Innovating Teaching and Learning Practices: Key Elements for Developing Creative Classrooms in Europe

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Tags

Creative classrooms, innovative pedagogical practices, ICT-enabled innovation for learning, systemic approach, educational change

This paper looks at how to innovate teaching and learning practices at system level. It describes the vision for 'Creative Classrooms' and makes a consolidated proposal for their implementation, clarifying their holistic and systemic nature, their intended learning outcomes, and their pedagogical, technological, and organisational dimensions for innovation. 'Creative Classrooms' (CCR) are conceptualized as innovative learning environments that fully embed the potential of ICT to innovate learning and teaching practices in formal, non-formal and informal settings.

The proposed multi-dimensional concept for CCR consists of eight encompassing and interconnected key dimensions and a set of 28 reference parameters ('building blocks'). At the heart of the CCR concept lie innovative pedagogical practices that emerge when teachers use ICT in their efforts to organize newer and improved forms of open-ended, collaborative, and meaningful learning activities, rather than simply to enhance traditional pedagogies, such as expository lessons and task-based learning.

A preliminary analysis of two existing cases of ICT-enabled innovation for learning is presented in order to show (i) how the proposed key dimensions and reference parameters are implemented in real-life settings to configure profoundly diverse types of CCR and (ii) to depict the systemic approach needed for the sustainable implementation and progressive up-scaling of Creative Classrooms across Europe.

1. Setting the scene

Educational stakeholders recognise the role of ICT as a key enabler of innovation and creativity in E&T and for learning in general. Throughout Europe there are diverse national policies for ICT in education and many activities are undertaken to promote the use of ICT in education and training in Europe (Eurydice, 2011). Innovating in Education and Training (E&T) is also a key priority in several flagships of the Europe 2020 Strategy: for example the Agenda for New Skills and Jobs, Youth on the Move, the Digital Agenda and the Innovation Agenda (European Commission, 2010a). The need for more innovative Education and Training also has been confirmed by the work of the ICT cluster consisting of representatives of Member States under the Open Method of Coordination (OMC) E&T 2010 (European Commission, 2010b).

However, it was also highlighted that there is still an implementation gap in formal education settings. International surveys such as PISA (OECD, 2011), EURYDICE (2011) and STEPS project (Balanskat, 2009) describe the seriousness of this implementation gap, its negative implication on learning outcomes and the need to take immediate action. The Digital Agenda Assembly session on "Mainstreaming e-Learning in education and training" in June

2011, confirmed that only a few innovative projects manage to reach beyond the early adopters' stage. The key issue is how to tackle large-scale implementation of ICT-enabled innovation for learning: "We need to scale-up, learn from each other, be clear about visions, goals and outcomes and we need to act now" are amongst the main messages reported (European Commission, 2011).

Putting ICT-enabled innovation for learning into practice on a large scale, involving large and diverse groups of learners and/or teachers/instructors at system level, has different enablers and barriers to small-scale projects and initiatives (Kampylis, Bocconi, & Punie, 2012). Thus, there is a need to clearly articulate the essential components of innovative learning environments associated with a systemic innovation of Education and Training.

In general, the more innovative an initiative is, the more challenging it is to scale up (Law, Yuen, & Fox, 2011). As a result, a huge individual and collective effort from all the practitioners involved is required, as well as adequate support and recognition at system level of key factors such as teachers' professional development in the pedagogical use of ICT or changing assessment strategies and curricula (OECD/CERI, 2010a; Ottestad, 2010).

This contribution is based on the initial results of a study on "Upscaling Creative Classrooms in Europe" (SCALE CCR) launched by the Information Society Unit at European Commission Joint Research Centre - Institute for Prospective Technological Studies (IPTS) in December 2011 on behalf of the Directorate-General Education and Culture (DG EAC), to be completed in June 2013. The study will identify and analyse existing initiatives of ICT-enabled innovation for learning (i.e. Creative Classrooms) and clarify the nature of their innovative activities (cf. concept development), their aims (e.g. pedagogical, technological, organisational innovation), outcomes, impacts, and implementation and dissemination strategies. A set of policy recommendations for educational policymakers, stakeholders, and practitioners for the progressively up-taking of ICT-enabled innovation for learning across Europe will also be developed.

The conceptualization of Creative Classrooms requires not only that the key characteristics of innovative pedagogical practices be detailed at organizational, curricular, and assessment levels, but also an articulation of the systemic capability (at micro, meso and macro level) which involves the whole schools community practices. This conceptualization is based on previous and ongoing IPTS research works (e.g. Cachia, Ferrari, Ala-Mutka, & Punie, 2010; Redecker, Ala-Mutka, Bacigalupo, Ferrari, & Punie, 2009; Redecker et al., 2011), and also on approaches emerging from the wider international context (cf. for example: European Schoolnet, 2009; Facer & Sandford, 2010; Fullan, 2011; Hannon, 2009; IBM Global Education, 2009; Law, et al., 2011; Levin, 2008; OECD/CERI, 2012; Reflection Group on the Future of the EU 2030, 2010; Shapiro, Haahr, Bayer, & Boekholt, 2007).

2. What are Creative Classrooms?

'Creative Classrooms'[1] (CCR) are conceptualized here as innovative learning environments that fully embed the potential of ICT to innovate learning and teaching practices (Bocconi, Kampylis & Punie, 2012). The term 'creative' refers to the innovation of learning and teaching processes through technologies (e.g. collaboration, personalization, entrepreneurship, etc.). Likewise, the term 'classrooms' is used in its widest sense to include all types of learning environments: formal, non-formal and informal.

