Deliverable 3.2

Rural Schools Innovation Strategies

This project has received funding from the European Commission PPPA Programme under Grant Agreement No.LC-01760255/10105266 LfE
The Rural Schools Innovation Strategies deliverable aims to provide the core strategies for the digital transformation journey of the rural schools that will receive financial support by the LfE project. The LfE team will provide a strong support mechanism and need-based training services to the rural schools to ensure the successful implementation of their innovative projects. The digital change that schools are about to experience centres around three main areas: (1) organization and support, (2) equity and excellence and (3) community learning. Specific recommendations and key resources are provided to ensure that the digital transformation journey of the rural schools will allow them to grow into sustainable innovation organizations.
Executive summary

Due to the COVID-19 pandemic, education and schools faced unpredicted challenges in the context of school closures and home schooling. Digital technologies were the means to deal with these highly difficult circumstances in an effort to provide continuous and quality education to learners at home. The digital transformation of education and schools was accelerated and large-scale changes were required at every level. However, not all schools were able to adapt to these rapid, digital-related changes. Specifically, schools located in remote areas suffered from the lack of infrastructure and opportunities for a well-tempered digital transformation journey. The Learning from the Extremes (LfE) project aims to address inequalities in access to digital education by enhancing inclusion, and by reducing the digital gap experienced and suffered by school communities in rural areas with low connectivity, limited or no access to devices and limited digital educational tools and content. The purpose of this document is to provide recommendations to rural schools for strategic, innovative and effective digital transformation by utilizing the resources and support that the LfE team will provide, along with additional information and other useful resources.

The strategies presented in this report are organised around three key thematic areas: a) Organisation and support for rural schools b) Equity and excellence in rural schools and c) Rural schools as community and educational spaces. These thematic areas are the main discussion points among the LfE consortium and all relevant actors, including school heads, teachers, ICT coordinators, students, parents, technology providers, policy-makers, universities, research organisations, experts and nongovernmental organisations (NGOs). The aim of the dialogue between the stakeholders is to exchange and analyse best practices and successful applications of how to increase access to digital educational solutions with a focus on schools located in remote areas. Moreover, it allows an in-depth exploration of the main challenges and opportunities for Rural Education, as part of the high-performing digital education ecosystem envisioned by the EU Digital Education Action Plan 2021-2027.

For each thematic area and main strategy, specific recommendations are stated to support rural schools to embark their digital and innovation transformation journey. Below, a summary of the main strategies are provided:

- Organization and support for rural schools
  - Instalment and effectively use of a highly equipped and connected classroom, and investment in opportunities for further development of the school’s digital infrastructure
  - Exploitation of professional development opportunities offered by the LfE project and other national and international PD providers

- Support equity and excellence
  - Establishment of a positive school culture and shared vision
  - Promotion and facilitation of differentiated teaching and learning

- Rural schools as community and educational spaces
  - Development of opportunities to connect with local/regional stakeholders
  - Transformation of rural schools into Learning and Innovation Hubs

This deliverable concludes with a final table that summarises all the recommendations for rural schools in line with the main barriers and opportunities revealed from a need analysis that was performed in the context of the LfE project. In addition, the table lists relevant resources that will support rural schools to excel in each dimension of the innovation strategies presented in this document.
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1 Introduction

1.1 Context

The COVID-19 crisis revealed not only challenges but also opportunities for schools to innovate by utilizing digital technologies. However, the success of the schools was highly dependent on the school’s location and readiness in terms of infrastructure, access to digital content and educators’ digital competency. Going beyond the unforeseen and emergency situation, there is a need for a holistic, strategic and long-term approach to digital education. Therefore, the European Union renewed the effective, though short-term, Digital Education Action Plan 2018-2020, and introduced a more ambitious and long-term approach for the digital transformation in the educational sector. As part of the renewed action plan, EU member states are responsible for establishing national policies and legal frameworks to accommodate the new era of digital education by deploying digital technologies to improve and extend education and training, and equip all learners with digital skills. In addition, they are committed to put in place broadband national strategies with a dynamic emerging market for the provision of broadband internet access in remote and rural areas and more specifically to schools.

Although the Digital Education Action Plan 2021-2027 has set clear strategic priorities and actions to be taken, the picture remains fragmented since it is difficult for rural communities in many European countries to create their own solutions. Rural schools are often disadvantaged and need to overcome several barriers and deficiencies caused by their isolated location. In the context of a need analysis performed by the LfE team under the activities of WP2, the main barriers of the implementation of digital technologies in rural schools of selected European countries and the enablers for the technology take-up were explored. In order to provide later in this document the specific recommendations for rural schools and their communities, we present the main conclusions of the need analysis here. First, many rural schools do not have suitable internet connectivity, access to networked devices, necessary digital technologies that will allow them to overcome isolation, and access to high quality teaching and learning material. Teachers in rural schools have limited opportunities for teacher training and continuous professional development programs and very often they feel detached from networking and exchange opportunities. School management often is unable to support and create an effective and collaborative school environment that will foster learning in the multilevel classroom, meeting the needs of all individuals at school. What will be beneficial for rural schools is to strengthen their relationships with the local community aiming at a higher level of interaction with and support from local stakeholders, including parents, local authorities and businesses. On the other hand, rural schools can become educational hubs and offer to the local community an open educational space for adult continuous development.

By examining the above needs in rural communities in many countries, allowed us subsequently to define common strategies that can be shared among them. The LfE project, its consultation services and outputs will serve this direction. Our vision is that rural schools will be linked to the broadband internet, increase their digital technology equipment, have access to digital educational tools and content, and be turned into multi-purpose local learning centres, accessible to all individuals in the rural community, enabling life-long learning for the entire population at their learning/working/living place. Ultimately, they will support and enhance local employment, civic and health services, will affect the local decision-making, and will promote a knowledge-based, sustainable local development.

The LfE project will support rural schools from 10 European countries to overcome the main barriers for digital education, and set up and use appropriately a digital technology infrastructure that will allow them to innovate on multiple levels. Through the LfE community of users and support mechanisms rural schools will have opportunities to excel in their communities and beyond, and share their good practices and creative applications.
1.2 The Learning from the Extremes approach

The LfE project adopts a multidimensional approach to thinking about and planning for the future of technology enhanced rural school education by involving all educational stakeholders. The overall aim of the LfE project is the development of a strategy that will present targeted recommendations on how to increase access to digital education in the EU remote areas and communities that mostly need such support. To do so, the LfE project will:

- Analyse the needs of communities and schools located in remote and rural areas of Bulgaria, Croatia, Cyprus, Finland, Greece, Ireland, Italy, Portugal, Romania and Spain to gain insights related to the barriers and enablers for digital education.
- Provide funding to rural schools from the above-mentioned countries to help them install the minimum equipment needed for their digital transformation and e-maturity journey.
- Set up targeted consultation and training services to provide to the selected schools technical support, pedagogical guidance, mentoring to access further funding and networking opportunities.
- Analyse the data collected from the selected schools’ pilots and experiences to prepare the final recommendations for future actions to support digital education in rural communities.

