



Small School, Smart Schools: Distance Education in Remoteness Conditions

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Accepted: 17 October 2020 / Published online: 28 October 2020
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Abstract

Mountain, insular and internal areas represent 70 percent of the Italian land with a population that experiences many difficulties in daily living due to territorial constraints. Nevertheless, it is extremely important to guarantee equal opportunities and services to those who live on the mountains and small islands of the country. Distance lessons could be an opportunity to overcome isolation and offer equal and quality teaching activities within curriculum. Remoteness and Distance education will be part of the curriculum of the small rural schools to offer to the students the opportunity to have equal and quality education as the “standard” schools. In this chapter we will describe two teaching methods which provide education through technological settings and project-based learning to foster soft skills in the students with the aim of learning disciplinary competences: (i) The *Extended Learning Environment*, where two or more classrooms work together on a common school subject project using different kind of technological setting. (ii) The *Shared lesson*, based on every day distance learning activities. Two classrooms (with students of different levels) of different schools define a smart setting with video-conferencing system and knowledge forum on a daily basis sharing the same lesson in the same time of school.

Keyword Small schools · Distance learning · Remoteness · Extended learning environments · Shared lesson

1 Rural School and “Remoteness”

Rural schools are often defined by isolation, long distances between places and scattered populations (Stelmach 2011). Located in “places left behind” (Lichter and Schafft 2016), they struggle to offer fair and quality educational opportunities. A novel school can become one of the “attractors” for the repopulation of fragile territories, and, in addition to the environmental well-being, it can preserve villages, rural–urban and peri-urban places (Gras and Salvati 2019), with consequent effects of de-territorialization (abandonment of known places) and re-territorialisation (through an exploration of

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other organizational models) (Dovey et al. 2018). Conversely, the perception of a school that is not able to offer fair educational opportunities, in addition to the distress perceived by families, can accelerate the phenomenon of depopulation and the consequent cultural impoverishment of territories.

We focus on the term “remoteness” to indicate the type of isolation experienced by these territories. Although the position of a school is outside the control of teachers and educational-policy makers, isolation (“remoteness”) requires great attention, because it influences the idea that students and families have about the educational service and the understanding by teachers of how much it can affect daily pedagogical practices. Isolation does not refer only to the “physical distance” of rural communities from urban areas, but also to a “cultural “distance, such as the hiatus between school and parents and pessimism about education and future opportunities. Some studies suggest that professional perspectives may be less developed in some rural areas due to the distance from central services and the lack of resources (Howley et al. 2011).

Small schools located in rural, island and mountain contexts face unique challenges associated with geographic isolation, racial segregation and limited school and community resources (Johnson and Strange 2007), that do not allow to respond to the specific needs of specific groups (Sze 2004). In these contexts the idea of an educational fragility emerges (Bailey and Du Plessis 2000), and parents ask for interventions capable of supporting quality educational programs for their children. Because of these problems, some of the benefits of collaboration can be particularly relevant for schools serving rural districts, where the ability to provide a broad educational curriculum and equal opportunities for all students, including those with special needs, may be limited.

To bridge cultural and geographic isolation, it is possible to employ interventions with mobile laboratories (mobile vans that transport learning resources to remote areas), independent online study paths, telephone lines dedicated to education, itinerant teachers, summer seminars, correspondence lessons, summer camps, tele-learning, electronic bulletins, exchanges of practices, and video lessons (Arnold 2001). These are systemic interventions to give the community an idea of “fair and quality school” that avoids a condition of fragility and the risk of closure. Studies conducted in this program indicate that small rural schools consider the collaboration helpful in solving problems caused by their small size (Busher and Hodgkinson 1996).

In some areas, such as the Australian inland, programs such as School of the Air (SOTA) and School of Isolated and Distance Education (SIDE) use radio and ICT to teach in rural areas. Parents, especially mothers, act as pseudo-teachers and certified educators take on an itinerant assignment (Tynan and O’Neill 2007) which integrates the online educational program.

The “small schools” issue includes the broader question of the *school form* (Vincent 1994; Maulini and Perrenoud 2005; George 2002), asking to the scientific community to modify time, spaces, resources, and help teachers and school principals to maintain a quality educational system in fragile territories. The topological *becoming of the school* (Fenwick and Landri 2015) and the development of a new order of space–time continuity increases interconnections, made possible by an attention to the training of teachers and to professional development. The aim is not to make them consider their teaching in these territories as ‘second best’ or “deficit appointment” (Jenkins and Cornish 2015), which would amplify the character of educational “inequality” in mobile modernity (Corbett 2015).

Distance learning has a great potential for small rural schools by requiring systems to rethink the *forme scolaire* for small schools and promote the experiences that recall the basic principles of smart schools.

Rudduck (2016) outlined the principles on which smart schools must act: a curriculum innovative for a better life, the transfer of the power to act to students, innovative methodologies and advanced teaching materials, assessment models based on continuous learning. In order to ensure the success of the desired teaching/learning model, smart schools require an effective and efficient management of resources and suitable support processes. The forms of distance learning can be the catalyst in the process of transforming small rural schools into smart schools (Rudduck 2016) through new architectures and environments for learning.