At the heart of CRR lie *innovative pedagogical practices*; inside CCR, open education principles (e.g.Iiyoshi & Kumar, 2008) are fully implemented, as learners are provided with concrete opportunities for developing 21st century skills, such as problem-solving, inquiry, and collaboration. Learning practices are flexible and engaging, designed to meet learners' individual needs and expectations.

In order to capture the complexity and richness of these learning eco-systems (Law, et al., 2011), a multi-dimensional concept for CCR is proposed (Bocconi, et al., 2012). It consists of eight encompassing and interconnected dimensions, which capture the essential nature of CCR. These are: *Content and Curricula, Assessment, Learning Practices, Teaching Practices, Organization, Leadership and Values, Connectedness,* and *Infrastructure*.

A set of 28 reference parameters (building blocks) unravel the most innovative elements of the multi-dimensional CCR concept, by clarifying and exemplifying the key enablers of CCR. The aim of the reference parameters is also to depict the systemic

1 'Creative Classrooms' concept originates from European Commission – DG EAC policies with the aim to support the mainstreaming of ICT-enabled innovation for learning. Currently, an EU funding call is open for policy experimentations on the implementation of innovative learning environments using ICT (http://eacea.ec.europa.eu/llp/funding/2012/call_et_2012_en.php).

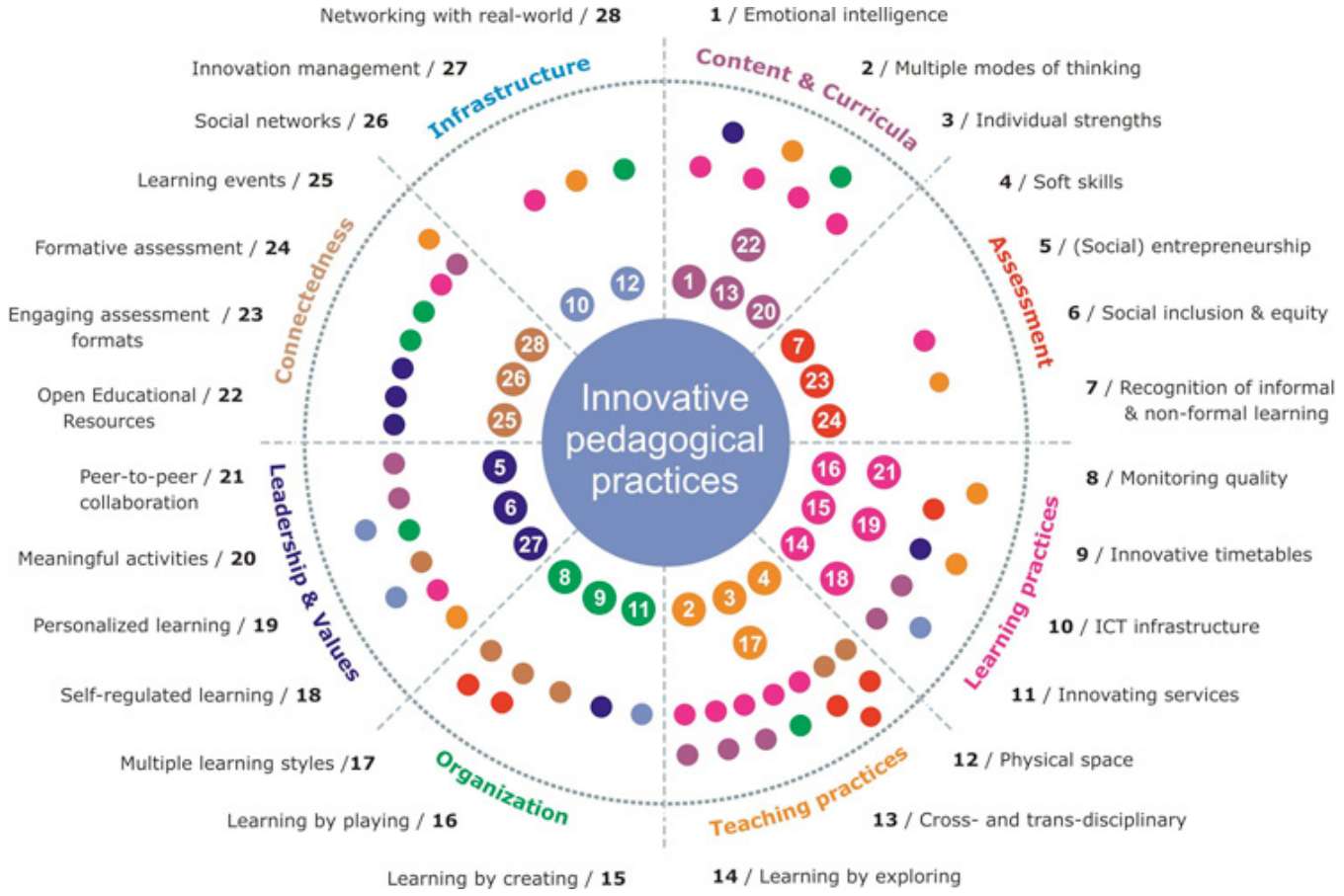

Figure 1: Creative Classrooms key dimensions and building blocks

approach needed for the sustainable implementation and progressive up-scaling of CCR across Europe.

