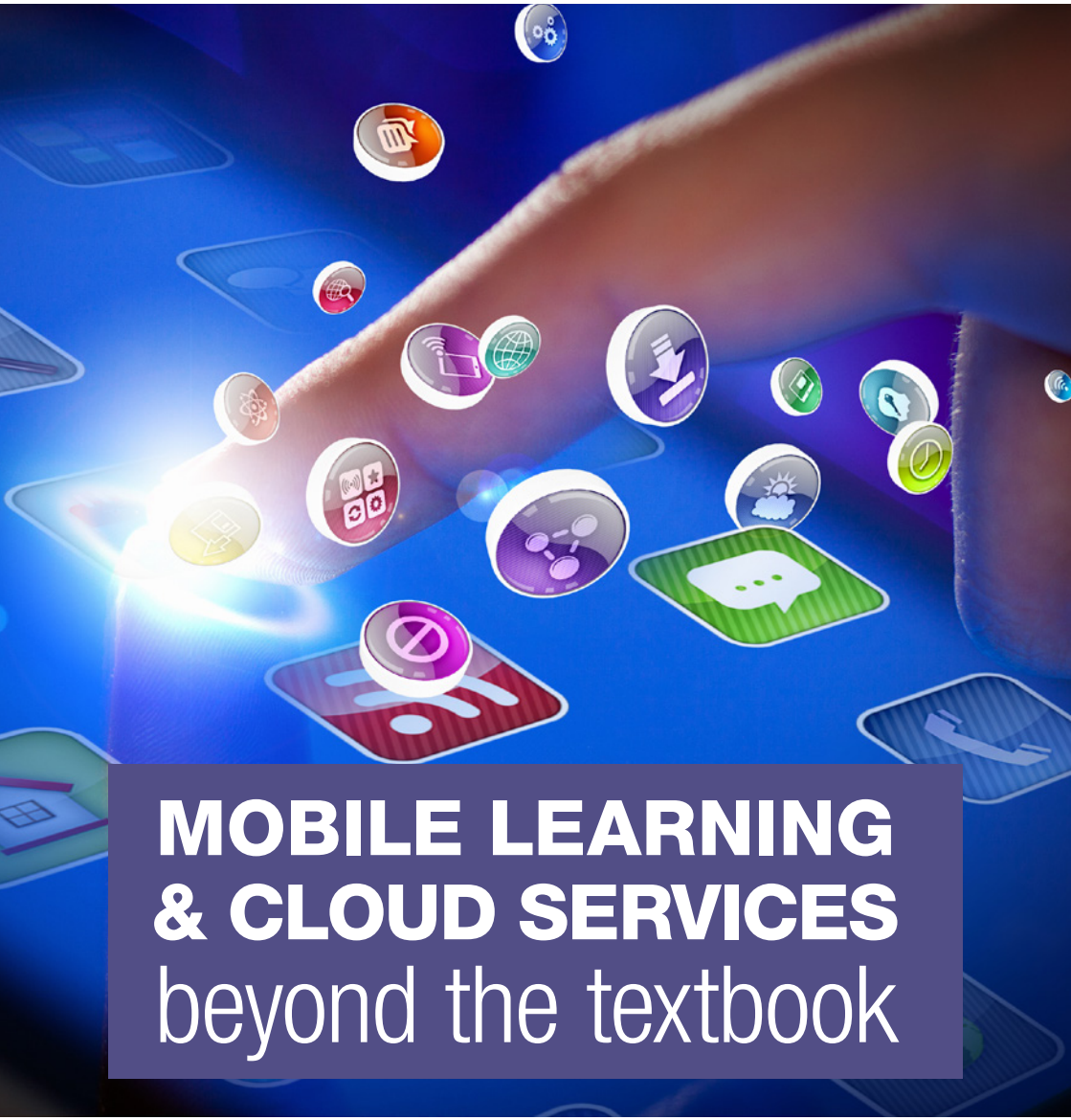
FCL Regio

RECOMMENDATIONS AND GUIDELINES FOR
POLICY MAKERS



MOBILE LEARNING & CLOUD SERVICES
beyond the textbook

PROVINCIA AUTONOMA DI TRENTO
TRENTINO
GR Utbildning
Generalitat de Catalunya
Departament d'Ensenyament
European Schoolnet

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1) Executive summary

The Future Classroom Lab Regional Network project (FCL Regio) brings together a growing number of local and regional authorities, as well as a network of national ministries of education, to explore common challenges related to the integration and mainstreaming of ICT in schools.



During its first year, the FCL Regio project has particularly focused on several key questions. What is mobile learning? What are cloud services for schools? How can they support a 'beyond the textbook' strategy? Why is this important? What are the potential benefits of introducing these technologies in the classroom?

These and other questions led the discussions held at the first Strategic Seminar in Brussels on the 10th May 2016, informed an online questionnaire dedicated to local policy makers in the field of education, as well as inspired face-to-face consultations with national and regional decision makers. The resulting main findings, reported in this document, allowed the consortium to formulate seven key recommendations for regional policy makers, summarised below, for a better deployment and implementation of mobile devices and K-12 cloud services at both regional and national levels.

FCL REGIO RECOMMENDATIONS

Education 'beyond the textbook'. *"Regions should develop strategies that support the co-creation of innovative digital educational resources for schools by policy makers working closely with software developers, publishers (both commercial and non-profit), teachers and students. In order to successfully move "beyond the textbook", It is particularly important that funding mechanisms and training (on standards, open licenses, new technological solutions) are not focused solely on adaptation of existing open educational resources (e.g. the creation of simple e-books) but that actions are taken to support the co-creation of original content for mobile technologies that both engages students and inspires teachers."*

Education based on equity. *"Regions should ensure that excellence in education is based on equity and that all students are entering schools where 21st century teaching*

and learning methodologies are supported by innovative use of ICT and digitally competent teachers."

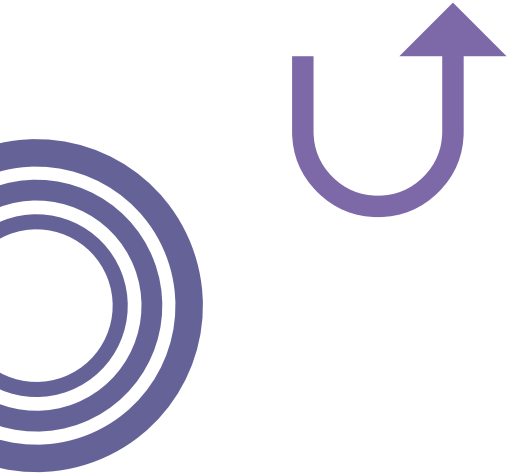
Vision. *"Regions should put in place mechanisms to develop a clear vision for how ICT can add value to schools, particularly in countries where there is no national ICT or digital strategy/agenda. Support should also be given to schools to help them develop their own ICT strategy based on this vision, including how use of mobile devices and cloud services can be effectively deployed."*

New procurement models. *"Regions should develop procurement models which reflect the fact that learning is increasingly taking place outside the school and may involve new issues related to the use of student personal data, cloud services and 1:1 access to mobile devices in and out of school."*

Public private partnerships (PPPs). *"Regions should actively explore how new models for public private partnerships can support innovative approaches to the implementation of ICT in schools."*

Mobile phone bans. *"Regions should resist having a policy that bans mobile phone use in schools and should support schools in developing clear student use policies and guidelines."*

Continuing professional development of teachers. *"Regions should increase efforts related to continuing professional development of teachers and should propose a minimum level of digital competences for all teachers as part of their regional ICT strategy."*





2) Background

The Future Classroom Lab Regional Network project (FCL Regio), funded by the Erasmus+ programme and coordinated by the Autonomous Province of Trento and European Schoolnet, is providing new opportunities for regional educational authorities to explore common challenges related to the integration and mainstreaming of ICT in schools. This project includes three local authorities in Europe (Catalonia, Gothenburg and Trento) that are at the forefront of making innovative use of ICT.

The project supports the integration of ICT in teaching and learning and aims to:

- Strengthen cooperation between decision makers developing and implementing ICT strategies for schools working at national and regional levels based on an exchange of practices and joint working related to the use of mobile devices and the development of cloud services;
- Showcase innovative classroom practice in regions and produce strategic guidelines for those attempting to mainstream ICT in schools, particularly related to pedagogical scenarios involving mobile devices and K-12 learning cloud services;
- Provide practical guidelines, recommendations, resources and other support materials for head teachers and school leaders developing strategies for whole school use of mobile devices and cloud services.

In the first year of the project, FCL Regio partners have been focusing on how regions are responding to developing, accessing and using digital educational resources. This has always been a challenge for policy makers at both national and regional levels but has become increasingly critical in the last few years given: the explosion of mobile apps; new interoperability standards and specifications; the growing demand for more personalised pedagogical approaches; and the increasing numbers of schools that wish to implement a 1:1 computing strategy or Bring Your Own Device initiative.

Regarding this rapidly changing context, this report is designed to inform and provide advice to decision makers developing regional and national ICT strategies. It particularly attempts to identify innovative new projects and pilots and highlight key policy challenges/roadblocks that policy makers need to address related to the deployment and implementation of mobile devices and K-12 cloud services at both regional and national levels.

A number of reports, studies, projects and pilots, summarised below, have provided the context for discussions within the project as well as helped to inform the recommendations being made in this deliverable.

THE 2013 SURVEY OF SCHOOLS: ICT IN EDUCATION (Hyperlink)

This study collected and benchmarked information from 31 European countries (EU27, HR, ICE, NO and TR) on the access, use, competence and attitudes of students and teachers regarding ICT in schools. The survey aimed to shed some light on the issue of ICT usage in schools.

THE EUROPEAN COMMISSION'S OPENING UP EDUCATION COMMUNICATION (Hyperlink)

This Communication sets out a European agenda for stimulating high-quality, innovative ways of learning and teaching through new technologies and digital content. 'Opening up Education' proposes actions towards more open learning environments to deliver education of higher quality and efficacy and thus contributing to the Europe 2020 goals of boosting EU competitiveness and growth through better skilled workforce and more employment.

UNESCO POLICY GUIDELINES FOR MOBILE LEARNING (Hyperlink)

UNESCO believes that mobile technologies can expand and enrich educational opportunities for learners in diverse settings. This set of guidelines seeks to help policy-makers better understand what mobile learning is and how its unique benefits can be leveraged to advance progress towards Education for All. According to these guidelines, mobile learning "involves the use of mobile technology, either alone or in combination with other information and communication technology (ICT), to enable learning anytime and anywhere.

TURNING ON MOBILE LEARNING IN EUROPE. ILLUSTRATIVE INITIATIVES AND POLICY IMPLICATIONS, HYLÉN, 2012 (Hyperlink)

This paper identifies strategies, initiatives and projects for mobile learning in formal education in Europe. Data collection has mainly been done through research inquiry. A questionnaire sent out to thirty Ministries of Education resulted in only two responses, probably reflecting the low priority given to mobile learning at the policy level in Europe today.

MOBILE LEARNING FOR TEACHERS. EXPLORING THE POTENTIAL OF MOBILE TECHNOLOGIES TO SUPPORT TEACHERS AND IMPROVE PRACTICES, DYKES AND RENFREW, 2012 (Hyperlink)

This paper reviews and analyses current and recent initiatives involving the use of mobile technologies for teacher support and professional development in Europe. Many of the initiatives are local, small-scale projects, often based in a single school or class. A handful are much larger projects that aim to have a substantial impact on education at a national or regional level.

MOBILE OPPORTUNITIES. EXPLORING POSITIVE MOBILE MEDIA OPPORTUNITIES FOR EUROPEAN CHILDREN, LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE, VINCENT, 2015 (Hyperlink)

The paper presents findings about how children and young people aged 9-16 use smartphones and tablets based on two European-wide research projects (EU Kids Online, and its sister project Net Children Go Mobile) and examines the potentially positive online experiences that mobile opportunities present.

NOW FOR THE LONG TERM. THE REPORT OF THE OXFORD MARTIN COMMISSION FOR FUTURE GENERATIONS, FREY, OSBORNE, 2013 (Hyperlink)

The document estimates that the jobs that are at risk are mainly in low-wage occupations that do not require higher education. Many jobs in manufacturing industries have already disappeared as a result of automation and digitization, and now the trend is spreading to areas such as logistics, sales and administrative occupations, construction and transport. However, jobs that require a higher degree of social skills and creativity are likely to continue to exist, because human factors are difficult to replace.