After summarizing some international studies that analyze the critical issues regarding the use of technologies in rural schools teaching, this paper offers an overview of experience of distance education in small and rural schools in Italy, with the aim of identifying some basic research and observation dimensions for distance teaching to be used in schools that are isolated and/or located in islands and mountain areas.

2 Distance Education Studies in Small School

Although there is a strong growth in the use of distance education in the K-12 area and many studies recall the potential benefits of distance education, in small and isolated schools the research revealed significant differences of usage and perceived effectiveness among respondents (Kormos 2018).

With reference to possible “barriers” to technology use in K-12 education, there are few studies that investigate what happens in different types of districts and communities, particularly in smaller and rural communities; scientific literature indicates that a lack of access to technology tools and resources may continue to be a significant barrier (Francom 2016; Kale and Goh 2014; Wright and Wilson 2011), especially in rural districts and communities (Howley et al. 2011).

Research lets us discuss distance learning in small schools starting from some analytical trajectories or approaches, in particular: (1) studies on the use of ICT by teachers in small and rural schools with a focus on the existing digital divide (Wang 2013; Hohlfeld et al. 2008) and on the need of a digital staff (Thomas and Falls 2019); (2) studies that stress the need to guide rural-areas teachers towards the adoption of network technology into their teaching, so as to better integrate students’ classroom and out-of-school activities (Hawkes et al. 2002; Songer et al. 2002; Panizzon and Pegg 2007); (3) studies that focus on ministerial initiatives and programs aimed at implementing the use of technology by teachers in rural areas (Park et al. 2007; Howley et al. 2011; Mangione and Calzone 2019; Cannella 2017).

2.1 Issues Related to Digital Divide in Rural Schools

Concerning the recent frameworks about digital divide, the one proposed in (Hohlfeld et al. 2008) lists among the main goals the need to provide schools with computer hardware and establish the presence of technology. This issue is particularly critical for rural schools with respect to urban ones.

Although today there is a large amount of online material available for teaching, peripheral areas still suffer from bandwidth limits (Page and Hill 2008), which prevents a real technological integration in pedagogical choices of rural schools. This not only affects the

possibility to implement forms of distance learning through video conferencing or streaming video, but sometimes limits even basic web applications (Hannum et al. 2009).

But digital divide does not imply only the availability of technologies in the classroom, but also the ability of small schools to profitably manage both the digital equipment and infrastructures, as stated in (Wang 2013). Even when rural schools have the mission to bridge the gap of digital divide, often they have neither the facilities nor ICT skills and knowledge necessary to integrate technology into classes. If urban schools have a dedicated staff dealing with maintenance and the resolution of technical issues, in rural areas small schools cannot rely on a technical support service (Hawkes et al. 2002; Howley and Howley 2008).

These considerations are supported also by a number of disciplinary studies. For example, the research reported in (Thomas and Falls 2019) highlights that rural schools face unique contextual challenges with relation to STEM teaching and technology integration. Unlike metropolitan districts, rural schools seldomly employ instructional coaches, professional development coordinators, or other administrators with the aim to support teachers with STEM content (Seltzer and Himley 1995).

2.2 Bottom-Up Interventions for the Integration of Digital Technology in Education

Although the access to an adequate and well-maintained technological infrastructure is a factor with a potential impact on teaching innovation in rural schools, other less tangible factors are also important. In this sense, examples include the possibility to guide teachers towards the development of awareness and the ability to rethink technology so as to suit specific pedagogical needs and develop educational paths connecting school and daily life (Songer et al. 2002; Wang 2013). Concerning digital knowledge and abilities, a number of studies pointed out that students generally perceive their teachers as “out of the world”, thus observing a disconnection between school and out-of-the-school environments (Panizon and Pegg 2007). “If the teacher is not comfortable using it [technology], then the kids won’t use it either” (Cullen et al. 2004, 139).

How can we encourage reluctant teachers to get closer to technologies and what are the main barriers to entry? Some studies highlight that one of the main issues is the working time required to plan technology integration into educational activities (Lewis 2010 in Francom 2016). In order to foster more positive attitudes and beliefs about technology integration, as stated by Howley et al. (2011), some authors promote the presence of tutors to supervise activities, the realization of sharing environments such as professional learning communities (Kormos 2018), and situated professional development and mentoring (Kopcha 2012; Ruggiero and Mong 2015; Wright and Wilson 2011). Moreover, Darling-Hammond (2014) outlines the figure of the pedagogical in-service supervisor who allows to “learn a practice in practice” by linking theory and practice, so as to guarantee a radical revision of the *status quo* and change the beliefs of the teachers reluctant towards digital innovation.