This deliverable is going a step closer to the identification of the probable, possible and desired developments in rural school education. It aims to offer recommendations to the selected rural schools to initiate their digital transformation journey taking into account that they will receive funding to install a highly equipped and connected school environment and will have access to digital content and tools. The Rural Schools Innovation Strategies will support school heads and staff to develop and implement innovative action plans that will help them embark on the digital transformation journey.
2 Organization and support for rural schools

Despite the fact that the use of digital technologies and innovation in schools was accelerated during schools’ closures, it is without doubt that not every school was able to address every need of students, teachers and parents during the COVID-19 crisis. Consequently, some learners were disengaged from learning and many teachers felt unsupported while teaching from a distance. This problem was more intense in rural schools due to the poor broadband connectivity, and lack of necessary digital devices and access to digital content. Therefore, rural schools need a strong and reliable digital technology infrastructure to use digital technologies effectively into every aspect of school life, including crisis and emergency management. The LfE project will provide funding to at least 80 European rural schools in order to install proper infrastructure in their schools and be able to use digital technologies in an efficient and innovative way. The framework used for the description of the required infrastructure, the “Highly Equipped and Connected Classroom” (HECC) model, will be explained briefly in this section. The HECC model should be used by rural schools to strengthen the dialogue with other stakeholders regarding new emerging technologies and further opportunities to apply for funding at a national or European level for the continuous upgrade of their infrastructure.

However, the instalment of digital technology infrastructure into schools does not lead to the digital transformation of education. As reported in the 2nd Survey on Schools on ICT (European Commission, 2019), pedagogical support was considered a crucial aspect for effective use of digital technologies. Moreover, the wider adoption of school innovation for digital transformation in rural schools requires the preparedness, commitment, and capacity of teachers and school leaders. To this end, teacher professional development, training, collaboration and learning opportunities are important elements in supporting the implementation of such innovative practices. Continuous professional development for teachers will ensure the appropriate and effective use of the digital equipment in teaching and learning practices whereas at the same time rural schools will be able to develop their own innovate applications. The LfE project recognises the need to support rural school leaders and teachers to build their capacity in the adoption of new approaches to implement digital technologies and create innovation action plans. Furthermore, the LfE team will provide customizable technological and pedagogical supports, information and resources for Continuous Professional Development opportunities, to ensure that teachers and school leaders in the funded rural schools are digitally competent and confident to improve and evolve their daily teaching practices, cultivating in turn the digital competence of their students.

2.1 Install and use the Highly Equipped and Connected Classroom

The implementation of innovative digital solutions in schools throughout Europe could be a major challenge considering the status of the rural schools’ connectivity and infrastructure. Specifically, rural schools located in villages/small cities are clearly lagging behind with regard to the deployment of high-speed internet and access to digital solutions. The LfE project will finance rural schools to acquire digital solutions and tools to integrate them into the existing school infrastructure. To conceptualize the optimum infrastructure required by rural schools to innovate in the digital education era, the HECC model was utilized.

The HECC model emerged from the “2nd Survey of Schools: ICT in Education” study, which was part of the previous European Digital Action Plan (2018-2020). The HECC model consists of three scenarios (see Figure 1) and provides information for the estimation of the costs to equip and connect an average European classroom with advanced digital technology components. Every HECC scenario is based on four dimensions: digital technology equipment (e.g., devices, hardware and software), network requirements (e.g., high-speed district wide-area network – WAN, high-speed local-area network – LAN or high-speed wireless local-area network – WLAN), professional development for teachers (e.g., online training, leadership training) and access to digital content (e.g., paid content, open educational resources). The three scenarios identified in the conceptual model are the 1) Entry level, 2) Advanced
level and 3) Cutting-edge level. The three scenarios are progressive, meaning that schools should enter the entry level first and then proceed to the advanced level and the cutting-edge level subsequently.

The Entry level scenario of the HECC model, describes the minimum essential components in each dimension, including a ratio of at least one laptop for every three students, interactive whiteboards, microcontrollers, word processing software, WLAN network, face-to-face and online training for teachers, educational software, digital textbooks and gaming. The Advanced level builds upon the elements of the previous level and includes further advances such as, additional high-tech digital equipment (e.g., 3D modelling software, classroom management system, etc.), service and network monitoring, more opportunities for professional development activities and in class coaching, and access to more advanced educational resources (e.g., e-books, virtual laboratories). The Cutting-edge level is even more advanced in terms of network requirements (ultra-fast broadband), it includes a greater variety of digital equipment (e.g., VR headsets, audio and video editing software, etc.), increased opportunities for professional development and leadership training, and a stable cost for paid content.

Figure 1. The conceptual model for a Highly Equipped and Connected Classroom – HECC model (EC, 2019, p.9)
According to the “2nd Survey of Schools: ICT in Education” (EC, 2019) the average cost per student per year to equip and connect an average EU classroom with advanced components of the HECC model is in the range of 224 Euros (Entry level scenario) – 536 Euros (Cutting-edge level scenario). This cost range includes costs for the four dimensions of the HECC model, meaning digital technology equipment, network requirements, professional development of teachers and access to content. The amount of finance that will be offered by the LfE project to rural schools (average funding 15 000 Euros per project) is foreseen to equip the schools with the necessary elements of the Entry level of a HECC. Thus, the LfE targeted funding will ensure broadband connectivity to rural schools, network infrastructure within schools and technical and pedagogical support to school leaders and teachers to take full advantage of digital technologies in every aspect of school life and to gain access to quality digital educational resources. Moreover, the LfE team will provide any advice requested by schools regarding digital infrastructural issues.

The instalment of the minimum technological equipment is only a step towards the digital transformation journey that rural schools should take up. In order to use digital technologies effectively in teaching and learning, schools must include their use into their innovation plans. The LfE team will support rural schools in implementing their innovation plans by offering need-based technical and pedagogical support to school leaders and teachers, aiming to the purposeful and effective use of the digital technology infrastructure. The LfE National Coordinators will ensure that school leaders and teachers are aware of the support and resources available relating to the use of digital technologies in teaching, learning and assessment, both at national and international level. The LfE support and training mechanisms that will be established under the activities of WPS and WP6, will be reviewed and updated during the project’s lifetime to again ensure rural schools will receive the necessary support and advice in terms of how they can use their infrastructure to meet their innovation plans as they envisioned.

At this point, it should be noted that for the effective and proper use of the technological devices, digital tools and software that schools will acquire, aspects related to cybersecurity, the protection of students’ personal data and the responsible use of the devices, must be taken into account. In each of the above cases, rural schools should be aware of the current national and international legislation regarding the use of devices connected to a school network, and the use of the Internet within the school environment. Schools must be responsible for students’ protection against inappropriate internet content when using devices within the school network. In addition, parent/guardian information and consent protocols must be prepared, in cases where it is required by the national authorities. These protocols should inform students and their parents/guardians about the type of students’ data, which is collected and used for educational purposes.

Going beyond what rural schools can achieve with the funding they will receive through the LfE project, it is important that they should establish sustainable funding mechanisms for the update and maintenance of their digital technology infrastructure. An ongoing annual funding is required for renewing software licences, for paid digital content, and paid professional development programs, as well as for infrastructure replacement and upgrade. Moreover, rural schools should envisage reaching the cutting-edge digital technology infrastructure, as defined in the HECC framework. Thus, rural schools are encouraged to use the HECC model as a reference framework to identify new and advanced elements that can be incorporated into their plans for digital transformation, and to estimate the respective costs. To this end, an awareness mechanism to inform rural schools about emerging technologies, appropriate broadband connectivity and funding opportunities at national and European level must be established in the school community. Through continued investment, rural schools will develop a sustainable digital technology infrastructure and increase their capacity to use it adequately in school and/or out-of-school activities.
2.1.1 Recommendations for utilizing effectively and further developing the digital technology infrastructure

Below we list recommendations that rural schools ought to take into account when implementing their digital transformation plan, in relation to the effective use of the installed digital infrastructure:

- Establish good communication with technology providers so that school staff may be acquainted with the necessary user manuals and technical support for the instalment and use of the selected digital solutions. For example, if a robotic kit is purchased then school staff must be provided with the technical and pedagogical support to use it effectively in the classroom. Usually, technology providers offer this support material as part of their sell products or they offer free and/or paid training sessions.