MAKING CHANGE WORK & IBM GLOBAL CEO STUDY 2008 (Hyperlink)

In 2008, IBM published a survey of what characteristics organization leaders need most in their staff. They spoke with fifteen hundred leaders in eighty countries. The two priorities were adaptability to change and creativity in generating new ideas. The survey concluded that, to prepare our students for a future where jobs are invented that we cannot even imagine today, we must use all means to move beyond the repetition of the textbook and promote future-skills by the use of the latest technology.

3) Regional case studies

This section provides background information and a brief summary on how each of the FCL Regio project partners is currently implementing ICT in schools in order to provide some context for the recommendations that are proposed in section 4.

3.1) Autonomous Province of Trento

THE PROVINCE & ITS SCHOOLS

The Province of Trento (Provincia Autonoma di Trento – PAT) has a special status of autonomy established by constitutional law. All competences in education are transferred from the state to the province (only Trentino Province has a peculiar law about education – L.P. n° 5 del 7/08/06) also from an administrative and financial perspective. The province legislative functions on education encompass pre-primary school, school construction and right to study, vocational training, and school organisation.

SCHOOL DATA	
Students	86.239
Classes	3.850
Teachers	5.866
Administrative Staff	1.825

BUDGET over 700.000.000 € PER YEAR	
Over 650.000.000	administrative expenditure (payrolls and schools management)
Over 45.000.000 €	capital outlay (investments, furniture, infrastructures)



THE EQUIPMENT & INFRASTRUCTURE

Deriving from these characteristics of Trentino Province, some school policies are directly managed locally, in connection with Trentino's goals of economic, cultural and social development. In this regards, ICT became one of the priorities of Trentino's political agenda, which resulted in a massive supply in teaching technologies.

DIGITAL SCHOOL DATA	
ICT educational tools	
Computers	12.575
Mobile devices	2.694
Interactive Whiteboards (IWB)	1.609
Multimedia Labs and ICT Labs	402
Classrooms with wired networks	3.569
Classrooms with Wi-Fi	1.437

The adoption of technological innovation projects in education, the large investment in IWBs (interactive whiteboards) and the construction of a fibre optic network throughout the PAT are just a few examples of how ICT is seen as a priority at the political level. Since 2008 PAT has provided its schools with more than 2500 IWBs (minimum 50% coverage of classrooms per school. Some schools with 100% coverage of the classrooms plus IWB in the labs).

POLICIES IMPLEMENTED & PLANNED SO FAR

Over more than a decade, PAT has been providing financial support and equipment to schools and promoting initiatives that support organisational and educational innovation in schools through the use of ICT. This policy priority has been implemented through the promotion of several projects, among which AVAC (promotion of virtual environments of cooperative learning), and SLIMTEAM (educational practiced community where teachers interact among themselves and share their knowledge and experiences).

ICT in schools is not merely considered as a process of equipping institutes with technological equipment. More importantly, it is seen as a means of encouraging reflection on pedagogical practice that invites teachers to change their assumptions about teaching and learning and help put the learner person as the centre of the

learning process. This approach has underpinned the funding of several important projects, including:

Didapat pathway – New Technologies for Teaching (Hyperlink). The aim in setting up the DIDAPAT platform was to provide teachers with digital competences and to foster the use of ICT in education. The investment concerned mainly laboratory and guidance methodologies, in order to substantially effect on teaching and learning processes and on the development of competences.

Cl@ssi2.0 (Hyperlink) is an advanced innovation project for the development of digital classes started in the school year 2010, in line with the national project named "Digital School - Classroom 2.0" (school year 2009-2010). The process was monitored in order to evaluate the impact of ICT and of the new learning environment on students' performance and skills. The focus was not on technology per se but on how use of ICT could promote pedagogical innovation. As a result, the cl@ssi 2.0 project encompassed the design and implementation of action based-research activities aimed at guiding teachers' work towards the concept of Learning Solutions (LSs) where students, who are part of groups, interact with a wide range of instructional tools and reflect all together on what and how they have learned.

Among the actions undertaken by PAT, is worth to mention the decision to create a Google for Edu domain for all the primary and secondary school teachers, in order to implement the use of cloud technology in both the communication and the teaching practice. A core element is the training of teachers. Currently, research and action activities are foreseen to take place on the topics of flipped classroom, modification of learning environments and a course in collaboration with the Catholic University of Milan on digital awareness.

TEACHER TRAINING IN TRENTINO

Training teachers on how to effectively utilise technology within pedagogical scenarios has always been considered a strategic priority in Trentino's school system and every teacher must dedicate at least 10 hours a year to training/professional updating/ activities according to the priorities set by their school. The school can use training opportunities promoted by the Administration or by other qualified/accredited public and private entities. Furthermore, newly recruited teachers must attend a mandatory training course (induction training). Training is supported 100% by PAT, both when provided by IPRASE - Provincial Institute for research and educational experimentation (the research and pedagogical training institute of the Province of Trento), or organized independently by the schools.

RELATIONS WITH NATIONAL AUTHORITIES. HOW IS THE NATIONAL STRATEGY IMPLEMENTED LOCALLY?

Despite the autonomy of the region, national policies translate into the provincial territory as well. In line with the national policy establishing the Italian National Plan for Digital Education (Piano Nazionale Scuola Digitale — PNSD, law n.107/2015, named "La Buona Scuola") the Province is also drafting a Provincial Plan for Digital Education. Among the plan's objective, there is the creation of creative workshops and laboratories for the development of digital environments competencies.

MAIN CHALLENGES. BOTTLENECKS, DRAWBACKS, UNTAPPED POTENTIALS

The main challenges arise in the effort to make more uniform the school situation in the Province. There are indeed schools which are very active in the use of ICT compared to others. Another challenge is to tackle attitudes that resist change and find new ways to encourage teachers to adopt more innovative pedagogical approaches. An untapped potential is the community synergy among educators, within the same school and across institutes, which can become the educational instrument for the promotion of an effective and innovative pedagogy and for the co-construction of knowledge.

Lessons Learned

The project Cl@ssi2.0, as described above and in the dedicated impact report (Hyperlink) can be seen as a good example of educational practice to be transferred into other contexts.

3.2) Catalonia Department of Education

POLICIES IMPLEMENTED & PLANNED SO FAR

Mobile learning and cloud services have always been a key issue for Catalan educational institutions regarding the use of ICT in education. The implementation of policies and actions regarding these two approaches began at different moments.

The Catalan Department of Education set up its own educational online network (XTEC, Hyperlink) in 1995. Since then, XTEC has become one of the most visited corporate portals of the Catalan government with some 30 million visits every year. XTEC offers resources, projects and documentation for all Catalan teachers.

In 2001, edu365 (Hyperlink) was created as a website for students and families. It was meant to offer materials that could be used by students at home. It originally

hosted curriculum-based interactive materials covering all subjects of infant, primary and secondary level education. With time, it began to incorporate cross-curricular materials and utilities, such as health education, Internet safety and a section for impaired learners. It addition to its original aim, it is now widely used in schools and has more than 30 million visits every year. Later on, edu365 incorporated sections for creativity (CREA, Hyperlink), game-based learning (JUGA, Hyperlink) and coding and robotics (IMAGINA, Hyperlink).

Edu365 is today a showcase of materials created by the Department of Education as well as those created by third parties and found on the internet, that are considered of high educational value. The site will increasingly be focused on educational competencies and not only resources which will imply a deep change in structure and contents. The challenge lies in satisfying the needs of those users who still find interactive materials useful, as well as moving towards the needs that new trends in education are demanding.

A particularly interesting tool created by the Department is JCLIC software that allows teachers to create their own interactive materials and share them within a wider international community. Originally Java-based, JCLIC is now moving towards html5, in order to become accessible on mobile devices. More than 2400 projects are available in JCLIC's library.

The Department of Education has concentrated considerable efforts in developing online cloud services covering a range of areas:

- Àgora (Hyperlink) offers cloud services to Catalan schools. Schools can download and set up their own VLE based on Àgora's Moodle platform (Àgora - Moodle) as well as their own website (Àgora - Nodes). More than 1500 schools use now Moodle, and more than 1000 have set up their own school site;
- Alexandria (Hyperlink) is an online repository of Moodle courses as well as a library of IWB materials created by teachers. Once schools have set up their VLE through Àgora, they can find and download courses covering most subjects (>270) in Alexandria, as well as many Open-Sankoré resources for their IWB (>700);
- Odissea (Hyperlink) is the cloud-based open online training service covering all aspects related to teacher training, regarding subjects, methodologies, approaches, infrastructure and new trends in education. Currently almost 3000 courses are available;
- XTEC Blogs (Hyperlink) is a blog hosting service for teachers. More than 40.000 educational blogs have been created, both teacher and classroom blogs.

The Department of Education also offers cloud services based on Google for teachers and schools through a customised *XTEC-Google Drive*, which allows educational agents to create their own materials and websites.

MOBILE LEARNING: A CATALAN PERSPECTIVE

The use of mobile devices in schools in Catalonia is increasing slowly. Tablets have replaced computers in classrooms in many cases but this is not what happens with mobile phones, whose use is often prohibited by internal regulations of the schools. However, the potential of these devices for educational use cannot be ignored, as the vast majority of students have a mobile phone and use it in their everyday life. According to the Statistical Institute of Catalonia, 53.7% of children between 10 and 15 years have one of these devices and use it daily.

The School Education Council of Catalonia (Consell Escolar de Catalunya, 2015), as a consultative body aimed at articulating social participation in the field of non-university education, has drawn up recommendations aimed at Catalan schools on the use of mobile devices (Education Council of Catalonia, 2015).

The Catalan Department of Education has developed a number of programmes related to the use of mobile devices in the classrooms including the **mSchools programme (**Hyperlink**)**, a multi-faceted mEducation initiative of the Mobile World Capital Barcelona in collaboration with the Generalitat of Catalonia, Barcelona City Hall and GSMA. Launched in 2012, mSchools supports students and teachers effectively integrating mobile technologies into the classroom. It demonstrates how use of mobile devices enables access to up-to-date materials, improves collaboration and strengthens learner engagement, opening up new ways of teaching and learning that improve achievement and employability.

MORE ABOUT THE APP EDUCATION COURSE

The App Education course is fully integrated in the Catalan secondary schools curriculum as a “Computer Science” elective and also as a pedagogical proposal for the compulsory Technology subject in the two last years of compulsory education (ages 15 and 16) and for VET education (age 17). Teachers can choose between the traditional programme and the app education content. The course is comprised of the official curriculum stipulations which are currently 105 hours distributed in three classes per week over the school year, for the “Computer Science” elective (age 16), and 70 hours in two classes per week, for the Technology subject. About 19.000 students are involved which corresponds to more than 35% of students between 15 and 17 years old.

RELATIONS WITH NATIONAL AUTHORITIES. HOW IS THE NATIONAL STRATEGY IMPLEMENTED LOCALLY?

The Department of Education has a high level of autonomy that allows it to manage its own policies regarding all aspects of the educational system. The central/national government dictates certain regulations such as the core curricular framework covering the main aspects upon which the curriculum must be based.

The most important projects carried out at a national level in recent years have provided regions with additional funding: e.g. Internet en la escuela (2004-2007, Hyperlink), Internet en el aula (2007-2009, Hyperlink); Escuela 2.0 (2009-2011, Hyperlink); Plan de cultura digital (2012-..., Hyperlink).

The national Ministry of Education takes the lead in terms of European initiatives/projects and manages the participation by the regions. In-service teacher training is organised and managed at regional level. Training offered at a national level is also available to Catalan teachers, although most of them make use of the training possibilities offered by the Catalan regional ministry and by private teacher training institutions in Catalonia.

MAIN CHALLENGES. BOTTLENECKS, DRAWBACKS, UNTAPPED POTENTIALS

One of the main challenges identified is the lack of dynamic information flow between national and local levels. Further actions need to be implemented in order to ensure that innovative policies at national level are not only known at a regional level, but are also made more easily available to the educational community at this level.

On the other hand, policies, initiatives and projects carried out at regional level should find a clearer and more efficient channel to be shared with, not only national authorities, but also the rest of the regional educational authorities in Spain.

3.3) Gothenburg Region Association of Local Authorities

THE REGION & ITS SCHOOLS

The Gothenburg Region Association of Local Authorities (GR) is a co-operative public organisation uniting thirteen municipalities in western Sweden. GR works within several areas, such as teaching support, collaboration between school and industry and ICT and experienced-based learning in school. It connects the thirteen municipalities in different networks and working groups with the aim of promoting co-operation over municipal borders and supporting the exchange of ideas and experience within the region.

GR Education is a department within GR, working specifically with education development for all levels in the public-school system. The focus is on many aspects within the school system, such as competence enhancement for school leaders and teachers, working with drop-outs and on the use of ICT in school, such as mobile learning and cloud services.