2.3 Top-Down Interventions for the Integration of Digital Technology in Education

Not all rural environments are impermeable to the adoption of technology in educational activities. Sometimes, school communities accept or even encourage the use of digital approaches (Howley et al. 2011; Kormos 2018). In these cases, efforts to increase the integration of technology into teachers’ educational practice require taking advantage of

ministerial programs. In general, ministerial programs tend to focus on one of the following goals: either getting technology on the one hand, or using technology on the other (Howley et al. 2011). In the U.S., federal and state technology grants are guaranteed to rural schools in order to improve access to technology. Park, Sinha and Chong (2007) reported that government programs such as E-Rate, designed to promote Internet access, offer some benefits to rural schools but require them to independently manage hardware and software supply and teacher training. In Italy, the national operational programs for school entitled “Per la Scuola—competenze e ambienti per l’apprendimento” and “Gestione degli Interventi sull’Edilizia Scolastica” represent a qualified observation point to intercept and select new ideas and proposals for rural schools (Mangione et al. 2017a, b; Mangione and Calzone 2019).

Programs designed to increase the use of technology generally involve mentoring (Duncan and Stock 2010) or explicit training (Mangione et al. 2017a, b; Sundeen and Sundeen 2013). Both methods claim to help teachers overcome discomfort with technology.

The mentioned programs promoted by national institutions and governments let us analyze both the separate and the combined influences of various conditions on teachers’ technology integration, particularly in rural areas (Cannella 2017). Among these influences, the remoteness of the school emerged, a condition examined in just a few other studies (Page and Hill 2008; Subramony 2007; Cannella and Chipa 2016). Based on the analysis of the gathered data, it is reasonable to conclude that distance education may play a relevant role in rural education, and its importance will likely expand (Hannum et al. 2009).

3 Potential Use of Distance Learning

Distance Education is intended as a process to focus teachers’ and students’ attention on the use of a computer network in order to present or distribute some educational content and to provide two-way communication via a computer network so that students may benefit from communication with other students and teachers (Paulsen 2003).

The study about the use of learning technology for distance education is mainly focused on the use of videoconferencing (Lawson et al. 2010). Passey and Samways (1997) used it with 10–11 years old students dispersed in various regions in England. The use of videoconferencing has revealed its potential for the improvement of the communication competences (soft skills) and students’ motivation to learn (Gage 2003; Austin et al. 2004). The adoption of innovative pedagogies using technology with teachers and students in Hong Kong has been pointed out in the study of Tong and Trinidad (2005, 1) “*despite the huge investments and zealous efforts on introducing ICT into education across the world, there are many examples showing traditional curricula and teaching methods have remained dominant, and as teaching tools, computers are still marginal.*”

Finger and Trinidad (2002) have identified four levels in the development of the ICT usage, describing a preliminary stage, which is defined as *threshold level* where practitioners teachers neither know about nor are committed to the use of digital technologies in their classrooms. From this stage, they progress towards *investigation* where the school and teachers accept the possibilities of such technologies but have reservations and are unsure about the impacts upon their teaching. The next progression is to *application* where there is greater confidence that the technology will contribute to teaching and learning, but are still uncertain regarding the ways in which it might change classroom practices. The following

step is the ability to use a videoconferencing system as the *critical border*, where significant change takes place. At this level where the technology is integrated into the teachers' practice, the result is a transformation of practice in which the combined affordances of the IWB, VC, and other connection software act as a catalyst to support all learners and allow enhanced collaboration, extended community engagement and "new ways of teaching and learning" (Finger and Trinidad 2002). In pedagogical domain we can have eight usages of videoconferencing:

- *Distance teaching and learning.* It is the case for students that live in small islands, or students that have illness problems and are forced to stay at home or in hospital. In other cases teachers would keep in contact with their students with others living in a distant or different context.
- *Contribution of expertise.* A group of student remotely connect with an expert to have discussions or interviews about specific topics.
- *Virtual field trip.* Remotely visit to places like museums, castles, historical sites.
- *Language practice.* Two or more classroom work together on a pedagogical project to practice a common vehicular language.
- *Events and Celebration.* Distance participation to conferences and events.
- *Teachers' training.* To minimize the costs and time spent in travelling for hiring a training course for teachers.
- *Temporary teachers absence.* In case of sickness of teachers or other reasons to find a replacement teachers, schools may consider the hypothesis to organize a group of teachers that work at distance.
- *Remote exam.* In some situations dealing with extremely isolated students (Scotlands, Australia, US) Universities give the opportunity to the students to do remote examination.

Effective video conferencing requires that teachers adopt not only content but also technique to account for the distributed, highly interactive nature of the pedagogical situation.

Interactivity is one of the critical aspects in using video conferencing in all situations. In some studies interactivity is defined as to include constructivist methods of teaching and learning (Hayden 1999; Sweeney 2007) and asking questions, hands-on activities, and discussions (Haydock and Dennison 2004). A recent study comparing synchronous and asynchronous interactions with scientists found that while students learning was equal in both interaction, the students that interacted asynchronously were more thoughtful and reflective in their questions. Conversely, the students who participated in synchronous interactions were more interested in the experts' content than study in a book (Kubaso et al. 2007).

Although the impact on students achievement were not so persuasive, there are clear benefits descending by the students-schools collaboration. Classroom to classroom events may take the form of a joint seminar, with two classes meeting regularly for interaction or shorter one-time video conference exchange.

