 'losses' are recorded, the software creates a league based on the relative popularity of the ideas. Such leagues can present 'players' with hard choices and encourage users to make decisions that are at times uncomfortable; both options may be desirable in different ways or present equally distasteful possibilities.

The Power League activity was chosen as a method for collecting student perceptions in iTEC because of its participatory affordances and innovative way of introducing the information and supporting discussion and reflection. Surveys do not offer the same participative or collaborative experience. However, the use of Power League has some limitations, particularly the lack of data it gathers from users. This can cause difficulty in understanding how the League is used, how decisions are made and who the users are. These limitations were addressed by attempting to gather demographic and usage information from teachers via other methods.

[14] See www.powerleague.org.uk. Power League is an online tool developed by Futurelab where 'leagues' are cohorts of competing ideas. The name 'Power League' is derived from the first 'league' activity, which asked participants to vote for people with the most perceived power.

The options or 'descriptors' for the iTEC Power League were generated in the project's first cycle of trend development[15]. A list of 62 trends influencing education and/or technology was developed through background research and work with project partners. These descriptors were then organised into categories (Learning spaces; Changing roles of teachers and learners; Curriculum and Assessment; Knowledge and skills; and Technology) and input into the Power League activity. Some of the trends were slightly rewritten to fit the title and description limitations of Power League[16].

Students accessing the Power League web site for iTEC started the activity with two options from the list of descriptors and were asked to consider the question: 'Which do you think is more important to help you learn?' Students chose a 'winning' option and were then given two more options to choose between. Students' choices of which description 'won' (and therefore which one 'lost') in each challenge were tallied as the activity was played. At any time, students could view the League results for that language to see which descriptions had the most 'wins'. The screen shot below shows a sample page students would have seen in the activity.

Power League pilot and results

Like the teachers' survey, the Power League activity was translated into 13 languages and piloted in November 2010 through Futurelab and other partners working on this iTEC Work Package. The activity was piloted in 5 schools in 3 countries and recorded more than 32,000 votes[17]. Feedback on the activity's use and implementation was gathered from teachers and country contacts participating in the pilot, and comments fell under the following themes:

- **Issues with translation:** While the Power Leagues had been professionally translated, there were still some mistakes, particularly around technical terminology. It helped to

[15] 'Descriptors' are summary statements intended to capture the core ideas of trends and drivers, as often used in futures research.
[16] See Appendix D for the full list of descriptors used in the Power League activity.
[17] For full set of pilot data, see here: http://media.futurelab.org.uk/resources/itec/wp2/iTEC%20Power%20League%20Analysis_Dec 10%20v2.xls

have native speakers working on the project who were able to check the Leagues before they were used by students.

- **Involving schools:** It was difficult to identify schools to participate in some countries where there appeared to be delays and difficulties in approaching and finding schools.
- **Age of students and use in classes:** Some teachers/iTEC partners were unsure of the age of students with which it was suitable to use the Power Leagues. There were also questions about how to use the site, such as whether a log in and password were needed.

Distribution of Power League

Based on the pilot feedback, a Power League lesson plan was created to clarify how the League worked and offer ideas on its potential use in classrooms. This English lesson plan was also translated into the other 12 languages and then uploaded onto the Power League web site so links to all versions could be distributed. The lesson plan also included a request for teachers using the League to send information via email on where and how the League was used in classrooms. Specific information requested included age of students, amount of time the League was used for, the classroom subject and how the lesson was structured (selected from five options such as 'Students worked individually' and 'Students worked as a whole class').

The Power League activity links and the accompanying lesson plan were uploaded to the iTEC web site and the link to these materials was distributed at the same time and through the same networks as the teachers' survey (see Appendix C for details).

Power League results

Results from the Power League votes were collected and recorded from each language version of the activity. These votes fall into two categories for each descriptor that was used in the activity: 'Win' and 'Lose'. The 'Win' and 'Lose' votes (and resulting percentages – e.g., how many of the total votes were 'Win' votes) were counted for each individual country and then totalled across all languages. Thus, the students' winning choices in the League were analysed by country and for the League as a whole. The overall results were then analysed for the preferences with the most 'Wins' and those with the most 'Losses'. Additionally, results have been analysed according to a taxonomy of teaching and learning elements as developed by Futurelab for the scenario development process. This taxonomy includes categories or elements of teaching and learning found in a scenario. The categories are *resources (including technology*), *activities*, *people*, *interactions (including pedagogy)* and *environment*. This analysis examines the top preferences in each category.