GR Education works towards meeting the increased demand of IT and media available in school with a vast number of teaching materials distributed over the Internet to all schools in the region. For IT-and media teaching aids, all the member municipalities in the region are covered by GR's teaching aids service. As technology and media use in society continues to, grow, it is becoming increasingly important to be able to provide relevant tools to support student learning and collaboration.

POLICIES IMPLEMENTED & PLANNED SO FAR

The Swedish Association of Local Authorities and Regions (SALAR) provides support and develops the digitalization process in Swedish schools. This includes support for municipalities and regions that wish to use cloud services. In 2013 SALAR, in cooperation with The Swedish Data Protection Authority, produced guidelines for municipalities regarding cloud services (Hyperlink). These guidelines include data about usage of cloud services in schools, case studies, and a template for the use of cloud services in schools.

In 2016, the new national strategy for ICT in schools was adopted with the objective that, by 2020, all students will have developed adequate digital competences. In this regard, the use of mobile learning and cloud services were identified as important elements of the overall vision.

Authorities responsible for schools (in Sweden the responsible authority is either the municipality, the state or the private actor) are required by law to take out a personal data assistant contract regulating the processing of personal data with the cloud service provider. The Agreement must also ensure that the cloud service provider's subcontractors will be bound by the same conditions as the cloud service provider. If personal data will be transferred to countries outside the EU / EEA, the responsible authority has a legal responsibility.

The Pedagogical Centre at GR Education leads development projects working with for example maker culture, game-based learning, or programming. Several municipalities within GR, for example, are a part of the national project Makerspace in School, supported by Vinnova, a Swedish innovation agency, that aims to contribute to the development of new subject matter specific technology based on the creative use of emerging technologies. By challenging students to explore the boundary between analogue and digital educational tools, the project combines theoretical and practical work. Also by developing best practices in maker culture between teachers, schools

and local education authorities this can over time lead to improved educational activities in general and input for future curriculum development.

GR Education also organizes several activities with the purpose to develop ICT in schools. One example is the science event called Teachers' Night for 400 teachers hosted together with Universeum Science Center in Gothenburg and UR Educational Radio.

During 2016, the project called Games held workshops for teachers on using programming as a learning tool. At the workshop teachers from Stoney Dean School in the UK and from Lexby school in Sweden presented best practices from working with programming in Scratch and Kodu. The purpose of the project Games is to find good examples and methods from using programming to support and increase the learning among SEN-students.

RELATIONS WITH NATIONAL AUTHORITIES. HOW IS THE NATIONAL STRATEGY IMPLEMENTED LOCALLY?

Currently there is no national ICT strategy, but there are guidelines provided by the Swedish National Agency for Education. In addition, digital learning resources are provided, for example via different apps:

- **The Spider** (Hyperlink) is a search tool that is specifically made for schools; searching for resources takes place only in archives containing materials for school work;
- **Check the source** (Hyperlink) is a search service for copyright free materials online, such as free music, free sounds, teacher produced films and free photos;
- **UR** (Swedish Educational Broadcasting Company, Hyperlink) is part of the public service broadcasting group in Sweden, with Swedish Radio (SR) and Swedish Television (SVT). UR's mandate is to produce and broadcast educational and general knowledge programmes, which enhance and strengthen the work of others active in education;
- **SPSM** (Hyperlink) is a search for special educational needs' study materials that allows users to compare teaching materials from an accessibility perspective. The Special Needs Education Authority runs this service.

STAKEHOLDER'S ENGAGEMENT (E.G. MUNICIPALITY, HEAD OF SCHOOLS, TEACHERS, PARENTS, PUPILS...)

According to Swedish law, the responsible authority has to conduct a risk analysis and provide instructions for users of cloud services (teachers and school principals). The instructions include:

- Which personal data may be processed in a cloud service;
- How personal data may be processed in a cloud service;
- What applies to the publication of videos and images of an individual;
- Whether, and if so how, a cloud service provided through the client is used by teachers and students for private use, and the consequences of the use contrary to the instructions.

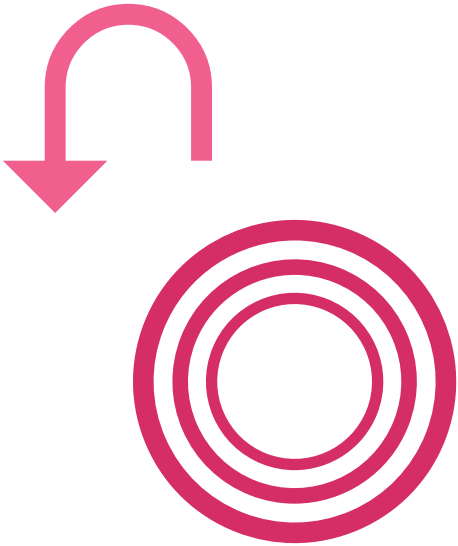
Again, it is up to the school and individual teacher to choose cloud services based on the risk analysis and instructions from the responsible authority.

Municipalities, county councils and regions may procure educational services from private companies, including cloud services. Privately managed providers financed from tax revenue must offer the service concerned to citizens on the same conditions as those that apply to a similar public service.

MAIN CHALLENGES. BOTTLENECKS, DRAWBACKS, UNTAPPED POTENTIALS

The challenge with mobile learning in GR (and Sweden) is that it remains optional for every teacher to incorporate or use ICT in lessons. With the upcoming ICT national strategy, the curriculum will be revised in order to include ICT as mandatory.

Another challenge is the knowledge and understanding of what cloud services are and how these work which varies from one school to another and is also different among teachers.



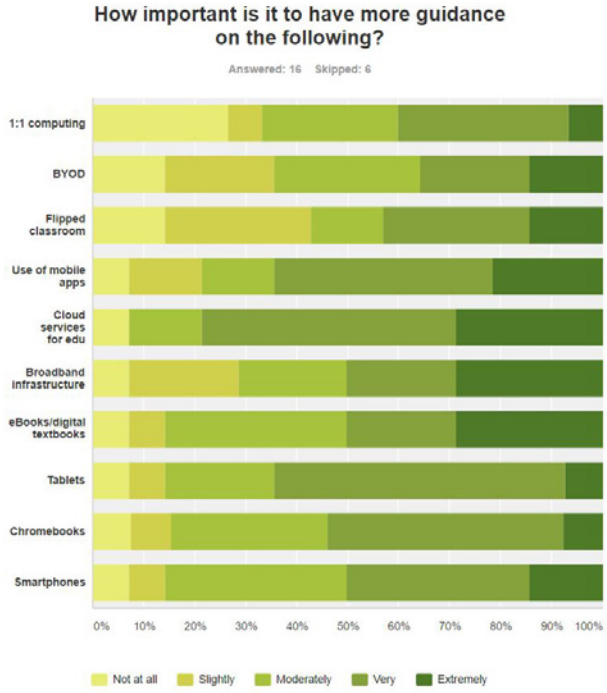
4) Priorities and challenges

4.1) A survey for local authorities in the field of education

In each year of the project, European Schoolnet, together with the consortium's partners, develops online questionnaires and conducts interviews with regional decision makers in line with the objectives of the project. The first survey was launched on the 15th of April 2016. 18 regional representatives responded to the survey from 9 different Regions and 5 different countries.

For **all of the respondents, ICT plays an important role in official regional education policies and future strategy.** *"ICT is an important issue for both preschool and school. Over several years, we have improved access to technology and now it is extremely important to increase the expertise in this area."*

The **need to have more information or guidelines** in order to develop regional educational strategies is considered important and crucial in some specific areas more than in others.

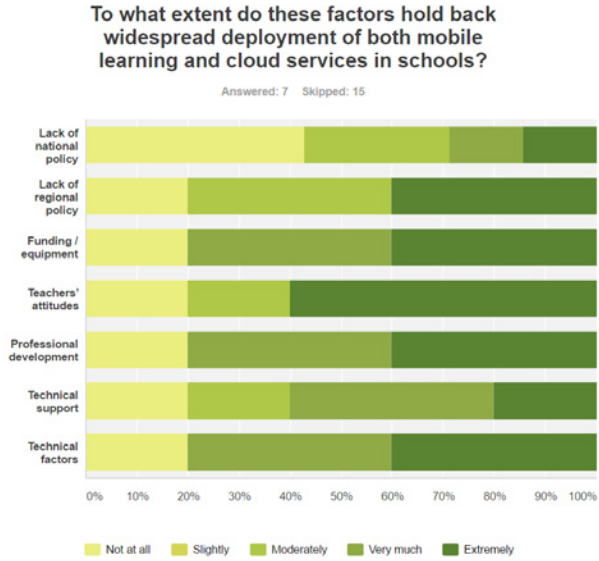


About **80%** of respondents said that receiving more information on **cloud services for education** would be very or extremely important, while the same perception applied to the need for information on the **use of mobile apps in school** for **64%** of the respondents.

Almost **85%** of responses about the importance of receiving more information about **eBooks and / or digital textbooks** ranged between moderately and extremely important. Other areas clearly indicated as of major interest were: upgrading **broadband infrastructure**; use of **tablets** and **smartphones**; **Chromebooks**.

For the European regions who responded to the questionnaire, **some factors hold back widespread deployment** of both mobile learning and cloud services in schools.

These factors concern more specifically the **lack of funding** and **equipment** but also an inadequate **network** performance.



For about **80%** of the respondents, **teachers' attitude** and the **lack or inadequacy of professional development** programmes are major constraints to the mainstreaming of mobile education and the use of cloud services for schools; *"without proper professional development teachers are not able to let go of traditional teaching methods"*. **Teachers' attitude** in particular, has been identified by **60%** of respondents as an extremely influential factor specifying that educators are *"[…] the key factor as they are the facilitators of any innovative program"*.

In line with these constraints, teacher training and engagement remains problematic despite of the increasing pressure to go beyond traditional teaching methods and

adopt more innovative pedagogical approaches that involves use of ICT. **Technical factors**, e.g. an insufficient network infrastructure, have been indicated by about **80%** of respondents as an element that could very much or extremely hold back the deployment of mobile learning and cloud computing, as *"In order to promote cloud computing there is a great need for top network performance and sharing"*. Also technical support has been identified as an important aspect to be considered and fostered, as often teachers have to deal themselves with technical issues.

In order to cope with these challenges, some regions have started to implement widespread initiatives at regional level related to the development and deployment of mobile devices and/or cloud services in schools. In the Tel Aviv District district for instance, the national ICT strategy has been adapted and implemented in 200 schools. The district also promotes ICT in core subjects and in numerous programs offered to schools (Hyperlink).

Some of the large-scale initiatives mentioned by respondents include: "inläsningstjänst, a project running in Göteborgsregionens kommunalförbund that relates to the provision of an audiobook in every subject in school; the Betaschool Future Classroom Lab, an initiative led by the Tel Aviv District in Israel that offers innovative programs for educators to implement cloud based learning (Hyperlink).

4.2) Common challenges identified

The main challenges mentioned by all partners and by other local authorities that are inhibiting widespread use of mobile devices and cloud services in the classroom are the following:

- There is a wide gap between schools using ICT actively and successfully and others not using it at all. Also teachers' degree of knowledge on the potential uses of ICT in the classroom is very unbalanced;
- Some teachers are still reluctant to use mobile devices and cloud services in the classroom despite growing recognition of the need to adopt more innovative pedagogical approaches; this attitude needs to be challenged;
- To ensure that innovative policies are equally implemented at all levels of the educational community, stronger and better collaboration between national and regional authorities is required.

The existence of a holistic ICT strategy was clearly identified by respondents as a key factor driving the deployment and implementation of mobile devices and K-12 cloud services at all levels together with technical support, equipment and a greater recognition of the need for improved network performance. Nevertheless, the lack of a comprehensive strategy does not seem to have prevented some regions developing

large-scale initiatives themselves. As the FCL Regio project continues, it will be important to better understand how these regions have been able to develop and support different types of initiatives and how these experiences can be adapted to other regions.





5) Recommendations and guidelines for policy makers

The major focus in the first year of the project, including during the first FCL Regio strategic seminar, was on how regions are responding to developing, accessing and using digital resources as they move "beyond the text book". The regional case studies in section three reference a number of projects and initiatives involving FCL Regio partners that are related to educational content along with links to the strategic seminar presentations (Hyperlink).

This work in FCL Regio has highlighted that, while there are various factors associated with teacher take-up of digital content in each region, there is broad agreement that further efforts are needed by policy makers to ensure that digital resources for schools: are high quality and easily accessible; are made more widely available, including in lesser used languages; have open licences that support adaptation and reuse; are more systematically mapped/ linked to the curriculum; and are well aligned with teachers' practice.



