Guidelines on Exploring and Adapting LEARNING SPACES IN SCHOOLS

European Schoolnet

Future Classroom Lab
by European Schoolnet

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1. Introduction

These guidelines have been developed with input from Ministries of Education in the European Schoolnet Interactive Classroom Working Group (ICWG). It has included work with policy makers, advisers, school leaders and teachers from across eight countries (Austria, Czech Republic, Estonia, Ireland, Italy, Norway, Portugal, Switzerland), and has been published with the support from Steelcase and Microsoft.

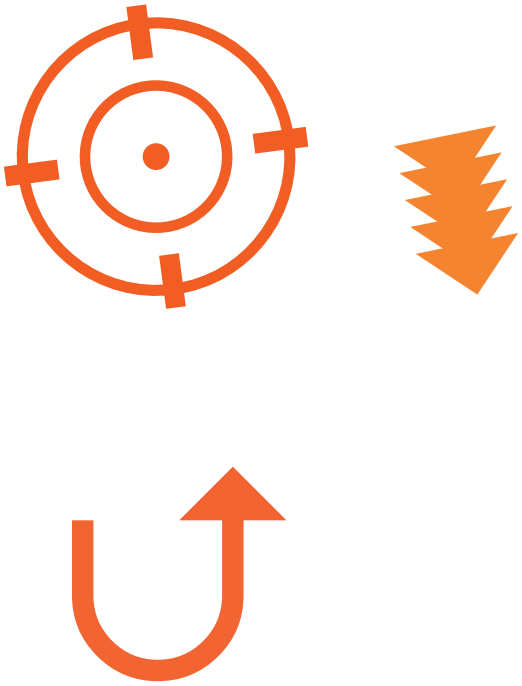
This document reflects that the national picture regarding learning spaces in schools, in 2017 is varied and inconsistent across Europe. In some countries, such as Italy and Portugal, policy makers are convinced of the importance of developing more flexible learning spaces and this issue is already a part of the national strategy for ICT and innovation in schools. In other countries, the need for more flexible learning spaces in schools is still not a policy priority or a specific part of the national digital strategy; however, some school leaders and teachers have started to recognise that innovative use of ICT and flexible learning spaces go hand in hand. Given that learning spaces have been identified as a developing trend in education, it is likely that the situation will continue to evolve rapidly and that adapting learning spaces will become an increasingly important issue for policy makers and school leaders in more countries.

The main aim of this document is to provide some practical advice and support to schools that are starting to explore how to develop and adapt learning spaces in order to enable the introduction of innovative pedagogies using technology. Knowing where and how to begin to make simple changes can make a big difference. Whilst some teachers are fortunate to be able to work in brand new settings, this is not a prerequisite to success. There is not one solution and what works in one place may not work everywhere. It is hoped, however, that this document will inspire school leaders and teachers, help them rethink their current classroom practice and illustrate how even quite small changes to existing classrooms and other spaces within a school can have an important impact on teaching and learning. Ultimately, it is about sharing the gathered expertise on the development of learning spaces in schools from across Europe.

The document begins by looking at some of the key literature on learning spaces in schools (section 2); this is diverse and spans over more than twenty years. The document then considers the key benefits of adapting learning spaces in section 3.

In Section 4, there is an overview of the European Schoolnet's Future Classroom Lab in Brussels. Section 5 gives suggestions for how schools can start to consider different learning spaces with some important considerations for school leaders. Section 6 provides practical advice for teachers who want to adapt their classroom including an introductory audit tool.

Section 7 explores the national context across eight European countries along with case studies presenting key issues that need to be addressed when schools make the decision to change and adapt learning spaces.



2. What the Research Says

The prime focus in this report is on the physical classroom and the growing awareness that making changes to how classrooms are configured and organised is, to some extent, being driven by the use of technology. In this section, some of the key literature on learning environments and learning spaces has been explored to signpost areas of focus in this work. Several projects have produced audit tools or checklists that might provide a useful starting point for other projects but, in adopting any of these, it is important to determine the scope and scale of your own project. The focus on teaching and learning spaces presents a potentially innovative way of looking at how we can make a difference to pedagogical practice in the classroom. It means that we can use the exploration of the physical spaces, not only in the classroom itself, but also throughout the whole school, to begin to address some of the challenges within educational processes.

It is important to first understand what we mean by learning spaces.

2.1. Definition of Learning Spaces

The Organisation for Economic and Cooperation Development (OECD) has the Learning Environments Evaluation Programme (LEEP) that builds on the work of their Centre for Effective Learning Environments (CELE). This offers a network with access to further information for school leaders, researchers and policymakers about learning environments.

Work carried out by OECD (2006) has probably come closest to providing an agreed definition of learning spaces:

> The OECD defines 'educational spaces' as 'a physical space that supports multiple and diverse teaching and learning programmes and pedagogies, including current technologies; one that demonstrates optimal, cost-effective building performance and operation over time; one that respects and is in harmony with the environment; and one that encourages social participation, providing a healthy, comfortable, safe, secure and stimulating setting for its occupants. In its narrowest sense, a physical learning environment is seen as a conventional classroom and, in its widest sense, as a combination of formal and informal education systems where learning takes place both inside and outside of schools *(Manninen et al., 2007).'*

Cited in Kuuskorpi, K and Gonzàlez, N. (2011)

Istituto Comprensivo di Cadeo and Pontenure, Italy

2.2. Learning from Existing Evidence

The Centre for Effective Learning Environments (CELE), OECD (2007) moved forward with an international pilot project, Evaluating Quality in Educational Spaces (EQES). The main objectives of the pilot were 'to develop user friendly, cost effective tools and data gathering strategies', to identify good practices and lessons learned, and to explore the contextual issues and constraints. The project involved between one and five secondary schools in Brazil, Mexico, New Zealand, Portugal and the UK (England and Scotland.) It led to a manual and tools to help the schools to consider the quality of educational spaces. This includes tools providing a framework for schools to consider their current environment with a focus on learning spaces, accessibility, comfort, safety and security, maintenance and the school's appearance. One of the challenges for any school leader or teacher who is keen to make changes to learning spaces is the size and scale of the work being undertaken.

Sanoff (2001) produced a manual to support 'school building assessment methods' adopting the analogy of the physical environment as 'the second teacher' emphasising 'the power' that is evident within the space 'to mirror the ideas, values, attitudes and cultures of the people within it.' The manual provides a range of surveys and discussion tools encouraging users 'to identify what works and what does not work in K-12 school buildings'. However, it also explores the need to understand the 'culture' of the school as an underlying principle dependent on 'open discussions and shared decisions', suggesting that teachers, students and the school community need to be involved in determining the learning environment. This set of tools is largely focussed on what is happening at whole school level and with a checklist for 'a walking tour', 'a school building observation form' and a 'school building rating scale'.

There are ideas that could be adopted by individuals and smaller groups of teachers looking to change the physical space, such as photo questionnaires (p.17-18) where students and staff are presented with photos and then rate the different spaces according to a scale. Sanoff (2001, p.28-30) presents a tool to encourage teachers to rate their own classroom environment using statements and a rating for the teacher to choose 'most like or most not like my classroom.' Fundamentally, what is most important is that schools have identified a way to evaluate their learning spaces so that there is evidence to show why something should be done in a particular way.

The transformation of teaching and learning spaces in the UK led to the British Government's Building Schools for the Future (BSF) programme for secondary schools in England in 2007. Leiringer and Cardellino (2011) discuss how the programme considered 'exemplar schools' in Denmark and Sweden to gain further understanding of how the design of the building was developed 'to support particular educational visions and approaches to teaching and learning'. The UK BSF programme highlights how large government investment programmes can play an important role in implementing substantial change across the system.

Barrett et al (2015) conducted their research study 'Clever Classrooms' on the impact of the built environment on student learning. The HEAD Project (Holistic Evidence and Design) looks at the learning rates of primary age students aged 4-11 years. The research data has been gathered over three years from 153 classrooms in 27 schools across three UK local authorities. Barrett et al (2015) focus on the 'naturalness' (light, temperature, air quality); 'individualisation' (flexibility and ownership) and 'stimulation' (colour and complexity) in classrooms. The report comes to the conclusion that 'well-designed classrooms boost children's academic performance in reading, writing and maths.'

The Clever Classrooms Report highlights that 'differences in air quality, colour and light together can increase the learning progress of primary school pupils by as much as 16% in a single year.' However, the report states that the size of the school and 'specialist facilities and 'play facilities' are not considered to be 'as important as the design of individual classrooms.'

The Clever Classrooms report argues that teachers can make small changes 'costing very little or nothing', that can make a real difference. For example, there are suggestions for teachers to change the 'layout of the classroom', the 'choice of display' and the 'colour of the walls'. Indeed, the report identifies 'checkpoints' for school designers and for teachers to follow when implementing changes in the classroom. These 'checkpoints' will be of interest to those who are working on the use of learning spaces.

At a global level, there is a growing interest in projects concerned with the development and use of learning spaces. Whilst this is not a new topic as such, it is being refocused given the increased access and reliability of technologies available. Discussions on adapting learning spaces also increasingly have to address issues related to the changing role of the learner who can now access personal digital devices inside and outside of the classroom to access resources and create outputs that are innovative, professional and easily shared. The New Media Consortium (NMC), (2017), for example, identifies redesigning learning spaces as a mid-term trend that will drive the adoption of technology in K-12 Education for the next 3-5 years.

Dr Wesley Imms, University of Melbourne, Australia, is leading an Australian Research Council Linkage Project entitled Innovative Learning Environments and Teacher

Change (ILETC, 2016-2019). This is a three stage project identifying the benefits and shortfalls of innovative learning environments. Dr Imms is also leading on a second project, 'Evaluating C21st Learning Environments', which was established to develop an evaluation framework to understand what works in various settings. Imms (2016) refers to the notion of 'disruptive interventions that often displace, rather than replace, the teacher.' The University of Melbourne leads a Learning Environments Applied Research Network (LEaRN) that has hosted conferences in Australia, London and Grand Rapids during August and September 2017 to bring together leading experts including academics, education specialists, school leaders, researchers, industry and practitioners as part of the ILETC project. This has included a programme of keynote speakers, PhD students and leading specialists and enabled much needed dialogue and shared practice on the potential for developing learning spaces in schools.

2.3. Why Change Teaching and Learning Spaces?

Schools are increasingly acknowledging that the traditional classroom with teachers at the front and students facing in one direction for the whole lesson does not enable innovative pedagogical approaches. Policy makers, teachers and researchers have recognised that the opportunity to work in groups, to undertake projects and to collaborate with others beyond the classroom, challenges traditional ways of teaching and learning.

Diana Oblinger (2006) states that, 'Spaces themselves are agents for change. Changed spaces will change practice.' Oblinger (2006) recognises that spaces designed several decades ago will not reflect the needs of students today. Even though this edited book brings together a series of chapters that were written over a decade ago, it discusses the role of technologies in 'connecting learners', there is an even bigger possibility to do this in today's learning environment and that students will anticipate that a continuous connection with the world beyond the classroom should be possible.

The 'interaction' between the learning and learning environment is highlighted by Lippman (2010) who considers the 'social and physical' aspects of the learning environment as part of the 'responsive design approach' showing that there is a need for further research and collective understanding to ensure that the design of spaces are underpinned by evidence of use.

Students increasingly have access to their own technologies both within the lesson and outside the classroom; their expectations of how they learn have also changed. However, the school environment has not necessarily changed at the same pace. Teachers recognise that students want to use technology and they are also keen to demonstrate their creativity. Students can also be assessed in new ways as they access digital resources and create presentations of professional quality, but this remains a challenge as summative traditional testing remains across the curriculum and much is still weighted on examination results. Communication both within and beyond the classroom has become immediate, spontaneous and global.

There is a shared consensus that schools want to show themselves to be continually acknowledging the changing needs of the student. Teachers interviewed as part of this project agree that 'something needs to be done' to improve teaching and learning in schools and that adapting learning spaces provides a very visible way of demonstrating to teachers, students and parents that positive changes are being made.

Istituto Comprensivo G. Mariti, Fauglia, rete scuole Senza Zaino

2.4. Implications for Pedagogy

In a paper published by UNESCO, Cynthia Luna Scott (2015) explores how the C21st pedagogies and approaches adopted by teachers need to change to embrace where children learn, what they learn and the tasks they undertake. Furthermore, there is the need to recognise that learning takes place 'outside the formal education system', and this in itself has changed the nature and concept of what school is for. C21st pedagogies such as flipped learning, collaborative learning and project based learning or scenario based problem solving have necessitated changes in the layout of the classroom to allow movement and flexibility. Increasingly, teachers and students recognise that technology offers the freedom to decide when and where to learn, but more significantly, it motivates students to produce outputs that demonstrate individual understanding of learning outcomes. For example, students can create a multimedia presentation or a video that can be easily edited and the learner is not dependent on being in one place. It is this blend of physical and virtual that needs to be nurtured.

Istituto Comprensivo 9 di Bologna

Some teachers, however, find this part hard to control because it can mean that the student is able to take the learning beyond the goal that the teacher is working towards. In truth, the student does not need to even know or have met the person who he/she interacts with. For example, the student may engage in an online forum, social media or web-conference anywhere in the world. Students are able to work together in virtual spaces through the sharing of a web link. These can be live (synchronous) or asynchronous. The teacher with access to technology can also identify particular students to complete a task and can gather instant feedback and data to support individual students. It is important that the students have access to their own devices. In some schools there is the opportunity for the students to own these devices through purchase schemes or government implementation. However, there are those that are only able to offer 1:1 access on an ad hoc basis.

Fisher (2010) presents three case studies focussing on 'technology enabled active learning environments'. Whilst his focus is largely on higher education, it is worthwhile considering how and where students learn. He draws on the work of Brand (1995) and his 'hierarchy of core building elements' to highlight how all the different 'elements' need to be 'up-to-date'. Namely, the 'stuff, space-plan, services, structure, skin and site.' Conflict is evident because 'the 'life cycle' of the technologies is approximately three years, the space plan may well be seven years, the services 10-20 years whilst the structure could be in excess of 100 years.'

Furthermore, the physical spaces have to be right for the pedagogies. These issues are ongoing for all educators, and it emphasises how each issue cannot be dealt with separately; all are interlinked and should form part of the strategic development of the school/education institution.