Participant data, including information on representation and bias

The Power League activity generated more than 284,000 votes. From the request to teachers to email information on League usage, 112 instances of use in five countries (Portugal, Italy, Slovakia, Lithuania and Turkey) were sent in from teachers. While this information is certainly not representative, it does provide a snapshot of participants. In these responses, the majority of students were between 12-18 years old, and nearly 70% of

responding classrooms were studying ICT, mathematics or science. A third of responding classrooms worked as a whole class (33.6%) and another 30.1% of classrooms completed the activity with students working individually.

The table below shows the numbers of votes per language. These can generally be seen to be from the country where the language is most commonly spoken; however, languages such as German, French, Dutch and English likely reflect votes from multiple countries.

Language	Total number of votes
Slovak	138406
Italian	57056
Portuguese	27258
Turkish	23280
Estonian	12772
English	12490
Lithuanian	4478
Hungarian	3694
French	1568
Norwegian	1534
German	1148
Hebrew	292
Dutch	172
Total	**284148**

Table 6: Summary of Power League responses

As the table shows, there is not an even spread of responses across countries. The explanation for this unequal representation and response is similar to that outlined for the teachers' survey. (See page 12 for further detail.) Any participating teachers and students were also self-selecting, creating a sample bias similar to that seen in the survey. Additionally, it is impossible to know how students made decisions on voting preferences and how much time they spent making their choices. Any analysis must consider this unequal representation and issues of bias.

Power League results: Top and Bottom

From the raw League data, a list of the descriptors in order of preference in each language was created. These lists were then amalgamated to create an overall list of descriptors in order of preference. The following list shows students' top choices across all categories and all countries. This means they received the most number of 'Wins' in the Power League votes across all versions of the activity.

Most 'wins' across all language versions

1. Schools provide students with netbooks
2. Teachers focus on developing '21st century skills' eg collaborative and social skills
3. Schools provide students with digital exercise books and digital paper
4. There is an increased focus on 'new media literacies'
5. Schools increasingly teach specialist skills for specific jobs
6. Schools provide unlimited access to the internet when using a computer on school premises
7. Pedagogies based on game design principles and play are increasingly seen as a tool for enjoying teaching and learning
8. Learners work on projects, doing authentic tasks and using technology creatively to tackle real challenges, this includes discovery based learning
9. Teachers use whole bodies of connected evidence from a variety of media to assess students
10. Computers don't just present information, but begin to understand its meaning. Intelligent systems learn what students are interested in and help them get what they want

It is also useful to examine which descriptors ended up at the bottom end of the preferences. The following descriptions received the highest percentage of 'Lose' votes, meaning that they lost to another descriptor more than the others did. While they were not actively selected, their likelihood of not being selected is significant enough to warrant recognition.

Least likely to 'win' across all language versions

1. Interaction without digital technology is valued
2. There are no more computer labs
3. There is a decrease in child centred learning and increase in teacher led classroom practice
4. Many companies and providers offer different resources and services to those willing to pay. As a result, some schools have access to better web services than others
5. Schools emphasise the teaching of canonical texts and important cultural ideas
6. Web 2.0 tools such as wikis and blogs allow shared authorship across geographic boundaries
7. Classes are organised by the level of the subject/topic being learned rather than by the age of the learner
8. Teachers focus on basic skills eg literacy and numeracy
9. Educational applications do not run on desktop computers but increasingly run on remote servers and cloud computing
10. Schools increasingly use open source software

From these results, there is a clear preference for the provision and presence of technology in schools. It is difficult to ascertain whether this demonstrates a preference for use of

technology in learning or is more related to having general access to computer equipment and the internet. However, a related interest and perceived importance of media use and studies is also apparent. Additionally, responding students seem to prefer pedagogies, learning activities and content areas that offer alternatives to the more conventional teacher-led learning.

The appearance of a number of specific types of digital tools in the 'bottom' list (blogs, wikis, remote servers, cloud computing and open source software) also raises the question of whether students do not actually prefer these tools or may in fact not be familiar or knowledgeable about them. This may be a point to explore if further qualitative work is undertaken with young people in the project.