- Establish an ethics committee within the school for cybersecurity, protection of sensitive personal data and responsible use of digital technologies. The committee will also have the responsibility of communicating with national authorities and parents/guardians, and participating in national and international communities for the exchange of good practices in relation to managing, protecting and sharing digital resources.

- Create a network for emerging technologies for keeping up-to-date. That can be done with the establishment of a group of teachers that will be responsible for connecting and communicating with other stakeholders, and specifically the digital technology industry and technology providers. This will support rural schools in sustaining and further developing their digital infrastructure.

- Develop a sustainable funding mechanism for the update and maintenance of the school’s digital technology infrastructure. An ongoing annual funding is required for renewing software licences, for paid digital content, and paid professional development programs, as well as for infrastructure replacement and upgrades (e.g., national and European funding schemes and opportunities).

2.2 Professional development for teachers

Educational reform and digital transformation in schools cannot be realized without having teachers and school leaders as the main actors for the change. Taking into account how global digitalization increases, educators need to be confident and competent in using digital technologies in their teaching practice, to prepare students for the challenges and opportunities they may face in the future. The preparedness, commitment, and capacity of teachers and school leaders are critical factors in the wider adoption of school innovation for digital change and transformation. The key to success is access to Continuous Professional Development (CPD) opportunities. CPD continues to receive recognition in the literature and is considered the main vehicle for improving teacher professional competence in facilitating student learning, especially when taking into account how the wider world is constantly changing, and how educational needs are shaped by radical changes. Initial teacher training is often not adequate in the preparation of teachers for their future classroom. As such, CPD has a central role in the teaching profession as it provides teachers with the techniques and expertise to upskill and meet ever changing educational needs. Although CPD interacts with other factors in influencing teachers' dedication to the profession (Day & Gu, 2007), it was found to have a positive effect on teacher willingness to change their instruction (Dixon et al., 2014) and it was strongly related with an increased student learning performance in several contexts (e.g., Downton et al., 2022; Sum et al., 2022).

Professional learning opportunities were usually more accessible for schools located near the big city centres, while rural schools had limited opportunities to attend. During the COVID-19 crisis, the opportunities for all teachers and school leaders increased due to the transition to online training sessions. However, the value of face-to-face collaboration and communication in the context of a
training workshop is unquestionable. Moreover, CPD opportunities must be tailored to teachers and school leaders’ digital competence levels and take into account the different school contexts and digital technology infrastructures.

The European Commission prepared a shared definition of digital skills for educators to support national and European opportunities for professional development, and the Digital Competence Framework for Educators, also known as DigCompEdu\(^1\). The framework describes six areas of educators’ digital competence (see figure 2) and six levels of proficiency, namely awareness, exploration, integration, expertise, leadership and innovation. Based on this framework the self-reflection tool, SELFIEforTeachers\(^2\) was created. This tool supports teachers to identify their current level of digital competence and invest in opportunities to develop it further. Rural schools and teachers who will participate in the LfE project and will implement their funded projects will be guided to use self-reflection tools and strategies to identified their real needs in professional development that will enable them to e-mature and implement their action plans.

Figure 2. A synthesis of the six areas of the DigCompEdu (EC, 2017, p. 19)

In the context of the LfE project, the selected rural schools will be supported continuously when implementing their funded projects. The LfE team will provide differentiated opportunities for professional development of teachers and school leaders. Moreover, the LfE support mechanism will be responsive and specific to individual needs regarding the effective use of digital technologies in everyday school practice and the continuous planning for digital innovation within the rural schools’ communities. It is envisaged that teachers and school leaders will be supported to strengthen their competence in using digital technologies in teaching, and learning, contributing, in turn to the development of student digital capacity. Moreover, rural schools will receive dedicated support and assistance in using self-assessment tools for the evaluation of the progress of their implementation plans.


The LfE training scheme includes an online course that will run when the selected rural schools receive their funding, and begin the implementation of their action plans and a Rural Schools Innovation Academy. The online course content will be tailored to the selected rural schools needs and will include strategies and tools on how to transform classes into hybrid and online, instructional design methodologies, tools and strategies for creating e-activities, teaching approaches, strategies and methods, and assessment tools and methods. On the other hand, the Rural Schools Innovation Academy will integrate the project outcomes and tools to provide a mentoring and support service for rural education. The Academy will include guidance and support for school heads with recommendations on the strategies to be developed according to the school’s needs and vision, support services to teachers, networking opportunities for best practice sharing, school profiling and recommendations for development and tools to boost innovation in schools.

The concept of the Rural Schools Innovation Academy will be tested in an International Professional Development Course\(^3\), which will be organized after the end of the pilot implementations of the rural schools financed by the LfE project. The purpose of the course is to bring together school heads and teachers from the participating schools as well as school heads and teachers from other schools and different countries. It is expected that 100 school heads and teachers will take part in this course to create a core group of school heads and teachers who will support the project development (validation of the project tools and the school innovation strategies) and will act as exemplary cases for the school network.

Although rural schools participating in the LfE project will receive continuous and need-based professional learning during the project’s lifetime, it is also important that they will search for sustained continuous professional learning opportunities at national and international level. This will allow teachers and school leaders to maintain and further develop their competence and confidence in using emerging digital technologies, to collaborate, and communicate information, exchange experiences, strategies and educational materials with other teachers and schools. In the next sections of this deliverable, we elaborate on examples of professional learning opportunities offered by some of the LfE National Coordinators as well as Massive Open Online Courses that can be used for teacher professional development in relation to the digital competency and innovation. Moreover, we present an example of an online authoring tool that allows users to create digital educational content from scratch.

\subsection*{2.2.1 National opportunities for CPD}

National Coordinators in the LfE project are responsible for the communication and support of the rural schools that will be financed. All the LfE National Coordinators are official CPD providers and they could offer flexible and differentiated professional learning to teachers and school leaders of rural communities. After the end of the project, National Coordinators will continue to support rural schools through their effective ongoing teacher professional learning. This will sustain the e-maturity journey of rural schools and it is expected that rural schools will be able to gain the maximum advantage from digital technology in every aspect of teaching and learning. In addition, it will allow teachers and school leaders to better understand and engage with new and emerging technologies to inform their teaching practice and school’s innovation plans. Finally, yet importantly, National Coordinators will continue to provide high quality resources that promote the safe, ethical and responsible use of digital technologies within the school community, reflecting the national and European policy.

Below, we present briefly a few examples of national opportunities rural schools will have for professional learning, offered by LfE National Coordinators or other providers. The examples consider the case in Cyprus, Finland and Ireland.