2.4.1. Can Technology Support or Enhance Learning Spaces?

Technology is pervading C21st learning environments but the reality is that innovative use of technology in classrooms continues to be fragmented and inconsistent. While the interactive screen at the front of the classroom remains the dominant feature in most classrooms, there is a realisation that students can change the direction of the learning much more readily either by engaging with existing technologies in the classroom or by bringing their own device. This is because 1:1 access encourages opportunities for immediate participation and students can be involved in different tasks.

C21st pedagogy has led to an exploration of schools providing different types of mobile devices through to some students being allowed to bring their own. However, it has exposed that one of the biggest challenges for students today is consistency of access. There are still very few examples across Europe of schools where students can use technology throughout the day with all their different teachers to support all of their learning. It is difficult to achieve this when all classrooms in a school do not have the same levels of equipment. It is even more challenging when teachers are not able to use the technology that is available.

Beichner (2014) identifies the need for today's students to have 'continuous connection' to information and people. Students expect to be able to have access to technology and expect to be engaged in doing something, along with the need 'to expect instant gratification and feedback.'

Teachers spend a lot of time encouraging students to work together, wanting them to use technology to search for answers and to create new ideas, but then it is expected for students to demonstrate their knowledge by sitting in rows taking summative tests or examinations in isolation. C21st assessment needs to be adapted to C21st learning.

2.4.2. Can the Development of Learning Spaces Support Personalising Learning?

Personalising learning is an ongoing process enabling the teacher to make formative assessments and to continually support the learning of the individual. The use of technology in the environment has enabled teachers to give more targeted activities and to provide immediate, direct feedback to allow the student to learn at their own pace. Access to technology also means that evidence can be captured to potentially give more precise detail about the student's progress.

Flexible learning spaces provide an opportunity to enable students and teachers to make the agile decisions about where and how they want to learn within the structures of the curriculum and the timetable. Teachers and students have to determine how they can personalise teaching and learning to maximise student success.

When the teacher is generally at the front of the classroom, there is less opportunity for interaction with individual students. The teacher is normally able to interact better with students as he/she moves around the room and can put the students into different groups more easily if the layout of the room enables this. The teacher can choose whether to disclose to the students why they are in a particular group. Preparing group activities also encourages the teacher to think about what each group will do and who will be in the group. Changing the layout of the room and providing access to technology can begin to address how the teacher is supporting the learning needs of individual students.

Over the past two years, education ministries in the European Schoolnet Interactive Classroom Working Group have been exploring different approaches to personalising learning in school, including how technology can support differentiated teaching and the learning of each individual student.

> "In a class with the traditional layout of chairs and desks, there is no personalisation of the teaching because all the students are told the same and given the same activity. If we change the design of the classroom with islands where students can do different activities, each student is able to be an individual person and work in their own way."
> *Fernando Franco, DGE, Portugal*

2.5. Finding out What Works – Why Active Learning?

In the report published by ISTE, Basye et al (2015) highlight the need for learning spaces to be 'active' in order to allow students to communicate and collaborate, as they will be expected to do so in the workplace. They explore the notion of 'Active Learning' to demonstrate how the teacher can change what is happening at the centre by synthesising space, technology and pedagogy. The report presents examples of 'active learning' in contrast to 'passive learning' emphasising the need for the students to be involved in different activities during the course of the lesson. (2015, p.26) The concept of active learning is defined by Bonwell and Eison (1991, p.2) as 'anything that involves students in doing things and thinking about the things they are doing.' Sean Corcorran, General Manager, Steelcase Education (2015, p.x) states: "Pedagogy as the driver, supported by space and technology, all working together, empower teachers to be their most effective and students their most engaged and successful." This is not a new idea, but the reality is that the concept is not always fully demonstrated as either the constraints of the space, the technology in use or the pedagogical approach prevents the synthesis. The challenge of integrating technology in schools within existing spaces and developing pedagogical approaches is a recognised area for continued research. Drawing on research that Steelcase has supported, there are several resources on the company's web site related to blended learning, active learning and the design of learning spaces that teachers and school leaders may find useful.

The ISTE Report (2015) draws on a research project undertaken by Steelcase Education (2014) where the findings show that 'classrooms intentionally designed to support active learning increased student engagement on multiple measures as compared to traditional classrooms.' Whilst

IISS Ettore Majorana, Brindisi

this study predominantly draws on evidence from Higher Education, it is notable that students self-reported 'increase in engagement (84%), ability to achieve at a higher grade (72%), motivation to attend class (72%) and ability to be creative. (77%).' This is based on data collected in a 'post-occupancy evaluation survey' undertaken as part of Steelcase's engagement and research, (including design principles of how a physical learning environment should be planned and organised). It is probably the notion of increased student engagement that attracts the interest of those who are looking for ways to 'motivate' students and provide new opportunities to encourage students to participate in 'active learning'.

Cleveland and Fisher (2014) refer to the definition of Zimring and Reizenstein (1980, p.429) where 'post occupancy evaluation' was 'the examination of the effectiveness for human users of occupied designed environments.' In their critique of physical learning environments, Cleveland and Fisher (2014) conclude that such evaluations are important as they allow us to collect feedback about how spaces are being used from those who are actually using the space. However, they acknowledge the challenges of harmonising the viewpoints of the various stakeholders. This is not surprising and perhaps in the C21st becomes further exacerbated as the role of the learner has changed with the pervasion of technology. Hence, the students' views on the success of a learning space will depend on whether they are able to do what they want to do and decide who they want to work with, but this may well differ depending on the teachers they have. Undoubtedly, access to technology and training will play a significant role.

2.6. Learning Spaces of the Future

Kuuskorpi and González (2011) acknowledge that 'the basic structure of teaching spaces does not seem to have evolved much over the past century.' Their research explores four different 'learning contexts' as part of a 'physical learning environment.' The study identified key factors that form part of the notable comparisons within physical learning environments; these are 'changeability, flexibility and sustainability'. The study involved giving students the opportunity to arrange a model classroom using a specific set of furniture (1:50 scale) to determine how they 'would like tomorrow's classroom to be configured'. Alongside this, questionnaires were given to teachers and local authorities were interviewed. The study also involved the method of 'process simulation' that led to a single model of a learning space developed from the input of designs by the students involved. It is important to note that this study suggests the development of 'additional spaces' of different sizes including 'the reflective environment', 'the creative learning environment', and 'the interactive learning environment' striking a balance between the 'traditional classroom' and spaces that encourage alternative ways of working. The study highlighted 'when physical learning environments offer resources and possibilities that support new teaching methods and learning goals, schools are much more prompt to change their operational culture.'

Basye et al (2015) consider 'learning spaces of the future' through the presentation of several scenarios with fictional characters. These recreate the lifestyle of the teenager to understand the different places where he/she can learn. The scenarios demonstrate how the school environment should be linked to preparation for the workplace. There is a fundamental consideration for how the physical spaces in school enable the student to develop 'creativity', 'communication' and 'collaboration'. This report published by ISTE documents activities for teachers and facilitators to trial in their own context that aim to help them understand the effectiveness of different physical spaces.

In the report by ISTE, Basye et al (2015) give due consideration to the need to 'reimagine the classroom'. It is not difficult to conclude that the C21st child has access to spaces to learn beyond school that potentially offer a much more global view of the world. The notion of 'agile' classrooms is explored recognising the need for 'the singular classroom...to be a flexible, multipurpose room', acknowledging that students should have the opportunity to understand where and how they learn. There are practical suggestions and ideas that can be taken forward, including offering ways for teachers to make the most of 'accessories' such as 'storage space, classroom supplies, writable surfaces, LCD displays, display space, colour and lighting within the room.' Ultimately, this emphasises the need for the person working in the space to take responsibility for how the space can be improved.

Research studies such as those mentioned above can challenge us to look at the learning spaces we have and begin to determine what we might need. However, to be able to do this effectively, at the same time teachers need to be able to rethink their current practice and consider how they can maximise the potential of their students. We cannot assume that only changing the physical spaces where students learn will automatically lead to progress. Change needs to be planned, considered and determined by the pedagogical needs of the C21st learner.

3. What are the Benefits of Adapting Learning Spaces?

The interviews and the research for this project have highlighted the perceived **benefits** by those who are exploring and adapting learning spaces:

- Schools can **connect the physical changes required with learning and teaching developments**. This can help the school to identify how priorities can be determined with a single point of focus. Schools can be much more aware of how space is being used.
- **Technologies can be used across different subjects** to enhance the use of space. For example, the teacher does not need to go to a computer lab to enable students to work together to access devices.

Benefits for Teachers

- Teachers are able to **explore different pedagogies** as the school adopts a **transparent approach** to sharing ways of working.
- Teachers benefit from **working together** to address an area for whole school development.
- Teachers are able to **group the students** according to their individual needs.
- Teachers find it easier to get to **know individual students** as there are more opportunities to discuss ideas when the students are in groups.
- Teachers may have the opportunity to **consider team teaching** with larger groups of students to share expertise.
- Teachers are able to **encourage the students to move and participate in** different tasks within the lesson.
- Teachers may be able to give the students **activities to do at home individually** in advance of the lesson in order to utilise lesson time to extend or develop ideas.

Benefits for Students

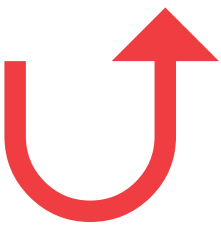
- Students can have **increased access to technologies throughout the day**, rather than technology being in one room and available for limited periods. This extends to beyond the school day and it means that time in school can be spent on different tasks and activities as students have accessed resources from home.
- Students can have **more opportunities in lessons to collaborate and discuss ideas**. This means that the students can learn with and from their peers. Students like the opportunity to **work in various groups and engage in tasks**.
- Students can **take an active role in their learning**. For example, a student may have several tasks to complete within a certain timeframe in various parts of the classroom.
- Students can **make decisions about the order of activities** and this helps them to become more **autonomous**.

And perhaps most importantly:

- **Students like their new learning spaces and want to be in school;** this is because a flexible learning space enables the student to be mobile and learn at school as they do in everyday life using technologies.
- Parents have noticed that **students are more likely to talk about what they have been doing during the school day**.

Becoming more aware of the potential benefits of adapting learning spaces will be an iterative process for many stakeholders. Hopefully, some of the studies, research and projects referenced in section 2 will provide useful ideas and pointers to tools along with the case studies in section 7.

Some of the schools mentioned in the case studies have also been motivated to start experimenting with adapting their learning spaces as a result of participating in some recent pan-European school pilots and seeing how European Schoolnet has been developing the model for its Future Classroom Lab initiative, as described in the following section.



4. The European Schoolnet Future Classroom Lab[1]

In January 2012, European Schoolnet launched a 'Future Classroom Lab'[2] (FCL) as part of its offices in Brussels. The idea behind the development of this facility emerged during the iTEC project[3] (Innovative Technologies for Engaging Classrooms), a large-scale pan-European pilot coordinated by European Schoolnet that focused on the use and mainstreaming of ICT in schools. iTEC involved 26 project partners, including 14 Ministries of Education plus a further three ministries that participated as unfunded associate partners.

During this flagship project (2010-2014) that was partly funded by the European Commission's FP7 programme, educational tools and resources were piloted in over 2,500 classrooms in 20 countries. At that time, this made it by some measure the largest pan-European pilot in schools involving the use of ICT. At the end of this four-year project, a major output from iTEC was a change management process encapsulated in a Future Classroom Toolkit. This enables educational policy makers, school leaders, teachers, ICT suppliers and other stakeholders to create and implement innovative pedagogical scenarios and learning activities that make use of a wide range of technologies that are increasingly available in classrooms. An updated and revised version of the toolkit will be released during the first half of 2018.

A key aim in iTEC was *not* to pilot 'blue-sky' teaching and learning scenarios using technologies that were just being introduced in the market. Many previous projects had been technology driven and/or adopted a 'rigorous imagining' approach in terms of what the future classroom might look like. However, most of these projects had failed to make a visible, long-term impact on classroom teaching. Also, in their use of leading-edge technologies and promotion of sometimes very radical visions for the future classroom (e.g. where the teacher disappears entirely), a number of these projects probably alienated some of the teachers, learners and parents they were trying to engage.

From the outset in iTEC the emphasis was on putting in place both a user-centred design process and a rigorous testing approach to ensure that the project's learning activities and proposed designs for the future classroom could be successfully validated in a large-scale pilot and taken to scale. Mainstreaming innovative practice was particularly at the centre of the project and, as a consequence, iTEC was explicitly designed to act as a 'living lab' for pedagogical and technical innovation involving ICT in schools.

However, although the living lab model informed the idea for the project, at the start of iTEC there was no intention to set up a physical lab space and there was no funding in the project proposal allocated to this objective. Early during iTEC though it became clear that having a physical space would help the project to showcase and disseminate the innovative pedagogical scenarios being developed. Many of iTEC scenarios were also prompting teachers to start thinking about how to adapt typical classroom layouts, for example so that they could better support collaboration and group work or project-based activities. Piloting of 'flipped classroom' scenarios towards the end of iTEC similarly challenged project partners and teachers to rethink what classrooms were for and how schools needed to provide more flexible learning spaces for students in order to support 21st century teaching and learning.

This is a very important point to grasp about the 'vision' behind the Future Classroom Lab. It was originally designed *not* as a technology showroom, but rather as a way to introduce different stakeholders to new teaching and learning approaches that incorporate innovative use of ICT and challenge them to rethink their current pedagogical practice within a flexible and reconfigurable space.

4.1. FCL Learning Zones

The Future Classroom Lab did not emerge as a fully formed concept in 2012 and is certainly not a unique idea. European Schoolnet particularly drew on the experience of previous initiatives such as the National Interactive Video Centre supported by the UK Department of Trade and Industry in the 1980s and several of the Multimedia Support Centres supported by the European Commission's FP4-ESPRIT programme in the late 1990s. In 2011, the model provided by the REAL Centre in the UK proved particularly influential. Set up by RM Education, a leading supplier of ICT solutions to education in the UK, the REAL Centre at the RM headquarters in Abingdon provided a large open space

1 This summary of the development of the Future Classroom Lab was provided by Jim Ayre, Senior Adviser, European Schoolnet.

2 http://fcl.eun.org

3 http://iTEC.eun.org

divided into different 'learning zones' with a mix of different technologies and flexible furniture that enabled teachers to experiment with new pedagogical approaches and rethink their current teaching practice.