Analysis by Power League categories

As previously mentioned, the results have also been analysed according to the taxonomy of teaching and learning developed by Work Package 2 during the iTEC project (Column 1 in the table below). The Power League activity was originally created with an early draft of taxonomy categories (Column 2 in the table below). The taxonomy was developed to outline the main elements of scenarios in order to aid the scenario development process. Analysing the results according to the taxonomy can help identify where student preferences fit within the scenario development process. Differences in the two sets of categories meant some categories had to be combined to make analysis possible. There is likely to be significant overlap between categories, so the results below should be seen as a guide rather than a refined analysis. The table below therefore shows the top three results for each category in the taxonomy. The first row combines two categories and so presents the top six results.

Category – taxonomy	**Category – Power League**	**Top results for each**
Activities and interactions (including pedagogy)	Curriculum & Assessment AND Knowledge & Skills	1. Teachers focus on developing '21st century skills' eg collaborative and social skills 2. There is an increased focus on 'new media literacies' 3. Schools increasingly teach specialist skills for specific jobs 4. Pedagogies based on game design principles and play are increasingly seen as a tool for enjoying teaching and learning 5. Learners work on projects, doing authentic tasks and using technology creatively to tackle real challenges, this includes discovery based learning 6. Teachers use whole bodies of connected evidence from a variety of media to assess

		students
Environment	Learning Spaces	1. Learning spaces are designed to accommodate different learning activities 2. Areas are set-up so that students can work as a team. The seating and table arrangement can be reconfigured to allow everyone to see and talk to each other 3. Schools have a variety of areas that can be used for lessons or study, including small spaces for individual work, small group working and whole class teaching.
People and roles	Changing Roles	1. All learners have opportunities to work with other learners and to collaborate locally, nationally and internationally 2. Learners are able to access formal education at any time of the day (people, resources, courses) 3. There is an increase in child centred learning with the teacher building links between children's interests and curricula
Resources (including technology)	Technology	1. Schools provide students with netbooks 2. Schools provide students with digital exercise books and digital paper 3. Schools provide unlimited access to the internet when using a computer on school premises

Table 7: Power League results analysed by taxonomy

From this analysis, students' overall preferences for future classrooms appear to focus on particular categories or elements of learning. The table demonstrates that only two categories are represented in the list of top preferences for students. Those categories are 'Activities and interactions' and 'Resources (including technology)'. The categories of 'People and roles' and 'Learning spaces' are not represented in students' top preferences at all. It may be that these categories appear less relevant or are less tangible for students to envision or understand. However, considering the top results in all categories corroborates the previous analysis in terms of pedagogy. Students appear to prefer more child-centred, collaborative approaches to learning. Elements of flexibility in learning activities also factor strongly, both in terms of learning spaces and how, when and with whom learning can happen.

Findings and Recommendations

This final section considers findings from analysis of the survey and Power League activity and focuses on what project recommendations can be drawn from these findings. It is once again important to acknowledge that the survey respondents and participating students comprise a particular cohort. Teacher survey respondents are self-selected and not a representative sample across participating countries. Similarly, student participants were involved via self-selection of their teachers and come from a non-representative geographical sample. Despite these limitations, the findings are still able to provide guidance on how the iTEC project can respond to and address the realities of responding teachers and preferences of students.

Summary of findings: Teachers' survey

Teachers' confidence and use of technology

- *Respondents were generally experienced teachers who see themselves as regular to high users of technology and who have perceptions of high levels of personal competence at using technology.*
- *While teachers generally rank their IT competency as competent to high, many are not using it for a majority of the time in lessons.* It is difficult to ascertain why this is the case; they may be using astute judgment of when technology use is appropriate, have poor access or be unsure how or why to use it in classrooms.
- *Despite a wide variety of technology usage in the classroom in terms of proportion of use within lessons, a majority feel that they are using it more than typical colleagues do and are using it in increasing amounts.* Respondents therefore appear to consider themselves to be invested users of technology for learning, regardless of the amount it is used in the classroom.
- *Teachers use a wide range of technologies with different affordances but find the 'most useful' to be those most associated with teacher-led, didactic classroom practice (eg, IWB, projector).*

Perceptions on enablers and barriers to using technology

- *Teachers who report confidence and competence at using digital technologies may not be as confident or skilled at using new technologies for educational purposes or to promote learning.* More than a quarter still found it difficult to introduce new technologies in their teaching; a very high majority of respondents across all countries desired additional training on using technology in the classroom; and a large cohort would also like evidence of its utility for teaching and learning.
- *Barriers often assumed to get in the way of using technology did not appear to be an overwhelming issue for responding teachers.* Issues such as curriculum restraints and e-safety concerns were seen to be barriers by some teachers but not by an

overwhelming majority. Assessment systems appear to provide a bigger challenge to the use of technology but were not seen to be a barrier by a majority of teachers.