\footnote{http://learningfromtheextremes.ea.gr/}
Cyprus

The Cyprus Pedagogical Institute (CPI) is the organization responsible for training all the in-service teachers. The CPI is under the authority of the Cyprus Ministry of Education, Culture, Sport and Youth. Among the programs and training it offers, is the project Innovation Schools. An open call for participation is launched each school year and schools from the primary and secondary education level, public or private, urban or rural, are welcome to join forces and participate in the project. The project aims at the utilization of digital technologies in the school unit and their integration into teaching and learning.

In the context of the project, schools that participate develop their action plans for the effective use of digital technologies into school practice, taking into account their needs by using the SELFIE questionnaire. In the centre of this initiative is the creation of teacher communities for communicating and exchange of good practices. For this purpose, regular online meetings are organised. At the same time, teachers and/or school leaders who are involved in the project receive continuous professional training by the CPI staff members and other collaborators.

Finland

In Finland, schools can seek for professional development learning offered by the Actuarial Society of Finland. In addition, there are organizations that focus only on developing/training the professional competence of teaching staff, such as the Ministry of Education and Culture, the Ministry of Economic Affairs and Employment, and the Finnish National Agency for Education. Finally, universities and vocational education and training centres are offering multiple opportunities for CPD.

Ireland

In Ireland, two main national CDP providers are the Professional Development Service for Teachers (PDST) and the Education Support Centres in Ireland (ESCI). The PDST operates under the aegis of the Department of Education and Skills and includes several services to address specific topics in education, such as the PDST Technology and Education that aims in promoting and supporting the integration of digital technologies in teaching and learning. ESCI is the umbrella organisation for the National Network of Teacher/Education (Support) Centres, which negotiates with the Department of Education and Skills and other relevant education bodies and partners in the country to empower teachers and support them in achieving their full potential as professional educators.

PDST Technology in Education provides a wide array of professional learning opportunities to teachers through its online courses, good practice videos, webinars, online learning resources and face-to-face courses. Similarly, ESCI provides courses either online or face-to-face addressing many topics among which is the integration of ICT into the teaching practice.

Massive Open Online Courses

Along with the tailored support that rural schools will receive from the LfE team, it is without doubt important to recognise the potential offered by Massive Open Online Courses (MOOCs). MOOCs developed by other providers in the field of digital education and innovative pedagogical approaches could have a substantial contribution to teachers and school leaders e-maturity and professional development. In this section, we chose to refer to the European Schoolnet Academy and School Education Gateway’s Teacher Academy platforms, where someone can find MOOCs that are free of charge. In these two platforms, multiple MOOCs target teacher digital competence while many of them focus on student centred and creative pedagogies, which are based on interdisciplinary approaches to engage students in real-life situations and problem solving. In addition, the purpose of other MOOCs is on how to build a meaningful student-teacher interaction using digital technologies and tools.
European Schoolnet Academy is an online platform, which offers MOOCs that are free of charge and open for anyone to participate, without a limitation on the number of participants. The courses focus mainly on innovative pedagogies, whole-school strategies, tools, and resources to enrich teaching practice. The European Schoolnet Academy was created by the European Schoolnet, a network of over 30 European Ministries of Education. Several European funded projects and Scientix, the community for science and STEAM education in Europe, support the MOOCs’ development and delivery.

Examples of MOOCs offered on the European Schoolnet Academy platform

Title: Digital Competent Teachers for Creating Digital Students
Description: The general objective of this MOOC is for teachers to learn how to integrate technology in the classroom in an effective way. By doing so, teachers will empower their students not only to be consumers of technology but most importantly to be creators. The MOOC comprises five modules, which aim in helping teachers reflect upon their digital competence for lifelong learning, get familiar with digital technology in education and explore different tools and strategies. Participants learn about European frameworks for digital competence and discover how to boost digital competence through European projects such as eTwinning and SELFIE. Moreover, they explore strategies and tools for remote teaching, digital assessment and classroom management.

Title: Integrated STEM Teaching for Secondary and Primary Schools
Description: The main objective of the MOOCs is to support primary and secondary school teachers to shift from teaching isolated Science, Technology, Engineering and Mathematics classes, to an integrated STEM teaching of these topics and all other disciplines. Each MOOC comprises four modules focusing on STEM integrated teaching approaches, innovative pedagogies, contextualization of STEM knowledge through industry-education cooperation and many practical examples from classroom implementations. By exploring the practical examples, teachers can get an insight of either in class, online or hybrid implementations, and learn about the best practices and tools the authors have followed.

School Education Gateway’s Teacher Academy is an online platform offering a variety of services and activities for anyone involved in school education. It provides information about on-site courses organised by training course providers all over Europe with opportunities for Erasmus+ covered cost. The platform also offers free online courses specifically designed for the requirements of teachers. The courses focus mainly on teaching challenges and priorities set by European school education. All online courses are designed, developed and delivered with the guidance of the Teacher Academy’s Pedagogical Advisory Board, which involves experts in the field of e-learning and professional development of teachers. In addition to the training opportunities the platform offers teaching materials developed by EU institutions, EU funded projects and online course participants.

Example of a MOOC offered on the School Education Gateway’s Teacher Academy platform

Title: Building a School Digital Strategy with the SELFIE Tool

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4 [https://www.europeanschoolnetacademy.eu/](https://www.europeanschoolnetacademy.eu/)
Description: The course focuses on how schools can use the SELFIE tool to develop their digital practices. The main objectives of the course is to allow schools to identify how to use digital technology to maximise student learning, set out a clear vision for using digital technology and identify the foundations of their digital strategy to develop and implement an action plan. The course is appropriate for either schools that are developing their digital strategy from scratch or schools that are willing to adapt their existing digital strategy.

2.2.3 Training and support material for creating digital content

Another aspect of digital education that teachers and schools should consider is the access to quality digital resources that can enrich their teaching practice. Usually, national education portals provide access to digital resources that can be used in schools along with support materials on how to incorporate them into teaching. However, it is also important that teachers develop adequate skills to create their own digital content by utilizing online authoring tools that are available for this purpose. The continuous development of teachers’ digital competency to design digital learning environments will ensure that students have access to quality digital content designed for their needs, contributing in turn to their digital competency development.

The LfE team will try to link European and national, digital rural education initiatives to support the exchange of digital learning content among rural schools. Being part of the LfE community and/or local communities that will be created in the LfE community platform, rural schools will have the opportunity to get informed about good practices in relation to the design of digital content. Moreover, they will be provided with a useful repository of information on how they can receive support to develop their digital competency in creating their own digital material.

In line with what has been mentioned above, we present the successful case of the Go-Lab ecosystem⁶, which is an open, online platform including digital content and tools for STEM education. The platform is considered the largest collection of online laboratories for STEM teaching and learning (see figure 3). It also offers a large collection of educational applications that can accompany an online laboratory into an Inquiry Learning Space (ILS). The Go-Lab ecosystem has its own authoring tool for the creation of online learning environments. Thousands of teachers in Europe and across have used the Go-Lab ecosystem to create and implement their digital lessons and many of them shared their content in the Go-Lab platform. Thus, there is also a repository of ILSs created by several users of the platform. This content is open and available for use in the class.

Figure 3. Example of online labs available in the Go-Lab platform (from left to right: a simulation for exploring electrical circuits; a remote lab for studying Archimede’s principle; a virtual lab for separating mixtures following several techniques)

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⁶ www.golabz.eu
Together with the content and tools, the Go-Lab platform provides also support material on the topics of Inquiry-Based Science Education (IBSE), development of 21st century skills, the use of digital tools and the Go-Lab ecosystem in the classroom. In addition, it offers a series of online training modules, informative and exemplary ones, to provide users with the technical “know how” and the pedagogical framework of Go-Lab. The online training modules are appropriate for both beginners and experienced users of the platform.

