UNIVERSITY OF SALAMANCA

Azucena HERNÁNDEZ MARTÍN

Ana IGLESIAS RODRÍGUEZ

Yolanda MARTÍN GONZÁLEZ

Marta MARTÍN DEL POZO

O3 - HOW TO ACCELERATE THE DEVELOPMENT OF SKILLS OF EDUCATION ACTORS THANKS TO DIGITAL TECHNOLOGY AND IN A DIGITAL ENVIRONMENT ?

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France – Catholic Institute of Paris

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Paul Claudel d'Hulst high school, Paris - France
Rakovski of Bourgas high school - Bulgaria
University of Salamanca - Spain
Zawm St. Vith - Belgium
Novida high school of Loimaa - Finland

A CEGEP in eastern Quebec (La Pocatière), recognized for its quality, excellence and sense of innovation, is a partner in the project for its high added value in the anchoring of digital technology and governance.

The ANGE project was launched on September 1, 2017 and will end on December 31, 2020 and has two priorities :

1. Promote more open, more innovative education systems, more firmly rooted in the digital age.
   Reinforce the profiles of teaching professions through training and development of the professional skills of all the actors (headmasters, teachers).

This project proposes to respond to the encouragement of the creation of networks and communities of practice focused on learning in order to pave the way for innovation at the European level. It builds on the specific skills of each country and each institution participating in the project in the field of digital technology, in order to create a team of European trainers competent in this field and coaching between European institutions.

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CONTRIBUTORS

Students (documentary research, analysis...)

Alexandra BALUȚĂ – 1st year Master's degree, University of Craiova (Romania).
Vlad Ovidiu CIOACĂ – 2nd year Master's degree, University of Craiova (Romania).
Rodica Nicoleta CONSTANDA - 1st year Master's degree, University of Craiova (Romania).
Rolland ADJALIAN - 2nd year Master's degree, Catholic Institute of Paris (France)
Vincent AFFHOLDER - 2nd year Master's degree, Catholic Institute of Paris (France)
Isabelle ARGOUARC'H - 2nd year Master's degree, Catholic Institute of Paris (France)
Chantal ARINO - 2nd year Master's degree, Catholic Institute of Paris (France)
Marie BOUCHERE - 2nd year Master's degree, Catholic Institute of Paris (France)
Elodie CAVANNA - 2nd year Master's degree, Catholic Institute of Paris (France)
Jean COURTADE - 2nd year Master's degree, Catholic Institute of Paris (France)
Colombe DE JERPHANION - 2nd year Master's degree, Catholic Institute of Paris (France)
Myriam DJELLAL - 2nd year Master's degree, Catholic Institute of Paris (France)
Anne-Sophie DURAND - 2nd year Master's degree, Catholic Institute of Paris (France)
Florence LAFALAISE - 2nd year Master's degree, Catholic Institute of Paris (France)
Blaise MANKANA MBEKA - 2nd year Master's degree, Catholic Institute of Paris (France)
Olivier MAUNAND - 2nd year Master's degree, Catholic Institute of Paris (France)
Edith MAWAKAM - 2nd year Master's degree, Catholic Institute of Paris (France)
Sybille MENAGER - 2nd year Master's degree, Catholic Institute of Paris (France)
Coline MOREL - 2nd year Master's degree, Catholic Institute of Paris (France)
Ida Diane ODJOUSSOU - 2nd year Master's degree, Catholic Institute of Paris (France)
Antonin PAHA - Master, 2e année, Catholique Institute of Paris (France)
Louis-marie ROCHARD - 2nd year Master's degree, Catholic Institute of Paris (France)
Nicolas SALOMON - 2nd year Master's degree, Catholic Institute of Paris (France)
Clémence TOUCHE - 2nd year Master's degree, Catholic Institute of Paris (France)
Alcides Martinho VAZ TEIXEIRA - 2nd year Master's degree, Catholic Institute of Paris (France)

Tutors (writing, coaching and support for students) and researchers

Michaël BOURGATTE - Lecturer HDR, Catholic Institute of Paris (France)
Azucena HERNÁNDEZ MARTÍN – University Professor, University of Salamanca (Spain)
Ana IGLESIAS RODRÍGUEZ - University Professor, University of Salamanca (Spain)
Yolanda MARTÍN GONZÁLEZ - University Professor, University of Salamanca (Spain)
Marta MARTÍN DEL POZO - University Professor, University of Salamanca (Spain)
Florentina MOGONEA - Lecturer, University of Craiova (Romania)
Gabriela MOTOI – Course instructor, University of Craiova (Romania)
Mihaela Alexandrina POPESCU - Lecturer, University of Craiova (Romania)
Mihaela Aurelia STEFAN - Lecturer, University of Craiova (Romania)
Laurent TESSIER - University Professor, Catholic Institute of Paris (France)