This has led FCL Regio to propose a key recommendation for policy makers related to how they can move beyond the textbook, including by replicating or being inspired by some of the elements of the very innovative and successful Catalan mSchools programme (Hyperlink).

5.1) Education 'beyond the textbook'

Regions should develop strategies that support the co-creation of innovative digital educational resources for schools by policy makers working closely with software developers, publishers (both commercial and non-profit), teachers and students. In order to successfully move "beyond the textbook", It is particularly important that funding mechanisms and training (on standards, open licenses, new technological solutions) are not focused solely on adaptation of existing open educational resources (e.g. the creation of simple e-books) but that actions are taken to support the co-creation of original content for mobile technologies that both engages students and inspires teachers.

GOTHENBURG REGION (GR)

The Gothenburg Region has an educational vision that states that students should have considerable freedom to develop their knowledge and insights, in progressive and digital learning environments of very good standards. This should be done without regard to the limitations of socio-economic, geographical, administrative, technical, social and cultural considerations. Students should also have equal opportunities regardless of ethnic background, gender, age and disability.

The vision includes two challenges. On one hand joint efforts are needed in the region to develop learning environments and educational skills and, on the other hand, there is the aim to establish an educational landscape that is as open as possible for every municipality in the region but also on a national level.

There is also a pedagogical challenge in the balance between the obligation to provide teachers with the digital learning materials of their choice, and at the same time to ensure the quality of the content being provided. Since Swedish legislation states that schooling must be free of charge and schools/teachers can choose any analogue or digital learning material, this results in major differences in digital tools between the municipalities. Also, sponsored material is not allowed.

GR as a regional actor and school development actor can play an important role in this situation and support the use of digital educational resources in schools in the region. GR can support the overall development of the digitalization in municipalities and meet the needs of both small and large teacher/schools/municipality skills' development within the region with regards to ICT and digital learning tools. Through projects on regional, national and European level, a regional actor such as GR can be a facilitator and bring software developers, teachers and students together to work on digitalization activities. Through the Gothenburg Region networks, policy makers and officials from the different municipalities can engage in discussions and knowledge

exchange related to a range of GR projects, workshops and courses that enable all stakeholders to develop new strategies for how learning materials can evolve beyond the textbook.

CATALONIA (CAT)

There is no precise policy on the co-creation of digital contents. Companies create their own and schools can freely choose their own syllabus-based curricular material. This policy is basically sustained by the use of textbooks, even though some schools have decided to move towards the use of ICT and mobile learning and part of the materials/contents are digital, either digital curricular content or apps.

Nevertheless, it is clear that the flow towards a more innovative methodological approach will yield different modalities regarding content creation. Publishers will have to change their approach and move towards a different scenario whereby they will not only become content providers (as this role will increasingly dwindle as educational agents tend to move towards content creation and content sharing) but they will also have to evolve towards a scenario where they are also service providers for the schools, by offering VLE's, platforms containing tools to create content, or also school digital management systems.

In parallel, the Ministry of Education in Catalonia together with GSMA, the cluster of telecommunication companies who are behind the structure of the mSchools initiative, have set up EduHack, a co-creation project by means of which teachers and also professionals in the educational content world meet together in a one-day workshop. Following a co-creation methodology, participants start with a weak point in any given situation in the educational ecosystem, and come up with a solution reflected in a task, a project or a school policy. More than 500 people took part in the first EduHack, and more than 700 have registered for the 2017 sessions. The first event in 2016 continued up to the implementation and testing of 12 different initiatives in different Catalan schools.

For more information:

http://mschools.mobileworldcapital.com/event/mschools-edu-hack/

http://mschools.mobileworldcapital.com/edu_hack-mobile-world-congress-2017/

TRENTO (PAT)

There are different factors, which allow teachers to use digital content in their teaching. Teachers consider the relevance of digital resources if they are:

- easily accessible;



- of quality;
- linked with the curriculum;
- aligned with their teaching practice.

For this reason, it is important to develop policies to promote knowledge practices, co-creation processes that encouraging an authentic collaborative approach involving software designers, education policy makers, for-profit/non-profit publishers as well as teachers and students. Policies should also support and "award" the co-creation of original content or the re-work/adaptation of already available digital content (OER).

Original content can be understood as lesson units, learning solutions, apps or any other material developed by teachers for their classroom or school, through a collaboration between teachers and students that can be shared and used in other classroom settings. This should be done financially but also in terms of suitable training on standards, technologies/software and rules/procedure (Creative commons...).

As mentioned in the OECD document *Review of the Italian Strategy for Digital Schools*[1] of 2013 but still relevant today, *"The development of quality digital content and software for education in Italy is also hampered by the highly fragmented demand of individual teachers and schools (...) Mobilising open educational resources and teacher exchange"*.

To develop the availability of these digital resources, the following actions should be considered at the national level in Italy and coordinated at the local level in order to ensure a greater efficiency:

- To translate in Italian and adapt to the Italian curriculum existing open educational resources available in other languages;
- To develop and promote a central resource bank for teachers, including all open educational resources (and possibly other digital resources as well);
- To encourage teachers to develop and share their teaching resources as open educational resources by giving awards and using other reputation mechanisms;
- To develop and promote a central resource bank for teachers on the Internet. This platform would bring digital resources available in Italian, these newly translated OER, as well as any other material shared by teachers.

As well as this focus on digital content during 2016, FCL Regio partners also identified and discussed a number of other important issues confronting policy makers who are

1 https://www.oecd.org/edu/ceri/Innovation%20Strategy%20Working%20Paper%2090.pdf.

attempting to develop and implement ICT strategies for schools. These include issues related to:

- Educational equity;
- Developing a vision for how ICT adds value to teaching and learning;
- New procurement models;
- Public Private Partnerships;
- Banning mobile phones in schools;
- Continuing professional development of teachers.

A number of these issues will continue to be investigated in more depth during the second year of the project, but FCL Regio can already propose some initial recommendations for how regions should move forward on each of these challenges. These are outlined below along with supporting information provided by each project partner.

5.2) Education based on equity

Regions should ensure that excellence in education is based on equity and that all students are entering schools where 21st century teaching and learning methodologies are supported by innovative use of ICT and digitally competent teachers.

CATALONIA (CAT)

The Catalan Education Law promotes the pedagogical autonomy of schools and this is reflected in the diversity of teaching styles and policies in both public and state-funded private schools.

Many teachers and schools have always been very active in adopting innovative educational methodologies in order to address the needs of all students. Nevertheless, it has been difficult to ensure that this effort has been made in all schools, which has led to a growing debate on issues related to educational equity. There is an increasing acknowledgement that all students have the right to a high quality educational experience that: suits their specific learning needs; enables them to achieve their learning goals; and makes it possible for them to fully participate as a citizen in a digital, knowledge-based society.

The Catalan government has full responsibility for education and aims to ensure that all schools comply with educational regulations, policies and the established curriculum. However, it remains difficult to ensure that all Catalan schools use 21st century teaching and learning approaches even when there is a growing evidence base on the success of these methodologies. Unfortunately, some obsolete pedagogical approaches are still having a negative impact on student learning and achievement. The government is, therefore, taking a number of measures to ensure that equity in relation of learning excellence is achieved.

In particular, the Ministry of Education has launched a project led by the School Council of Catalonia (Consell Escolar de Catalunya) called Ara és Demà (Today is Tomorrow; Hyperlink). This initiative tries to identify the key issues that are needed to guarantee educational equity for all students and does this by framing a discussion on this topic around what are seen as the four main "pillars" of the Catalan educational system.

- The foundations of the educational system;
- The school;
- The teachers;
- The students.

The discussion starts with the publication of a paper by a renowned expert on each of the pillars that is promoted to the whole educational community. The Catalan School Council then invites all educational stakeholders (schools, teachers, students, families, unions…) to contribute with opinions, criticism and suggestions which are then incorporated in a larger document that attempts to provide guidelines for an educational system where equity will prevail.

Open live sessions related to the four pillars are also held where different stakeholders present examples of relevant educational policies in other countries (i.e. Estonia and Finland). During these events, teachers and institutions have an opportunity to explaining their own experiences and projects related to educational equity issues. More than 500 people have attended these sessions and talks and presentations are available to the public directly from the website.

GOTHENBURG REGION (GR)

Individual schools are part of a very complex system, consisting of actors all the way from national and regional governments down to the individual teacher and student. Complex systems are hard to change, in part because it is difficult to come to grips with how each individual agent and system interact with one another. Swedish professor Martin Ingvar (Hyperlink), Chairman of the innovation organisation Swelife, once said that no one is afraid to work hard, but no one wants to work in vain, implying that

the effect of innovations must be visible if they are to have a long term impact on the different agents in a complex organisation. To create learning organisations it is just as important to make development visible as it is for teachers to make their students' learning visible[2].

There are of course individual schools and indeed school systems that have achieved fundamental changes to their learning environment and there are conclusions that can be drawn from these. Research, by Helen Timperley[3] and others, show that there are some important factors that must be considered if you want to make a real impact on your local school or your national school system.

- Regardless of factors such as socio-economic status etc., student learning is strongly influenced by what and how teachers teach;
- Teaching is a complex activity that is shaped by multiple factors, not just by policies and the agendas of those looking for changes in practise, but strong factors are teachers' knowledge and their beliefs about what is important to teach, and how students learn;
- For leaders and policymakers it is important to set up conditions that are responsive to the way teachers learn. You have to engage teachers' prior conceptions about how the world works, developing deep factual and conceptual knowledge, organised into frameworks that facilitates retrieval and application, and promote metacognitive and self-regulatory processes that help learners (teachers) define goals and then monitor progress towards them.

For example, in order to work with 21th century skills at a national or regional level, you first need to define and communicate what you mean by 21th century skills. Howard Gardner (Hyperlink) defines 21th century skills as: The disciplined mind, The synthesizing mind, The creating mind, The respectful mind and the ethical mind, but Gardner is not the only one with ideas about 21th century skills.

You also need to define and communicate what you mean by 21th century teaching and communicate what methodologies this includes and how it involves ICT. A new Swedish study[4] shows excellent results from a methodology called WTL, (Write to Learn) which has a solid base in the research around formative feedback and formative assessment. WTL lets children from 1st grade use several ICT tools to write texts and

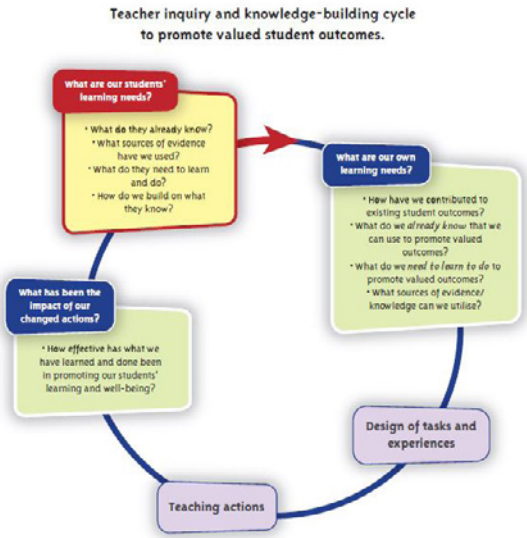
2 http://visible-learning.org/2009/02/visible-learning-meta-study/

3 Teacher Professional Learning and Development, Helen Timperley, International Bureau of Education, 2008, http://edu.aru.ac.th/childedu/images/PDF/benjamaporn/EdPractices_18.pdf

4 Closing the gaps – Improving literacy and mathematical collaboration, Å. Grönlund and A. Genlott, Elsevier 2016, http://www.sciencedirect.com/science/article/pii/S0360131516300859

subsequently discuss and refine them together with classmates and teachers using digital real-time formative feedback and assessment. This research project which builds on a method involving use of digital tools inspired by Arne Trageton's (Hyperlink) "Writing to read" method shows significant results in student achievements in literacy and mathematics.

Once you have defined what you want to do and why, the next step is, of course, to make everyone adopt the approach. Setting up a structure for teacher learning, based on the needs of students relating to the goals that you have defined, has proven very successful and Helen Timperley has written several books that can be used. Designing a structure and providing the tools for teacher collaboration is the key to achieve professional learning organisations and valued student outcomes, as illustrated below by Timperley's teacher inquiry and knowledge-building cycle.[5]



To support the implementation of 21st century skills in teaching and learning there are initiatives on national, regional and local levels. On a national level we are still awaiting the final decision on the national strategy for the digitization of schools and preschools[6] but SKL, the Swedish association of Local Authorities and Regions, provide a national evaluation tool for the use of digital teaching and learning called LIKA[7] that is widely spread in Sweden.