Initially, European Schoolnet and RM explored how a number of the iTEC future classroom scenarios could be implemented within some of the learning zones that RM had incorporated in its REAL centre. This led to the design of the Future Classroom Lab in Brussels with six learning zones which have been utilised in a wide variety of ways during successive European Schoolnet projects over the last five years and as a result of working with teachers in FCL professional development workshops and other events.

The initial six learning zones exist in the FCL today and each of them focuses on a different approach or aspect of teaching and learning. They encourage those exploring the FCL to consider the physical space, resources, the changing roles of students and teachers, and how to support different learning styles. Collectively, the zones provide a way to visualise how different, innovative pedagogical approaches that incorporate ICT can be implemented in classrooms and across a whole school. The zones reflect what good teaching should be about: being connected, being involved, and being challenged.

a. **Investigate**
The investigate zone is designed to encourage students to discover things for themselves and to be active participants rather than passive listeners. Teachers can particularly use this space to explore inquiry- and project-based learning and help enhance students' critical thinking skills. The flexible furniture supports this concept and this space can be reconfigured quickly to enable work in groups, pairs or individually. The mix of different technologies available supports students' research by providing rich, versatile and real-life data along with tools and devices (including data loggers, robots, microscopes, online laboratories, 3D models etc.) that encourage learning to examine and analyse.

b. **Create**
Students need to be empowered to do more than absorb or annotate content and resources created by others. In the create zone they have a space in which they can exercise their imaginations in order to plan, design and produce their own work. As well as enabling individual students to learn by creating using the available tools (digital cameras, microphones, video editing software tools for creating podcasts, animations and streaming media etc.) this space also aims to encourage students to develop their soft skills through project-based work and teamwork.

c. **Present**
The presentation and delivery of the students' work has to be factored into the planning of lessons and the present zone shows how the sharing of results can be supported by an area with reconfigurable furniture that encourages interactive presentations, active listening and feedback. Interactive screens and online publication tools enable students to think about how to reach different audiences both face-to-face in the school's public spaces as well as online (e.g. via the school web site, blogs, podcasts etc.).

d. **Interact**
A challenge in traditional classroom settings is getting all students actively involved in learning. The interact zone tries to show how a teacher can use different technologies (interactive whiteboards/displays, learner response systems, mobile devices, classroom management software etc.) with different room layouts (students sitting in a horseshoe shape or in small groups) to enhance interactivity and student participation in traditional learning environments.

e. **Exchange**
Being able to collaborate successfully with others is increasingly seen as a key 21st century competence that all students need to develop. This space (including interactive whiteboards/tables, mind-mapping software, brainstorming tools etc.) helps teachers explore: how the quality of collaboration is composed of ownership, shared responsibility and group decision-making processes; and how ICT can help support a richer way of communication and collaboration.

f. **Develop**
The Develop zone is a space for informal learning and reflection. With soft furniture, study corners, portable devices with headphones, games etc., students can carry out school work independently at their own pace. They can also learn informally in a more relaxed, non-monitored, home-like environment where they can focus on their personal interests. It is a space that aims to support self-expression and self-directed learning and which can be used by teachers to support personalised learning approaches.

4.2. Mainstreaming the FCL

When the Future Classroom Lab concept was first developed within the iTEC project it was unclear how policy makers, teachers and school leaders would react to this initiative. By the end of the iTEC project, however, a number of ministries or national ICT agencies had already started to replicate the FCL model (in Norway and Estonia). In June 2014, nine ministries also agreed to launch and provide ongoing support for a pan-European network of Future Classroom Ambassadors[4] to help exploit the outputs from the iTEC project and further develop the FCL vision and adapt it to different national contexts. In September 2017 the FCL Ambassador network has now expanded to cover 15 countries (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Hungary, Israel, Italy, Norway, Portugal, Spain, Sweden, Turkey).

Setting up a Future Classroom Lab, however, is challenging and takes time, commitment and funding. What took European Schoolnet by surprise was the extent to which teachers and school leaders who had visited the Future Classroom Lab in Brussels were so inspired by the concept that they decided to set up a version of a FCL within their own school (see case studies on the Czech Republic and Portugal). There is now a growing network of these labs across Europe[5] coordinated by European Schoolnet and FCL Ambassadors.

In most countries this 'bottom up' mainstreaming has also largely happened with little or no direct government funding to the schools involved. In Portugal, for example, DGE, the General Directorate of Education of the Ministry of Science and Education, has mainly provided support for five FCL Ambassadors who provide training and support to schools wishing to develop their own flexible learning spaces based on the FCL model and help coordinate a community to share examples of good practice. In September 2017, there are now 34 examples of what in Portugal are called 'Innovative Learning Environments' that are based on the FCL model.

European Schoolnet is still trying to fully understand why the FCL concept seems to resonate so strongly with many teachers and school leaders and motivate them to set up a similar space. Part of the reason is undoubtedly that visiting the FCL in Brussels or participating in FCL workshops and courses is the first time that many practitioners have had an opportunity to think seriously about the relationship between the design of flexible learning spaces and how to implement innovative pedagogical approaches involving the use of ICT.

4 http://fcl.eun.org/fcl-ambassadors
5 http://fcl.eun.org/fcl-network-labs

An important point to make here is also that, while some of the learning labs inspired by the FCL have chosen to adopt the FCL model of learning zones and even some of the FCL furniture, branding and visual identity, European Schoolnet is not trying to provide a prescriptive FCL 'blueprint' or suggest that all labs must be identical. On the contrary, it recognises that all such spaces must be adapted to the local context and local needs. European Schoolnet is also very conscious to promote the message that creating a FCL is just a first step in a more comprehensive change management process that will require teachers and school leaders to adapt classrooms and other potential learning spaces throughout the whole school.

The main conceptual ideas behind the Future Classroom Lab, however, are clearly visible in this growing network of learning labs which have the following common elements:

- They provide **flexible learning spaces** that can be easily reconfigured according to the needs of different learning activities and that allow for easy repositioning of learners and teachers.
- They have **a mission to host innovative learning.** Learning activities taking place in the learning labs aim to incorporate new visions on pedagogy, 21st century skills and technology-enhanced learning.
- They are places both for student learning activities and teacher professional development, including meetings and discussions about education. A learning lab **is a space for practice but also for reflection.**
- They **aim to involve and to connect different stakeholders.** They create a dialogue between teachers, school leaders, policy-makers, commercial partners, students, parents, etc.
- They **help to develop an open culture;** for example, teachers can observe each other's lessons and provide mentoring; students can use the learning lab to take part in European projects like eTwinning.
- Communication is an important part of engaging the stakeholders and informing the outside world about the activities. **A learning lab can be an inspirational lighthouse for the area** (e.g. for other schools in the region).

4.3. Future Directions

An important part of the overall FCL vision has been to ensure that the iTEC project was not a stand-alone activity on the future classroom but was part of a 'family' of related projects underpinning the long-term strategy of European Schoolnet as defined by its 31 supporting Ministries of Education. By the end of iTEC, European Schoolnet had developed three other projects with co-funding from European Commission programmes that leveraged and extended iTEC results:

CPDLab project 2011-2013 (Lifelong Learning Programme - creating continuing professional development resources for teachers)

Living Schools Lab 2012-2014 (7th Framework Programme - developing a whole school approach to change management by networking very innovative schools with those making less advanced use of ICT)

Creative Classrooms Lab 2013-2015 (Lifelong Learning Programme - a policy experimentation involving the use of tablets in schools in nine countries)

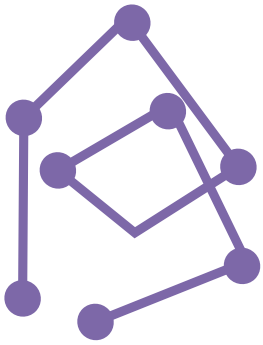
Many teachers involved in these projects had opportunities to participate in workshops at the FCL and, inspired by this experience, a number have gone on to set up their own learning lab. Unfortunately, however, European Schoolnet has not yet identified a suitable funding line within European Commission research and development programmes that will enable it to accelerate the take-up of the FCL concept including the co-ordination of the emerging pan-European network of learning labs. Hopefully, however, the topic of learning spaces in schools will soon be addressed more specifically within EC research programmes as more education ministries follow the lead taken by Italy and Portugal and start to address this issue as part of their national ICT strategy.

Following iTEC, working with Initial Teacher Education (ITE) organisations has been a priority for European Schoolnet and some important initial progress has been made here. For example, the *University of Lisbon* which was an iTEC partner opened its own learning lab in April 2015 in the Institute of Education and is exploiting iTEC tools and results within its ITE and CPD programmes. In August 2016, a major FCL (2,100m2) opened in the new *Campus Carlsberg* in Copenhagen, supported by the Danish Ministry of Education that will provide teacher training for 10,000 students. One of the latest learning labs is the *Future Learning Lab* (FLL) in Vienna that opened its doors officially in September 2017 at the Centre for Innovation in Learning and Teaching (ZLI), part of the Pädagogische Hochschule Wien. This new space builds on the FCL model

and will offer a well-equipped environment for learning and teaching of digital competences and will also be linked to the 'School 4.0' initiatives of the Austrian Federal Ministry of Education (BMB).

European Schoolnet particularly hopes to associate these initial teacher education labs with its new *ITELab* project that commenced in January 2017. This three-year Knowledge Alliance project, co-funded under the European Commission's Erasmus+ programme, aims to foster innovation and knowledge exchange in initial/pre-service education. A key output of this project, that includes five higher education institutions involved in initial teacher education and four ICT Industry partners, will be the formation of a sustainable forum to help address the perceived 'disconnect' between initial teacher education and teacher continuing professional development. Steelcase and Microsoft who have supported the production of these guidelines are both partners in this project and it is anticipated that the need for more flexible learning spaces in schools will be an important issue for discussion. It is also hoped that many more higher education institutions will leverage and adapt the FCL model for use with student teachers as a result of their participation as Associate Partners in ITELab.

Finally, it is hoped that the case studies and guidelines in this document will: provide schools that are in the early stages of setting up their own learning lab with some practical advice on how they can develop more flexible learning spaces; and make more policy makers aware that developing a whole school approach to adapting learning spaces must be a key component of any strategy that is focused on mainstreaming innovative use of ICT.



5. Getting Started

This section outlines the key areas of consideration for school leaders. Exploring teaching and learning spaces gives teachers the opportunity to create a blank canvas and to start again. It provides a way to take a close look at existing practice and to build learning scenarios from the beginning. It is fundamental that we acknowledge the ongoing need to continue to evidence why we are teaching in the way that we do. Understanding the use of learning spaces is at the heart of school development.

This information brings together issues highlighted in pilots and research studies as well as by school leaders and teachers as part of the case study interviews in section 7:

> "It is very important to know your starting point, we are very attentive to what is happening nationally, we look at what is happening outside early, we undertake personal research, we have a group in school who work on this and what to do in the spaces."
> *Giovanna Rosi, Italy*

5.1. Setting up a Future Classroom Lab

As indicated in some of the case studies in section 7, **setting up a Future Classroom Lab or Learning Lab can be a useful catalyst for change in some schools**. A single room that can easily be reconfigured can become a focal point within the school, not simply by creating a 'showcase' for teachers to emulate, but rather by offering a flexible space that can be used for teacher professional development and within which teachers can be challenged and invited to rethink their current pedagogical practice and experiment with new ways of organising learning.

Ryan (2016) identifies areas to consider when implementing learning spaces focussing on the importance of **phased developments, rather than trying doing everything at once**. This can be a challenge for some schools that may be impatient to create a single 'learning lab' or 'Future Classroom Lab' but who have not thought about what happens next. Ryan (2016) also recommends **working with one company**, but this is not always achievable. Perhaps what is more important is to **provide technical support for the different devices and ensure that they are compatible with other resources in school.**

a. **Vision**
   Every school needs a vision and a strategy for development. These exist in various forms and one of the challenges is connecting the development of physical buildings and resources with learning and teaching. The interviews carried out for this project show that schools need to develop a vision that combines space, technology and pedagogy. There is also an ongoing need to **plan for the sustainability of developments**.

b. **Audit**
   Audit your existing school spaces. This is not just to capture what resources you have, but also so that you have evidence of who uses the rooms and what types of pedagogies are currently implemented. You may find the audit tool on page 22 helpful as a starting point for further discussion in schools. You could also use some of the tools and frameworks highlighted in the research and studies referenced in section 2.

c. **Discussion, Dialogue and Planning for Change**
   Schools have benefited from creating **learning and teaching teams** that look at what is working in the school. It is important to consider that changing learning spaces will impact upon more than one teacher and one class of students. Above all, school leaders need to recognise the importance of **ongoing consultation, discussion, dialogue and planning for change** with teachers, students, parents and other stakeholders. This helps the school to determine clear reasons for the change and gives opportunities to ensure that others understand the potential benefits. It will be necessary to **involve all teaching and support staff** if changes are going to affect the whole school. Changes can take time and it is important to communicate and share evolving plans with teachers, students, parents and other stakeholders.

School leaders may find the following useful to get started:

1. **Seek advice** from those who are responsible for the development of Education at a local/ national level. You may be able to work with a local university to develop your ideas.

2. **Make a wish list** for the things that you would like to change. Ask staff and students and parents to make a wish list. Sanoff (2001, p.20) even suggests that 'students, teachers and parents can fantasize about their dream school' by writing a poem. Indeed, this is even better if the wishes express why changes should be made. You can then compare the similarities and differences.

3. **Identify a team** to look at the use of learning spaces, technology and pedagogy in school. If you have a large group of staff, you could identify one small group for each issue and bring them together to discuss their findings.

4. **Visit education development and technology exhibitions**; for example, the annual BETT Show in London and events in other European countries have been a source of inspiration for some interviewees in this study.

5. Make time to **visit other schools that have already adapted learning spaces** as often as you can. Encourage your learning spaces' team to visit other schools too. This needs to be an ongoing activity.

6. **Develop a strategy and action plan** for the development of learning and teaching spaces. How can the whole school focus on this issue and what are the key areas for development connected to the development of learning spaces? What transformation are you trying to achieve?

7. Imagine if you could **only show someone three aspects of your school**, where would you go? Try to determine the areas of the school that are your best practice showcase. Equally, consider the three aspects of your school that you avoid. Try to determine the areas of the school that need your attention.