2.2.3.1 Recommendations for effective exploitation of professional development opportunities

Below we list key recommendations for rural schools to exploit professional development opportunities during the LfE project and beyond:

- Use of self-reflection tools to identify what specific needs teachers and school leaders have in relation to their digital professional growth. Find opportunities and support through the LfE consultation and support mechanism to address these needs.

- Encourage the distributed opportunities for professional development to allow smaller groups of teachers to be trained in a specific area and then disseminate the knowledge, resources and experiences to the rest of the school’s staff and provide support to colleagues if needed. It is important that all teachers and school staff be involved in a sustainable professional development mechanism to cover all the six areas of educators’ digital competences, according to the DigCompEdu framework.

- Examine opportunities for peer learning in professional development courses, especially in the case of online courses. This will also increase the networking and collaboration opportunities for future projects and activities at national and/or international level.

- Selection of open online courses that provide certification based on an evaluation schema, e.g. peer assessment, expert assessment. The accreditation will increase schools and teachers’ visibility in national and international communities, allowing the exchange of expertise and mentorship.

- Selection of courses that focus on student-centred and innovative approaches to teach with digital technologies such as project-based learning, inquiry-based learning, problem-based learning, integrated STEM learning, and design thinking.
Support equity and excellence

Students and teachers are central to the digital transformation and innovation in rural schools. On the one hand, no student should be left behind and on the other hand, all teachers should excel in utilizing and incorporating digital technologies into their teaching practice. Rural schools must explore ways and methods to innovate by embedding professional learning for staff, providing motivation to teachers to increase their digital confidence and preparing all students to develop the necessary digital skills required for adapting in rapidly changing societies. To this end, the role of school leadership is crucial in sustaining the digital transformation journey of the whole school and ensuring the effective use of digital technologies. At the same time, the adoption of digital technologies into teaching and learning, facilitates equity in education by providing all students meaningful opportunities to learn with new technologies. The effective use of digital technologies to support personalized and inclusive learning will support students in understanding the digital world and productively evolve in the digital era.

3.1 School leadership

Successful digital change and innovation in rural schools requires a clear vision and shared leadership for planning and embedding digital technologies into teaching practice. The planning processes for accomplishing the school’s vision should be based on a holistic view of the current digital and innovation status of the school. However, successful digital change and transformation is highly dependent on teacher and school leader capacity. The introduction of innovative approaches requires fundamental changes in the school culture, rather than simply introducing or changing isolated practices. To successfully drive change, school innovations must be flexible, responsive to the specific school needs, embedded in the school contexts and open to their environments. At this stage, school leaders become a dynamic and influential force in the school community that can guide schools in creating a culture that initiates and supports innovation. Good leadership can ensure a supportive environment for teachers, promote collaborative practices such as mentoring, formative feedback, reflective and inquiry-based practices, and provide relevant opportunities for networking and professional development.

As shown in Table 1, the main models of school leadership are four; instructional, transformative, distributed leadership and leadership for learning. In the context of the instructional leadership model, school leaders focus mainly on teachers’ behaviour as they engage in activities that are related with student development (Leithwood et al., 1999). Thus, they have specific knowledge and power to influence teachers and their actions. In addition, this model of school leadership involves the implementation of procedures to ensure the quality of teaching resources and practices. Although many schools are still following this model of leadership, it was found that it creates high expectations for the principal’s role resulting in feelings of inadequacy and guilt (Hallinger & Wang, 2015).

Transformative leadership involves significant changes in the form, nature, functionality and capacity of school leadership. The main goal is to strengthen the individual and collective problem-solving capacity of all members of the school staff. Therefore, school leaders defined specific objectives and practices to be used to achieve them (Leithwood et al., 2012). Currently, transformative leadership is the dominant model in the field of education. It focuses on building organizational capacity for sustainable change and creating a new vision for the school (Lui, 2015). However, this model focuses heavily on the school’s leadership capacity and sometimes school’s diversity is not taken into account. Therefore, the practices implemented may not respond to the real needs and the objectives to be achieved.

In contrast to the two previous models, in distributed leadership there is no single leader (Timperley, 2005), but formal and informal groups of members of the school interact to address various issues (Spillane, 2006). In this way, the leadership duties are not the responsibility of a single leader but more than one leader without implying that they hold a corresponding official position. Therefore, tasks and
responsibilities are shared among teachers, and collaboration and shared vision to initiate innovation are the focus.

The fourth model, leadership for learning, is an inclusionary process where the whole community is actively involved in the improvement of learning (Otero, 2019). In this context, leadership for learning means creating strong and equitable learning opportunities for students, teachers, and systems and motivating participants to take advantage of these opportunities (Coplan, & Knapp, 2006). In addition, it entails a constant effort to strengthen the desire to learn and to maintain the commitment and cooperation of those who lead the learning (Birch, & Crane, 2017).

### Table 1. Four models of school leadership

<table>
<thead>
<tr>
<th>Instructional leadership</th>
<th>Transformative leadership</th>
<th>Distributed leadership</th>
<th>Leadership for learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centres around the school principal and it is a top-down approach</td>
<td>Aims to foster capacity building, and in the mid-to-long-term, facilitates change through bottom-up actions</td>
<td>Based on decentralization of tasks and responsibilities among peer teachers and it highlights collaboration, shared purpose and ownership of initiatives and innovation</td>
<td>Conceptualized as an inclusionary process where the whole community is actively involved in the improvement of learning</td>
</tr>
</tbody>
</table>

It is without doubt that school leadership in rural schools should be based on a vision that can be shared by all members of the staff, parents and other stakeholders to lead to a successful digital transformation journey and innovation. Thus, a model of school leadership where the responsibility for decision-making is concentrated on a single school principal or a group of formal school leaders is not representative of school innovation. The LfE team, its services and support materials, will address the issue of successful school leadership in rural education by engaging and empowering school leaders and teachers to enable them manage and lead the embedding of digital technology into teaching and learning within their school contexts. As already mentioned in the previous section of this deliverable, the online course and the Rural Schools Innovation Academy that the LfE project is developing, invites school leaders and teachers to receive dedicated support and resources for digital and rural education. One of our main goals in the LfE project is to increase drastically school leaders’ and teachers’ capacity to innovate in digital education. This will support them not only to implement their funded innovation projects but also to envision future projects and opportunities to continue their digital transformation journey.

### 3.1.1 Recommendations for positive school culture and shared vision

Below we provide specific recommendations on how rural schools can achieve a positive school environment and shared vision for digital transformation and innovation, through effective school leadership:

- Create a positive school environment and set clear leadership expectations and values to motivate teachers and support the effective use of digital technologies into teaching and learning.
• Establish good communication and collaboration with teachers for the development of a shared vision and a common school strategy for change and innovation in digital education. Facilitate the effective planning for digital education through a shared understanding of relevant pedagogical approaches.

• Establish a leading group responsible to ensure that the use of digital technologies in the school environment does not violate national and European safety and ethical regulations.

• Establish a leading group responsible to provide support and resources to colleagues, ensure the capacity building of all teachers, and lead the achievement of the shared vision and the objectives around digital education and innovation.