5 Realizing the Power of Professional Learning, Helen Timperley, McGraw Hill/Open University Press, 2011, https://books.google.se/books?hl=sv&lr=&id=UDhFBgAAQBAJ&oi=fnd&pg=PP1&dq=professional+learning+timperley&ots=PEfbq-Fz2G&sig=-hDiXY_p6ERXAeq8vpcQZu_0sVs&redir_esc=y#v=onepage&q=professional%20learning%20timperley&f=true

6 http://www.skolverket.se/om-skolverket/publikationer/visa-enskild-publikation?_xurl_=http%3A%2F%2Fwww5.skolverket.se%2Fwtpub%2Fws%2Fskolbok%2Fwpubext%2Ftrycksak%2FRecord%3Fk%3D3621

7 http://lika.skl.se/

TRENTO (PAT)

Today, there is a limited understanding of just how technology may or may not be effectively supporting student learning. There is also an on-going debate on whether integrating technology in a learning environment requires a direct change in pedagogical vision or teaching practices. Given this context, many teachers still resist or are slow to experiment with using ICT.

It is important, therefore, to discuss the concept of technology-based pedagogical innovation and, based on evidence and experience, to develop awareness and a shared understanding on the value of ICT from a variety of perspectives (organisational, institutional, pedagogical) and levels[8] such as:

- School level: organisation of learning environments, presence and leadership on the part of the head teacher, peer-support, etc.;
- Technological level: devices (computers, IWBs, tablets, video-projectors, software, etc.) and types of technology;
- Teacher level: competence in using technology, training background in using technology, methods of teaching and class management, aims in using technology, etc.;
- Student level: competence and frequency in using technology, gender, social-economic status or family background, psycho-social constructs like motivation or self-efficacy, etc.

In the Province of Trento, although there have been a number of recent initiatives promoting the use of ICT in schools, uptake of technology-based teaching in the classroom is still quite slow and limited. There are some excellent cases where schools are making innovative use of ICT but also schools that refuse or oppose the use of technology in everyday teaching.

To justify this negative attitude, schools frequently claim that they do not have suitable educational software and tools or the necessary infrastructure for making effective use of technologies. Many other regions in Europe undoubtedly are in the same situation. Given this context, each regional authority needs to: develop a structured and organic plan for how they intend to innovate with ICT; implement actions to ensure access to resources and learning environments; enhance teachers' ICT skills and confidence as well as learning and training opportunities; promote the use of web platforms that offer high quality digital pedagogical resources and training opportunities.

In addition, in Italy and also in the Trento province, there is opposition to the use of technology in education more from a cultural perspective. For successful adoption and

8 Pisanu-Gentile, Ricercazione-Vol. 2/2012 IPRASE

integration of ICT into teaching, policy makers obviously need to the create the conditions that enable all schools to integrate the technology effectively into classroom, particularly by providing adequate access to broadband, teachers professional development and on-going support. However, teachers must also: perceive that technology provides value and enhances previous practice; is consistent with their existing values, past experiences and needs; is easy to use and that there are opportunities to experiment with ICT on a limited basis before making a decision to adopt; and finally, that the results of the innovation are visible to others.

Against this background, policy makers will need to develop a more systematic approach and comprehensive strategy related to school innovation based on a digital agenda that focuses on 21st century teaching, learning, methodology and skills. Only in this way will we counter the negative perceptions of some teachers towards ICT and trigger a cultural shift.

With clear policies and goals for implementation and monitoring the process, such a digital agenda can provide an appropriate balance of pressure and support for change. It should then also be accompanied by a communication strategy to encourage bottom-up initiatives based on a shared vision and consensus, to inform and educate, to promote good practice, and to strengthen those opinion formers and communities of practice that share these goals.

This phased approach will help in creating teacher demand rather than resistance in Trento and other regions which is likely to be more effective that previous attempts that have involved “pushing” ICT onto teachers. It is in this way ICT will be mainstreamed and it will be possible to create a sustained demand for classroom technology and for support in using ICT in schools.





5.3) Vision

Regions should put in place mechanisms to develop a clear vision for how ICT can add value to schools, particularly in countries where there is no national ICT or digital strategy/agenda. Support should also be given to schools to help them develop their own ICT strategy based on this vision, including how use of mobile devices and cloud services can be effectively deployed.

CATALONIA (CAT)

The vision for ICT in Education developed in Catalonia is based on the principle that "all students achieve the digital competencies necessary for becoming autonomous members of society." It is derived from the section of the Catalan 2009 Education law (Hyperlink) relating to digital technologies and stipulates that, for effective learning to take place using ICT:

- Students need to achieve competency/autonomy is using digital technologies;
- Teachers must be able to use technologies to support new methodological approaches (and bring about a paradigm shift in teaching practice);
- Schools must be able to successfully integrate different technologies and implement innovative projects and digital services (e.g. related to academic records, personal learning portfolios etc.).

To help implement this vision, all schools are encouraged to set up a **TAC (Technology for Learning and Knowledge plan** (Hyperlink) to help them move towards 'digital maturity' which is understood as the ability of a school to make effective and strategic use of technology in order to improve educational outcomes.

The current vision, therefore, can probably be encapsulated by the motto: "Shifting from computer classrooms to a digitally mature school."

GOTHENBURG REGION (GR)

The 21st century presents tremendous challenges and significant opportunities to national policy makers as they formulate economic and social policies and programs. Educational policy makers are being asked to formulate educational policies and programs – particularly those related to ICT – in ways that advance a nation's or region's economic and social development. We also need to consider a world that is rapidly moving away from the industrial era and where there are new requirements and we learn and work in a knowledge based society. In this context, school systems need to move away from teaching where the sole purpose is *Knowledge Acquisition* to

providing schools where the focus is on *Knowledge Creation* according to, amongst others, Robert B Kozma[9].

Any vision about the use of ICT in education needs to take into consideration that students in our schools today will meet a different world in 5, 10, 15 years, than the one we grew up in ourselves. We have to try and look into the future as best we can, and describe the knowledge, competences and requirements that the future holds[10].

It is also important not to let one's vision solely consist of blue-sky visionary talk about future possibilities. Doing so runs the risk of alienating teachers many teachers and can potentially obscure how ICT can already enhance teaching and learning across the curriculum. Hattie and Donoghue[11], for example, have described the importance of putting 21th century skills, such as critical thinking and creativity, in a real life context, filling them with relevant content, to give them meaning and coherence.

As yet, Sweden has not implemented a national strategy for the use of ICT in education, although there are proposals both on a national strategy and for a revised national curriculum that were submitted to the government in April 2016. The proposal (Hyperlink) includes a vision for ICT in education in 2022, and both the national strategy and the revised curriculum is expected to be fully implemented by 2018 at the latest.

Of course, many schools and local education authorities in Sweden already have their own visions and strategies for using digital tools to promote student learning and providing students with opportunities to work with modern tools. The foundation for these visions and strategies are often based on the debate around 21th century skills and predictions about what digitization and automation will do to our societies and labour markets. However, as Hattie and Donoghue concluded, it is important to enrich these visions and predictions with content and context.

An interesting example of how to form a vision and an ICT strategy is provided by the project **Makerskola** (Makerschool, Hyperlink). Approximately 30 local education authorities, businesses and research institutes, including Sweden's leading universities, are involved in the project, which aims to contribute to the development of new subject matter and a specific methodology based on the creative use of emerging technologies. Challenging young people to explore the boundary between analog

9 ICT, Education Reform and Economic Growth: A Conceptual Framework, Robert B. Kozma, 2008, http://support.intel.co.jp/content/dam/www/public/us/en/documents/brochures/kozma-wp1-conceptual-framework.pdf

10 Now for the Long Term. The Report of the Oxford Martin Commission for Future Generations, 2013 Frey, Osborne, https://wiki.bath.ac.uk/display/charlescornelius/Howard+Gardner's+Five+Minds

11 Learning strategies: a synthesis and conceptual model, John A. C. Hattie and Gregory M Donoghue, 2016 http://www.nature.com/articles/npjscilearn201613

and digital resources also means combining theoretical and practical work, in line with what happens in for example crafts, but in an even broader context. The project provides opportunities to develop and disseminate best practices in the field of maker culture between teachers, schools and local education authorities, which over time aims to improve schools' educational activities in general and provide input for future curriculum development.

Seven of the municipalities in the Gothenburg Region take part in the project, which has proven invaluable as a test bed for exploring interoperability between different digital tools and the goals set up in the national curriculum. It has also provided the participants with solid, best practice answers to the most fundamental (Why? and How?) questions concerning the use of mobile learning including why it is so important in 21st century classrooms and schools.

TRENTO (PAT)

Over the past ten years, the Trento Province has been carrying out a range of initiatives related to the use of digital technologies as part of a general eSociety strategy. Based on this experience, the provincial government is now developing a new "Provincial Digital Plan for Education" proposal. This strategy will take into account both the guidelines set out in the **National Plan for the Digital School** (October 2015, Hyperlink) as well as the recommendations that will arise from the FCL Regio project.

The new Provincial Digital Plan concerns the support and integration of ICT tools and innovative methodologies in schools. This initiative will be developed in several phases linked to the following main pillars:

- Financial support for supplying schools with multimedia equipment and connecting schools to the internet (broadband connection from 100Mbps to 1 Gbps);
- Skills and content;
- Teacher training;
- Accompanying measures; for example, appointing of a dedicated "digital innovator" (animatore digitale) inside the school; dissemination; monitoring and assessment of the process.

The objectives of the Plan will be shared through public events with experts and presentations of best practices. A first support action for schools has been a call for proposals (Hyperlink) where funding is being provided to encourage schools to run creative workshops and design digital and mobile environments based on innovative pedagogical ideas and approaches.

As part of the Digital Plan, training initiatives will also be carried out across the province in which school leaders and teachers will have the opportunity to share experiences with external experts on the following key areas: environments and tools, skills and content, training and support. The key strategy here is to organize training and support for networks of schools and not single institutions in order to engage more teachers and managers and to build "bottom-up" the "new" digital school. This approach will also be particularly focused on methodology (and not on the digital tools). The aim is to support the most advanced and motivated schools so that they can become centres of contamination and dissemination.

5.4) New procurement models

Regions should develop procurement models which reflect the fact that learning is increasingly taking place outside the school and may involve new issues related to the use of student personal data, cloud services and 1:1 access to mobile devices in and out of school.

CATALONIA (CAT)

Currently CTTI (Telecommunications and Information Technology Centre), a large public agency with overall responsibility for the management of ICT in the Catalan Government, oversees, manages and executes the Generalitat's ICT projects in education. A new IT infrastructure model began in 2013 with the idea that the Catalonia Government will spend 35% less for data centre services thanks to cloud computing and "economies of scale".

To comply with government goals in general, this new ICT Model was designed with four main objectives. It is important to note though that this model is not strictly related to education and connectivity in schools. However, the following overview of current ICT situation in Catalonia indicates the broad direction of travel concerning procurement of ICT hardware, software and services in schools and the service that CTTI is providing in general relating to:

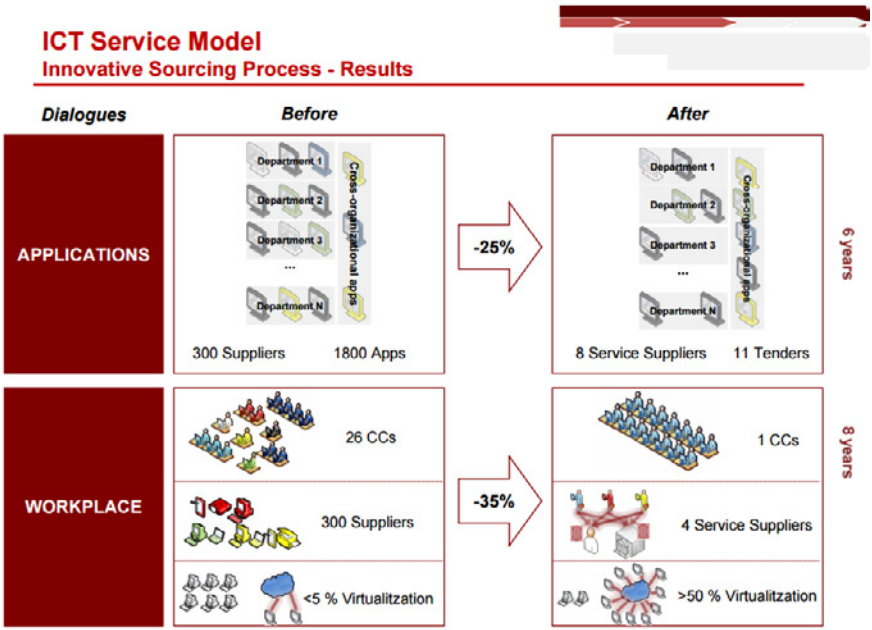
- Efficiency - Improving efficiency and savings in the provision of recurring ICT services and energy spending;
- Transformation - Consolidating infrastructure and transversal applications, and modernizing desktop and telecommunication services;
- Competitiveness - Providing Catalonia with a high capacity telecommunications network. Promoting regional balance;

- ICT Sector - Boosting the Catalan ICT sector and attracting investments from international companies in Catalonia.