- *Teachers report large variations in levels of technical support, access to technology and supportive teacher networks between participating countries.* This is emphasised by the variability seen in the use of different digital technologies. These may be contributing factors to why more than a quarter of responding teachers find it difficult to integrate new technologies into their teaching, particularly interesting when considering the high reported levels of confidence and competence reported by these teachers.

Value and benefits of using technology

- *Teachers recognised the value of using technology in the long-term but identify a short-term impact on workload.* This point is particularly important for the iTEC project to recognise, as the pilots will be asking teachers to use new technologies with a likelihood of increasing their workload.
- *Respondents appeared positive about the benefits and value of using technology in the classroom, but areas of teaching and learning that are often more complex (developing critical, intellectual and social skills) were the areas that showed the highest lack of conviction from respondents.* This is important to consider within the project, as these are areas of learning present in many scenarios and may require additional support for teachers.

Summary of findings: Power League Student Activity

- *There is a clear preference from students for the presence and use of technology in schools*. It is unclear how much preference relates to use of technology in learning or is more related to having general access to computer equipment and the internet. Certainly students identified strong preferences in relation to access of hardware, software, and internet in schools.
- *There is a related interest and perceived importance of media use and studies.* This suggests that related curriculum content, such as media studies and digital literacy, are also student preferences.
- *Responding students seem to prefer pedagogies, learning activities and content areas that offer alternatives to the more conventional teacher-led learning.* Specific areas that were highly ranked include collaboration, game-based learning, play, project- and discovery-based learning and students working in teams.
- *Students appear to prefer more child-centred, collaborative approaches to learning.* This includes teachers understanding and building links with children's interests outside of school.
- *Flexibility in learning also factors strongly, both in terms of learning spaces and how, when and with whom learning can happen.*

- *Students demonstrated strong interests in schools helping them become prepared for the world beyond formal education.* Relevant highly ranked areas of education included gaining '21st Century skills' and skills for specific jobs (rather than basic skills), performing authentic tasks and undertaking real challenges.

Recommendations for using these findings within iTEC

The survey and Power League activity provide important perspectives from teachers and young people on their attitudes and preferences of technology use in future classrooms. Guidance and recommendations these findings offer for the remainder of the iTEC project particularly resonate in the development of scenarios and support provided to teachers involved in the piloting of scenarios across Europe. Students' preferences should particularly be considered in relation to the picture the teachers' survey presents. Therefore, recommendations are as follows:

1. *Acknowledge and challenge teachers' current use of technology in classrooms through scenario and technology development.* There appears to be a strong teacher preference (in terms of utility) towards more conventional, hardware-based and often didactic teacher-led technologies. iTEC scenarios should consider how to challenge the use or application of these often-preferred tools so they are used in more innovative ways that also respond to student preferences for more collaborative, child-centred forms of pedagogy. Additionally, a number of more collaborative technology tools were not commonly used across most countries and therefore could represent an opportunity to be introduced as innovative where appropriate for learning activities. Tools including the use of games, social networking, mobile technology, video conferencing, virtual simulations and high-tech instruments have low take-up rates within most countries represented here. Even commonly used tools such as collaborative tools and digital resources are still not perceived as being exceptionally useful by most teachers, providing an opportunity for iTEC to demonstrate where they can be innovative and useful within classroom scenarios.
2. *Provide training for teachers that includes evidence of the benefits of new technologies for learning and also Incorporates pedagogical, as well as technical, training on the use of technology in classrooms.* Just because technology is used by teachers who are seen to be competent and confident at using different tools, it may not be used effectively in terms of teaching and learning. The majority of teachers also still wanted both evidence of benefits and additional training when using new technologies in the classroom, despite their self-perceptions as competent, invested users of technology.
3. *Recognise and facilitate the short-term investment of technology use required by teachers*. Many teachers recognise that a short-term investment in time and resources to use technology will reduce workloads (while also providing many

benefits to students) in the long run. iTEC's ability to motivate teachers to commit to the short-term investment with engaging scenarios and adequate support and is an important determinant of long-term success.