• Foster and guide professional learning by providing opportunities to engage in online and face-to-face professional development courses.

• Encourage teachers to collaborate between them in selecting and creating digital content, engaging in professional dialogue and reflecting on teaching and learning practices. To this end, foster interdisciplinary and project-based approaches to teaching and learning.

• Participate in communities of practice to share and learn how school leadership is implemented in your school and other schools. Explore resources, courses and tools that can support the transformation of school leadership in your school.

3.2 Personalized and inclusive learning

It is obvious that the effective use of digital technologies has the potential to promote inclusion and remove barriers to learning. Therefore, digital technologies can support differentiated and personalized learning to address the needs of individual students, especially those students who may be at risk of educational disadvantage, and to empower all students to succeed in their learning trajectories. Inclusion, accessibility, and sustainability should be included in the key functionalities of the educational activities in the rural school environment also. The rural school environments should provide more challenging, authentic and higher-order learning experiences. It should offer opportunities for teaching tailored to the students’ needs while it should provide continuous measures of competence, integral to the learning process that can help teachers work more effectively with individuals.

3.2.1 Universal Design for Learning (UDL) framework

The Universal Design for Learning (UDL)\(^7\) framework is proposed for inclusive teaching and learning and it is based on multiple means of engagement, representation and action/expression. UDL is a new approach to education; it is a holistic way to minimize barriers, respecting individual values and choices, enabling multiple opportunities for personalisation and differentiation. It aims to guide educators on how they can eliminate unnecessary barriers that prevent individuals’ learning. The framework was developed based on scientific insights into how humans learn. It combines the knowledge on how the brain works with a set of principles for curriculum development that gives all individuals equal opportunities to learn, including students with additional needs. It offers flexibility in the ways students access material, engage with it and show what they know. This framework is considered a useful resource for rural schools while they put in action their visions for digital education and innovation.

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\(^7\) [https://www.cast.org/impact/universal-design-for-learning-udl](https://www.cast.org/impact/universal-design-for-learning-udl)
The UDL framework is divided into three main strands: Engagement, Representation and Action & Expression. It connects the three primary brain networks with principles and guidelines as presented in Figure 4.

![Universal Design for Learning](image)

**Figure 4. Connection of networks, principles and guidelines in the UDL framework**

The first pillar of UDL is about how learners engage with the lesson. By providing multiple means of engagement, we ensure student motivation and sustained enthusiasm for learning. It is important to take into account student interest and provide options that can help all students regulate their own learning. The three guidelines under this pillar are:

- Recruiting interest (spark excitement and curiosity for learning)
- Sustaining effort and persistence (tackle challenges with focus and determination)
- Self-regulation (harness the power of emotions and motivation in learning)

The second pillar of UDL refers to the use of multiple means of representation to introduce information and content to students. By using a variety of ways to present educational content, we address students with different learning styles and support their understanding. This pillar is represented by the following three guidelines:

- Perception (interact with flexible content that does not depend on a single sense like sight, hearing, movement, or touch)
- Language and symbols (communicate through languages that create a shared understanding)
- Comprehension (construct meaning and generate new understandings)

The third pillar of UDL is about how students are expected to act strategically and express themselves. It is important that students have several options to demonstrate their learning using their creativity and personal preferences. The guidelines related to action and expression are:
• Physical action (interact with accessible materials and tools)
• Expression and communication (compose and share ideas using tools that help attain learning goals)
• Executive functions (develop and act on plans to make the most out of learning)

Besides the general guidelines that are defined in the UDL framework, further support is provided in the form of concrete suggestions and checkpoints that can be applied to any discipline or domain to ensure that all students can access and participate in meaningful and challenging learning opportunities. Figure 5 below shows an overview of the UDL guidelines and the specific suggestions. More information can be found on the CAST organization website.

### Universal Design for Learning Guidelines

![Image of Universal Design for Learning Guidelines]

Figure 5. An overview of the UDL guidelines (© CAST, Inc. 2022)

#### 3.2.1.1 Applying UDL guidelines for curriculum development

The utilization of the UDL guidelines for curriculum development may seem a complex and demanding task, however, access to information and examples could support educators in making the big change when planning and delivering educational content. Prior to the implementation of the guidelines, it is very important that educators develop an understanding of each individual student’s needs and explore their learning styles. This will guide them later to apply the guidelines when planning and

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8 [https://udlguidelines.cast.org/](https://udlguidelines.cast.org/)
implementing learning activities. The need to tailor the delivery of educational content in digital education is also very crucial, because students do not only have different learning styles but they also have different digital capacity. To this end, the implementation of the UDL guidelines when designing and delivering digital content is highly recommended. To illustrate how this can be done we present in this deliverable the exemplary case of the inSTEAM project.

The project developed a collection of online lessons by means of the tools and resources of the Go-Lab Ecosystem. The lessons focused on severe environmental issues and addressed the topics in an interdisciplinary manner. Specifically, the three main thematic areas of the lessons are climate change, water management and renewable sources of energy. For each thematic area, a bundle of six lessons was created. The lessons can be implemented as standalone or as projects consisting of more than one lesson from the same thematic area. The main design principle for the creation of the lessons was the UDL framework. At the same time, each thematic area has been approached from a scientific, socio-economic and cultural perspective through inquiry-based learning and open schooling approach.

All lessons incorporate several tools and sources of information, provide opportunities for differentiated student support, allow students to self-regulate their learning trajectories, to collaborate with others, and to express their learning in multiple ways. Figure 6 below is a screenshot from the learning environment that illustrates the implementation of the UDL guidelines. Specifically, in this example students are given the opportunity to create different learning products as a solution to a problem studied in groups. Although students work in groups they are supported to choose their learning trajectory based on their interests and capabilities.

<table>
<thead>
<tr>
<th>In order to create a model of your idea you may choose to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Draw your idea on paper</td>
</tr>
<tr>
<td>• Use real materials (e.g. recycled materials, building toys) for the construction of a 3D model</td>
</tr>
<tr>
<td>• Create a sculpture with clay</td>
</tr>
<tr>
<td>• Create a drawing on the computer; e.g. with Paint</td>
</tr>
<tr>
<td>• Create 3D models using online drawing tools, e.g. with Tinkercad or SketchUp.</td>
</tr>
<tr>
<td>You can work with more than one solution in your group, if you decide to do so.</td>
</tr>
<tr>
<td>Is there something that you would like to change in your initial idea? Now it is the right time to do it, before moving to the creation. Discuss with your group and keep notes below.</td>
</tr>
<tr>
<td>* Do not forget to give a title to your idea!</td>
</tr>
</tbody>
</table>

Upload photos and/or screenshots of your drawings and/or models below!

Figure 6. Example of multiple options to demonstrate learning using creativity and personal preferences

3.2.2 Recommendations for supporting differentiated teaching and learning

Digital education in rural settings must ensure that all learners will be supported to have equal access to appropriate digital technologies to reach their full potential, especially students with additional learning needs. To implement this strategy in rural education, schools are recommended to take into account the following:

9 https://insteam.deusto.es/
• Use digital technologies to enhance inclusion and equity by providing students with appropriate guidance and support.

• Ensure the provision of flexible, differentiated and needs based learning content and activities to all students by elaborating the UDL guidelines.

• Ensure that all students who have special educational needs have access to appropriate assistive technologies (e.g., voice amplification systems, speech output software, speech generating devices, etc.)