Having CTTI as the sole provider in charge of the procurement of all the services related to the implementation of ICT in schools provides economies of scale and saves schools from having to manage the complex elements of different types of procurements that cover connectivity, hardware, VLE´s, servicing etc.

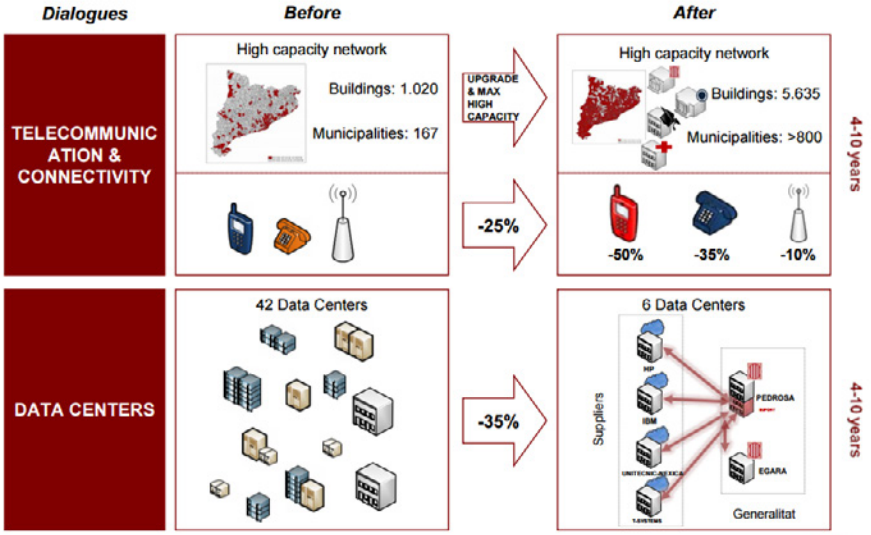
All public schools are now provided with a connection of 100 Mbps. State-funded private schools are not part of this system and must procure with the needs under their own management, except for the VLE platform which is mainly offered by the Catalan Ministry of Education.

Catalonia is still working through this this process. However, some results are reflected in the diagrams below:



ICT Service Model

Innovative Sourcing Process - Results



Results

Investments - Telecommunications

XFOCAT (High bandwidth network)

The Catalan high bandwidth network is built with two suppliers:



Fiber optic network of the Generalitat de Catalunya.
Operated by Xarxa Oberta de Catalunya.
Capacity to provide service to 745 buildings.

+



Fiber optic network of Telefónica.
Conditions of "balance" and "neutrality" as they are set on C1 contract.
Capacity to provide service up to 5.000 buildings.

BEFORE	End of 2016	
Number of connected buildings	Transformation to high bandwidth	
5.907 buildings	4.297 buildings	712 municipalities
939 municipalities	73% (*)	75%

GOTHENBURG REGION (GR)

The Gothenburg Region has already centralized the purchase of textbooks and streamed media and the procurement of hardware and software is also coordinated for all municipalities by GR Teaching Materials which is a branch of GR Education. GR has the responsibility for ensuring that procurement contracts are in place with suppliers of digital teaching materials. Schools in member municipalities purchase teaching materials from GR at a lower cost than they would have negotiated if they had bought the equipment directly from the supplier. They also do not have to worry about complex procurement issues, since GR has already gone through the whole procurement process on their behalf. One more benefit of this coordination is also that it opens up the possibility of municipalities sharing software licenses between each other that are not being fully utilised.

Although the procurement and purchase of most teaching materials, including digital resources, are coordinated by GR, it is not the case that all schools in the region use the same type of tools or digital platforms, since each municipality is responsible for its schools and what digital tools are used. Centralized purchasing, therefore, does not lead to all schools in one region using the same digital tools and currently GR has public procurement contracts with 26 wholesale suppliers who can, in theory, provide any type of teaching hardware, software or materials.

The process of procurement of teaching materials is under rapid development towards more digital tools and software being distributed by GR to the member municipalities[12]. Some important aspects, however, needed to be considered during this development, including the personal data act and personal data assistant contracts. For example, as some software can recognise an individual student's level of achievement and where they need more practice, the information gathered by these programmes from the schools could lead to municipalities breaking the laws on use of personal data.

GR, therefore, needs to ensure that contracts about the handling of such information is already in place before students use the software. Each municipality has a contract relating to the use of personal data with GR, which, in turn, has a contract with all the suppliers. It is important to have these things in mind when using software in this way in school but a regional provider can considerably ease this process for schools and ensure that secure procedures are put in place.

Although not yet adopted by the Swedish parliament, the new national strategy on ICT in Sweden suggests that teachers in Gymnasium (students aged 16-18) will have 1:1 access to digital tools within one year and that the same 1:1 provision will be made for their students within two years. In elementary school and pre-school, the 1:1 goals are set one year later respectively. That means that, even if most schools allow students

12 http://www.grkom.se/toppmenyn/dettajobbargrmed/skolautbildning/laromedel.4.4fea3bce111092982468000317.html?closeLevel=1

to bring their own device to school and some may already permit students to use their own devices in lessons, the national policy foresees a procurement policy under which every student will soon be provided with a device for personal use.

Of course, we need to acknowledge that the use of digital tools in schools may look quite different in 5, 10, or 15 years, with new devices, services and software etc. becoming available. This may possibly have implications for procurement polices. However, with a national strategy that aims to provide students with an adequate level of digital competences and 1:1 devices but does not specify which units should be used, the municipalities and schools in Sweden will most probably still be able to purchase and use any devices or tools that they consider most relevant for their students' needs[13].

TRENTO (PAT)

Trento provides free use of textbooks (until the end of compulsory education). This means that the total expenditure for the purchase of textbooks is covered by the Province, at an average level of around 200 Euros per student annually.

For over a decade, PAT has also supplied educational institutions in Trento with a range of ICT devices including interactive whiteboards, desktop computers, notebooks, tablets, etc., centralizing the purchase and procurement via general public tenders. However, experience has shown that this in not the most efficient model, particularly as there is a rapid obsolescence of ICT equipment that forces schools to become involved in a cycle of continuous renewal. In addition, new national rules have been introduced on procurement that allow schools to access "the central marketplace (Consip-Mepat)" that centralizes the purchase of goods for public administrations. This enables schools to choose directly the equipment that best meets their requirement at the most acceptable price.

So, reviewing procurement strategies has been an important part of the Trento strategy. For mobile devices, the current approach is that families are free to buy the devices they prefer or that are recommended by the school without any financial support coming from the province. Instead, PAT provides the network infrastructure in line with requests and ICT developments plans submitted by the schools themselves. As Trento is renowned for its mountains, this on-going initiative aims to provide broadband to each school but also needs to take into account the orography of the region. Currently, all secondary schools have 1 Gbps connections while around 20% of primary and other schools have 100 Mbps broadband access.

13 http://www.skolverket.se/om-skolverket/publikationer/visa-enskild-publikation?_xurl_=http%3A%2F%2Fwww5.skolverket.se%2Fwtpub%2Fws%2Fskolbok%2Fwpubext%2Ftrycksak%2FBlob%2Fpdf3621.pdf%3Fk%3D3621

In Italy is not possible to force schools to use the same digital content, software or platforms, due to the Italian principle of "freedom of education/freedom of teaching". For this reason, not all schools in the province use the same types of tools or digital platforms. Software procurement, therefore, is not coordinated by PAT, nor is it permitted to propose even a shortlist of recommended software.

The Provincial Institute of Educational Research and Experimentation (IPRASE) uses Moodle for blended courses (Hyperlink) and it is recommended that all institutions have a single virtual learning environment to: facilitate secure access for students; provide access by teachers but also parents; avoid the replication of credentials in different environments that may confuse the user. Previously, the province created common learning platforms for schools (based on Moodle). However, this approach has now been abandoned as schools increasingly preferred to have more autonomy when it comes to choosing and organizing the learning environment that students would use.

Finally, all teachers and school leaders receive an institutional e-mail address within the Google G Suite package with the possibility to use Google Drive (GDocs, GPresentation GCalendar and all other applications) and Google Classroom. In addition, many schools have themselves independently set up G Suite for all pupils, staff and parents so that everyone can have a Gmail account with name, surname and Institute domain membership.

5.5) Public private partnerships (PPPs)

Regions should actively explore how new models for public private partnerships can support innovative approaches to the implementation of ICT in schools.

CATALONIA (CAT)

In Catalonia new models of public-private partnerships have supported the design and implementation of innovative policies for a number of years and have helped provide funding for long-term initiatives in education as well as in other sectors. Over this period, the involvement of private sector stakeholders in publicly funded initiatives has resulted in a 'win-win' relationship, the clearest example of which is the mSchools programme, a multi-faceted initiative of Mobile World Capital Barcelona in collaboration with the Generalitat of Catalonia, Barcelona City Hall and the GSMA (representing the interests of mobile operators worldwide).

Launched in 2012, mSchools has supported teachers and students with effectively integrating mobile technologies into the classroom, providing access to up-to-date

materials, improving collaboration and strengthening learner engagement, and opening up new ways of teaching and learning that improve achievement and employability. The mSchools programme involves private and public sector stakeholders working together to prepare students to work in today's digital world and is focused on three main areas:

- Improving learning with mobile technologies;
- Promoting digital competences and entrepreneurship;
- Building an open environment for mEducation.

The programme currently includes five different initiatives (see section 3) to motivate students to learn using mobile technologies and help teachers to take advantage of the possibilities offered as a result of using mobile devices in schools.

1. An **App Education Course** (Hyperlink), is offered in Catalan High Schools to teach students about mobile application design and prototype development from a computational thinking perspective;
2. **Mobile History Map** (Hyperlink), an app advocating the use of mobile technologies in non-technical subjects, allows students to create content about points of interest within one kilometre of their schools;
3. **The Mobile Learning Awards** (Hyperlink), recognises the integral role of mobile technology in education, rewards innovative teacher-led projects and student produced videos on the "School of tomorrow";
4. **mSchools Toolbox** (Hyperlink), is a virtual platform to showcase teacher validated educational apps. These apps are sorted in categories and have associated ready-to-carry-out educational activities;
5. An Entrepreneurship support programme, **mSchools Lab** (Hyperlink), helps entrepreneurs to develop of mEducation solutions and supports the promotion of local initiatives.

All projects are monitored and evaluated by specialists from the Department of Education in order to gather evidence of their impact on improving student learning and performance.

The App Education course that is part of the mSchools programme is offered in Catalan High Schools to teach students about mobile application design and prototype development from a computational thinking perspective. It is fully integrated in the Catalan secondary schools curriculum as a "Computer Science" elective and also as a pedagogical option for the compulsory Technology subject in the two last years of compulsory education (ages 15 and 16) and for VET education (age 17). Teachers can choose between the traditional programme and the app education content.

The course is in line with the official curriculum stipulations which are currently 105 hours distributed in three classes per week over the school year for the "Computer Science" elective (age 16), and 70 hours in two classes per week, for the Technology subject. Approximately 19,000 students are involved, which is equivalent to over 35% of students between 15 and 17 years old.

The main goals of the App Education Course are:

- To learn about mobile devices and their social and economic impact;
- To help develop computational thinking skills applied to visual language programming for developing computer applications;
- To promote entrepreneurship;
- To stimulate scientific and technological vocational options as well as motivation in students to take up these fields;

This App Education Course is designed as "project -based learning" with ideation, design development and marketing of a mobile app by students organised in groups, a process that simulates a business structure. Mobile apps are designed to solve a problem identified by the students in their day-to-day lives and this process enables them to work on a hands-on/cross-curricular project that gives coherence to the content objectives within this course subject. As a final activity, groups must present their solutions at the end of the project in order to justify their creations and try to convince the audience why it is a good product in the current market. The apps are created using 'App Inventor' which is currently a copyright free software programme.

A set of resources, in-service teacher training, an online community, mentoring and a competition have also been developed in order to support schools and teachers.