4. *Incorporate student preferences into the content, pedagogy and assessment elements of scenarios*. Student preferences should be considered and integrated into the scenario development process, including more opportunities for flexible learning, learning outside the classroom, collaboration, play and game-based learning, authentic learning experiences, and project- or discovery-based learning.
5. *Consider how to employ the enablers many teachers have identified that support use of technology in the classroom.* These enablers include involvement of students in the teaching and use of technology, additional training, and providing evidence on the educational value of using technology. These enablers should be considered during the scenario development process and could also apply to the training and ongoing support provided to teachers.
6. *Involve teachers and students in the development, preparation and facilitation of the iTEC process.* Teachers should be more directly involved in the scenario development process. Additionally, in order to accommodate the overlap and address the tensions between the students' preferences and teachers' realities, future scenarios should re-iterate and further explore how student preferences can be included in the scenarios through additional research and input from learners.
7. *Augment these findings with additional research and data gathering.* The difficulties with bias and representation presented in this survey can be somewhat alleviated through continued research and data gathering from similar studies. Additional involvement of teachers in the iTEC project can provide qualitative data to support or challenge the results found here. Additionally, European Schoolnet is leading on Survey of Schools: ICT and Education, a survey of heads, teachers and students from 35,000 schools in 31 countries (including all iTEC partners). This will provide a complementary data set about digital competence, use and attitudes that will prove useful in subsequent iTEC cycles.
8. *Accommodate for the diversity of access and use of technology in classrooms.* Classrooms within and across countries are widely varied and this local context must be recognised in the development of scenarios, training processes and evaluation. This could include recognition of local context and need during piloting, as well as a wider range of scenarios or options within scenarios.

The survey and Power League activity provide important perspectives from teachers and young people on their attitudes and preferences of technology use in future classrooms. The picture they provide is generally one of teachers and students interested, engaged and motivated to use technology for learning and in schools. However, they also highlight the diversity of experiences across Europe and the subsequent complexity of implementing

technology-based educational innovations. The insight into the use, perceived barriers and enablers and value of technology, as well as student preferences in their education, is a key contributor to iTEC's continuing approach to the process of developing, implementing and evaluating preferable learning scenarios.

Appendix A: Teachers' survey questions

The following is the list of questions on the teachers' survey, in their entirety. They were translated into 12 languages in addition to English.

Background

1. In which country do you teach?

Box 1: Participating countries

Austria
Belgium
Czech Republic
Denmark
Estonia
Finland
France
Germany
Hungary
Israel
Italy
Lithuania
Netherlands
Norway
Portugal
Slovakia
Spain
Switzerland
Turkey
United Kingdom

2 Which age group do you use digital technology with the most?

7 years and under 8 - 11 years 11-14 years 14-16 years 16+ years

3 How long have you been teaching?

less than 1 year 1-4 years 5-9 years 10-19 years 20+ years

4 **What are the main subject(s) you teach? (Please tick all)**

Box 2: Subjects (based on netbook survey by European Schoolnet)

Early years

Pre-school subjects
Primary school subjects

Arts

Drama / Theatre studies
History of art
Music
Visual arts

Design and technology

Design and Technology

Home economics
Media education
Humanities
Citizenship
Environmental education
Ethics
European studies
Geography
History
Law
Politics
Religion / Theology
Information technologies
Informatics/Information Communication Technology (ICT)
Languages
Classical languages (Latin and Greek)
Modern foreign languages
National language and literature
Mathematics and business studies
Economics
Mathematics/Geometry
Philosophy / Logic
Science
Biology
Chemistry
Geology
Health studies
Physics
Social Science
Social studies / Sociology
Psychology
Physical education
Physical education
Special needs education
Special needs education
Others, please specify

Current usage

5 What digital technologies do you use in an average term? (Please tick all that you use)

Box 3: Digital technologies (based on netbook survey by European Schoolnet)