• Request specific guidance and advice on pedagogical approaches for using assistive technologies for students with special educational needs.
4 Rural schools as community and educational spaces

The challenge for the successful digital transformation and innovation in rural schools is to provide schools with an integrated framework fitting all the pieces together: providing mechanisms to monitor and assess the progress at different levels, introducing and helping to sustain a culture of change, supporting community and capacity building, providing tools and resources for innovative projects. This is a foreseen role of the LfE project. Specifically, the LfE project will facilitate the rural school innovation process, acting as a mentoring ecosystem for school heads, students and teachers, parents and policymakers. The above-mentioned parameters for supporting rural schools will form the services that the LfE Rural Schools Innovation Academy will offer to school heads and teachers. The training scheme’s goal is to provide valuable guidance and to develop a sustainable support mechanism to assist both the school leadership as well as the teachers during the transformation process.

Besides the LfE training and support services, we explore below how rural schools could develop a strong connection with local/regional stakeholders and how they could explore opportunities for community learning through the adoption of open schooling approaches. The key here is the development of an innovative culture among schools and other stakeholders. By developing opportunities for interaction with other stakeholders, the digital transformation journey of the whole school and the local community is more likely to thrive. A step towards the development of innovation at the multi-stakeholder level is the establishment of learning communities, cooperation initiatives and shared projects.

4.1 Connection with local/regional stakeholders

Stakeholder experience should be exploited for addressing inequalities of access to digital education and for reducing the gap suffered by school communities in remote areas. Stakeholder interaction should help rural schools develop and implement their innovation plans towards their e-maturity journey. Rural schools should provide opportunities for intergroup interaction between stakeholders and ingroup interactions between members within each stakeholder group. These types of interactions will allow schools to develop and update a toolkit together with parents, technology providers, policy makers, universities, research organizations, experts and NGOs. This process should be based on an ongoing consultation, engagement and joint action and it needs to be designed as a social learning process, involving regular stakeholder meetings for planning, monitoring and assessing joint action in subsequent iteration cycles. In this regard, the LfE community platform will provide tools for community building, consultation, mentoring and assessment to support rural schools with the implementation of their innovation projects, in collaboration with other stakeholders.

As a scaffold for supporting the connection of rural schools with local/regional stakeholders, we present in Table 2 below, a participatory scenario development approach. This approach aims to foster a concerted stakeholder interaction, in contrast to the sporadic and fragmentary interventions that rural schools may undertake at school level. Hence, there is a necessity of stakeholder joint action for effective innovation in digital education. This interaction could also take place in the LfE community platform in two ways; horizontally, for comparing different contexts at the same level of reference (e.g., cross-national comparison of the implementation of a good practice); vertically, for establishing and updating a bilateral flow between top-down and bottom-up initiatives (e.g., exploiting the experienced gained from the implementation of a good practice for policy recommendation based on what works well regarding digital education in rural areas).

Table 2 presents an example of how the participatory scenario development approach could look like for a joint stakeholder action. The columns of the table correspond to the different scenarios. “Business-as-usual” scenario describes the existing state of affairs, “small effort” scenario depict the

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potential to depart from the current conditions and make a difference, while “best-case” scenario describes ideal futures.

Table 2. Participatory scenario development approach

<table>
<thead>
<tr>
<th>“Business-as-usual” scenario</th>
<th>“Small effort” scenario</th>
<th>“Best case” scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describes possible futures if the current situation does not change; projection of the current situation in the future</td>
<td>Describes observable improvement beyond current conditions attainable under minimal stakeholder investment</td>
<td>Describes ideal and sustainable conditions, which can be possible only under maximum stakeholder investment</td>
</tr>
</tbody>
</table>

The most important step for rural schools is to plan and implement the “small-effort” scenario, which is a step away from the “business-as-usual” scenario. The latter would have implied, for example, that a rural school would make any effort to innovate in digital education by utilizing its existing infrastructure, in a micro-level. While the “small effort” scenario could be, for example, the identification of specific needs in terms of availability on digital tools and content, the implementation of specific actions and investments for the acquisition of the necessary tools and content and the incorporation of them into teaching and learning, in a micro-level. In the context of the LfE call for financial support, eligible rural schools are already planning for the “small effort” scenario to equip their schools with necessary digital technologies. Moreover, they will use the LfE consultation and training services to launch initiatives for their digital transformation journey. Finally, planning and implementing for the “best-case” scenario entails the creation of sustainable options for maximum stakeholder investment to maintain and upgrade the school’s digital infrastructure. The “best-case” scenario in the LfE context will be implemented by utilizing the services and tools of the LfE platform. School networks will be created and will be open for external stakeholders to join and bring in innovative technologies and creative solutions to the classrooms. In the “best-case” scenario, the school’s role changes from implementer to stakeholder to innovator. Schools as innovators will cultivate a culture of change and use the constraints and barriers encountered during their transformation journey to reconsider and revise their practices for the future.

4.1.1 Recommendations for developing opportunities to connect with local/regional stakeholders

Below we provide specific recommendations on how rural schools can connect with local/regional stakeholders and benefit from positive interactions during their digital transformation:

- Establish intergroup interaction between stakeholders and ingroup interactions between members within each stakeholder group to facilitate the development and implementation of innovative good practices for digital education.

- Participate in regular stakeholder meetings for planning, monitoring and assessing joint actions in digital education.

- Employ the participatory scenario development approach to plan and implement ideal and sustainable conditions for digital education in your community.

- Create your school network and invite external stakeholders to join and contribute with new innovative technology solutions, good practices and creative applications.

4.2 Opportunities for community learning
The last dimension for promoting digital transformation of education in rural communities is to support schools to become Learning Hubs for their communities. The idea of a Learning Hub in a rural community is that it will offer digital solutions that can be used by all members of the local community in need of continuous training/education. A school could serve both as a resource for lifelong learning development and as a vehicle for the delivery of a wide range of services. School resources such as facilities, technology equipment, and well-trained staff can provide a range of educational and retraining opportunities for the community. Acting as Learning Hubs, rural schools contribute to the vision of the European Commission to support the digital transformation of economies and societies in Europe. Although during COVID-19 pandemic many countries showed an advancement in digitalisation efforts, still rural communities suffer a digital gap. Apart from the students, a rural community in need of such support could include farmers, people in the tourist industry, small businesses, etc. The creation of such horizontal links from a school or a group of schools to their local community is considered a major development. The advantage of such development is that it helps recruiting parents and the local community to support the students’ learning and possibly, to provide material and financial help to schools or vice versa. It furthermore provides valuable experience, and skills and contacts that can help students gain the confidence and knowledge necessary to seek employment and to establish themselves within the adult community in the future.

The LfE project envisions developing a culture of change in the participating rural schools based on well-established approaches that have proven efficiency and efficacy to diffuse innovation in school settings. To support rural schools in transforming into Learning and Innovation Hubs, the LfE project builds upon the Open Schools for Open Societies (OSOS)\(^\text{12}\) initiative. The OSOS project has demonstrated an extremely successful scheme for the diffusion of innovation in school settings. It sets as a major component for the diffusion school-based innovation the Open Culture of the organization. Open School Culture requires schools, in cooperation with other stakeholders, to become agents of community well-being; families are encouraged to become real partners in school life and activities; professionals from enterprises and civil and wider society are actively involved in bringing real-life projects to the classroom. These projects are being developed by school networks. To achieve this, OSOS has developed an approach that is based in clustering schools around strong innovative open schooling environments, the OSOS School Hubs. OSOS School Hubs create communities of practice to implement their innovative projects, involving numerous schools that progressively adopt the open school culture.