Figure 1 shows the interconnectedness between the eight key dimensions and the 28 reference parameters of CCR. Numbered bullets located in the centre of the figure represent the main connection of reference parameters with corresponding key dimensions; the smaller bullets depict a second level of interconnections with other CCR dimensions. For instance, the reference parameter "*(12) Rearranging physical space*" is mainly connected with the dimension "Infrastructure" (light blue numbered bullet), but it also impacts on "Leadership and values" and on "Learning practices" as depicted by the smaller light blue bullets.

Innovation goes hand in hand with all eight dimensions, all of which are equally necessary for CCR, and significant effort should be made to address them all. To this end, CCR innovative learning environments need to be inspired and supported by innovative policies, ensuring the progressive implementation at system level of all CCR encompassing elements (OECD/CERI, 2010b).

These proposed eight dimensions and the related set of 28 reference parameters build on previous IPTS studies (Cachia, et al., 2010; Ferrari, Cachia, & Punie, 2009; Redecker, Ala-Mutka, & Punie, 2009; Redecker, et al., 2011) and other relevant works on creative learning and innovative pedagogies using ICT (ACOT2, 2008; Johnson, Smith, Willis, Levine, & Haywood, 2011; Kennisnet, 2011; Law, et al., 2011; Microsoft, 2011; OECD/CERI, 2010a; OECD/CERI, 2010b; Shapiro, et al., 2007). Furthermore, consultations with educational policymakers, stakeholders and practitioners (e.g. DG EAC Thematic Working Group on ICT in Education consisting of representative of Member States Ministries of Education, eTwinning teachers) contributed to the further development and validation of the multidimensional CCR concept.

The main characteristic of each CCR dimension, described in details in Bocconi, et al. (2012), are briefly summarised below:

- *Content & curricula*: in order to leave enough room for experimentation and creativity and provide learners with concrete opportunities for developing 21st century skills (e.g. problem-solving, inquiry and communication), CCR content and curricula should be open, flexible, linked to real-life contexts and regularly updated, drawing on evidence-based research (Kampylis, 2010; Law, Pelgrum, & Plomp, 2008; Law, et al., 2011).
- *Assessment*: shifting from traditional assessment of knowledge acquisition to innovative ICT-enabled approaches, CCR (e)Assessment strategies should transcend the standardize testing paradigm and develop integrated, authentic and holistic assessment formats that replicate real life contexts (Redecker, Punie, & Ferrari, 2012; Villalba, 2009).
- *Learning practices*: focusing on the experience of learning and how learners engage with it (Bocconi & Trentin, 2012; Craft, 2011), learning practices established in CCR should be flexible, playful and engaging, meeting students' individual needs and expectations, enabling self-regulation (Zimmerman & Schunk, 2011) as well as peer-learning.
- *Teaching practices*: the role of the teacher in CCR should be that of a mentor, orchestrator and facilitator of learning (Cachia, et al., 2010; Hannon, 2009), acting as a role-model of creativity and innovation and applying expertise in pedagogy developed through adequate training opportunities and participation in professional networks (Kampylis, 2010).
- *Organization*: CCR organisational practices for learning should be co-owned and shared among all community members, implying progressive breadth and depth of action to meet local circumstances and needs (Levin, 2008). Monitoring mechanisms should evaluate progress and effectively refocus organizational practices (Seidel, Tishman, Winner, Hetland, & Palmer, 2009).
- *Leadership and Values*: school leadership inside CCR should be open and participatory and should play a crucial role in orchestrating innovations by applying in practice values like equity and inclusion (Hannon, 2008; OECD, 2012b) and by supporting staff professional development.
- *Connectedness*: focusing on the social and emotional factors that impact on engagement and motivation (ACOT2, 2008; Law, et al., 2011), CCR should empower both teachers and learners to connect with ideas, (their) interests and people (e.g. peers and parents), thus opening up and broadening the learning experience (OECD, 2012a).
- *Infrastructure*: CCR should sustain a dynamic (technological and physical) infrastructure to facilitate, communicate and disseminate innovative practices and to extend the boundaries of the learning space (Burke, 2007). Effective support structures are also needed to implement smoothly all necessary technologies.

In Table 1, the current set of 28 reference parameters of CCR are briefly described, including some concrete examples.

Table 1: Creative Classrooms reference parameters

Reference Parameter	Description	Example
Fostering Emotional Intelligence	In CCR, emotional intelligence should be recognised as a key factor for creative learning. A variety of activities help learners to manage emotions and form positive relationships. ICT enable the use of learning resources that foster learners' emotional knowledge skills (e.g. self-awareness, empathy for others) (Domitrovich, Cortes, & Greenberg, 2007).	*PATHS* is an example of successful promotion of socio-emotional competences. This is realized with practical tools for teachers to implement goal-oriented cultural education. Source: http://www.oecd.org/edu/ceri/49750409.pdf
Fostering multiple modes of thinking	In CCR, teachers should encourage learners to develop their talents and creative potential to the fullest extent in all possible areas (notion of *polymathy*) (Kaufman, Beghetto, Baer, & Ivcevic, 2010). ICT applications (e.g. audio editing) offer unprecedented opportunities for exploratory learning and creativity.	The *Media Lab* at MIT engages learners in cross-disciplinary projects in a wide range of domains (e.g. nanotechnology and music). Source: http://www.media.mit.edu/about/mission-history
Building on individual strengths and preferences	CCR teachers should build on learners' strengths, potentials and preferences (i.e. understanding their backgrounds, interests, skills) as crucial resources and drivers for motivation to learning. ICT offer multiple ways to express learners' interests (e.g. through social networks) and can facilitate the development of their creative potential.	The *Enrichment Programme* implemented in a Slovenian school aims to increase learners' inner motivation for learning by respecting their "interests and ideas". Source: http://www.oecd.org/edu/ceri/49768501.pdf