- Collaboration tools (such as: blogs, wikis, bookmarking)
- Computer projection (including document cameras, ie, mounted camera attached to a digital projector allowing documents and other objects to be projected)
- Digital games
- Digital media tools (such as: video camera, audio recorder) and music/photo/video/slide sharing sites (such as: You tube, Flickr)
- Digital resources (such as: databases, electronic books, online textbooks animations, videos etc)
- Digital tools that help you organize your work (such as: Diigo, Bubbl.us)
- Handheld student response systems (such as: voting tools)
- High tech instruments for science (such as: data loggers)
- Interactive whiteboards (such as: Promethean, Smartboard, Polyvision)
- Mobile devices (such as: cell phones, PDAs, MP3 players)
- National or regional educational school portal
- Online courses
- Podcasts
- Social networking sites
- Text communications tools (such as: email, IM and text messaging)
- Video conferencing (such as: Flashmeeting, Elluminate, Skype)
- Virtual experiments and simulations
- Virtual Learning Environments/Learning management systems (such as: Blackboard, Moodle, Angel)
- Other - please specify

6 What one digital technology do you find the most useful?

Drop down list - see list in Question 5

7 How do you rate your skills with digital technology in general?

Non-user	Novice	Competent	Good	Expert

8 What proportion of time on average do you use digital technologies in your lessons?

0-20%	21-40%	41-60%	61-80%	81-100%

9 How does this compare to the typical usage of other teachers within your school?

Much more	A little more	Similar	A little less	A lot less

10 How does this proportion compare to this time last year?

Much more	A little more	Similar	A little less	A lot less

Please answer the following questions in relation to the use of digital technologies in your classroom
The following statements all included the following possible responses:

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree
- No opinion

11 When a new technology is introduced I have sufficient technical support in my classroom
12 The use of digital technologies supports delivery of the curriculum
13 I would like evidence of the educational value of a new digital technology or activity before using it
14 I find it difficult to see how I can integrate digital technology that I have not used before in my teaching
15 Assessment requirements limit my use of digital technology
16 Using digital technologies will increase my workload in the short term
17 Using digital technologies will increase my workload in the long term
18 I would like more training in how to effectively use digital technologies for learning
19 I participate in a supportive teacher network around digital technologies
20 I have sufficient access to hardware and software in my classroom
21 I choose not to use some digital technologies because of e-safety concerns
22 Students in my class help me with the use of digital technologies during lessons

In relation to the technology you find most useful in your lessons, what benefits does it offer?
The following statements all included the following possible responses:

- Strongly agree
- Agree
- Neither agree or disagree
- Disagree
- Strongly disagree
- No opinion

23 It motivates students to learn more
24 It improves performance in the subject
25 It improves students' personal skills (e.g. initiative, persistence)
26 It improves students' social skills (e.g. teamwork, communication)
27 It improves students' intellectual skills (e.g. problem-solving)
28 It improves students' critical skills (e.g. evaluating a resource for bias)
29 It improves students' digital technology skills (e.g. use of online resources)

Appendix B: List of translated languages and participating iTEC countries

The survey and Power League activity were available in the following languages:
Dutch
English
Estonian
French
German
Hebrew
Hungarian
Italian
Lithuanian
Norwegian
Portuguese
Slovakian
Turkish

iTEC partner countries
Austria
Belgium
Denmark
Estonia
France
Germany
Hungary
Israel
Italy
Lithuania
Norway
Portugal
Slovakia
Spain
Switzerland
Turkey
United Kingdom
Associate Partner countries:
Czech Republic
Finland
The Netherlands