Following the OSOS model, the LfE services will support the full cycle of schools’ transformation into Learning and Innovation Hubs (see figure 7). The process starts with the Change Agents who are becoming Inspiring Leaders of the school community. The LfE will offer open, interoperable and personalised solutions meeting the local needs, support school heads capture innovation, to decide on the appropriate strategy to diffuse innovation to the school and through constant reflection guide them towards the transformation of the school to innovation hubs and digital learning commons and finally to sustainable innovation ecosystems.

The LfE project will contribute to the execution of the five key processes needed so that rural schools complete their digital transformation journey:

- **Increase mass**: Analysis of the school needs to identify areas in which the school can best demonstrate innovative approaches and projects. Development of a critical mass of innovative teachers who will share the vision of the school leader to take the school to the next level.
- **Increase density**: Community building and support tools for the development of strong communities of practice around the implementation of resource-based educational scenarios.

\(^{12}\) [https://www.openschools.eu/](https://www.openschools.eu/)
• **Increase temperature**: Content creation and content delivery tools to create a steady and supportive development of new learning techniques and methodologies, leading to sustained improvement.

• **Increase reflectivity**: Acceleration of the educational changes regarded as effective and sharing within the school communities and national authorities.

• **Growth**: Transformation of the school into an efficient player of a Sustainable Innovation Ecosystem.

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**Figure 7. The full cycle of the school transformation with the support of the LfE support services**

The LfE community platform, training and mentoring services will facilitate the processes described above. The support mechanism will define the path and the specific elements to depict innovation in rural schools, as well as the relevant indicators. By following this path, rural schools will complete the necessary conditions that will describe their digital transformation journey. However, before schools can embark on change, they need a clear vision and leadership. Specifically, school leaders need to create a shared vision for how digital education can meet the needs of all learners, develop a plan that translates the vision into action and collaborate adopting a mentoring mentality. These vision and planning processes should be based on a holistic view of the current digital innovation status of the school.

### 4.2.1 Recommendations for transforming schools into Learning and Innovation Hubs

To increase the opportunities for community learning, rural schools are recommended to take into account the following:

- Consider the procurement of digital technology solutions and applications that can serve for lifelong learning for all the members of the rural community.
• Create horizontal links with the local communities for exchanging support, material and financial help.

• Follow the digital transformation path provided by the LfE support and training services. Analyse the school’s needs, create a shared vision for the school, participate in communities of practice, ensure sustained improvement through the development of new learning techniques and methodologies, accelerate the educational change on a broader level and finally transform school into a sustainable innovation ecosystem.
5 Conclusions

Although lately there has been a significant shift to digital education mainly forced by the COVID-19 crisis, many rural communities and schools are still lagging behind, compared to urban schools, in successfully exploiting the opportunities for digital education. This happens for several reasons mainly caused by the isolated location of rural schools. Since digitalization of the world in every aspect, including education is inevitable, rural communities and specifically schools located in remote areas need to receive immediate support to cope with all these radical changes. The LfE project is aiming in this direction by providing financial support to European rural schools along with need-based support and training services. The vision of the LfE project is that rural schools will be linked to the broadband internet, increase their digital technology equipment, have access to digital educational tools and content, and be turned into multi-purpose, local learning centres accessible to all individuals in the rural community, enabling life-long learning for the entire population at their learning/working/living place.

The Rural Schools Innovation Strategies deliverable aims to provide the core strategies for the digital transformation journey of the rural schools that will receive financial support through the LfE project. The LfE team will provide a strong support mechanism and needs-based training services to the rural schools, to ensure the successful implementation of their innovative projects. The digital change that schools are about to experience centres around three main areas: (1) organization and support, (2) equity and excellence and (3) community learning. Specific recommendations and key resources are provided to ensure that the digital transformation journey of the rural schools will enable them to grow into sustainable innovation organizations.

Table 3 shows a summary of the recommendations for rural schools in line with the main barriers and opportunities that schools have, and a list of relevant resources to support the e-mature and innovation in schools.
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Main need and/or enabler</th>
<th>Recommendations</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization and support for rural schools</td>
<td>Lack of suitable internet connectivity access to networked devices, necessary digital technologies and access to high quality teaching and learning material</td>
<td>Good communication with technology providers, access to user manuals and technical support for the instalment and use of the selected digital solutions. Ethics committee for cybersecurity, protection of sensitive personal data and responsible use of digital technologies. Awareness system for emerging technologies to sustain and further develop the digital technology infrastructure. Sustainable funding mechanism for the update and maintenance of the school's digital technology infrastructure.</td>
<td>Highly Equipped and Connected Classroom – HECC model: <a href="https://bit.ly/3q8m5Po">https://bit.ly/3q8m5Po</a></td>
</tr>
<tr>
<td>Dimension</td>
<td>Main need and/or enabler</td>
<td>Recommendations</td>
<td>Resources</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Support equity and excellence</td>
<td></td>
<td>Clear leadership expectations and values to support the effective use of digital technologies.</td>
<td>Video about shared leadership: <a href="https://bit.ly/3qpCl9y">https://bit.ly/3qpCl9y</a></td>
</tr>
<tr>
<td>School leadership</td>
<td>School management often is unable to support and create effective and collaborative school environment</td>
<td>Development of a shared vision and a common school strategy.</td>
<td>Online course about shared leadership (provided by the European Schoolnet Academy): <a href="https://bit.ly/3RPtQpm">https://bit.ly/3RPtQpm</a></td>
</tr>
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<td>Leading group to ensure that the use of digital technologies does not violate national and European safety and ethical regulations.</td>
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<td>Leading group to ensure the capacity building of all teachers, and lead the achievement of the shared vision.</td>
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<td>Guide professional learning by providing opportunities for all teachers.</td>
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<td>Main need and/or enabler</td>
<td>Recommendations</td>
<td>Resources</td>
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| Personalized and inclusive learning    | Rural schools should foster learning in the multilevel classroom, meeting the needs of all individuals at school. | Teacher’s collaboration for selecting and creating digital content, and reflecting on teaching and learning practices.  
Communities of practice for sharing and learning about school leadership.  
Use digital technologies to enhance inclusion and equity by providing students with appropriate guidance and support.  
Ensure the provision of flexible, differentiated and needs based learning content and activities to all students by elaborating the UDL guidelines.  
Ensure that all students who have special educational needs have access to appropriate assistive technologies.  
Request specific guidance and advice on pedagogical approaches for using assistive technologies for students with special educational needs. | UDL guidelines: [https://udlguidelines.cast.org/](https://udlguidelines.cast.org/)  
<p>| Rural school as community and educational spaces |                                                                                          | Facilitate the development and implementation of innovative good practices for digital education through intergroup and ingroup interaction between stakeholders. | LfE community platform with community building tools and networking and mentoring services (under construction) |</p>
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<td>Opportunities for community</td>
<td>Rural schools should become educational hubs and offer to the local community an open</td>
<td>Stakeholder meetings for planning, monitoring and assessing joint actions in digital education.</td>
<td>Support, training, mentoring and networking opportunities through the LfE community platform (under construction)</td>
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<td>School network with external stakeholders to join and contribute with new innovative technology solutions, good practices and creative applications.</td>
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