Reference Parameter	Description	Example
Fostering soft skills	In CCR, a great variety of activities should address transversal soft skills such as problem solving, collaboration and cultural awareness, in order to facilitate the learning of the hard, subject-specific skills. ICT provide means for fostering soft skills, as the ability to communicate and work in team.	Projects being developed in *Fab labs* at MIT's Center for Bits & Atoms provide authentic learning and soft skills development. Source: http://fab.cba.mit.edu/about/faq/
Facilitating (social) entrepreneurship	CCR should provide learners with more opportunities to initiate, design and implement real-life projects with emphasis on innovative products/services for the school community in order to create a culture that values sensible risk taking, entrepreneurship, and innovation (Eurydice, 2012). ICT offer opportunities for both real and/or virtual entrepreneurship.	In Cyprus, the *'simulation sample enterprises'* programme foster students to work on a specific area of entrepreneurship. Source: Eurydice p. 26: http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/135EN.pdf
Applying in practice social inclusion and equity	In CCR, all learners (gifted students, migrants, drop-outs, etc.) should be provided with equal opportunities and appropriate means for quality learning, in order to mitigate social disadvantage and reduce schools failures. Evidence shows that ICT-enabled approaches offer tailored learning opportunities (and contents) inside and outside of E&T institutions (OECD, 2012a, 2012b).	The *CONNECT Project* included interventions in Irish North & South schools that target the causes of anti-social behaviour and community disengagement by means of an innovative ICT-enabled approach. Source: http://scotens.org/docs/2010-mvet.pdf
Recognizing informal and non-formal learning	Informal and non-formal and learning that takes place outside formal settings should be recognized. Recognition of (both students and teachers) achievements constitutes a core factor inside CCR. The potential of ICT is exploited to facilitate ubiquitous learning through open educational resources (e.g. online videos, podcasting).	*Flipped classrooms* follow a reversed teaching and learning model: learners watch lectures and at home and use the classroom time to interact with peers and teachers. Source: http://www.techsmith.com/flipped-classroom.html
Monitoring quality	CCR should develop and communicate a clear framework for quality, transparent to all members of the wider school community, in order to monitor and enhance quality in teaching, learning and assessment. ICT offers a broad variety of versatile tools to support incremental approaches and systematic review of implementation strategies.	In the *Qualities of Quality* project, achieving quality in K-12 arts programs is an ongoing examination of *programmatic, personal purposes, values*, and *"in the room" action*. Source: http://www.pz.harvard.edu/research/Quality.htm
Innovating timetables	Innovative, flexible (Csikszentmihalyi, 1996), and tailored-made timetables should be used for providing teachers and learners with more opportunities to engage in creative learning in CCR. ICT offer new tools (e.g. online shared calendars) for sharing timetables and facilitate time management.	A primary school in Seville, Spain has adopted an innovative timetable, dividing lessons in 15-20 minutes with subgroups coordinated by various actors. Source OECD: http://www.oecd.org/dataoecd/0/61/49930737.pdf
Levelling-up and functioning ICT infrastructure	ICT infrastructure should reach adequate performance and interoperability in order to provide learners and staff with access to multimedia-rich contents and online services for innovative pedagogies in CCR. Research (e.g. Redecker & Punie, 2010) shows that ICT-based infrastructures such as broadband networks, cloud computing, web applications, and tablets offer great opportunities for innovating learning and teaching practices.	Numerous large-scale *1-to-1 computing initiatives* currently undertaken in Europe represent a qualitative move toward ubiquitous access to online resources through a personal device (netbooks) for all the learners. Source: http://resources.eun.org/insight/Netbooks_on_the_rise.pdf