8. Ask at least **one other school leader to spend a day (or more) in your school**. What do they notice?

9. **Consider the use of spaces in school where lots of students go. What happens in the school library? Are there ways in which this could be used more effectively? What happens in the outdoor spaces? How are corridors used?**

d. **Scale**
You may not be able to afford to make physical changes to every classroom, but it is important to communicate and share the vision with staff so that everyone has the opportunity to look more closely at how teaching and learning can be developed. If you decide to focus your resources and energies into one space, you will need to think about the numbers of students that will benefit. It can be **difficult to access funding,** but schools can begin by exploring **what can be done with existing resources or by adopting a DIY or bricolage approach.** The real key to success is to make sure that teachers are not working in isolation and good practice is shared across the school.

e. **Furniture (Adaptability, Flexibility and Mobility)**
Schools have recognised that classrooms do not need to be static. **Modern furniture allows for classrooms to be adapted to suit the learning taking place.** As part of any new design, schools need to consider how the same furniture could be used in different ways. You should **ask the furniture provider to demonstrate various visualisations for how the same furniture can be used within one space.** This is particularly important for schools that need rooms to be used for different purposes. Furthermore, schools need to **consider furniture at different heights to encourage students to move**, but also to provide space for students' individual needs, such as wheelchair access. The layout of the room can be a challenge to rearrange when different teachers are using the same space.

f. **Environment (Lighting, Acoustics, Colour, Air Quality)**
The research shows that the **lighting, acoustics, colour and air quality should be considered as part of any audit of physical learning spaces**. There is evidence (Barrett and Zhang, 2009) to show that students may behave differently and the changed environment may affect their response in the classroom. Schools wishing to create open spaces for large numbers of pupils will need to think carefully about noise and acoustics.

g. **Timetable and Access**
If the school makes changes to one space, it can be difficult to timetable the room so that all students benefit. Some schools have chosen to **give as many students as possible the opportunity to work in specialist spaces** while others **identify teachers who are confident to use new technologies, flexible furniture and equipment.** It is important to achieve a consistent approach to make it easier to demonstrate and document progress; for example, 'Class B used the room each Thursday for 1 hour. They were able to do the following activities, X, Y, Z...' Some schools also **introduce spaces in the timetable that allow the students to decide where they will learn**. Students can choose when and where they will complete particular tasks; there are examples of where students can decide what they will do to demonstrate that they have understood learning outcomes. This means that the student can make independent choices and decisions. There are also examples of where secondary schools have arranged parallel groups with several classes having the same subject at the same time, but with the opportunity to move and regroup between classes. This allows the students to access a range of resources and different room layouts enabling more varied activities. All students may not have access to technology outside the school day. Some schools address this by **providing access in the school library beyond the lesson time**.

h. **Length of Lessons and Activities**
At secondary school level, teachers comment that 50-60 minute lessons are sometimes not long enough. **Students can be given double periods**, but this means changes to the timetable. It is not so easy to make some of the bigger changes. **Teachers have outlined the benefits of a longer lesson being divided into shorter sections**, to allow for more intense and focussed activities. **Classrooms have been divided into zones** or areas to encourage students to participate in various activities. It can be more time consuming to plan activities when the teacher has to prepare for different groups rather than just speaking from the front of the classroom.

i. **Autonomy**
Timetables can be restrictive; schools are exploring opportunities to give students **flexible timetables that allow students to make choices and develop their autonomy**. This is equally important for teaching staff that need to be able to make decisions about how they teach and understand different pedagogical approaches.

j. **Ownership**
In some schools, the teachers move from room to room, whilst the students stay in the same classroom for different lessons. However, in other schools it is the students who move after each lesson to another room. **It is important to consider who 'owns' the space**. Schools can dedicate a particular room/space to a certain subject; this can be helpful to encourage teachers to feel that the layout of the room can be changed for longer than just one lesson. This means that work can be displayed on a particular subject.

k. **Training and Professional Development**
Schools choosing to invest in new furniture and technologies also need to **invest in training and professional development for staff**. There needs to be a combination of training that looks at what can be done in a space and how. **Teachers need time to try out ideas and to understand what works** and how innovative pedagogies can be introduced by making changes to the space and the technologies. You might need to **identify existing staff that are able to train others**, but it can be useful to ask an external trainer to support you to use the technologies. Training will be needed to ensure that staff fully understand how the layout of the classroom can change the whole approach to learning and teaching.

l. **Pilot Studies - Investigate**
Teachers and parents can be nervous that creating changes will affect test and examination results. This can mean that some are resistant to change. In the first instance, schools need to **identify pilot groups or teachers who are willing to explore new ways of working**. There needs to be opportunity for staff to share practice and try out new ideas.

m. **Technologies**
Schools are required to make big decisions about the technologies that they will invest in. Some schools have chosen to **identify a standard classroom equipment list so that every classroom in school has key infrastructure and resources**. The two essential points to consider are what technologies the teacher and the students have access to. This is not just about the physical classroom, it is equally important to consider the virtual spaces too.

Technology offers a number of opportunities to enhance learning and teaching spaces. Students can engage in collaborative working across the globe from a single space. Students are able to work together in virtual spaces through the sharing of a web link. This can be live (synchronous) or asynchronous. The student can also use his or her own device such as a tablet or smartphone in some schools, although implementing a Bring Your Own Device (BYOD) policy will require careful thought concerning a number of technical and other issues including internet safety.

Classrooms have introduced multi-screens to enable students to work on a screen within the lesson in groups. In some classrooms these are mounted on the wall, whilst in others they are on mobile stands. This allows for different layouts of the room. The teacher and the students can share ideas that are immediately visible to others and content can also be saved more easily.

n. **Collaboration**
Creating opportunities for the students to work collaboratively is not as simple as having the students sit together. For example, students may have different roles such as researching information for a particular section, or presenting data in a certain format. The teacher needs to **design tasks that encourage different students to take responsibility for various aspects of the work.**

6. Practical Advice for Class Teachers

1. Draw a simple plan of your classroom.

2. Identify the things that you like and the things that you would like to change.

   - You might want to start with three likes and dislikes and give some consideration to how you can begin to make some changes.

   - What could you change easily? (You might want to try writing an 'I Wish' poem as suggested by Sanoff (2001, p.20).

3. Try to understand what the challenges are in the classroom.

   - Are the students bored?

   - Do you have challenges with student behaviour?

   - Do you want to improve attendance?

4. Take three photos of current ways of working identifying points that you like/dislike.

   - Think about the role of the teacher and the role of the students in different aspects of their learning.

   - What are students and teachers expected to do before the lesson/during the lesson/after the lesson?

5. Decide on the space that you want to adapt.

   - This may be an existing classroom but it could be an area that is currently used for something else; for example, a cupboard for storing cleaning materials, part of the library, part of a wider corridor, an office or an old computer lab.

6. Identify how the room will be timetabled.

   - Who will use the room?

   - How will you know who has used the room?

7. Decide on the equipment that will be available in each room.

   - Some schools have chosen to standardise this so that each room has a list of the same equipment that is available.

   - Specialist rooms can then be identified if they have additional equipment.

8. Devise a 10 week plan for change.

   - Identify factors that will show evidence of success. Initially, try some different arrangements of the tables and chairs, but you have to give this time to work.

   - Develop a small scale investigation with the questions you are seeking to answer.

   - What can you do differently with what you already have in school?

   - Is there anything that you can purchase with a smaller budget that would make a difference; for example, bright coloured cushions, clearer signage and displays around school?

9. Try to capture your progress at each stage.

   - This is important so that you can share your ideas and understand what works, as well as being able to identify what should be done differently.

10. At the end of the 10 weeks, take three new photos to demonstrate what you have been able to achieve.

    - Share your practice with others in your school.

    - Explore ways to share your practice in wider networks and conferences.

6.1. Audit Your Use of Learning Spaces

When you have identified a group of teachers to explore learning spaces, you can begin to audit your use of learning spaces with these simple questions.

You can use this checklist as a starting point for each space.

Space Identified:

	Descriptors	Strongly Disagree	Disagree	Neither agree/ disagree	Agree	Strongly Agree
1	The space is used for different subjects.					
2	There are appropriate resources in the room.					
3	The space can be used within lesson time.					
4	The space can be used before and after lesson times.					
5	The furniture is mobile and flexible.					
6	The lighting is adjustable and appropriate for teaching and learning.					
7	The acoustics are appropriate for the activities that take place.					
8	The air quality is appropriate for the activities that take place.					
9	The space is accessible.					
10	The teacher is usually at the front of the classroom/space.					
11	The teacher moves around the classroom/ space regularly.					
12	The students move within the lesson to undertake different tasks.					
13	The teacher prepares different tasks for different students.					
14	The students produce the same outputs for the lesson.					
15	The students are expected to complete technology based tasks prior to the lesson.					
16	The students use technology during the lesson.					
17	The students are able to use their own devices in the lesson.					
18	The teacher uses technology during the lesson.					
19	The timetable allows the students the opportunity to make decisions about when and where they will learn.					
20	The space is occupied on a daily basis.					

7. The National Context and Case Studies

Istituto Comprensivo di Cadeo and Pontenure, Italy

The National Context

This section begins by exploring what is happening at a national level in some of the countries involved in this study. In 2017, the national picture is varied and inconsistent across Europe. As indicated below, countries like Italy and Portugal are already convinced of the importance of developing more flexible learning spaces and this issue is an important part of national strategy for ICT and innovation in schools. However, given that learning spaces have been identified as a developing trend, it is likely that the situation will continue to evolve rapidly and that adapting learning spaces will become a priority issue for policy makers in more countries. Indeed, this is already the case in some countries as detailed below.

The example case studies are from schools identified by members of the European Schoolnet Interactive Classroom Working Group who have contributed voluntarily to these guidelines.

Austria

The significance of the appropriate learning space or learning environment for the success of teaching and learning scenarios is considered in many initiatives and projects in the Austrian education system. Teacher training colleges have provided experimental settings and pilot projects for a number of years, focusing on suitable learning spaces for open learning scenarios, support for the acquisition of basic skills like reading or writing, or learning spaces outside school.

Current initiatives follow the approach of the European Schoolnet Future Classroom Lab, which inspired the Ministry of Education to install what it terms Education Innovation Studios (EIS) at teacher training colleges in various parts of Austria. The EIS at Vienna University College of teacher education was opened in May 2017. The next EIS is expected to open by early 2018.

These studios provide the necessary resources and mobile infrastructure (learning technology) to support various types of learning scenarios which utilise the Future Classroom Lab's concept of learning zones. Students are encouraged to interact with each other, to exchange knowledge and views, to investigate resources, to create and construct their own understanding, to present their findings and to develop further plans and activities.

The EIS initiative especially targets schools at primary level. Teachers are offered support to create suitable teaching and learning scenarios that help their students to develop digital/coding skills through constructivist methods.

Czech Republic

Currently, in the Czech Republic, at a national level there are no 'actions' to change and enrich the environments of existing schools. However, the Ministry of Education is planning to release a new call for schools to apply to be equipped with hardware and software for their ICT labs, language labs and across STEM. This call should start in October 2017.

Estonia

In Estonia, there are no national architectural guidelines for schools. However, on a national level there are efforts to consolidate the school network and, as part of this, school owners commission solutions from architectural bureaus for school buildings to be renovated or constructed. This procedure is carried out as a bidding process and one of the important aspects for school owners to look at is a school building as a learning space. In forthcoming years, this process will be extended to include the municipal primary schools (grades 1-9).

The National Lifelong Learning Strategy 2020 is an important document to consider as this is where one of the five strategic areas is focussed on digital developments. This means that Estonia intends to use modern digital technology for learning and teaching more effectively and efficiently, for the entire population's digital skills to improve. It is because of this that access to the new generation of digital infrastructure is ensured. To achieve these objectives, the Ministry of Education and Research approved the Digital Focus Program in 2014 with the aim of developing a comprehensive approach to the development of digital competences and the targeted deployment of digital opportunities in the learning process, thereby supporting the changed approach to education. The Digital Focus Program is implemented, among others, by the Information Technology Foundation for Education (HITSA). The overall budget for the program is 46,4 million euros until 2020.

Ireland

In Ireland, the topic of Learning Spaces, as defined in this document, is not currently reflected in national policies. However, policies such as the *Digital Strategy for Schools 2015 – 2020*, provide priorities and actions which include optimizing school infrastructure and using mobile devices to support and enable innovative learning to take place, both inside and outside of the classroom.

The Digital Strategy for Schools, states its vision for ICT in Irish schools as follows: "To realise the potential of digital technologies to enhance teaching, learning and assessment so that Ireland's young people become engaged thinkers, active learners, knowledge constructors and global citizens to participate fully in society and the economy." (*Digital Strategy for Schools 2015-2020*, Ireland)

One of the 4 key themes of The Digital Strategy for Schools relates to ICT Infrastructure and key actions within this area include services relating to the provision of robust wireless networks and cloud computing solutions, to facilitate internet access 'anytime, anywhere, for teaching, learning and assessment resources and activities'.

Many Irish schools are using digital technologies to enable them to move beyond the walls of the classroom and provide engaging and meaningful learning opportunities to students. Advice, support and CPD on the embedding and planning for ICT in teaching, learning and assessment, including videos of good practice as well as specific infrastructure advice is provided to schools by *PDST Technology in Education*, which is a part of the national support service, the Professional Development Service for Teachers, an agency of the Department of Education and Skills.

Italy

In Italy, at a national level, Indire is responsible for helping the Ministry of Education to implement various parts of the plan for education and innovation working with the schools to observe and support them. Indire identifies research themes that support the strategies of the Ministry of Education aiming to promote innovation in the national school system. At a national level there are policy initiatives called 'actions' to change and enrich the environments of existing schools. The actions have been linked to developments with ICT since 2009 with different iterations addressing various changes. For example, in 2009 there was an action to address the use of ICT and interactive whiteboards. Currently, there is a focus on projects to explore the use of learning spaces, ICT and innovation.

Indire promotes the cultural framework, including a manifesto on learning spaces that is currently being disseminated to schools, local authorities and architects. This is the result of a modelled process and five years of research and study of national guidelines for school environments in different countries in Europe. Indire has issued a book of theoretical frameworks and of best practice all around Europe that was shared at an *international conference in Rome in December 2016*.