Appendix C: Distribution of Survey and Power League

Organisation	Method	Country	Language	Date	Circulation (approximate and where known)
European Schoolnet	EU Schoolnet newsletter (http://files.eun.org/corporate/newsletters/issue57.htm)	Various	English	04/03/2011	
European Schoolnet	EU Schoolnet teachers newsletter (http://service.eun.org/teachers-newsletter/teachers_nl_022011_en.html)	Various	English, French, German	04/03/2011	30,000
European Schoolnet	iTEC Newsletter	Various	English	04/03/2011	
European Schoolnet	EUN General mailing lists (basic press, portals and European projects	Various	English	04/03/2011	
European Schoolnet	Facebook (facebook.com/european.schoolnet)	Various	English	04/03/2011 and 21/03/2011	
European Schoolnet	Twitter (twitter.com/eu_schoolnet)	Various	English	04/03/2011 and 21/03/2011	
European Schoolnet	Other EUN projects asked to promote according to their possibilities (websites, newsletter, etc.)	Various	English	04/03/2011	
Promethean	Promethean Planet teacher web sites (English: http://www.prometheanplanet.com/community/news-events/promethean-planet-invites-you-to-participate-in-the-itec-survey.aspx)	Various	French, Portuguese, German, Dutch, English, Italian	23/02/2011 - 25/02/2011	237,476 - Figure based on number of teachers registered on Promethean Planet in Portugal, France, the Netherlands, Germany, Italy and the UK (as the

					information was available in Portuguese, French, Dutch, German, Italian and English and targeted at teachers in Europe).
Promethean	Facebook/social media	Various	English	01/03/2011	
SMART	SMART consultants who work with schools	Various	Various	26/02/2011	520 schools (26 consultants in Europe (in participating countries) who work with approximately 20 schools each)
iTEC	iTEC monthly update	Various	English	07/03/2011	
iTEC project partner - Turkey	ACER netbook project teachers and Kocaeli province netbook initiative teachers	Turkey	Turkish	09/03/2011	
iTEC project partner - Belgium	Teacher community site and direct email	Belgium	French/Dutch	19/03/2011	Direct email to every teacher in the country
iTEC project partner - Israel	Teacher network	Israel	Hebrew	14/03/2011	3,000 teachers
iTEC project partner - Portugal	Innovative schools networks, Institute of Education teacher mailing list	Portugal	Portuguese	14/03/2011	Included in a Moodle course accessed by 100 clusters (around 400 K-12 schools that responded to a call for innovative projects in the educational use of ICT)

iTEC project partner - Italy	Teacher networks	Italy	Italian	04/03/2011	Should be able to send to 100 classrooms
iTEC project partner - Estonia	Has passed on to national coordinator who will send out to teachers (possibly those interested in being pilots)	Estonia	Estonian	04/03/2011	
iTEC project partner - Lithuania	Pre-pilot teacher network	Lithuania	Lithuanian	04/03/2011	
iTEC project partner - Norway	Has passed on to the national coordinator who will send on to schools in their networks	Norway	Norwegian	08/03/2011	
iTEC project partner - Hungary	Teacher network and national educational portal (http://www.sulinet.hu/tart/cikk/Sa/0/36948/1). Also published in other portals and blogs.	Hungary	Hungarian	09/03/2011	
iTEC project partner - Slovakia	Schools network	Slovakia	Slovakian	mid-March	Forwarded to more than 60 secondary schools
iTEC project partner - France	Schools network	France	French	late March	
eLearning Global Network	LinkedIn network with more than 7,000 professionals involved in eLearning	Various	Various	18/03/2011	
ITTE (Association for Information Technology in Teacher Education)	Promote among ITTE colleagues to forward to teacher networks	Various	Various	18/03/2011	

Appendix D: Power League Descriptors

Category	Descriptor
Changing roles	There is an increase in student centred learning with the teacher building links between student's interests and curricula
Changing roles	Schools use digital technology to share their specialist teachers with other schools
Changing roles	All learners have opportunities to work with other learners and to collaborate locally, nationally and internationally
Changing roles	Learners are able to access formal education at any time of the day (people, resources, courses)
Technology	Collaborative web 2.0 technologies allow learners to learn from each other as part of their formal education experience
Changing roles	There is a decrease in student centred learning and increase in teacher led classroom practice
Changing roles	Teachers develop teaching and learning strategies that take account of student's one to one access to computers
Changing roles	Teachers become less central as direct instructors, and more involved in helping students learn autonomously at their own pace
Changing roles	There are a greater number of specialist teachers, for example, special educational needs teachers, science teachers, teachers focusing on gifted and talented students
Changing roles	Digital technologies are used to give learners access to experts around the world
Curriculum and assessment	Classes are organised by the ability of the student in the subject or topic being taught rather than by their age
Curriculum and assessment	Global priorities influence educational systems around the world so schools are very similar: similar subjects, exams, teaching methods etc
Curriculum and assessment	Schools can offer their curricula and assessment to other countries around the world
Curriculum and assessment	Digital technologies allow schools to use assessment data to personalise their teaching
Curriculum and assessment	Teachers use whole bodies of connected evidence from a variety of media to assess students
Curriculum and assessment	Teachers focus on developing '21st century skills', e.g. collaborative and social skills
Curriculum and assessment	Learners work on projects where they do authentic tasks and use technology creatively to tackle real challenges, this includes discovery based learning