Reference Parameter	Description	Example
Innovating and renovating services	CCR should make use of technological means in order to modernize existing services and/or offer totally new services both for formal and informal learning. ICT offer powerful tools for updating existing services (e.g. school library offering e-books) or introducing innovative services (e.g. online courses for ill students) for learning 24/7.	The project *"World of stars"* offers tools (e.g. chat, videoconference) to children who have a long stay in hospital to communicate with school, peers and family. Source: http://www.mundodeestrellas.es/opencms/index.html
Rearranging physical space	The CCR physical space should take advantage of colours, sounds, materials etc. in order to provide a flexible, aesthetically-appealing and inspiring environment for learning (Burke, 2007). Moreover, the physical CCR space should cover as far as possible learners' special needs. ICT tools (e.g. video projectors) can be used for creating an easily adaptable physical space.	*Vittra* schools have adopted a new pedagogical approach, without any traditional classrooms. The challenging design and pedagogical zones offer a space for innovative pedagogical practices. Source: http://vittra.se/english/VittraEnglish.aspx
Learning across disciplines / subjects	In CCR, a variety of learning materials should be organized thematically to foster "horizontal connectedness" (OECD, 2012a) and enable learners to analyse and understand things by multiple perspectives (Cachia, et al., 2010). ICT offer innovative ways to retrieve information from different domains and to create rich multimodal content.	The *International Primary Curriculum* (IPC) is a privately developed curriculum (adopted by over 1000 schools in 65 countries) providing a cross-curricular, thematic structure. Source: http://www.internationalprimarycurriculum.com
Learning-by-exploring	CCR should enable learners to explore complex concepts and manipulate ideas in order to enhance their critical thinking and ability to make connections about seemingly unrelated concepts. ICT offer new means such as online access to remote laboratories for exploratory learning.	Online laboratories allow learners and teachers to carry out experiments with advanced equipment. Source: https://wikis.mit.edu/confluence/display/ILAB2/iLabs
Learning-by-creating	CCR should actively engage learners in producing and generating their own contents (artefacts) in order to nurture creative imagination, innovation attitude and authentic learning. ICT offer the means for designing, (re-) creating, and communicating learner-generated content worldwide, in new and cost-effective ways, from blogs, to wikis, to video making and sharing.	Stop-motion animation techniques are used in many schools worldwide for learning-by-creating. For instance, Daylesford Primary School students' create their own clay animations working in small groups. Source: https://fuse.education.vic.gov.au/pages/View.aspx?pin=7C8E6E
Learning-by-playing	CCR should extensively embed (both physical and mental) playfulness in order to fully engage students in the learning process. ICT offer great opportunities for playful learning through a great variety of digital games and simulations.	*Lego Mindstorms* engages students in learning-by-playing e.g. *Winterfest* Source: http://is.jrc.ec.europa.eu/pages/EAP/eInclusion/games/documents/Buchem_CASE_Wintertest_short.pdf
Addressing multiple intelligences and learning styles	CCR should give value and provide the means (i.e. plurality of tasks, contents, etc.) for addressing multiple learning styles (e.g. Dunn & Dunn, 2008) and intelligences of learners (Gardner, 1999). Evidence shows that ICT have great potential to foster multiple intelligences (e.g. blogs/intrapersonal intelligence; motion-controlled videogames/body-kinesthetic intelligence).	Within the framework of the Comenius project *EduComics* the creation of online comics is used to facilitate multiple learning styles, engage and motivate students, and utilize technology in a practical and effective way. Source: http://www.educomics.org

Reference Parameter	Description	Example
Empowering self-regulated learning	CCR should empower learners with self-regulation skills in order to help them take control of their learning process, promoting self-directed learning skills and supporting reflection and meta-cognition (Zimmerman & Schunk, 2011). ICT provide attractive, encouraging and engaging environments that foster self-directed learning, helping learners to cope with lifelong learning.	*Crescent Girls School* in Singapore distinguishes itself in its exemplary educational practices that empower students to be self-directed learners equipped with important skills required for the 21st century. Source: http://www.crescent.edu.sg/
Personalised learning	In CCR, learners should be at the centre of any learning process. Accordingly, curricula and methods are continuously sensitively adjusted to respond to individual learners' needs, fostering their motivation and self-expression (Redecker, et al., 2011). ICT increases opportunities for personalized learning, e.g. maintaining detailed data on learners' academic progress and using OER for tailor-made learning activities.	At *E-Classrooms at Škofja Loka-Mesto Elementary School*, a virtual learning environment is used in order to personalize student learning, foster creativity and innovation, and improve students' digital literacy. Source: http://www.oecd.org/dataoecd/1/38/49930715.pdf
Meaningful activities	CCR activities should be carried out in an authentic context, encouraging learners to apply their prior knowledge, inquiry and independent thinking to enhance both soft and hard skills. ICT offer unprecedented opportunities for engaging learners in meaningful activities (e.g. museums virtual tours, geotagging, etc.).	*Fiskars elementary school* provides students with active learning in authentic "real life" contexts through an innovative partnership with local artists. Source: http://www.oecd.org/dataoecd/32/28/49750430.pdf
Facilitating peer-to-peer collaboration	As learning is a social process, CCR should constantly encourage peer collaboration. This fosters learners' ability to think both independently and with others, enabling them to consider a plurality of perspectives. Synchronous/asynchronous online peer collaboration in networks and communities of practice transcend space /time limitations and are likely to increase creative learning.	*eTwinning* projects offer teachers from around Europe the opportunity to collaborate with their counterparts in designing and implementing innovative pedagogies. Source: http://www.etwinning.net/en/pub/news/press_corner/statistics.cfm
Using/ reusing and creating Open Educational Resources (OER)	CCR should make consistent use/reuse and remix of existing OER to broaden and update the curriculum and achieve the desired/expected learning outcomes. ICT increase opportunities for sharing/reusing/exchanging of resources, fostering learning communities around OER which contribute to raising stakeholders' motivation to use OER.	Several initiatives across Europe support teachers in using platforms to exchange and reuse learning resources. Source: http://lemill.net
Engaging assessment formats	In CCR, assessment should incorporate creative tasks in order to engage and motivate learners while assessing complex skills (e.g. collaboration) developed inside and outside school, which cannot be measured by conventional assessment. ICT have the potential to keep track of, process and communicate the learning progress of each student in totally new ways (e.g. e-portfolios).	The Danish *Pedagogical Platform* utilizes three different portfolios (working, selection, and presentational) portfolios to foster learners' competences of 'knowledge', 'self-assessment', 'conduct', and 'being'. Source: http://www.oecd.org/dataoecd/32/55/49749695.pdf
Embedding formative assessment	CCR should embed a plurality of methods and tools for formative self- and peer-assessment, by assessing learners' competences (rather than factual knowledge) for monitoring and feedback purposes. ICT tools (e.g. online forms, flash cards, study games creators) can provide immediate feedback to students.	*The University of Manchester* (UK) is investigating peer-assessment in two contrasting scenarios. Source: http://www.celt.mmu.ac.uk/ltia/issue4/langanwheater.shtml