1. Materials

A new set of curricula materials has been developed to help and guide teachers (in Catalan and English) along with activities, methodological guidelines, and evaluation criteria. These can be downloaded from a Generalitat of Catalonia website and can be uploaded to the school's learning management system (Moodle). Schools are able to use the resources 'as is' or can adapt them to their own needs and student profiles.

The App Education course is divided into thematic blocks, using an order which builds on the content from each previous block, that include documents, presentations, questionnaires, and links, in addition to information for teachers regarding timing, assessment and a teachers' guide. As the course methodology utilises a collaborative approach, the students mainly use free, easily shareable Web 2.0 tools such as: Drive, Mind42, Balsamiq, App Inventor, Blogger, Sites, YouTube, Prezi, Zoho, Gmail, Skype, and Google Hangout.

The structure of the course is as follows:

- Introduction: Teacher's guide and technical requirements;
- Teacher information per term: Term planning, Assessment criteria and Activity list;
- Content modules (each block has the same structure): Instructions for the teacher, Work plan, Materials (documents, links, videos, images) and Activity tasks (forums, questionnaires, document delivery).

2. In-service Teacher Training

The Department of Education has launched an in-service teacher-training programme for teachers who decide to implement the course. Teachers following this online training (scheduled as a 30-hour MOOC) go through the same process and tasks as their students so that they can familiarise themselves with the course content and methodology before implementing it in the classroom. Over 600 teachers have taken this course during the two years that the App Education Course has been running. The final assessment of the course is based on the teachers submitting portfolios where examples of the students' work must be documented.

3. Networking

Teachers can have 'virtual' exchanges within an online VLE (Xarxa docent Educat, Hyperlink) in order to share their experiences and concerns with other teachers who have been providing the App Education Course during this current school year.

4. Mentoring

An important part of this public-private partnership includes the direct involvement of mobile industry professionals who support and mentor student projects and enable students and teachers to be in contact with companies and practitioners across all relevant areas of the mobile industry. School and industry interaction is also built into the course to help students develop entrepreneurship skills which is now seen by the EU as one of the key competences supporting economic and social well being. Working with private sector partners helps provide students with the mind-set and knowledge to generate ideas and the entrepreneurial initiative, creativity, project planning and management skills to turn those ideas into actions.

5. App Awards

During a ceremony at the end of the school year, schools that implement the App Education Course have the opportunity to present the work of their students in an App Awards event. The aim of these awards is to help keep students engaged and motivated throughout the school year. This contest begins with an exposition area where the finalist projects are presented by the students. A jury of specialists visit each

stand and asks students to pitch their products, evaluating them on a set of criteria central to the App Education Course. The public attending this event can also vote for the best project.

GOTHENBURG REGION (GR)

In the Gothenburg Region, the most successful partnerships in recent years have resulted from cooperation between research centres and scientists in the public and private sectors. Working together increases innovation and has made it possible to connect modern environmental research to educational needs and mobile solutions. One example is the pedagogical game **Future Happiness Challenge** (Hyperlink) that was developed as a result of close collaboration between private sector game designers, public authorities and students and scientists connected to **Mistra Urban Futures** (Hyperlink) (a Swedish Foundation promoting sustainable urban futures) and Chalmers University of Technology.

The game is based on the results of the report Low Carbon Gothenburg, which highlights the lifestyle changes required for a sustainable society and also the way in which these changes will probably affect peoples' overall happiness and well-being. This free game comes with a teachers' guide in English, is easily accessible and can be used in schools and workplaces to stimulate discussion on the changes needed for a sustainable future.

Successful cooperation between public actors, research institutes and companies has also been demonstrated in the **Makerskola** (Makerschool, Hyperlink) project where schools and companies came together to explore the possibilities of digitalization and developed new methods, services and products under the umbrella of a national science institute (RISE). During the project, several Maker Days for knowledge sharing were organized to which also stakeholders outside of the partner group were invited. The methods tested and developed during the project then were then promoted to a wider community.

TRENTO (PAT)

In 2016, new national regulations related to "work-based learning" (Italian: alteranza scuola-lavoro, work experience schemes) started to be widely promoted and applied by schools in the Trento region and this is providing opportunities to develop innovative public-private partnerships. Work-based learning provides new possibilities to connect and integrate the theoretical knowledge learned in the classroom with practical experience in a work environment and also enriches the training received in school and training courses with the acquisition of skills that are required by the labour market.

During school year 2015/16 5,000 students were involved, around 10,000 in school year 2016/17, and we anticipate 15,000 students being involved in 2018/19.

As this scheme has developed, it has become clear that private sector organisations can particularly contribute to education by:

- Providing testimonies and lectures by experts and corporate trainers;
- Organising training activities both during the school year and during the summer months;
- Organising seminars for teachers;
- Providing work experience for students.

In terms of the development of specific ICT skills and the use of technology, partnerships have been carried out with research centres such as FBK (Kessler Foundation), MUSE "FabLab", the University of Trento and a number of local ICT companies providing software development or telematics / information technology services. The objectives here have been:

- To create a better consistency and coherence between education and industry;
- To develop a technical and professional culture in the school capable of training students that can meet the growing request for IT technicians;
- To develop a better dialogue and cooperation among businesses, schools, research institutions, universities and local stakeholders.

The successful co-operation between these actors is shown by POLO INFORMATICO GESTIONALE di TRENTO project. in this initiative third-year students in an upper secondary school each year develop specific software components for the four technological partners under the supervision of a project manager from one of the four organisations which include: the IT offices of the newspaper Adige and of the Trento municipality; the GPI Group specialized in software in the healthcare sector; and Informatica Bancaria Trentina, a software-house producing a banking information system for the region.



5.6) Mobile phone bans

Regions should resist having a policy that bans mobile phone use in schools and should support schools in developing clear student use policies and guidelines.

Banning use of mobile phones in schools and failing to appreciate how they can support teaching and learning can occur when educators and parents are unaware of the growing number of studies which highlight the potential of mobile devices and how they can be leveraged to support educational objectives. Regions considering this issue should consult some of the following studies and reports.

According to UNESCO's report Policy guidelines for mobile learning (2013, Hyperlink), mobile learning "involves the use of mobile technology, either alone or in combination with other information and communication technology (ICT), to enable learning anytime and anywhere. Learning can unfold in a variety of ways: people can use mobile devices to access educational resources, connect with others, or create content, both inside and outside classrooms. Mobile learning also encompasses efforts to support broad educational goals, such as the effective administration of school systems and improved communication between schools and families".

The purposes of these guidelines is "to help policy-makers better understand what mobile learning is and how its unique benefits can be leveraged to advance progress towards Education for All". The document also presents examples of best-practices than can be applied to a wide range of situations and institutions with the needed changes to contextualize them. The goal is to encourage policy-makers "to adopt UNESCO's policy recommendations, tailoring them as necessary to reflect the unique needs and on-the-ground realities of local contexts".

Two other reports have been published by UNESCO focused on European experiences. These are Turning on Mobile Learning. Illustrative Initiatives and Policy Implications (Hylén, 2012, Hyperlink) and Mobile Learning for Teachers. Exploring the Potential of Mobile Technologies to Support Teachers and Improve Practices (Dykes and Renfrew, 2012, Hyperlink). These reports show experiences that can be inspirational for the design of initiatives based on the use of mobile devices both for educational institutions and for policy implications.

A recent report published by the London School of Economics and Political Science (Vincent, 2015), Mobile Opportunities. Exploring positive mobile media opportunities for European children (Hyperlink), presents findings about how children and young people aged 9-16 use smartphones and tablets based on two European-wide research projects (EU Kids Online, and its sister project Net Children Go Mobile) and examines the potentially positive online experiences that mobile opportunities offer. This report

also presents recommendations for shaping policy to encourage further positive policy actions related to the use of mobiles and the Internet at schools.



CATALONIA (CAT)

The use of mobile devices in schools in Catalonia is increasing slowly. Tablets have replaced computers in classrooms in many cases but this is not happening with mobile phones as many schools often have internal regulations that prohibit their use.

Nevertheless, the potential of these devices for educational use cannot be ignored, not least because the vast majority of students own and heavily use mobile phones as part of their everyday life. According to the Statistical Institute of Catalonia, 53.7% of children between 10 and 15 years have one of these devices and use it daily.

Banning mobile phones in schools represents not only a lost opportunity to have quick and easy access to information but also to use specific educational applications that help bring learning activities closer to the students. Schools also cannot disregard the fact that a mobile phone is the key way that children engage with their peers via online social networks. Of course, there are important issues here related to eSafety and use of mobile devices in classrooms can sometimes be disruptive. However, the solution is not to prohibit their use but rather to teach students how to use mobile phones and other devices in a responsible and safe way.

Establishing guidelines and performance standards that clearly show the spaces, activities and situations where the use of mobile phones is not only allowed but also encouraged is much more effective than imposing a blanket ban. In addition, schools and teachers must be provided with pedagogical support, training and recommendations that allow them to maximize the potential of mobile devices.

The School Education Council of Catalonia (Consell Escolar de Catalunya, 2015), a consultative body that encourages social participation in the field of non-university education, has drawn up recommendations aimed at Catalan schools on the use of mobile devices. This document also contains examples of activities carried out by

Catalan schools to serve as a model. On the question of whether to ban mobile phones in schools, the document includes the following recommendation: "Total prohibition of mobile devices in educational centres with the goal of avoiding potential problems goes against the curricular goals that are linked to achieving digital competence, learning in general and the capacity for lifelong learning. Knowing how to use digital devices responsibly is both part of the curriculum and a competency to be acquired that the student body should not be deprived of".

Reflections on the use of mobile phones in schools has been the subject of several reports by various educational and research institutions[14].

A "guide for digital devices" (Hyperlink) has also been created in order to encourage schools to allow students to bring their mobile devices into the class. Many other useful online guidelines and guides on internet safety have also been published (Hyperlink 1, Hyperlink 2, and Hyperlink 3)

Workshops (Hyperlink) for teachers and students are held every year with the purpose of educating both teachers and students to be responsible and respectful users of Internet.

The debate on whether or not to allow mobiles in schools though can often be heated and there is still no consensus amongst school bodies on how to proceed. Although there is not a great deal of data on what is actually happening in schools, the majority of institutions still tend to prohibit the free use of mobile phones or devices within the classroom.

However, a small number of school have started to implement a BYOD strategy and some have created innovative ways of allowing students to use their phones depending on a set of rules which have been agreed by the entire school body. Examples of symbols/posters created by a school with regard to allowing students to use their mobiles can be seen in the following image (Pla Marcell School, Cardedeu, Catalonia) :

A guide written in both Catalan and English has also recently been published in the hope that more schools will be encouraged to allow the use of mobile devices for educational purposes: Mobile Technologies in Schools by the School education Council of Catalonia.

14 Mobile Learning. How to incorporate mobile learning, Mercè Gisbert Cervera (coordinadora), Miquel Àngel Prats Fernández, Nati Cabrera Lanzo, Fundació Jaume Bo ll, 2015 http://www.fbofill.cat/publicacions/aprenentatge-mobil-com-incorporar-els-dispositius-mobils-laprenentatge



GOTHENBURG REGION (GR)

There is an intense debate on banning mobile phone use in Swedish schools. Those supporting a ban mainly do so on the basis that mobile phones are a disruptive element in the classroom that affect student concentration and inhibit students from playing outside or being physically active. Following a decision by the Swedish School Inspectorate, the responsible minister Gustav Fridolin declared that schools are free to ban mobile phones if the students are involved in the decision-making process.

Research (Hyperlink), however, shows that that almost every student in Sweden from the age of 10 has their own phone, and 69 % of elementary schools and 93 % of high schools allow students to use their phones during class. Nevertheless, only 28 % of middle school students and 56 % of upper secondary school students use their phones during lessons.

Since technical developments over the past six or seven years has been very rapid, there is not a great deal of research on the subject on mobile phone bans. One Swedish example is the research project “Connected classrooms” at the University of Karlstad, (Hyperlink), in cooperation with University of Helsinki and Åbo Academy. The research

has shown that students adapt to the classroom situation, i.e. sometimes they use their mobiles as dictionaries or to easily access information. During short breaks in the lesson, mobile phones are often used to stay connected with friends and for social media.

The research further shows that use of mobile phones seldom disturbs the lessons and teachers rarely reprimand students. If the teacher provides an interesting lecture, if the students are engaged in group work that demands constant interaction, or if they work individually with motivating tasks, they do not use their mobile phones. Those who lose concentration and for a moment focus on the phone do not really disturb the class. The mobile phone in this context could perhaps be understood as a replacement for daydreaming which has always occurred when concentration is lost due to lack of interest.