In order to be effective, a school should support distance learning promoting some actions. Recommendations include the support of the implementation process by the local authority; the identification of a coordinator and a training program for teachers to create skilled users. Important components of a successful program include support from the technology experts within the school. In this scenario is really important the role and skills of the ICT coordinator/expert. This aspect is confirmed by the recent *Eurydice Brief* about



Fig. 1 An example of outdoor activity at Travo. *Source* Repertorio INDIRE

*Digital Education at School in Europe (2019)*¹. It offers the Digital Competence Framework for Citizens (DigComp) where are listed the digital competences area for teachers. One of the four areas deals with “Communication and collaboration”. The *Brief* highlights that “the prime factor in the pedagogical use of digital technologies is teachers competence, [...] teachers need specific digital competences to enable them to use technology effectively in the classroom and for their wider responsibility in school.” It is also important whether teachers “see digital technology as adding value to their teaching practices and their students’ learning experiences.”

4 Distance Learning in Italian Smart Small School: Pioneer Experiences

Online twinning and shadow visit between schools in different European countries are effective tools for supporting teachers professional development even in multi-class situations. Further actions to broaden the social environment of students and teachers, to overcome the conditions of cultural isolation or marginality that can limit the educational opportunities of these communities are collaboration with cultural bodies and institutions (for example museums) Fig. 1.

Sometimes (remote collaboration projects² have become necessary to allow schools attended by a small number of students (less than 10, according to the legislation) to avoid closure and to guarantee the curricular teachings also in the case of an insufficient number of teachers Fig. 2.

To this regards, ICT can provide a support to potential network of schools in order to overcome isolation and create an extended learning and social environment. Example of

¹ Available at https://eacea.ec.europa.eu/national-policies/eurydice/sites/eurydice/files/eurydice_brief_digital_education_n.pdf.

² See, e.g., Progetto Marinando, INDIRE, 2006.



Fig. 2 Virtual lessons involving students from distant classes at Gissi. *Source* Repertorio INDIRE

the efficacy of the usage of ICT to overcome cultural isolation and to cover curricular teaching is the European action “eTwinning”.

eTwinning is one of the latest European initiatives among those addressed to the schools, now included in the Erasmus Plus Program. It is the largest community of schools in Europe with over half a million registered teachers and seventy-seven thousand projects under its belt since its inception. In 2005 established as a platform to support electronic twinning to strengthen the European dimension of schools through remote collaboration carried out by Information and Communication Technologies (ICT), eTwinning soon turned into a much more complex, enriched reality from the interaction and exchange between teachers and students from all over Europe Fig. 3.

eTwinning seems to adapt particularly well to the world of small schools: buildings located in remote areas of the country and on most municipalities, which welcome, sometimes in multiage classes, pupils from rural and/or mountain areas or small isolated realities, where there is a strong desire to overcome geographical isolation and the relationship with the local community and the roots of traditions are often very strong. In this context, eTwinning can represent an interesting educational initiative to overcome isolation while enhancing the richness of its local context.

The National eTwinning group supported a specific training action to a group of teachers working in small rural schools in the school year 2018–2019. The “Little Schools outdoor”,³ a project led by the small school of Travo, promotes innovative educational processes through the participation to European actions (Cannella and Mangione 2020).

³ <https://twinspace.etwinning.net/78606/home>.



Fig. 3 A lesson across distant buildings at IC3 Modena *Source* Smart Learning e sviluppo professionale, 2019. Available at: https://www.ic3modena.edu.it/smart-learning-e-sviluppo-professionale-di-p-ellerani-universita-del-salento-d-barca_ic3-modena-e-c-a-tenchini_sharp-eletronics-spa/.

Through the use of different tools (*Google Docs*, *Present* and *Eforms* to design, present, evaluate; *Spark*, *Animoto*, *Biteable* and *Genially* to document; *Ourboox* to create an ebook in order to collect the best activities; *Flipgrid* to exchange opinion videos; *TwinSpace* to communicate and interact), it was possible to link the experiences that children lived outdoors with the curriculum, connecting classes from different European countries. Families have been provided with guest accounts, thanks to which, the pupils, even the youngest, could view the activities at home and open the discussion on the most suitable ones in the classroom.

Further examples that can be included within the school initiatives that promote the use of ICT to overcome isolation and foster communication between teachers based in different school buildings are a Comprehensive school in Gissi (Chieti) in southern Abruzzo and a Comprehensive school in Modena, Emilia Romagna.

The former, the Gissi school, has welcomed INDIRE's proposals to pilot the "Extended Learning Environments". One of the tools which the school uses to create unity within the constellation of school complexes is the promotion of training activities open to all, to counter the risk of fragmentation caused by distribution across the territory and the diversity of school levels. Implementation of an ELE has allowed the school to embark on a path of innovation that began by training teachers in the use of technological tools which primarily aid collaboration between teachers working in different schools. For the students, working on a common theme online with schools that are geographically distant as well as with neighboring complexes has allowed them to get to know other 'classmates'. Teachers at primary and lower secondary schools succeeded in tying the online activities to the curriculum through unity of knowledge.