Reference Parameter	Description	Example
Learning events	The CCR community should actively and systematically participate in learning events and also organise them (f2f, online and blended). ICT have the potential to deliver educational courses worldwide and offer innovative ways for online lifelong learning e.g. Massive Open Online Courses (Conole, 2010).	The eTwinning Group *Creative Classroom* uses ICT for delivering online open learning events on topics related to creativity in formal education context. Source: http://groups.etwinning.net/web/creative-classroom/welcome)
Engaging through social networks	In CCR, social networks should be used to increase interaction in the school community, opening up and modernising internal processes (Ala-Mutka, 2010). Evidence shows that social computing (blogs, Twitter, etc.) enable learners and teachers to collaborate across cultures, language barriers, and institutional walls.	*Absolutely Intercultural* uses podcast to facilitate intercultural dialogue in formal and informal learning settings, engaging students and teachers on intercultural simulations. Source: http://www.absolutely-intercultural.com
Implementing innovation management	CCR should implement a systemic approach to learning, defining and adopting a strategic and feasible development plan. Fostering a collective culture and engagement favours sustainable innovation and makes effective use of human resources. Social computing helps learning organisations become more dynamic, flexible and open, and also intensifies their collaboration with other organisations.	The *Ontario case* shows how effective leadership should be fostered throughout the learning system, by putting in place a set of fundamental whole-system-reform strategies. Source: http://www.edu.gov.on.ca/bb4e/Ontario_CaseStudy2010.pdf
Networking with real-word context and actors	CCR effectively interact and cooperate with a plurality of actors (e.g. industries, agencies, museums, etc.), on a regular basis in order to engage and experiment with social values and multiple cultures, and to support and foster learners' motivation. ICT offer innovative, powerful and cost-effective ways of online networking, interaction, and collaboration across the boundaries of time and space.	In the Finnish *Model Vihti*, schools interact and cooperate with local municipalities, parents, NGOs, local farms and experts to learn by doing and to create sustainable learning environments outdoors. Source: http://www.oecd.org/dataoecd/32/21/49750537.pdf

In the following section, CCR key dimensions and building blocks are applied to two existing cases of ICT-enabled innovation for learning in Europe.

3. Two cases of Creative Classrooms in Europe

Case 1: Monkseaton High School (UK)

Monkseaton High School (http://www.monkseaton.org.uk/Pages/Home.aspx) is a British Trust School[2] with 700+ students aged 13 to 18 (Year 9 to Year 13). The school holds specialist status in mathematics, computing and science and hosts a football academy. The Monkseaton High School has new purpose-built premises completed in the summer of 2010 that have won regional and national awards for their revolutionary design[3].

As shown in Figure 2, Monkseaton High School adopts innovative practices that cover 7 out of 8 CCR key dimensions and 21 out of 28 building blocks.

The majority of building blocks are related to teaching and learning practices. Monkseaton High School facilitates active and engaging ways of learning such as *playing by exploring, learning by creating,* and *learning by playing*. Moreover, school's inspiring learning spaces (*rearranging physical space*) allow the *self-regulated learning, peer-to-peer collaboration* and *personalized learning* through playful, *meaningful* and *cross-disciplinary activities* (mainly ICT-based).

2 Monkseaton became England's first Trust School in August 2007. The partners are the Monkseaton High School, Microsoft, Tribal Education, North Tyneside Council and the Chair, Professor David Reynolds. The focus of the Trust is applying technology and neuroscience to education at the school and creating, testing and sharing solutions for better ways of learning (http://en.wikipedia.org/wiki/Monkseaton_High_School).

3 The design, beyond the formal teaching spaces, incorporates a number of learning areas for students to study independent of teachers. The light, airy feeling created throughout the school encourages 'open' learning and is a move away from traditional, 'institutional' school design.