Indire began their work in this area with 20 'Avant Garde' schools that are all developing their ideas on the use of learning spaces. This network has developed considerably to more than 170 schools in 2017, with approximately half of the schools having

a specific interest in learning spaces. The aim is to create what has been identified as 'a 3.0 classroom' to develop more flexible and comfortable learning spaces with the use of technologies by teachers and students. Teachers are encouraged to create collaborative workspaces where desks are joined in 'islands'. Students have their own devices. Often, the first 20 minutes of a lesson is an explanation from the teacher, followed by group work and presentations. The spaces can be rearranged quickly. Schools are able to introduce innovative pedagogy enabled by technology.

The government has also created a specific national unit to look at the development of school buildings. Italy's public property assets include approximately 42,000 schools, most of which were built between the '60s and '70s and have been subject to poor maintenance.

However, over the past three years, renovation of school buildings has become a government priority. A '*Mission Structure*' (*www.italiasicura.governo.it*) was established in 2014 during the Presidency of the Council of Ministers to coordinate and add momentum to operations to renovate school buildings.

The main mission of the Structure is to support local authorities – the owners and managers of the school buildings – and provide information to citizens and administrations on school construction. Among the objectives are the identification and recognition of sources of financing, interventions and their monitoring, in collaboration with the Ministry of Education, University and Research (MIUR).

The priority of the Government has been on providing the necessary funding: from 2014 until 2017 a total of **9.5 billion Euros** has been allocated, spread across several programmes (#sbloccabilancio, #scuolesicure, #mutuibei...). This means that more money has been provided over the last three years than was allocated over the previous two decades. Out of the total, **4.7 billion has already been allocated** to local authorities for interventions.

The results are already visible: from 2014 until now, more than 10,000 interventions have been funded involving over 6,000 school buildings.

The renovation of the school building stock is well under way, with **over 300 new schools** already financed: future-proof buildings open to the world outside, sustainable, and safe. Over 200 have already been realized: the courage to demolish and rebuild is proving to be a winning choice, providing Italy with works of architecture fit for education. For local authorities, a new building also has substantially lower management costs and will not require maintenance for many years.

Innovative Schools in Italy

Law 107/2015 on the 'Good School' introduces an extraordinary novelty: €350 million for the construction of new buildings open to the world outside and sustainable and safe school architecture in every region. This has been seen as an opportunity to spur on Italian and European designers and launch some 'live' experimentation with proposed models for new technical standards. The current standards for schools in Italy date back to 1975.

In March 2017, the MIUR appointed a Committee of Experts (Chaired by the architect Benedetta Tagliabue from Barcelona) to judge the **1,238 project entries** to create 51 new schools from the north to the south of Italy.

The opening to the outside world is the real 'revolution' of today's school. Especially in the larger cities, 'open school' experiences have flourished.

Schools can function as community centres and act as points of reference for the area where they are located; this includes schools where the library, the laboratories and especially the gymnasium are also for use by local citizens. The MIUR is also funding these projects through the programme 'The School at the Centre', a major investment for the future of schools.

Norway

In Norway, the Norwegian Centre for ICT in Education works directly under the Ministry of Education with headquarters in Tromsø and offices in Oslo. From January 2018 the centre will be part of the newly established Norwegian Directorate for kindergartens, basic education and ICT. The centre currently has two main functions:

- Improving the quality of education and
- Improving learning outcomes and learning strategies with the use of ICT.

The centre's primary target groups are children in kindergarten, students in schools and apprentices in primary and secondary education as well as students in teacher-training programmes.

The centre conducts, gathers and disseminates research and practice-based knowledge about ICT. It contributes to the development of tools for the sectors' assessment of their own activities related to ICT and provides relevant information, guidance and referrals when it comes to digitalisation and implementation of the ICT policy in educational sector. There are two national reports, Monitor Skole and Barnehagemonitor that are published every two years that look at digitisation in schools and kindergartens and identify the state of the art in digital practice. The centre has also launched the Professional Digital Competence Framework for Teachers and is currently working on the development of a related online course for teachers in collaboration with Western Norway University of Applied Sciences and University College of Southeast Norway.

The centre advises on ICT architecture and work to implement national and international standardisation in the field of education. It also helps schools and kindergartens to comply with requirements regarding data security and privacy, as well as safeguarding youth when it comes to their privacy online. One of these resources is ICT Plan (*iktplan.no*), where the centre provides guidelines for the digitalisation of schools and kindergartens. This includes security and data protection as well as digital learning resources. It is a holistic package directed towards the competences required to develop and identify digitally mature educational institutions.

The Norwegian government has just released a new ICT strategy for basic education. The strategy aims: to provide students with digital skills that enable them to succeed in further education, work and community participation; and to better utilize ICT in organising and implementing the training to increase pupils' learning outcomes. The 2017 budget also provides 97 million NOK for funding specific competence measures to strengthen teachers' professional digital competence. From 2018 it will be possible to take specialist education in several subjects as well as in professional digital competence for teachers.

In Norway there were no national initiatives directly for the development of learning spaces, but there was an initiative for 'Computers in Schools' (2007 – 2009). By 2010 all upper secondary students were provided with laptops. Today, schools no longer buy the technology but students can get a funding scholarship to enable them to purchase a device.

The centre has established learning spaces in Tromsø and Oslo inspired by European Schoolnet Future Classroom Lab. The purpose of these spaces is to explore the learning potential of makerspaces, computer games, programming, virtual reality / mixed reality and other technologies, and develop examples and experiences of new pedagogical practices with a playful approach to technology and learning in collaboration with pupils and teachers. The centre also brings selected technology to conferences and events in schools. Experts focussed on innovative practice regularly travel with equipment including drones, tablets, games, and knowledge of programs or apps to support teaching and learning. The aim is to integrate these devices into subject teaching in schools and the development of basic skills. The centre also awards an innovative practice prize for kindergartens and schools.

The centre supports Initial Teacher Education institutions by providing guidance for development of professional digital competence. At present, it is helping the University of Agder, University of Stavanger and University of Tromsø, the Norwegian University of Science and Technology, as well as the University College of Southeast Norway to establish learning labs that are also based on the model of the Future Classroom Lab in Brussels. Norway recognises the need to educate their new teachers entering digitally equipped classrooms. It has established a national network for professional digital competence and assists initial teacher education institutions in organising seminars and workshops for Norwegian teacher educators twice a year. This encourages exchange of experiences and ideas for exploring the use of technologies in learning spaces.

Portugal

At a national level in Portugal, Direção-Geral da Educação (DGE), funded by the Ministry of Education is responsible for the implementation and development of technology in schools. A national network has been established to bring together the work of different schools that are focussed on creating their own Innovative Learning Environments building on the Future Classroom Lab model. At present there are 34 of these but the network is growing and it is likely by the end of 2017 this number will have doubled. Each school has identified their own way of implementing learning spaces. (The first school to promote this idea was Escola Secundária Dom Manuel Martins with 'Sala de Aula do Futuro project' - see the case study on page 43.) Fernando

Franco, DGE explained: 'the aim of the network was to bring together schools that are looking at changing the learning spaces, the methodology and the use of technology at the same time.'

DGE was one of the first education ministries to appoint a Future Classroom Lab Ambassador to work with European Schoolnet on the development of the FCL concept and, within Portugal, has now established a group of learning ambassadors to provide teacher training and help schools that wish to set up their own Innovative Learning Environment. These schools have been encouraged to utilise resources from other parts of the school in one place to develop a 'project room' and DGE has supported the schools by providing information about different products and suppliers. The learning ambassadors have also been working with the schools to develop the use of mobile devices, but the challenge can be the widespread difference in the number of devices available.

Fernando Franco commented: "We are a bridge between stakeholders and the schools." At present, the schools that are part of the network have largely only identified one area of the school to be developed, whilst just three or four schools have more than one Innovative Learning Environment space. Schools are being encouraged to introduce project based learning to give students the opportunities to work more collaboratively and to promote different ways of talking to students.

In most cases, the schools have been able to implement their changes over the course of one academic year or 12 months. DGE has worked with the schools to ensure that teacher training is part of the change process. This has even taken place in some schools before adapting the learning space. Fernando Franco recognises that alongside making the physical changes, it is important to speak with parents and the students themselves who will also need training.

There are two significant challenges that have been identified by DGE with regard to the technology; firstly, not all students have their own device, and secondly, teachers do not have the skills to use the smartphones owned by the students. At a national level, there is not currently any legislation to determine how schools should work with students who bring their own devices into school. Schools have the autonomy to decide how this should work.

DGE has a working group to develop a new profile of students to capture what students must learn throughout school. The curriculum has become much more student centred and linked to C21st learning competencies.

At present, DGE has identified only one school that uses digital textbooks throughout the curriculum. In other schools, some students are able to access textbooks on their mobile devices.

Fernando Franco stated: "The governmental role is crucial; the new ministry has recognised the classroom is important. Changes need to be made and we are looking forward to the next episode."

Switzerland

In Switzerland, educational strategies and management are piloted at the cantonal level, which means that there are 26 departments of education, with a national coordinating body, and two intercantonal coordination agencies, one for the French and Italian speaking cantons and one for the German speaking cantons. These two agencies pilot the two national curricula.

As far as school constructions are concerned, there are no national architectural guidelines. Schools (from year 1 to 11) are paid for by local authorities; each canton has a service in charge of school constructions that provides basic rules about class size, water and electricity supply, fire escapes. These offices of school constructions are more or less involved in how schools are built, depending on their size and mandate. Only a few of them though have recommendations related to the impact of learning spaces on pedagogy, etc. This means that local communities and architects have great freedom to develop school constructions that meet their goals and budget.

Several cantons have launched projects that focus on the development of schools as whole day institutions that requires the management of heterogeneity in mixed-aged and multicultural groups and the integration of students with special needs. There is a growing awareness that achieving these goals requires that a school's learning and living places be adapted. When an existing school is renovated or a new school is built, architects, local authorities and teaching teams are encouraged to think together how learning spaces can be adapted and some cantons have produced guidelines to structure this dialogue and collaboration. Leading in this area is the canton and the town of Zürich. The town has encouraged very innovative school architecture in several of its schools. In 2010, it produced a booklet defining how inside and

outside learning spaces should be adapted to meet pedagogical goals.

The canton of Luzern has produced and disseminated a useful brochure, Dem Lernen Raum geben, Pädagogische Planungshilfe. It is built around the question – What makes a school good and how do children and teenagers learn? It offers a series of questions about possible impacts on a school's architecture and surroundings. The catalogue of questions works as a checklist to consider learning spaces as tools for pedagogical innovation. It also contains links to the most relevant research on the topic. A national network of cantonal representatives has been set up to disseminate examples of good practice and intensify the dialogue between architects, departments of education and schools.

School Case Studies

Austria

This case study looks at how one headteacher in Austria has literally broken down walls in a school and redeveloped the timetable to enable innovative changes to the use of learning spaces.

Age of Students	10-18
Area of Focus	Flexible timetable; independent learning Project based learning
Use of Devices	PCs, laptops, tablets, smartphones
School Website	http://www.gymzell.at/php/portal.php

Breaking down walls, Zell am See School, Austria

Zell am See School, Austria

Background, Context and Drivers

Gabi Jauck is the Principal of Zell am See School in Austria. It has taken over four years to develop a vision for adapting learning spaces and plan the changes necessary to implement that vision in the school. The school building is 60 years old and whilst the long-term dream was to have a new building, the teachers decided that interim changes needed to be made and developed a plan that included breaking down walls to create more open spaces. The school wanted to develop an arena where long 'platform' style seats can be arranged for many students to gather. Throughout the school there are smaller spaces where students can sit in

groups to work, rather than rows. Students are also given opportunities to work outdoors including within cross-curricular projects. One such project called “The Avalanche” gives students the chance to look at the snow profile and to visit the local tourist information office. The school wanted to develop more open spaces and to give the students choice and decision making. The staff wanted the students to learn to self-organise and to follow their own interests.

The Learning Space

The students arrive at school in the morning at 7.40 am and have regular classes until 10.30 am. In the regular classes, the students still sit in rows. The students are given a plan with learning outcomes for either one week or two weeks. At 10.30 the doors of the classrooms are opened and students can move freely to use extra spaces such as the computer rooms and the library where they can meet to work in small groups or individually. 10.30 am - 12:30 pm is considered “Free Space”. In the afternoon twice a week students are given fixed projects, whilst on the remaining three afternoons, students have offers that they can choose from. Teachers are assigned to supervise the different areas. Students have to learn to organise their timetable and their activities to ensure that they have time to complete their work. The content of the main curriculum has not been changed, but students have the freedom to determine how and where they undertake the tasks.

Use of Technology

The school has made sure that the use of technology is across the curriculum. Students no longer have just the use of the computer lab for an hour. Students have access to PCs, laptops, tablets and their smartphones.

Benefits

- The headteacher believes that students are able to take more responsibility for their own learning. Teachers have more opportunity to explore different pedagogies. It means that they can enable the students to try out different activities and perhaps encourage shorter, more intense tasks for 15-20 minutes, as well as gaining a deeper insight into a topic while working for 4-5 hours on it.

- Students have ongoing access to technology and this means that the teacher knows he/she can readily make tasks available online.

Zell am See School, Austria

Zell am See School, Austria

Zell am See School, Austria

- Students and parents have given the school a lot of positive feedback. Parents have commented that students are now more able to share what they have been learning and doing during the school day.

Challenges

- Students found it difficult to organise themselves when the new timetable was introduced. In the first instance, it took 2-6 months to get used to this type of learning.

- Whilst it may be considered a whole school change, it has been difficult to convince all the teachers. In Austria, teachers are allocated to each school and therefore the principal cannot always be certain that teachers who join the school are willing to work within innovative spaces.

Advice from the School Leader

Gabi Jauck says "I was trying to achieve a learning environment where children like learning and want to stay – not running out as soon as the bell rings."

Lessons Learned

The school has tried working with two or three classes in one bigger space but this did not work because of the numbers of students to supervise and the amount of noise.

The school had to explain to the architect that they wanted to be able to see different solutions.

Gabi Jauck commented that she found it extremely important to visit other schools both within Austria, but also in other countries. "I found it useful not just to visit and look at the school, but to make time to observe and understand how the students are learning."

Next Steps

"We worked with the local university (University of Innsbruck) and one of their architecture classes. The university students spent a whole semester in our school planning a new school with us. We now have several new plans that we can consider as we work towards developing our brand new school." Gabi Jauck

Zell am See School, Austria

Zell am See School, Austria

Czech Republic

This case study looks at one school in the Czech Republic that has developed a replica Future Classroom Lab. The teacher emphasises the role of the reflective practitioner.