The ICT equipment used by the teachers is a kit of free applications, video conferencing tools and active pedagogies that allow all the teachers of the small schools to use and have access to the minimal technical requirements.

The latter, the IC3 Modena school, decided to pilot the use of Sharp Smart School suite. The proprietary system based on the Sharp Anywhere to connect the classroom dispersed in the nearby of the school and the Big Pad to work together allowed the students to communicate and work together and the teachers to work collaboratively with their colleagues of the school.

The company provided to the students with the wireless technology so as they can send digital artifacts in group or individually (Ellerani et al. 2018).

The narration of the activities carried out by the teachers through the Google suite blog made it possible to map different types of initiatives conducted with both Sharp AnyWhere and Sharp Big Pads. The goal of these technologies was to support methodologies such as the flipped classroom or the distributed leadership of skills between teachers and students of different schools.

The mentioned examples highlight that many schools in isolated condition should rethink the teaching experiences using technological solutions adequate to the context, makes it possible to overcome the isolation of the social environment which limits the opportunities for discussion and tends to reduce stimuli and opportunities.

5 Small Schools Movement and Smart School Practices: The Extended Learning Environment and the Shared Lesson

INDIRE has the goal of encouraging the permanence of schools in geographically disadvantaged territories, maintaining an educational and cultural presence and fighting the phenomenon of depopulation. This objective is pursued by renewal actions for small schools, providing them with resources and teaching tools useful for keeping up with the change, at the same time enhancing their original skills and characteristics. Over the years, the institute has supported several schools in small islands and mountain areas of the Italian territory, experimenting innovations in networked and remote education to overcome geographic isolation, to connect classes with few pupils to similar ones and to develop training courses based on the use of technological advancements.

Small schools are educational scenarios located in mountain contexts or in the smaller islands and in all those internal areas characterized by low population density, with difficult socio-economic situations, few pupils, and teachers who go back and forth. According to a recent survey conducted by INDIRE together with MIUR, using numerical parameters in addition to the geographical ones listed by current legislation, small primary schools represent 45.3% of all Italian primary ones, and small secondary schools 21.7% of all Italian secondary ones.

Although empirical, this new definition takes into account parameters capable of aligning the analysis of the Italian context with that of other European countries. The phenomenon affects all Italian regions, with peaks in both the North and the South: 944 small schools in Campania, 872 in Lombardy, 864 in Piedmont and 836 in Calabria. Overall, 591,682 students are involved.

The radical move is not only to use its small schools to fight the challenge of depopulation, but to recognise those schools and communities in Italy as, “*communities of memory*,”

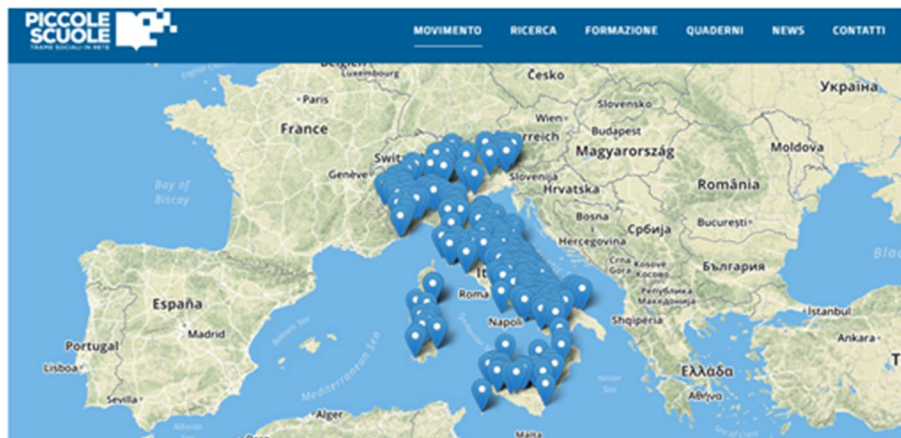


Fig. 4 Map of the Italian small schools joining the movement. Source <http://piccolescuole.indire.it/il-progetto/>

custodians of one heritage of history, art, traditions and cultures often unique and deep, of environmental treasures of great value."

In 2017, INDIRE has promoted a cultural movement, named "Movimento delle Piccole Scuole" (in English, Small Schools Movement), open to all those small schools that want to fully participate in the national education system, start an innovation process, minimize the risk of marginalization. The purposes and ideas of the movement are collected in the Manifesto signed in Favignana by 60 institutes formed by numerous buildings falling under the definition of small schools. There are currently 250 educational institutions belonging to the movement, 1241 complex schools, 518 multi-classes, 70,924 pupils, and 11,842 teachers (7903 of which are tenured). Many of these schools are located in the 72 internal areas of the Italian territory (source: National Strategy for Internal Areas) Fig. 4.

The Small Schools' Manifesto⁴ (Manifesto delle Piccole Scuole) proposes three pillars of small or isolated schools' sustainability which capitalize on their strengths as: (i) being communities of memory and quality learning; (ii) having the technologies to support social inclusion; and (iii) using the experience of multiage classes, as a resource, not a limit.