Curriculum and assessment	Methods of teaching based on game design principles and play are increasingly seen as a tool for enjoying teaching and learning
Curriculum and assessment	There is an increased focus on 'new media literacies'
Curriculum and assessment	More creative approaches are used in education and students are encouraged to learn from their mistakes
Knowledge and skills	Schools develop courses and careers advice for a variety of mixed aged learners, including older students who need new skills and younger students
Knowledge and skills	Influential corporations and global organisations have agreed standards of 21st century skills
Knowledge and skills	Due to an aging population, skills of health-care and nursing are increasingly valued in society
Knowledge and skills	Teachers focus on basic skills, e.g. literacy and numeracy
Knowledge and skills	There is an increased focus on individual pupil qualifications for gaining employment, and for school accountability
Knowledge and skills	Schools emphasise the teaching of texts agreed as essential, and important cultural ideas
Knowledge and skills	Schools increasingly teach specialist skills for specific jobs
Knowledge and skills	Businesses develop closer relationships with individual schools and help shape the school's priorities
Learning spaces	Some learners learn in virtual social networked environments, such as Second Life
Learning spaces	Schools have a variety of areas that can be used for lessons or study, including small spaces for individual work, small group working and whole class teaching
Learning Spaces	Schools have specially built studios or classrooms away from the school site. These could be in the local park, out in the community or in places of industry
Learning spaces	Areas are set-up so that students can work as a team. The seating and table arrangement can be reconfigured to allow everyone to see and talk to each other
Learning spaces	Schools only use renewable sources of energy like solar power, wind power and wave power

Learning spaces	The needs of students with special educational needs or disabilities are taken into account when planning new schools (e.g. room layout, choice of furniture, technology)
Learning spaces	Formal and informal learning takes place in an increasing variety of spaces (parks, homes, playgrounds etc)
Learning spaces	The flow of information between home and school becomes seamless, for example parents and carers can communicate with teachers via the web
Learning spaces	Learning spaces are designed to accommodate different learning activities
Learning spaces	The school library becomes a multipurpose learning space
Learning spaces	There are no more computer labs
Technology	There is an increase in the ownership of mobile phones in 12-16 olds
Technology	Schools provide students with netbooks
Technology	Schools provide students with digital exercise books and digital paper
Technology	Multi-touch surfaces are increasingly used to interact with computers in the classroom
Technology	Interaction without digital technology is valued
Technology	Web 2.0 tools such as wikis and blogs allow shared authorship across geographic boundaries
Technology	Interactive white boards are cheaper and more powerful
Technology	Mobile phones are cheaper and more powerful
Technology	Tangible interfaces and interactive projections are more available
Technology	PCs and laptops are cheaper and more powerful
Technology	Gaming technologies (e.g. consoles) are cheaper and more powerful
Technology	Smart technologies are embedded in everyday objects, e.g. RFID tags in key cards
Technology	Use of interactive touch surfaces increases (such as interactive white boards, multitouch tables or any other surface)
Technology	Widespread use of digital technologies allows the creation of personal portfolios that showcase education and personal development
Technology	Schools increasingly use intelligent software systems to teach students

Technology	Many companies and providers offer different resources and services to those willing to pay. As a result, some schools have access to better web services than others
Technology	Learners can search across many specialist repositories on the web, where contents are carefully categorised and checked for quality and reliability.
Technology	Learners use technology such as haptic devices to simulate medical practices, or simulations to create possible learning environments, e.g. for foreign language learning
Technology	The teacher has one interface to see information on their students, including their digital learning plan
Technology	Educational applications do not run on desktop computers but increasingly run on remote servers and cloud computing
Technology	Schools increasingly use open source software
Technology	Computers don't just present information, but begin to understand its meaning. Intelligent systems learn what students are interested in and help them get what they want
Technology	Schools provide unlimited access to the internet when using a computer on school premises