Age of Students	6-15
Area of Focus	Developing a replica Future Classroom Lab
Use of Devices	Interactive whiteboards, green screen, 3d printer, sensors, tablets, Lego
School Website	*http://www.zscakovice.cz/*

Background, Context and Drivers

Petra Boháčková is a class teacher and deputy headteacher at ZŠ Dr. Edvarda Beneše in the Czech Republic. The school has 1996 students and the number on roll continues to grow. Petra works with teachers in her school to develop their use of technology to support teaching and learning. One of the main reasons that the school wanted to introduce the concept of the Future Classroom Lab was because current practice was heavily focussed on the teacher providing the 'knowledge' to the students. The school wanted to develop the opportunity for students to participate and be given time to think about how they want to learn, rather than being passive in the classroom.

ZŠ Dr. Edvarda Beneše, Czech Republic

The Learning Space

Over the last year, the school has tried to replicate the model provided by the European Schoolnet Future Classroom Lab in Brussels.

- "My headteacher and a few other teachers visited the Future Classroom Lab at the European Schoolnet office in Brussels and tried to rebuild it in our school. We chose the biggest classroom. We used a coloured floor. We bought lighter and easy to move, bright, colourful furniture. Tables are different shapes; you can move them and let students work in groups easily. We bought ICT equipment, a green screen, 3D printer, sensors, tablets, Lego. The headteacher felt this was a good investment. The room took almost a year to implement. We opened it with almost no equipment because we needed the space and built up the equipment over the course of the year."

From the outset, the headteacher identified a large classroom to implement the development to ensure that students had maximum space to move through the different learning zones.

Use of Technology

Petra has led teacher professional development workshops in the Future Classroom Lab and trained the teachers in using tablets and sensors with the aim of encouraging teachers in the school to appreciate that the innovative use of ICT needs to be combined with the flexible use of learning spaces. The use of technology has also enabled students to be more creative and to produce different outputs. Petra comments: "Pen and paper is no longer enough, the students enjoy making videos."

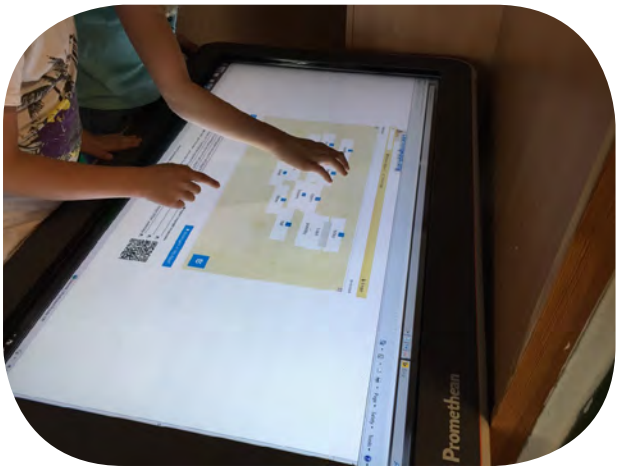
Benefits

- Petra believes that when the students use the room, they are more autonomous because they can move between the different learning zones. They have different tasks and they are not continuously facing the teacher.
- Students benefit from collaboration and discussion.
- The different activities in the various zones enable them to be creative.
- Students are less likely to be isolated as they can participate in group activities.
- The teacher can take time to learn more about individual students because there is more opportunity for the teacher to engage in discussion as he/she is able to move around the different group activities.

ZŠ Dr. Edvarda Beneše, Czech Republic

Challenges

- The Future Classroom Lab has been in place for one year; at the moment access to the room is through a timetable with teachers who are interested in developing the student use of technology. The school is currently looking for ways to introduce a second classroom lab.
- It can be hard in the beginning because lessons cannot be the same as previously. Teachers have to give more time to preparation of lessons and to think about what the students will be doing in each group.
- Teacher training needs to be done differently and must include showing teachers how to use spaces that are configured in various ways.



ZŠ Dr. Edvarda Beneše, Czech Republic

Advice from the School Leader

You have to ask yourself “What are the students learning and how do you know?” Petra Boháčková

Lessons Learned

Petra says: “One of the most important things I have had to learn is to be reflective on my own practice and to look at how I need to change myself as a teacher.”

Next Steps

The school currently has three different buildings and the town hall plans to develop the ‘campus’. The headteacher is hoping to build another Future Classroom Lab within the new build for the school.

Estonia

This case study explores how one school in Estonia developed a room dedicated to robotics to ensure that students can regularly access these technologies as part of the curriculum.

Age of Students	7-19
Area of Focus	Robotics, Programming
Use of Devices	PCs, Laptops, iPads, Robotics Kit
School Website	*https://www.oesel.ee/kg/*

Background, Context and Drivers

Kuressaare Gymnasium in Saaremaa, Estonia has 1060 students aged 7-19 years. Madli-Maria Naulainen is a History and Civics teacher and is also a lead teacher for the use of learning technologies in the school. One of the challenges across the school is the lack of space and the school tries to make sure that space is used efficiently. The school was renovated 10 years ago and much effort was put on the environment. The school added a winter garden with lots of plants. Students are able to sit in the garden and rest between the lessons. Expanding across four floors, the school has a gym, a swimming pool, language, physics, chemistry, cooking and technology labs, and two computer rooms.

The Learning Space

The school recently developed a room for robotics. Three years ago, there was a decision to introduce programming across the school. The students now in grades 1-4 are taught robotics and 'Scratch' programming once a week. Initially, robotics was also taught in the computer lab but, due to demand, the decision was made to convert an existing teacher workspace into a room 'dedicated' to robotics. One of the significant benefits of this was to be able to leave the kits ready and available for teaching and learning. The initial focus has been to introduce robotics to 7-11 year olds, but this will eventually involve students until 9th grade.

Robotics Room, Kuressaare Gymnasium, Estonia

Use of Technology

Students use laptops or PCs in the computer rooms, but these are large devices and therefore not easily moved into other classrooms. There are 30 iPads that are scheduled for use by teachers from across all subjects. In some lessons, where possible, students are allowed to use their mobile phone for 'searching' on the internet or digital brainstorming or answering tests. The school has some interactive whiteboards; however, these are largely used as display screens, one exception.

Benefits

- The traditional classroom environment has double desks that are largely static and cannot be easily moved. There are also some classrooms with mobile desks, which make it easier for students to work in various group sizes.

- Teachers are able to maximise the potential of the students by giving them opportunities to work collaboratively.

Challenges

- Teachers can be resistant to new spaces and new environments.

- Logistics of the timetable – however, putting all the kit together in one space has made it more readily available.

Advice from the School Leader

Madli-Maria commented: “If the problem is finding the space, the school should consider the needs of the students first.”

Lessons Learned

Madli-Maria says: “Don’t do things with a big rush; everything needs to be planned properly.”

The school has recognised the importance of visiting other schools to understand how they are using similar spaces. Some of the teachers were able to visit a school that had been renovated similarly. It provided ideas and highlighted new possibilities on how to use space and work more effectively.

Next Steps

The plan is for all students up to 9th grade to be able to access the robotics room as part of their studies. For after school activities there is also a physics lab where some more advanced work on robotics takes place.

The school is currently exploring ways of developing more mobile furniture solutions.

A new future classroom project is on the wish list for planning and development.

Kuressaare Gymnasium, Estonia

Kuressaare Gymnasium, Estonia

Ireland

This case study looks at one secondary school in Ireland where every teacher is equipped with an iPad, every student has their own iPad instead of parents buying textbooks and every classroom has a standard list of furniture and equipment.

Age of Students	12-18
Area of Focus	Brand new school; access to devices and standard classroom equipment
Use of Devices	Every student and teacher has their own iPad Each classroom is equipped with one data projector and two dry wipe boards.
School Website	*http://lecheilesecondaryschool.ie/*

Le Chéile Secondary School, PDST Technology in Education, Ireland

Background, Context and Drivers

Le Chéile Secondary school was opened in temporary accommodation in 2014 and moved into a purpose built building in 2016. In 2017 it is still only half-built with further development continuing. It is anticipated that the school will be fully finished in August 2017.

Dr Áine Moran, the principal of the school, has been teaching for 25 years with a focus on economics and mathematics. Prior to becoming principal, she was deputy principal of a brand new school.

In this school, the principal made the decision to visit the BETT exhibition in London. This "opened up a whole different world" and raised the school's awareness about the potential to develop learning spaces.

This school has 49 different nationalities and, therefore, it was even more important to place an emphasis on the different learning styles of the students.

Le Chéile Secondary School, PDST Technology in Education, Ireland

The Learning Space(s)

In all of the classrooms the school has put a dry wipe board on both sides of the room. Teachers also have access to one data projector in each classroom.

The school has a lot of bright spaces and corridors with sofas and bookcases to promote the idea that anywhere can be a learning space. The windows of the classroom face onto the corridor and teachers can use special pens to write on the glass. The windows are used to brainstorm and share ideas.

In this school it is the students who move between lessons. Teachers have their own rooms and classrooms are decorated to ensure that they are

bright and welcoming. One classroom has been equipped with 'icanchairs' that are on wheels and flexible; each classroom has 30 chairs with six different colours. This means that the teacher can group the students according to the colour of the chairs.

There is an open space outside the principal's office and even this has been converted into a learning space.

This school has developed a standard furniture list for a classroom:

- 15 double desks
- 30 coloured chairs
- A table and mobile chair
- 1 cabinet
- 1 mobile trolley for small equipment
- 1 data projector
- 2 dry wipe boards

Use of Technology

In this school, the teachers have worked to generate their own content for the students so that there are no textbooks in use. The students use iPads because the school wanted the students to be autonomous and to personalise their learning experience. The school has Apple TV throughout which allows the students to share the work from their iPad. The use of two whiteboards in the room has helped to enable the movement of the teacher in the room from just the 'front' of the classroom. Some of the teachers use video materials in a flipped learning approach as the students are encouraged to access these at home prior to the lessons. Every student has their own iPad which is bought by the parents through a school coordinated purchase scheme. (Parents buy the iPad rather than buying the textbooks.) Every teacher also has their own iPad, whilst each subject department has a MacBook.

Le Chéile Secondary School, PDST Technology in Education, Ireland

Le Chéile Secondary School, PDST Technology in Education, Ireland

Le Chéile Secondary School, PDST Technology in Education, Ireland

Benefits

- Different coloured chairs allow the teacher to group the students e.g. all those on a red chair can do a particular task.

Challenges

- It can be difficult to change the approach of all teachers, but you have to make a start with the ones who are willing to change. It is a big shift for teachers because trainee teachers do not get training in the use of new spaces. The principal commented: "Teachers need to recognise that you have to prepare differently and you have to be prepared to engage in that."

- The tendering process can be limiting because schools cannot work in isolation to find a cheaper alternative.

- It would be good to have bigger spaces for larger groups.

- The iPads will need to last throughout the student's time in the school.

Advice from the School Leader

Students and teachers can find that being in a classroom is limiting. It is important to explore other spaces in school that allow students some freedom.

This school has led developments through the work of the curriculum committee and tried to make sure that ideas are piloted first and then reviewed by the senior leadership team and some teachers. The school has also made time to listen to the voice of the students about how they would like to learn.

The school has tried to make use of the corridor spaces and students can work there too.

Lessons Learned

"You have to look for ways to let teachers have some creativity; for example, providing a second dry wipe board in each classroom and markers for writing on the windows in each classroom is not expensive, but can have a big impact."

Classrooms need to be bigger to allow for greater mobility. "We were worried that students would wheel the chairs down the corridor, but they haven't."

Having bright new learning spaces has led to parents commenting that they would love to go back to school. In turn, the school believes this is very positive for the students.

"Don't get caught up waiting, sometimes you just have to try it." Dr Áine Moran

Le Chéile Secondary School, PDST Technology in Education, Ireland

Le Chéile Secondary School, PDST Technology in Education, Ireland

Next Steps

The school is currently looking to make changes to the timetable to allow the students to have time to complete independent projects.

Italy

This case study looks at the need to have a clear vision for adapting learning spaces across the whole school. This school has considered how learning spaces and the use of technology need to be addressed together by encouraging a more flexible timetable and giving students access to technologies that provide opportunities for collaboration and the ability to create interesting outputs.

Age of Students	3-14
Area of Focus	Libraries; open access to the community; engaging in national and European projects; change in timetable
Use of Devices	IPads for students and teachers
School Website	*www.istitutocomprensivocadeo.gov.it*

Istituto Comprensivo di Cadeo and Pontenure, Italy

Background, Context and Drivers

Istituto Comprensivo di Cadeo and Pontenure have 1330 students aged 3-14 years. The school has developed several different rooms with moveable furniture and areas with comfortable cushions for the students. This has been integrated along with technologies including interactive whiteboards, laptops and tablets. The school has also given attention to the design of the art work in the rooms. The school has two music labs with instruments and interactive whiteboards and performs concerts that are shared online. The school has a large auditorium that holds 150-200; this is open to the community for seminars and events.

The school used the development of learning spaces as a way to implement their vision by encouraging ongoing collaboration and discussion between teachers to 'stimulate the change' and to address any resistance to innovation.

Istituto Comprensivo di Cadeo and Pontenure, Italy

The Learning Space

In this school the timetable has been organised to give every student regular access to the library. In the library the students are encouraged to undertake independent or small group tasks that allow them to make decisions about how they learn. The library has been equipped with bright coloured cushions and lots of open space. Students can choose to move the cushions and work freely on their projects.

- "One of our jewels is the library and we are trying to renew this, we are not leaving things as they are – ever. We try to maintain and build on. We are organising lectures, we are involving the community. We have developed a reading group for small children. We are constantly thinking about new initiatives to keep our ideas alive. It is essential to have technology – mobile technology for teachers and students' 1-1 collaborative use of devices in secondary and collaborative use of devices in primary."

The school has also developed an outdoor library where the garden has been equipped with recycled and new furniture to encourage students and teachers to read and/or work with the iPads that they can borrow from the indoor library.

Istituto Comprensivo di Cadeo and Pontenure, Italy

Use of Technology

Each classroom has access to an interactive whiteboard. Students and teachers have access to iPads and over the last four years there has been a project enabling older students to purchase iPads by instalments. Students are encouraged to work in small groups. They still do some work on paper and in books but are given some of their homework on the iPads. The school believes that it is essential to have mobile technologies in school and continually looks for ways for students to use devices to encourage collaboration. The school has tried to develop students' ability to create presentations and to advance their speaking skills.