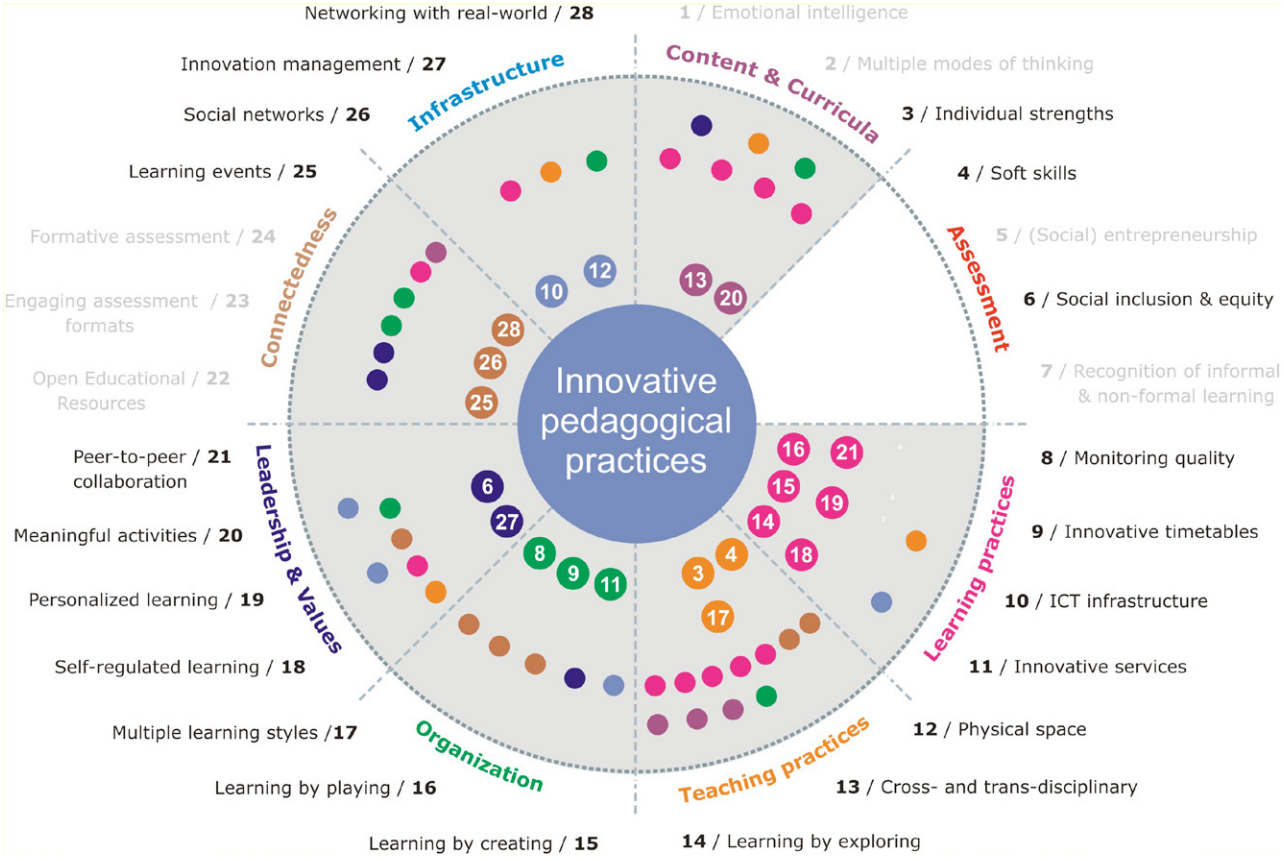

Figure 2: CCR key dimensions and building blocks covered by Monkseaton High School (UK)

Moreover, the school networks extensively *with the real world context and actors*. For instance, technology is widely used to inform and engage parents in their child's learning (throughout the school portal). The school also benefits from a close and multidimensional collaboration with the Open University, which gives students the opportunity to enrol in 50 specially designed courses through the Young applicants in Schools Scheme (*innovating services*), and industry (Microsoft).

The school's state-of-the-art *ICT infrastructure* allows the development of students' *soft skills*, such as problem solving and communication with the *real-world context and actors*, and the fostering of *multiple modes of thinking* through multimodal teaching and learning materials. Most of the school's innovations were initiated mainly by the ex-headteacher, Dr Paul Kelley, who sought to develop, test and share innovative solutions for education based on cutting-edge science and technology (*innovation management*). Among other innovations he introduced an *innovative timetable*. This is based on research on the biological mechanisms behind teenagers' need to sleep in longer in the morning. The timetable also takes into account neuroscience research on long-term memory, and includes the 'spaced learning' (namely 10-minute breaks, during which distractor activities such as physical activities are performed by the students- between three intensive sessions of 15-20 minutes teaching.

Thus, according to a preliminary analysis, based on literature research and online sources, Monkseaton High School adopts a wide-ranging innovative model that impacts not only on teaching and learning practices but also on leadership and values, connectedness, content and curricula, organization and infrastructure. Following the CCR multidimensional concept, a future progressive up-taking of Monkseaton High School should focus on the shift from traditional assessment paradigms to innovative ICT-enabled assessment approaches that capture not only factual knowledge but also 21st century skills.

Case 2: Hellerup School (Denmark)

Hellerup Skole (http://www.hellerupskole.dk) is a primary and lower secondary school near Copenhagen. This public school is one of three pilot schools in Denmark (operating since 2002) and has up to 750 students and over 60 teachers.

As shown in Figure 3, Hellerup school adopts innovative practices across all CCR key dimensions, implementing and building upon a significant number of CCR building blocks (24 out of 28).