This concise document recognizes the 77% of Italy that consists of islands, mountains and hills, and expresses the case for 'a different paradigm for this educational reality, which puts at the center the possibility of creating learning environments adapted to the development of inclusive pedagogical and educational objectives.' The manifesto is designed to support INDIRE's enduring aim 'to guarantee educational quality in every part of its territory' ensuring therefore that 'even small schools must be quality schools'. Hence, INDIRE's work to 'promote the permanence of schools in isolated territories, in order to maintain an educational and cultural presence and to fight the phenomenon of depopulation.' It capitalizes, therefore, on the research findings described above, and the often undervalued resources of the schools themselves. These include (i) the social and cognitive benefits of collaborative learning in multi-age classes, implemented by

⁴ <https://piccolescuole.indire.it/en/the-movement-what-it-is/the-manifesto/>.

teachers trained to adapt their practices to optimise this approach, and (ii) the historical and cultural hinterland in which these small rural schools are located.

The Manifesto summarize these concepts into three key points:

- *Communities of memory and quality of learning* Small schools traditionally reinforce and preserve their distinctive cultural and historical traits, becoming great communities of memory. Their relationship with the natural, social and cultural environment [is] a resource with strong innovative potential, enhancing it in respect of territorial vocations. Small numbers of students [offer an] “advantage” for curricular innovations that allow a more flexible organization.
- *Technologies and social inclusion* The experimentation educational activities in collaboration with other scholastic realities of different territories can represent a real opportunity to overcome the limits of isolation and from limited size of territories and social environments.
- *The experience of multiage classroom as a resource, not a limitation* The enhancement of differences, learning while respecting rhythms and characteristics of each student, the promotion of flexible organizational methods through forms of peer learning that promote collaboration and inclusion, ensure that the Multiage classroom, may actually suggest new ones.

The Manifesto and its dissemination have already attracted people to move into the local area of the small school (Cannella and Chipa 2019). This Manifesto has grown out of investment in new technologies and working with teachers, some of them initially reluctant, to bring the schools together, but retain the school in its community. The Manifesto connects schools around these principles and identifies good practices in educational experiences in multiage classrooms throughout Italy in contexts of cultural isolation. Moreover, it fosters agreements with schools and networks to ensure that the models and practices are transferable and sustainable. INDIRE studies aimed at accompanying the integrated use of technology as a part of educational models capable of enriching the educational practice of teachers in rural areas (Cannella and Chipa 2016; Mangione et al. 2017a, b; Mangione and Calzone 2019) aiming to support the preparation, recruitment and "retention" phases (Azano et al. 2019).

Key aspects of this system are the technologies with which the network becomes a “digital communication network”, a vertical design for an idea of a joint school, a vision of the territory involving a workshop approach and, finally, a community of objectives between school and territory to turn it into “a community school”.

This way of working, within a network based on a central institute and many complexes spread across the territory, makes it possible to:

- Ensure access to quality education beyond the school’s geographical location (thus overcoming the inconveniences due to particular morphological conditions of the territory), also for students unable to attend the classes in person;
- Enrich the learning environment with opportunities for joint education and socialization;
- Overcome teachers’ sense of isolation;
- Use technologies to encourage collaboration and the development of cognitive and social skills;

- Strengthen the initiatives created by particular institutions and thus transform the school into a point of reference for the territory in addition to becoming a local flywheel of innovation.

Under the umbrella of the National Movement NDIRE leads training and experimentation procedures for methods that can extend the classroom and allow educational activities in collaboration with other school realities belonging to different territories with different forms (the extended learning environment for projects, forms of shared lessons with flexible methods of opening classes). INDIRE research group is engaged in experimenting with methods or educational scenarios in order to help small schools overcome the limits deriving from isolation and the limited size of territories and social environments.

Moreover, the Movement promotes cultural activities such as conferences, toolkits and on line webinar on specific topic that can give support to the small schools to start innovative process.

Within the described scenario two possible teaching scenarios emerged from the observation visit that INDIRE carried out between 2006 and 2010. Both scenarios refer to the theoretical framework of distance learning. A *common learning environment (Ambiente di Apprendimento Allargato)*, where two or more classrooms work together on a common school subject project using different kind of technological setting. The *shared lesson (Classi in rete)*, based on every day distance learning activities.

5.1 Extended Learning Environment

Most of the schools observed set up a kind of activity that INDIRE describes as *Extended Learning Environment*.

The methodological toolkit "Extended learning Environment" has been developed to offer to the small schools a practice tool to work with colleagues of the same schools whose building are spread in the nearby. The toolkit is based on an initial work conducted within the Future Classroom Scenarios, within the European research project iTEC (Innovative Technologies for an Engaging Classroom <https://itec.eun.org>) and then developed and tested as part of the "Small Schools" project 10.1.8.A1-FSEPON-INDIRE-2017-1.