Even though mobile phones potentially reduce student concentration, there is also the possibility for this to happen in the workplace. When to use and not to use mobile devices is something that employees in both the private or public sector also must learn. If we do not ban mobile phones in schools, therefore, we have an opportunity to train the future workforce at an early stage on how to use mobile phones effectively.

While mobile phones can potentially be a tool that enables students to "escape" from the classroom, they can also be integrated in the learning process and change education. The crucial point is the teacher's knowledge about how to use the mobile phones in education so that it does not become a distraction but can be used to support student note taking, taking photos for use in assignments or using educational apps.

An important challenge when it comes to mobiles in school is the issue of cyber bullying. However, researcher Elza Dunkels (Hyperlink) at the University of Umeå suggests that bullying is not by itself a reason to ban mobile phones. Bullying also happens in physical spaces. Cyber bullying will still happen if a school ban mobile phones but there is the possibility that teachers will have less chance of noticing it if a ban is in place.

Finally, as policy makers increasingly develop ICT strategies where the aim is that that every student should achieve a minimum level of digital competences, it will be a regressive step if educators insist on banning mobile phones, the device of choice for most students, rather than trying to integrate these technologies into learning activities.

TRENTO (PAT)

In Italy there is an intense debate on the use of mobile phones in schools with those favouring a ban doing so mainly based on claims there are health risks associated with using phones and Wi-Fi in schools.

In Trento there is currently no provincial regulation on this issue and, at present, the Italian Education Ministry has not intervened. Most school principals in PAT refer to the 2007 National Directive of the Education Minister that still remains in force which strictly defines and limits personal use of mobile devices in the schools. Some schools have even banned the use of personal mobiles or denied access for the students to the school Wi-Fi network. Other schools are more open to mobile use and have independently established their own rules related to use of student phones and other personal devices.

Given this background, there is a growing need to develop recommendations and guidelines at provincial level, particularly as schools start to consider upgrading wifi networks in order to implement 1:1 computing and BYOD strategies that support teaching and learning. Here, the European Schoolnet BYOD Guidelines (Hyperlink) for school leaders that were published in 2015 have proved a useful starting point for developing a regional strategy. PAT is currently also exploring how to provide better information to parents (related to privacy and protection of personal data), what regulations could be adopted by individual institutions, and what sort of training and "agreements" can be provided for both students and their families.

Guidelines related to mobile phone use, of course, need to be closely linked to direct training interventions for the entire educational community with the aim of promoting a wide range of digital citizenship skills.

5.7) Continuing professional development of teachers

Regions should increase efforts related to continuing professional development of teachers and should propose a minimum level of digital competences for all teachers as part of their regional ICT strategy.

CATALONIA (CAT)

In Catalonia the Department of Education has been working for some time on improving the digital competencies of teachers and many official documents have been developed with the aim of making practical changes with regards to improving digital competencies and teaching methodologies. These can be found on the Department of Education's website. A particularly useful document (also available in English) is Core Competencies in the Digital Field (Hyperlink), which contains the core digital competencies for secondary education.

The development of digital competencies is now mandatory and the Catalan Department of Education has a long tradition of offering online professional development courses for teachers. In the 2016-2017 school year more than 200 courses will be offered involving around 6,700 teachers. Some of these courses and seminars are provided as face-to-face training although the vast majority are offered online. Courses are usually taken by teachers during their own time rather than during normal working hours.

There are also many private institutions which offer courses to teachers, either during the Summer months or during the school year. Below are links to just a few platforms or organisations where teachers can further their professional development (Hyperlink 1, Hyperlink 2, Hyperlink 3, Hyperlink 4, Hyperlink 5).

Recently, the Department of Education has also launched Co-creation projects whereby different teachers come together in order to identify common needs and then propose possible solutions to those needs in the shape of proposals for the classroom or the school. This initiative called Edu_Hack (Hyperlink) was carried out in collaboration with the GSMA/Mobile World Capital.

In 2016, Eduhack attracted 432 teachers from all over Catalonia who developed 66 proposals, out of which 12 are being currently piloted, involving 1720 students, 50 Schools and 121 teachers and education professionals. The 2017 Eduhack will be launched on the 1st March and 500 teachers will take part out of a total of 700 who applied.

GOTHENBURG REGION (GR)

Raising the digital competence of the existing workforce in schools is very important and should be linked to defining a minimum level of digital competences for all teachers. However, this definition should not be too narrow; teachers still have to be provided with some degree of flexibility so that they can define the ICT skills they need, depending on the context in which they are working and the needs of their students. It may be useful to consider two levels of professional development, one 'strategic' and the other more 'tactical'.

The strategic level could contain the following dimensions[15]:

1. General digital competence - being able to understand and use ICT and digital media in everyday life;

15 Professional Digital Competence in Teachers Education, G.Ottestad, G Björk Gudmundsdottir and Marijana Kelentric, Nordic Journal of Digital Literacy 4/2014 https://www.idunn.no/dk/2014/04/professional_digital_competence_in_teacher_education

2. Didactic digital competence – being able to use ICT and digital media to develop student knowledge and skills;

3. Professional digital competence – being able to use ICT and digital media to plan lessons, perform administrative tasks, communicating with parents, collaborate with colleagues etc. (Hyperlink).

The tactical level could contain the following dimensions[16]:

1. Understanding that the use of ICT and digital media is closely linked to how you look at knowledge and learning. When you start to think about introducing ICT in schools, it can provide opportunities to reflect on learning theories, pedagogical perspectives and different practices and encourage discussion and collaboration. ICT in education is no longer about practising and repeating but the focus should be on simulations, collaborations and creating;

2. It is essential to use ICT and digital media in a way that develops core skills and abilities in the subject that is taught, regardless of what the subject is. It is about finding new ways to work with didactic challenges and helping students understand and cope with the challenges that digitization brings;

3. Future teachers need to find constructive solutions to the problems that may and will occur when ICT and digital media is used in education. The ability to lead your class, motivate your students and communicate clear guidelines, rules and goals are important for teaching to work and to minimize time wasted on gaming and chatting. (If that isn´t what your goal for the lesson).

Regions and governments are important facilitators on both levels because they can provide:

- Learning material such as MOOC´s and other materials that schools can work with. The focus on such material should not be digital technology in itself, but how it can be used to enhance students' learning;
- Funds to enable school leaders to design learning possibilities for their teachers based on collaborative learning

At the regional level GR provides a number of teacher training possibilities, for example the Teachers Night concept[17], which is free for the members of GR and a

16 What Does Professional Digital Competence Mean in Teacher Education?, Andreas Lund, Jonas Bakken, Kirsti Lyngvaer Engelien, Nordic Journal of Digital Literacy 4/2014 https://www.idunn.no/dk/2014/04/what_does_professional_digital_competence_mean_inteacher_e

17 http://www.grkom.se/toppmenyn/dettajobbargrmed/skolautbildning/nyhetsarkivgrutbildning/aktuelltgrutbildning/karinnygardstillteachersnightiseptember.5.1ed20d4a154e642bab792fdb.html

wide spectrum of courses focused on 21st century learning and teaching. GR also provides high quality, process management resources for its members. At the local level, each of GR´s members also provide extensive training possibilities focused on digital learning. In the municipality of Öckerö, for example, there is a teacher training/certification system called SIKTA[18] for both teachers and school leaders. All teachers and school leaders are expected be trained/examined on three levels. Two teacher-training days and an E-Meet focused on 21st century skills and digital learning are arranged each year.

TRENTO (PAT)

The quality of teaching immensely improves when there are effective support systems for professional teacher development. Experience also shows that it is increasingly necessary to consider professional development as a continuum, from initial teacher training to on-going, in-service training. Teacher learning communities are also frequently key in fostering in-depth learning and continuous improvement.

In Trento, the Provincial Institute of Educational Research and Experimentation (IPRASE) supports the activities of the provincial educational system and has the task of promoting and implementing actions aimed at research, experimentation, documentation, studies and in-depth examination of education and training issues (also in relation to youth activities), and encouraging initiatives supporting educational innovation and school autonomy.

Digital competence and new learning environments are some of the educational priorities identified by our policy makers and consequently digital technologies are included in the courses (Hyperlink) organized by IPRASE for all teachers.

Each teacher is obliged to spend at least 10 hours a year (within normal working hours) for training and professional development activities according to priorities set by each school. It should be stressed that, despite this mandatory training requirement, it is always up to each teacher to choose his/her own specific training path among a wide variety of subjects. For this reason, there is a percentage of teachers who have never attended courses on the use of technologies in education.

Continuing in-service education is a process that should be designed and supported throughout a teacher' career, so that it is possible that all teachers achieve a minimal level of digital competence.

It is also important to formally recognise teacher's commitment to professional development, preferably via an official and recognised system of credits or via a system

18 https://iktockero.com/tag/sikta/

of digital badges, such as the those provided to teachers who are involved in European Schoolnet Academy MOOCs.

Professional development is also likely to have a more strategic impact when courses and other top-down actions are supplemented by bottom-up actions, for example:

- The development of school/teacher networks and communities of practice that provide both formal and informal support, sometimes via dedicated Facebook groups or by involving teachers in the eTwinning initiative;
- The introduction within schools of teacher-facilitators who can particularly encourage and provide peer mentoring.

Recently Trento (and Italy generally under a national plan) has started a programme which enables every school to appoint a teacher to fulfil the role of a "digital innovator" (in Italian: "animatore digitale") who will play a key role in providing both pedagogical and technical support to staff. The "digital innovator" normally provides special training structured in practical workshops but also arranges study visits to other Italian schools.





6. Next Steps

According to the consultations and interviews presented in chapter 4, in order to effectively develop ICT strategies in schools, decision makers would greatly benefit from having more detailed information and guidance on **cloud services for education, the use of mobile apps in school, eBooks and / or digital textbooks, upgrading broadband infrastructure, use of tablets and smartphones, Chromebooks.**

Furthermore, local authorities identified the following elements as particularly relevant as they, or their absence, could jeopardise the widespread deployment of both mobile learning and cloud services in schools: lack of funding and equipment, inadequate network performance, but also the lack or limited professional development programmes including ICT training for educators. *"Without proper professional development teachers are not able to let go of traditional teaching methods".* **Teachers' attitude, finally, was identified as an extremely influential factor as educators are** *"[…] the key factor as they are the facilitators of any innovative program".*



Responding to the above-identified bottlenecks, the FCL Regio project has formulated recommendations on a wide range of topics, and included one specifically focused on continuing professional development of teachers (recommendation 5.7). "Regions should increase efforts related to continuing professional development of teachers and should propose a minimum level of digital competences for all teachers as part of their regional ICT strategy."

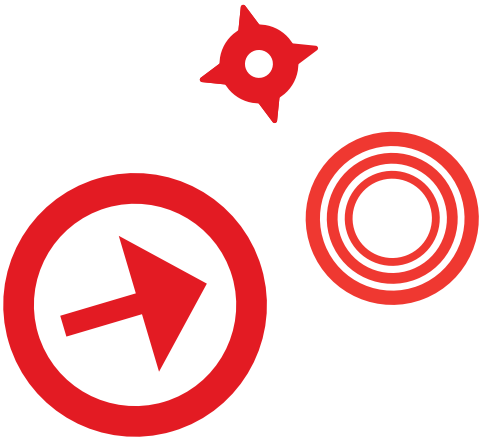
Teacher education is indeed key for successful integration of ICT in schools, but this training must include also initial teacher education and not only on-going, 'life-long' professional development opportunities throughout all stages of a teacher's career. Initial Teacher Education is often regarded as one of the biggest bottlenecks

that hinders the use of ICT in education. Providing teachers with the knowledge and competences they need in order to make use of ICT tools is a core issue for policy makers related to the digitization of schools.

As well as developing effective CPD programmes that improve the digital competences of all teachers, it is important that policy makers also look for ways to work with Initial Teacher Education (ITE) institutions in the region to ensure that pedagogical use of ICT is adequately covered in ITE curricula or that other strategies are adopted to provide mandatory training for newly qualified teachers.

The provision of digital competences to both pre-service, newly qualified and experienced and their training on the pedagogical use of technology, will therefore certainly be part of discussions and research in the coming year of the project. This effort will also seeks synergies with a new Erasmus+ Knowledge Alliance project that was launched by European Schoolnet in January 2017, Initial Teacher Education Lab, which aims to establish a University-Industry forum with a view to fostering innovation and knowledge exchange with regard to ITE curricula.

In Year 2 the FCL Regio project focus will explore the whole spectrum of teacher education programmes and activities that allow educators to develop their ICT competences.



FCL Regio

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