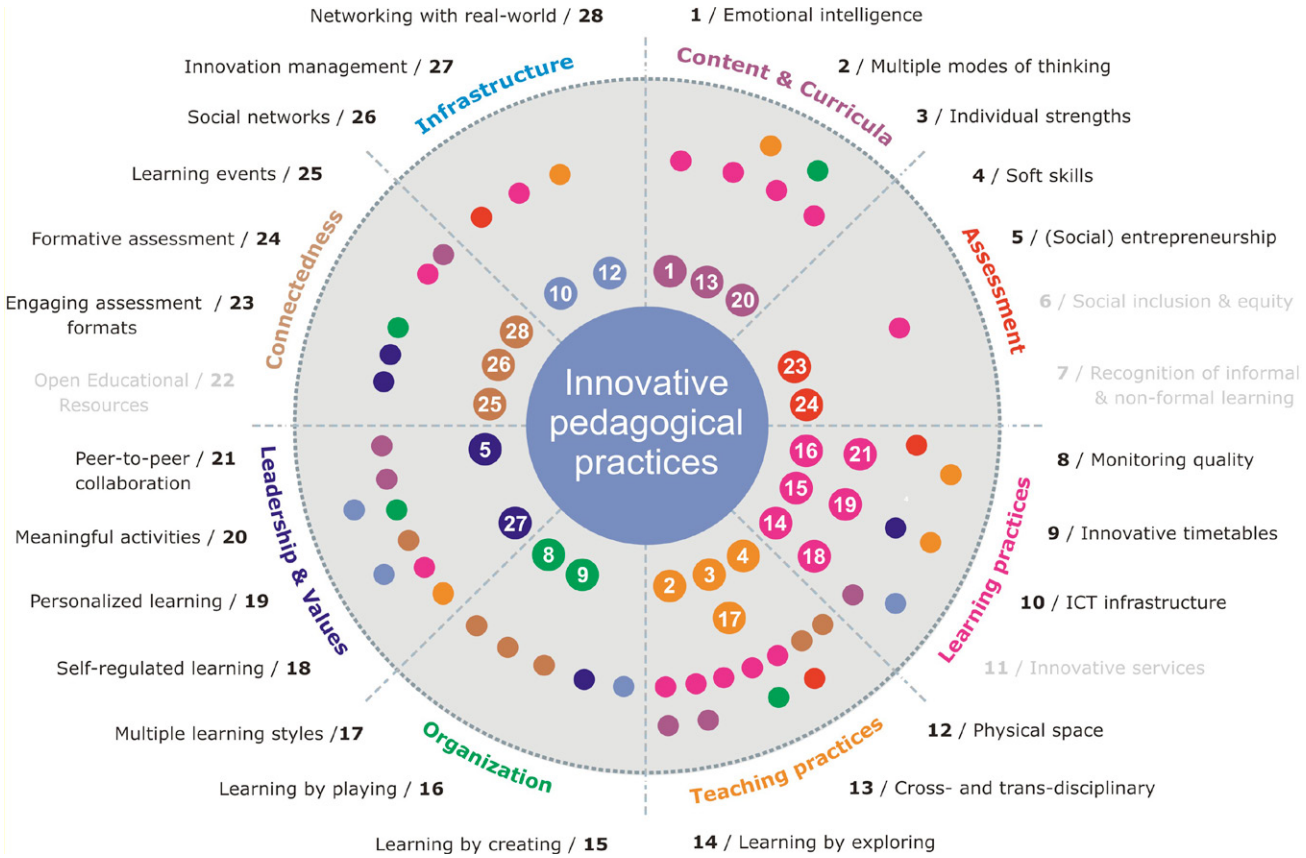

Figure 3: CCR key dimensions and building blocks covered by Hellerup Skole (Denmark)

Though the school follows the national curriculum, several cross-disciplinary projects[4] are also carried out each year, enabling students to form positive relationship (*fostering emotional intelligence*), while carrying out activities in authentic context (*meaningful activities*) and developing *transversal soft skills* (e.g. problem-solving, collaboration, etc.). This also contributes to keeping the curriculum creative and dynamic.

Focus is on the individual learner (*personalized learning*), facilitating active and engaging ways of learning such as *learning by creating* and *learning by playing*. More than in other schools, students learn for themselves individually (*learning by exploring*) and with their peers (*facilitating peer-to-peer collaboration*). Students are also constantly challenged to take responsibility for their learning (*empowering self-regulated learning*). *Innovating timetables* are also applied: students start together for about 10 to 15 minutes and then they can choose to work alone or with their peers according to their needs.

A broad spectrum of evaluation methods is used, including logbooks, individual (digital) portfolios and student plans (*engaging assessment formats*). The aim is to help students become aware of their progress and future goals, as well as of *how* they learn (*embedding formative assessment*). ICT-based national tests are also part of the evaluation.

The teachers also work in small (5 to 6) and autonomous teams, designing activities that address individual students' interests and *learning styles*. In order to develop their professional practices, school staff participate in university-based training programmes on a regular base. The autonomy of teachers' teams reflects the distributed leadership approach adopted by the school.

The children work in constantly changing environments and collaborate with others. For two weeks of every year, children of all ages work together on a special creative art project, providing opportunities for mixed age learning and reinforcing the school community.

Spaces are shaped to accommodate children and the way they learn: there are plenty of different corners, private/collective, quiet/playful which allow children to seek their own preferred space that best fit their learning styles[5].

4 For example see http://ingenious-science.eu/web/guest/hellerup-school

5 The unique school design is the result of collaboration between the architects, school staff, parents and even students. The goal was to ensure that the physical design of the school could support the school's

Thus, according to a preliminary analysis, based on literature research and online sources, Hellerup school implements a systemic approach to educational innovation that involves and impacts on the whole school community.

4. Conclusions

The multi-dimensional conceptualization of 'Creative Classroom' proposed here, suggests that a systemic approach is needed in order to innovate teaching and learning practices. Based on the current research literature and existing best practices of ICT-enabled innovation for learning, eight key dimensions and a set of reference parameters (CCR building blocks) are identified as essential factors underpinning most innovative pedagogical practices, which lie at the core of Creative Classrooms.

Two cases, the Monkseaton High School (UK) and the Hellerup school (Denmark) illustrate how the systemic approach, captured by the proposed CCR conceptualization, can be successfully applied in practice, encouraging innovation and actively implementing a collective paradigm shift in pedagogical thinking and practices.

In the framework of the SCALE CCR study, an in-depth analysis of a number of existing cases of significant scale and/or impact at system level (e.g. eTwinning) will be carried out in order to identify the enablers and bottlenecks for further take up of ICT-enabled innovation for learning in Europe. Through this in-depth analysis and an ongoing wide-ranging consultation process with key stakeholders, policy makers and practitioners in the field of Education and Training (E&T) in Europe, concrete recommendations for the further development and mainstreaming of CCR in Europe will also be developed.

The views expressed in this article are purely those of the authors and they should not be regarded as the official position of the European Commission.

learning philosophy, which is rooted in Howard Gardner's theory of multiple intelligences (see http://www.elearningeuropa.info/en/tv/hellerup-skole).

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