The *Framework*, designed within the European iTEC Project (*Innovative Technologies for Engaging Classrooms*), proposes a methodological toolkit for teachers that leads the teacher step-by-step into the design of a lesson that includes group work, use of different kinds of technological devices, and engaging activities for students. Two or more classrooms work together on a common project-based learning using different kind of technological setting. The link between physical place (classroom) and the distance classroom is a Virtual Learning Environment, which teachers use for collaboration between students or for sharing digital contents.

INDIRE has re-designed the *Framework* for the necessities of the small schools identifying effective tools and actions for teaching activities, which fit to the different classroom contexts and include ICT. The process of developing the scenarios came from a trial project carried out on a vast scale between 2010 and 2014 involving 18 European countries and over 2,000 classes, 100 of which were in Italy: *iTEC. Designing the future classroom*.

Nevertheless, the *Framework* focuses on the teaching practices and not only on technologies. It is a driver towards innovative educational processes. The learning scenario that best fits "*The Extended Learning Environment*" is "Distance Learning in a multi-age classroom", selected among those of the iTEC project and improved in Italian small



Fig. 5 How to manage multi-classes through network technologies. *Source* Repertorio INDIRE-Pluriclassa di Gissi



Fig. 6 Writing a storytelling (Cannella and Iommi 2019)

schools. The model was the subject of laboratory training with the teachers of the Abruzzo region and its experimentation allowed to highlight some guidelines in the form of a Small Schools Notebook entitled “L’ambiente di apprendimento allargato” (Cannella and Iommi 2019).

In an ELE, online learning does not replace the usual practices but complements and enhances traditional teaching, with the advantage of optimizing the available resources and allowing greater opportunities for interaction between teachers, students, and their families.

This is a way of working which, by combining various teaching principles, means that two or more classes can develop a common project and organize regular meetings via video conferencing Fig. 5.

Through the use of these tools it is also possible to reach out to external experts whom it would normally be difficult to meet and who can make contributions to the teaching and the students’ knowledge.

To help teachers create an ELE scenario, the teacher employs two basic elements: the ‘Learning Stories’ and the ‘Learning Activities’, combining and rearranging them through a narrative approach related to the syllabus and the specific context in which the teacher is working.

Then the teachers write the teaching project through a narrative approach, as a learning story. This means that each teacher tackles the scenario through a personal Learning Story,

which is open and can be configured *ex ante* as a planning tool and *ex post* as documentation of the pathway actually followed Fig. 6.

After the production of the learning story, the teacher fits the learning scenario to his/her teaching subject, to the curriculum, to the students' age and to the social context.

The Learning Story therefore constitutes the 'script' of a series of Learning Activities, divided into objectives, resources, defined roles and interactions, classroom settings, school timetables, evaluation tools, and so forth.

The Learning Activities proposed are:

- **Discussing:** Students are involved in a brainstorming activity to bring out their prior knowledge on the themes of the educational pathway chosen by the teacher.
- **Questioning:** Students identify and question an expert from outside the school to obtain information that will enable them to organize/plan the work to be carried out in an informed, effective way.
- **Reflecting:** Students reflect on the work done for their presentation; highlighting any weak points and identifying helpful ideas to improve their way of working.

To practice and disseminate the toolkit, a range of the methodological tools and technological devices has been designed by the teachers that piloted it: tools for supporting the discussion during the videoconferencing session, app to share the content produced by the students and methods to collaborate at distance. Finally, teachers have also used documentation strategies, either for students and for teachers training session.

5.2 Shared Lesson

The cases of Italian schools that close due to the lack of teachers or to the reduced number of children are increasingly being addressed by mass media. In addition, teachers experience difficulties in managing "multi-classes" and sharing with parents the idea that school quality can be preserved even in these situations. In this context, the Shared Lesson model supports the pedagogical use of distance teaching in the design of disciplinary courses, thus helping those scenarios in which the lack of teaching staff and the impossibility to complete school hours interfere with the normal course of classroom activities.

*Shared Lesson*⁵ is a tool based on a "hybrid setting", namely on a system that combines the social interactions that occur in the physical class with others that, conversely, take place online through specific technological supports, so as to cross roles, spaces and activities. The *Shared Lesson* is conceived for everyday distance-learning activities. Similarly to the ELE model, this too was a scenario defined in the context of the European research project iTEC (Innovative Technologies for an Engaging Classroom⁶), then better developed in the "Small Schools" project 10.1.8.A1-FSEPON-INDIRE-2017-1 with the collaboration of the Québec network "École éloignée en Réseau" (Allaire et al. 2006). Results have been returned to the Italian school community in the form of a Small Schools Booklet entitled "CLASSI IN RETE Progettare lezioni condivise per la gestione di (pluri)classi aperte e isolate" (Mangione and Pieri 2019) Fig. 7.

⁵ <https://piccolescuole.indire.it/quaderni/strumenti/>.

⁶ <https://itec.eun.org>.



Fig. 7 Two distant classes working on the same subject within the network *École en réseau*. Source Radio-Canada <https://ici.radio-canada.ca/nouvelle/686163/ecoles-reseau-programme>



Fig. 8 Lesson shared among classes at Bruzolo. Source Repertorio INDIRE

In *CLASSI IN RETE* two classes, located in different buildings, aim to design a common path involving them in the same activities and in the management of the classes as if they were one by adapting calendars, spaces and teacher roles, also managing in parallel the activities that characterize their pedagogical planning.