Istituto Comprensivo di Cadeo and Pontenure, Italy

Benefits

- The school believes that looking at learning spaces has given the students and teachers
  - Chances to collaborate
  - Opportunities to develop personal interaction and
  - Enabled the introduction of active and inclusive teaching methods.
- In this school the teachers who are working on the development of learning spaces have tried to collect photos of their progress and examples of how students' multimedia work has developed. The school has used these both internally and externally as a way to be able to demonstrate progress.
- Students are more linked to the school as the learning spaces and the use of mobile devices reflect their everyday life.

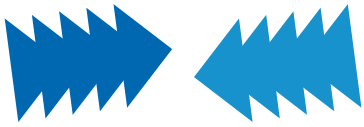
Challenges

- The school recognises that it can be a challenge to maintain clear priorities. It is also difficult to sustain support for the change. Giovanna Rosi commented: "Questioning traditional practice is difficult because teachers show resistance when they are asked to try something completely different."
- One of the biggest reasons contributing to staff resistance is because they are concerned for how the changes will affect examination results. In the first instance, teachers need to be given the opportunity to participate in pilot studies and smaller investigations that allow learning spaces to be used in innovative ways.
- Training all the staff can be a problem; this school uses a combination of teachers in the school providing professional development and asking external trainers to come in and give support.

Advice from the School Leader

"Set up a work group in school, develop a clear idea of what you are able to do, take a project approach to the development of the space, share your ideas with parents and the municipality to ensure their support and involvement."

"You have to give the teachers time to introduce new kinds of teaching. Sometimes the teachers think that this is a great effort and they are not given anything in exchange." Romina Bertuzzi



Lessons Learned

"It is very important to know your starting point; we are very attentive to what is happening nationally, we are continually reviewing what is happening outside. We have a group of teachers who are always considering how to develop our learning spaces." Romina Bertuzzi

New teachers should be encouraged to know the school at induction to ensure that they want to work with the school and continue to improve the use of learning spaces.

"Remember that the goal is learning, we have to focus on the needs of the student and everything linked to this space is part of this goal." Giovanna Rosi

"Teachers need to be involved in the change." Leonardo Tosi, Indire

Italy has a manifesto on learning spaces that has been developed from best practice at an international level.

Next Steps

At present, spaces are built with the aim of students remaining in the same place. Teachers encourage all students to participate inclusively; however, the school is currently exploring ways for students to engage in different activities to suit their individual learning needs.

Norway

This case study emphasises the ongoing role of the school leader in a secondary school in Norway to support the development of innovative approaches to teaching and learning by giving teachers the opportunity to collaborate and innovate.

Age of Students	16-19
Area of Focus	New building; student access to technology; flexible and adaptable spaces
Use of Devices	Interactive whiteboards; laptops; tablets; student use of personal devices (mobile phones)
School Website	*http://www.hordaland.no/nordahlgriegvgs*

Nordahl Grieg vgs School, Norway

Background, Context and Drivers

Margreta Tveisme is the assistant principal at Nordahl Grieg vgs School, Bergen Norway. There are currently 957 students. The school has an additional responsibility to support students with a hearing impairment.

Nordahl Grieg vgs School, Norway

This was a brand new school in 2010 built in an area where the population had increased. The school was created as a model for others to capture the potential of the changing school. The first principal was appointed two years before the school was completed, meeting with the engineers and architects; this meant that the headteacher had the opportunity to influence the development of flexible learning spaces within the school. The assistant principal was appointed one year later and then the leadership team in February before the school opened in August. At that time, there was no model given for the development of classrooms.

The leadership team especially are continuously concerned with pedagogical development. They have worked towards an integrated use for technology within the space. This school was awarded a national prize for innovation in 2015.

Margreta acknowledges: "Teachers were not prepared for open access to the internet in Norway when laptops 1:1 were introduced; teachers did not know what to do. At our school, they were a bit more prepared, having applied to work here, knowing that technology would play a major role."

Nordahl Grieg vgs School, Norway

The Learning Space

In the entrance to the school, there are always activities and the school maximises the flexibility of this open space. The entrance is seen as a marketplace ('torget'). The school has a lot of glass windows; this encourages transparency and openness to emphasise that 'everyone can see what is happening'. It reflects the visibility of the teachers and the students. The school has several rooms for small group work. Throughout the school, there are different areas for different departments. Classrooms can be joined and there are some open spaces. The school has a library with working spaces for the students, and an outside area called "The Reading Grove", with trees, grass, and benches for the students and two auditoriums with good facilities for watching films.

Nordahl Grieg vgs School, Norway

Use of Technology

In this school there is continuous access to technology for the teachers and students. In the early days the school was expecting students to arrive with devices mainly from one supplier; however, the availability of this equipment has grown and in response to this the school had to make sure that they have teachers who are very familiar with Apple hardware and software in addition to Windows products. Margreta Tveisme acknowledges the importance of the role of technology in the development of the learning spaces: "We have used technologies for social media and collaboration, in turn; these virtual spaces become important learning spaces."

Benefits

- Students can reflect on their own learning.
- Students are encouraged to make a lot of choices.
- The new school means that it is easier for teachers to implement new ideas.
- Margreta says: "Ideas come directly from the teachers, we discuss their plans seriously. The transparency of the school mirrors the teachers' and students' willingness to share their ideas and practice with each other."

Challenges

- Margreta notes that one of the biggest challenges is time: "Change in school takes time and you have to evaluate constantly."
- Exams are a big challenge when students are expected to work individually with no access to the internet to support their learning.

Advice from the School Leader

Try to organise staff so that teachers are not working in isolation. You need teams to help/support/reflect with each other.

New teachers to the school are placed into teacher teams where there is an expectation that they will work together and cooperate with other staff. This can help to encourage the idea of team change.

Teachers are given the opportunity to collaborate on new ideas and work with a member of the leadership team once a month on innovation.

Lessons Learned

The flexibility of the spaces along with the parallel groups means that students can be given much bigger tasks. The length of the lessons also alternates between 90 minutes and four hours. Students can go in and out of the classrooms and various learning spaces.

Next Steps

- Implementing a new Makerspace into more subjects and lessons. For now, it is mostly in use for Technology and Science, but the school wants all the science subjects, as well as other subjects, to make use of it.

- Have more informal softer, flexible furniture for group work in the open spaces. (e.g. large cushions) The school has identified that whenever a table and some chairs are left in such an area, they are immediately put to use by students.

- Continue to cooperate and develop with other schools on an international level through online learning spaces such as social media.

Nordahl Grieg vgs School, Norway

Portugal

This case study explores how the idea of implementing a new learning space in school was first adopted by one enthusiastic teacher.

Age of Students	11-18
Area of Focus	Learning labs; learning networks; teacher training
Use of Devices	Tablets; smartphones
School Website	*http://escoladmanuelmartins.com*

Background, Context and Drivers

Carlos Cunha is a physics teacher at Escola Secundária Dom Manuel Martins in Setúbal, Portugal where there are 520 students. Since 2012, he has worked closely with the Future Classroom Lab in Brussels to understand how he can learn from this initiative and develop the ideas in his own context. The school wanted to improve poor examination results and student retention. After consultation with the staff, the teachers concluded that the students found the existing didactic approach in the classroom uninspiring.

The decision was then made to change the methodologies used in the classroom. However, Carlos recognised that in order to be able to adapt existing pedagogical practice, there was also a need to change the learning space.

Escola Secundária Dom Manuel Martins, Portugal

Escola Secundária Dom Manuel Martins, Portugal

The Learning Space

The school set out to create a replica of the Future Classroom Lab in Brussels with the following specific aims:

1. To develop enquiry based learning.
2. To develop cross curricular activities.
3. To encourage students to work in small group activities.
4. To develop teacher training and be an example to the schools in Portugal and beyond.

From the outset, the school wanted their classroom to be identified as a 'learning lab', rather than a 'future classroom'. The overall intention is to continue to increase the number of interactive spaces around the school and the school has started to work towards this by encouraging staff to seat the students in groups of five. Each classroom is equipped with an interactive whiteboard, but the idea is for teachers to spend only 15-20 minutes teaching new ideas within a 90 minute lesson. The rest of the lesson must encourage students to participate in different activities, whilst the teacher is able to use formative assessment to determine the students' progress. The school has worked with the Ministry of Education (DGE) at a national level to share their practice and to continue to develop ideas.

Use of Technology

The school has provided tablets for the students where they are needed because not all students have access to technology. The students like to be able to use their own mobile phones for learning and soon learn to stop using them in an inappropriate way because they know that they need them for learning.

Benefits

- The teachers have noticed that the students cannot believe the lesson is over. Students have been much more interested and engaged in learning because they have different activities.
- The teachers and students recognise how much they can achieve within the limited lesson time.
- The real benefit is that the students are learning how to use the technology for learning, rather than just for fun.

Challenges

- One of the biggest challenges identified by the school is that the teachers need to have confidence in the reliability of the technology.

Advice from the School Leader

You really have to give some thought to the different types of activities that students can do within the learning lab. Carlos Cunha commented: "We wanted our students to be part of the learning process and not just spectators."

Lessons Learned

"The school has learnt from the response of the students that the changes have been received well. The students have now engaged with their learning and enjoy taking part in different activities." Carlos Cunha

Next Steps

The school would like to continue to develop the spaces and engage in European teacher networks to share ideas and results.

Escola Secundária Dom Manuel Martins, Portugal

The second example in Portugal comes from Isabel Estevinha, the Principal at EB 2,3 Soeiro Pereira Gomes School in Alhandra, Vila Franca de Xira, who has just embarked on a new project in school to enable the school to be part of the Ministry of Education (DGE) network on learning spaces. The school has 1300 students aged 10-15 years.

Age of Students	10-15
Area of Focus	Erasmus Project - Profile of the student
Use of Devices	Interactive whiteboards; student devices
School Website	*http://agasjm-m.ccems.pt/*

Background, Context and Drivers

At a regional level, the school is part of a cluster of ten schools, but currently the first in the region to work on enhancing learning spaces. It has identified one of the new teachers in the school to train existing teachers in how to make innovative use of technology. The school began by doing a survey to determine the digital confidence and competences of their teachers. It has been involved with an Erasmus project to understand the profile of the students working with colleagues from Bulgaria, Estonia and the UK. The project has explored what a typical student will learn at school. The teachers have explored different ways to evaluate students including developing criteria for collaboration, communication, citizenship, creativity and C21st skills. This project is helping to inform their work on learning spaces.

The Learning Space

The school established a project in December 2016 to create a fresh new space with support from government funding, the local authority and from parents. Inspired by other schools working on learning spaces in Portugal, this school wanted to develop several spaces with different resources including a 3D printer and tablets. The school has introduced large interactive whiteboards and tries to encourage more than one student to be working on activities using the board. The initial focus was to work with 5th and 7th grade students to provide an extra teacher to facilitate the use of technology within the spaces. Students learn robotics and computer programming. They also have access to equipment to learn about astronomy. Eventually, the headteacher would like the programme to benefit all of the students across the school.

The headteacher commented: "The teachers are enthusiastic, I have seen them do new things that they have never done before. We don't want them to be fearful and give up."

EB 2,3 Soeiro Pereira Gomes School, Portugal

Benefits

- The headteacher stated that one of the biggest benefits is "to see the students connected to what the school is about." The teachers and the students have been able to rethink the concept of "school." The headteacher believes that the students have recognised the value of the new spaces and show their respect for what has been achieved.

Challenges

- The headteacher believes that the curriculum needs to change. "The curriculum needs to be a guide, rather than an instruction."

Lessons Learned

"All the developments need to be part of the strategic school improvement plan." Isabel Estevinha

Next Steps

The school is now looking to develop their ideas across the different year groups and wants to continue to work in collaboration with other schools to develop their understanding on learning spaces.

Switzerland

This case study looks at one school in Switzerland that has maximised the use of learning spaces by creating larger open spaces that can be used for different purposes. Parts of the school are also used for different purposes including childcare and community activities. However, as the case study shows, it can be a challenge to adapt spaces in school and it has meant trying to overcome problems with the acoustics when larger numbers of students are working in the open spaces.

Age of Students	4-16
Area of Focus	Building design; open spaces
Use of Devices	Laptops
School Website	*https://www.stadt-zuerich.ch/schulen/de/leutschenbach/unterricht.html*

Background, Context and Drivers

Leutschenbach is a Gesamtschule with 27 classes and about 520 students from kindergarten (6 classes) to secondary school (6 classes). There are approximately 100 teachers and childminders and 520 students spend the whole day at school. The school offers breakfast, lunch at midday, and supervised care over midday and afterschool. During the day 400 students eat at the school. The school is a big compact glass cube; the upper floor is dedicated to the sport facilities. This way it was possible to keep large spaces around the school free and a playground which the whole neighbourhood, a new developing area of Zürich (with very high immigration), can use as a recreation area. It includes sport areas, barbecue spots, etc.

The emergency exits have been moved to the building's 2.5 m large balconies, which means the entire inner space can be used for teaching. The walls are made of industrial, opaque glass, so that light travels from one space to the other. There are also doors between the classrooms, which facilitate innovative teaching formats. The original concept of the school was to develop a modern, team oriented and integrated school, with small classrooms or classrooms for special needs, in accordance with the new school law.

Leutschenbach School, Switzerland

The Learning Space

The aim of the school was to promote more flexible learning approaches, in particular collaborative learning. Four classrooms share a cluster – an open space where they have to collaborate to make optimal usage of the space. They have to agree how they work together, side by side. Parallel classes also have doors between them. There was an idea to mix all students together, from kindergarten to secondary school, but with the implementation of the day school, this mix was put into question.

The idea is to promote more collaboration between classes and students of different ages. Before they opened the school, they tried to experiment by opening the spaces between classes and working with several classes together, but this did not quite work as noise levels were too high when so many students were working together at the

Open Corridors, Leutschenbach School, Switzerland

same time. The overarching idea is now that teaching takes places in the classrooms and group work and collaboration in the open spaces.

Leutschenbach School, Switzerland

The initial pedagogical concept underlying the construction of Leutschenbach was to develop open rooms with everybody together and no walls to separate spaces. Each classroom is 83 m^2, instead of the 72m^2 in regular schools. The 11 m^2 that are usually dedicated to group spaces was integrated into the classroom with clusters of tables and chairs for group work set in the open spaces between school rooms. The underlying concept is that of openness and light, the walls are glass, the light travels from one space to another, the "Betreuung" spaces (care areas) are also open from one floor to the other (no separations between floors).

Leutschenbach School, Switzerland

The idea was that you can work in groups in such open spaces, but this has only been partly successful. When children needed smaller spaces to work together or to work without being distracted by others or to feel "Geborgenheit" (peace and security), the current layout can be a challenge. The schools that were built after this one in the town of Zürich have smaller group spaces again and there are fewer open spaces. This openness concept was not pursued.

The building is considered to be very spectacular and the architect won several awards. The classroom spaces are very high quality but there is more of a problem with the common spaces which the school would like be able to break down into smaller spaces in more effective ways. The school is only eight years old; therefore investment in improving the structure and adapting the layout is out of the question at this point in time.

Use of Technology

In Zürich, schools are largely encouraged to have laptops – 6 per class and no fixed computers; the students can take the computers outside school if they need to and they are pooled between classes. There is Wi-Fi everywhere and teachers and students have access to computers they can share. The school does not have any tablets or interactive whiteboards but they have moveable projectors; the concept was to keep things flexible.

Support is good, well-organised and the infrastructure is very stable and professional. In Leutschenbach, students have a short period of time after lunch for using their own mobile phones. However, the headteacher would like to open up the school network to allow for learning with mobile phones, but this is not allowed by the policy of the Canton.

There are computer rooms for the secondary school students and students can also borrow computers from the library, as long as they are brought back. There is a lot of technology in the school but, as the building is ecological, the technology is quite well hidden (floor sockets, etc.).

Benefits

- Students are proud to attend the school; they like the large classrooms and the light everywhere.
- Students propose a lot of events; for example in 2016, they had an 'electro tag' day (day of technology where each student could bring his/her device and the teachers could decide if they would integrate the technology into teaching).
- The building was evaluated positively by the parents and teachers but they both commented on the noise and the quality of the acoustics in the building is always a topic for discussion.
- The teachers find the school very attractive; a lot of young teachers apply to work at the school to be able to use the innovative structure and space.

Challenges

- Teaching and mentoring students in these open spaces is challenging as there can be relatively high noise levels when working with large numbers of students related to the basic design (the structure is metallic frames and concrete) and the fact that the architects chose hard material such as glass for the walls, or stone instead of wood for the floors etc. Some materials have been included to dampen the noise, but the headteacher comments that this has not really solved the problem because the ceilings are very high, in particular on the top floors.
- The high noise level forces staff, in particular for the day school, to organise timetables differently so that the students who are eating or relaxing don't bother the students who are working, etc. They have to plan things so that different groups are far enough away from each other so they don't cause interference.
- You have to want to work in such an open space and this is not for everybody. Teaching is no longer the only activity; teachers have to be involved in the comprehensive range of out of hours activities.

Advice from the School Leader

The headteacher highlights the need to insist on high quality installations of equipment and furniture in the classroom, good community spaces (a community classroom ('aula'), library, etc.), and enough spaces for the community. These can then be adapted and reconfigured, with moveable walls, rather than just curtains.

The furniture must fit the school architecture, and should be part of the concept. The architects need to conceive the building as a whole: floor space, furniture, colours.

A school should also be modular, expandable when needed and the concept should work even if the school is extended or new needs develop, like the need to have students at school all day.

Lessons Learned

The school was not able to choose furniture adapted to the innovative architecture. The town of Zürich has an office of school buildings that standardizes school equipment, selects school furniture and negotiates prices for the 99 town schools. The problem is that this is not a "standard school". It would make sense in this case to have furniture for "Lernlandschaften" (learning landscapes). This possibility to shape the building's inner layout, for example with an Interior designer, would have improved the overall quality for the teachers and the students and would probably have been cheaper than adding pavilions or interfering with the school's structure.

Next Steps

Based on the experience they have collected over the school year (first year as Tagesschule), the headteacher is planning to move things around a bit. They will create pavilion structures in the park for out of school care, which will also make things quieter. It is important that the learning time you gain by organising schooling over the whole day should be used in the best possible way and be as productive as possible.

Leutschenbach School, Switzerland

The second case study in Switzerland is Volketswil's "Gesamtschule", In der Höh. This case study explores how one school in Switzerland is exploring larger, open spaces to encourage visibility of teaching and learning and sharing of practice.

Age of Students	4-16
Area of Focus	Larger teaching spaces; open spaces, transparency, visibility of teaching and learning
Use of Devices	Laptops; tracking students' learning
School Website	*https://www.schule-volketswil.ch/schulen/in-der-hoeh/home/*

Background, Context and Drivers

Marcel Baier intentionally sought to be the headteacher of Volketswil's "Gesamtschule," *In der Höh School* because he knew about its pedagogical concept of larger classrooms and innovative building. He has now been head of the school for five years. He particularly raises issues related to the acoustics of buildings because, if learning spaces are open, ways must be found to also make them as quiet as possible.

In der Höh's library, Switzerland

As headteacher, Marcel is currently overseeing the building of a second school house – which will welcome classes from the town's other schools while they are being renovated. For this second building, he is contributing certain ideas he has developed about school buildings and personalised learning. The new school will have a similar "Raum Kultur", classroom layout, the Bistro Konzept, as he calls it, but he wants to have more large open spaces (equivalent of two classrooms merged together) where several groups of students can work side by side. There will be fewer small rooms (only for the speech therapist, German as a second language classes, etc.)

The Learning Space

In der Höh has a combination of large rectangular open spaces and smaller classrooms. The space is then organised into small "niche" areas where students can work individually or as groups. Teachers can co-teach more effectively (there are usually two people present in each classroom, the regular teacher and the teaching coach for students with special needs).

Since Marcel Baier arrived, teachers have a free hand when it comes to furniture or class layout so they can personalise the spaces to meet the students' needs. They can bring things from home or from IKEA if they wish to; this is often done in collaboration with the pupils. This was not the case when the school was new; there were strict rules about what could be used in the classroom. The architecture of In der Höh was intended to support the following two concepts:

- Gesamtschule: one building for K-11
- Focus on personalisation of learning

To promote new forms of learning (learning coaching, individualisation) the teachers required a lot of continuing professional development and coaching that was provided by Andreas Müller from the Institut Beatenberg.

Children are on an individual learning path and a school should support this, according to Marcel Baier; it is the teachers' job to acknowledge the uniqueness of each student and to find out what each child needs to reach his or her next goal.. He believes that children need to be part of a community; the feeling of being part of a group is particularly important if learning is individualized. Individualisation and promotion of community go together in his opinion. Students can also get help from another student. He would like to get to the point where all teachers recognize that students are on an individual path and that teaching should be organised around this principle.

A primary classroom divided into different zones, Switzerland

The headteacher has a long term objective that walls will disappear from the school, so that it contains several large classrooms. He disagrees with the trend in the Swiss German part of Switzerland to go back to smaller classrooms and smaller groups; he would have larger classrooms and classes and hire more teachers. Schools that have "Lernlandschaften" (learning landscapes) use this. It is possible when teachers have really internalized the pedagogical objectives.

For Marcel Baier, a school is not about aesthetics but about pedagogy and he would have looked for a new post if he had not been able to move things on in this respect: "It is important that students can see what they have produced, that they can be proud of their work." In the last two years he has really noticed an evolution in thinking about these aspects in Volketswil.

In der Höh, Switzerland

Use of Technology

For a school that puts its focus on personalized learning, there is relatively little technology in use in *In der Höh* primary classes. Each classroom has a 2-3 computers and for each school level there are 8 tablets and laptops available to share (1 device for 5-6 students on average). The secondary school students have access to pools of laptops and a programme to track their learning and progress, 'Mosaik Schulen' software. Marcel Baier is convinced that, in future, greater use of technology will help teachers to adopt personalise learning approaches but at this moment teachers in the school personalize learning by using paper and traditional resources.

For the new building that will open in August 2017, there will be interactive screens for upper classes and secondary school students will be working 1 to 1 with tablets. This will be a big change for the teachers. In moving in this direction, Marcel Baier sees a significant advantage in the fact that students do not need to carry around so many books.

Benefits

- The students love their school and are proud to study there. During the construction work they had to move the playground: many students and their parents came to help to set up a temporary playground.

- Teachers appreciate the aesthetics of the school; they all mention that they enjoy teaching in this beautiful, pleasant building.

- The architects wanted the building to be open, so that you can see what is going on everywhere and what is being done. You cannot hide away as there is a lot of glass. To save money, these window and doors are a feature that the architects wanted to get rid of in the new building but Marcel Baier opposed this decision because he believes it makes a huge difference if you can see inside the classroom or not. He believes that the openness and transparency in the building is reflected in the teaching approach and in the teachers who are willing to share practice. Mr Baier noted: "Not all teachers can or want to teach in such a school where you are always visible."

Challenges

- Marcel Baier suggests that head teachers should not give up on features that are really important pedagogically when architects are looking for ways to save money or are proposing that funding is spent on design elements that are not essential (e.g. an expensive sculpture in the school entrance.)

Advice from the School Leader

The school head and a representative of the teaching body should be part of the construction board. "You should fight to be involved from the start in the process; to make sure the architecture serves the pedagogical concept, not the other way round. If financial choices have to be made, the money should go to serve the pedagogical objectives," comments Marcel Baier.

Pedagogically, you can already do a lot with the classrooms available. Marcel Baier suggests that, "If you have a team and a concept you really stand behind, innovation can be done in every school, but better architecture makes it all easier."

Lessons Learned

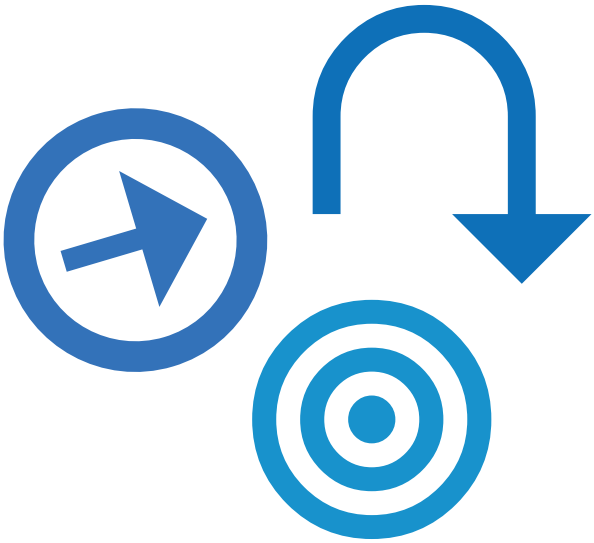
More generally, to pilot innovation, you need the teachers on board, and to work very closely with them, offer lots of continuing education (about 10 sessions a year in In der Höh, which is more than in most schools). Marcel Baier avoids big staff discussions and prefers to work with the teachers in charge of each level (Kindergarten, Zyklus 1, Zyklus 2, Zyklus 3) - who then work more specifically with the teachers.

Make sure the parents are on board by inviting them regularly to talk about what is going on at the school; you have to convince them that the school's personalized learning environment is worthwhile.

It is a good idea to publish a newsletter to inform the parents of how the new constructions are going.

Next Steps

Ideally, the head teacher would like to have more rooms for free movement and encourage opportunities for creativity. He would also like to develop the library and media room so that it is open to students from morning to evening.



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Projects

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Additional Websites

European Schoolnet

- http://www.eun.org/
- http://fcl.eun.org
- http://fcl.eun.org/fcl-ambassadors
- http://itec.eun.org
- http://lsl.eun.org
- http://creative.eun.org
- http://fcl.eun.org/fcl-network-labs

OECD

- http://www.oecd.org/edu/innovationeducation/centreforeffectivelearningenvironmentscele/

Steelcase

- https://www.steelcase.com/discover/information/education/blended-learning/
- https://www.steelcase.com/spaces-inspiration/active-learning-spaces-classrooms

Microsoft

- https://www.microsoft.com/en-us/education
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- https://customers.microsoft.com/en-gb/story/beta-school-education-office-365

Further information from the Case Study countries

Estonia

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Ireland

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Italy

- www.italiasicura.governo.it
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Norway

- www.iktsenteret.no

Switzerland

- https://www.stadtzuerich.ch/ssd/de/index/volksschule/themen_angebote/schulraumplanung/anforderungen_schulbauten.html
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- http://www.netzwerk-bildung-architektur.ch/
- https://institutbeatenberg.ch/

> In modern learning and teaching the student is an active participant in the construction of knowledge, challenging the traditional hierarchical teacher-student relationship, as well as the physical learning environment. Our studies have shown that the space can support the active engagement of students in the learning process, ultimately leading to increased student success. We are pleased to support European Schoolnet in helping to drive this change.

Sean Corcorran, General Manager, Steelcase Education

> Innovative learning spaces are so critical for students to learn in new ways, that engage, inspire and motivate them. Teachers and school leaders can think creatively about how to use their existing space, as well as plan new spaces using ideas and guidance from this publication. We are pleased to support European Schoolnet in sharing knowledge in Europe about this important issue.

Anthony Salcito, Vice President, Education Industry, Microsoft

Future
Classroom Lab
by European Schoolnet

Guidelines on Exploring and Adapting Learning Spaces in Schools

The report has been initiated by European Schoolnet's Interactive Classroom Working Group (ICWG) with support from Steelcase and Microsoft. The ICWG's aim is to explore common areas of concern, share experience, and address policy challenges related to the integration of a wide range of technologies in classrooms and their impact on teaching and learning. Ten Ministries of Education are involved (Austria, Czech Republic, Estonia, Ireland, Italy, Luxembourg, Norway, Portugal, Switzerland, Turkey). Read more at fcl.eun.org/icwg

BMB Bundesministerium für Bildung
direção-geral educação
DZS Dům zahraniční spolupráce
educa.ch
HITSA Information Technology Foundation for Education
INDIRE Istituto Nazionale Documentazione Innovazione Ricerca Educativa
Le Gouvernement du Grand-Duché de Luxembourg Ministère de l'Éducation nationale, de l'Enfance et de la Jeunesse
PDST Professional Development Service for Teachers
T.C. Milli Eğitim Bakanlığı
The Norwegian Centre for ICT in Education

Steelcase Education
Microsoft

http://fcl.eun.org/icwg

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