Depending on the phase and nature of the shared teaching experience (preparation, implementation, objectification) designed by partner teachers, the activity can be

carried out individually, in teams (intra- or inter-class) or in a plenary way (intra- or inter-class) Fig. 8.

Delocalized classes recall the use of two fundamental environments: video conferencing and the Knowledge Forum. The former tool supports the processes underlying the delocalized teams, the latter encourages the "questionnement" (problematization based on discussions and questions) at the basis of the works of the remote teams. The Knowledge Forum is a cooperative environment in which it is possible to carry on an investigation activity based on structured discussion. The space allows you to build a discussion path by inserting main notes and the corresponding answers (also called "Build on") which generate a cluster of linked notes. Children can use scaffolds aimed at supporting a particular discussion process on a problem they are investigating. There are several types, including: "I need to understand", generally used to report a problem that you want to investigate; "My theory", normally used to indicate that some idea has been developed; "New Information", indicating useful information about the problem under discussion. These scaffolds can be easily customized.

The Knowledge Forum technology is typically accompanied by a videoconferencing environment for meetings and live presentations via network. In this way, it is possible to watch and listen to a remote user while simultaneously interacting through a number of shared tools (blackboard, documents, chat ...).

Videoconferencing has had considerable exploration and research in schools. Yates (2003) explored how this model of schooling could give students, assisted by a tutor or a teacher, the opportunity to experience school activities living in rural area. Passey and Samways (1997) piloted other uses of the video to improve students' learning communication in some subjects. The pilots addressed to 10–11 years old students and to students with disabilities. Finally, a relevant study describes students' improvement in communicative competences and motivation (Gage 2003; Austin et al. 2004; Comber and Kamler 2004).

In the case of the *Shared Lesson*, the distance education model INDIRE researchers observed could not allow the teachers to proceed at a normal pace in teaching the curricular contents because of the constraints of the technological infrastructure, which, for example, reduces the time of attention of the students. To face these difficulties, the teachers' team designed a special curriculum based on the development of skills interrelated to the subjects of the standard school curriculum. The pedagogical approach was social constructivism (Lave and Wenger 1991), with a problem based learning approach and situated learning.

The organization of a shared educational path must encourage both classroom work and networking among multiple classes or schools. The classroom has to include:

- an interactive multimedia whiteboard (in Italian: *lavagna interattiva multimediale*, or *LIM*) or table, positioned so that all students can see its content and activate group discussions;
- differently sized desks, so as to allow students to work individually and in teams of different ages;
- computers located along a laboratory wall, in order to maximize the access space to virtual or partner classes;
- a computer near the teacher for quick use or to support students carrying out network activities.

Work areas must be multiple and able to allow online collaboration for small groups of different buildings or schools. A videoconference can be planned to prepare and enhance

some activities, to go back to an exercise already carried out in the Knowledge Forum, to clarify some aspects or evaluate what has been done so far, to launch new challenges and propose changes.

6 Conclusion

The Italian initiative called “Movimento delle Piccole Scuole” and the models of distance lessons reported in this work meet some of the main goals mentioned by Rudduck (2016) for smart schools, with particular attention to the democratization, education and extension of the educational sphere beyond the school walls.

The promoted methods of distance learning offer the students opportunities to practise soft skills and to let other students know their cultural context using ICT as a globalisation tool. Both models described above require a high performance of ICT infrastructure and teachers’ technological competence, which represent a challenge for these kinds of schools that face the risk of closure every year if they do not reach the minimum number of enrolled students.

INDIRE’s experience and observation activities recommends that the schools work with local authorities and with other small rural schools in order to create a national network of small schools that includes schools on the mountain and schools on the small islands. If a community of schools with similar features can work together, then, they can offer the students living in those parts of the country, a rich learning environment.

Acknowledgements The present work has taken advantage of the results obtained by the ITEC project (Innovative Technologies for an Engaging Classrooms) funded by the European Commission under the 7th Framework Program (FP7) and specialized in the context of small schools thanks to the Progetto Piano Nazionale Scuola Digitale—Macro area “Attività di informazione e Diffusione-Piccole Scuole” (CUP B52F16004670001) and to the Progetto Piccole scuole—Programma Operativo Nazionale plurifondo (2014IT05M2OP001) “Per la scuola—competenze e ambienti per l’apprendimento” 2014–2020—Asse I “Istruzione”—OS/RA 10.1 “Riduzione del fallimento formativo precoce e della dispersione scolastica e formativa”—Azione 10.1.8 “Rafforzamento delle analisi sulla popolazione scolastica e i fattori determinanti dell’abbandono, con riferimento alle componenti di genere, ai contesti socio-culturali, economici e locali (anche con declinazioni a livello territoriale)”—Project Code: 10.1.8.A1-FSEPON-INDIRE-2017-1—CUP: B59B1700001000.

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