CONTRIBUTION OF THE AUTHORS

FIRST PART. INNOVATION AS AN ENVIRONMENT AND PROCESS FOR THE DEVELOPMENT OF E-SKILLS		
Chapter 1	Approach to the concept of educational innovation	Azucena Hernández Martín Ana Iglesias Rodríguez Yolanda Martín González Marta Martín del Pozo
Chapter 2	The school as a basic unit for change	Laurent Tessier, ICP 2nd year Master students : Rolland Adjalian, Vincent Affholder, Isabelle Argouarc'h, Chantal Arino, Marie Bouchere, Elodie Cavanna, Jean Courtade, Colombe De Jerphanion, Myriam Djellal, Anne-Sophie Durand, Florence Lafalaise, Blaise Mankana Mbeka, Olivier Maunand, Edith Mawakam, Sybille Menager, Coline Morel, Ida Diane Odjoussou, Antonin Paha, Louis-marie Rochard, Nicolas Salomon, Clémence Touche et Alcides Martinho Vaz Teixeira
Chapter 3	Conceptualisation and characteristics of good educational practice with ICT for innovation	Florentina Mogonea Mihaela Aurelia Stefan Alexandrina-Mihaela Popescu Gabriela Motoi Rodica Nicoleta Constanda (1st year Master's degree, Faculty of Letters, University of Craiova, Romania) Alexandra Baluță (1st year Master's degree, Faculty of Letters, University of Craiova, Romania) Vlad Ovidiu Cioacă (Master, 2nd year, Faculty of Social Sciences, University of Craiova, Romania)
SECOND PART. CASE STUDIES		
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Chapter 5	The study of the classlab carried out at the Novida Lukio High School in Loimaa	Marta Martín del Pozo

Chapter 6	The study of the classlab carried out at theTraining Centre ZWAM DE St Vith	Michaël Bourgatte, ICP 2nd year Master students : Rolland Adjalian, Vincent Affholder, Isabelle Argouarc'h, Chantal Arino, Marie Bouchere, Elodie Cavanna, Jean Courtade, Colombe De Jerphanion, Myriam Djellal, Anne-Sophie Durand, Florence Lafalaise, Blaise Mankana Mbeka, Olivier Maunand, Edith Mawakam, Sybille Menager, Coline Morel, Ida Diane Odjoussou, Antonin Paha, Louis-marie Rochard, Nicolas Salomon, Clémence Touche et Alcides Martinho Vaz Teixeira
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PRODUCTION SUMMARY

This report is part of the ERASMUS+ ANGE project, which aims to develop innovation through the use of digital technology in the management of schools. More specifically, this work attempts to answer the question: "*How can the development of the skills of education stakeholders be accelerated through the use of digital technology and in a digital environment?* ». To answer this question, a critical review of the literature first clarified a few important concepts and identified a certain number of "good practices" in the use of digital technology to develop innovation. Next, schools from four different countries (Bulgaria, Finland, Belgium, France) tell us how, in their particular context, they have tried to answer the question posed and with what effects.

The contributions of the critical review of the literature

In the first chapter, innovation is seen as a process, a long journey, which depends on the dynamics of the educational community and the professional culture of those involved in the institution. It is a process of incorporating something new into an existing reality, producing a change in practice, in the development of teaching and learning strategies and, more broadly, in the dynamics of the school. Many facilitating or inhibiting factors are mentioned in the scientific literature. The following essential conditions are particularly noteworthy: (i) governance that implies a posture of recognition, acceptance and integration of complexity; (ii) shared leadership between the different actors of the school; (iii) actors committed to and supported by a management team that coordinates innovative practices; (iv) the development of communities of learning and practice (in particular through webinars, think tanks, transnational exchange and training meetings of the ANGE project).

Chapter 2 builds on this by highlighting the dimensions that make the school the basic unit of change: (i) the strategic dimension, focusing on contextualised needs and the future of the school; (ii) the motivational dimension, which supports the commitment of stakeholders by using their distinctive capacities (particularly those linked to the use of digital technology); (iii) the logistical dimension, by ensuring that resources are available which are useful for innovation and which can be used by stakeholders; (iv) the support

dimension for professional development, which involves the proximity of school management and resource persons to stakeholders in the field; (v) the involvement of pupils in innovation projects.

Chapter 3 focuses more specifically on the use of digital technology within institutions. Different uses, illustrated by good practices drawn from projects in several countries, are highlighted, including the following: (i) organising the classroom for better learning ("The classroom of the future", Austria); (ii) conducting differentiated learning (the "eLC 2. 0' project, Austria); (iii) promoting collaborative learning (the 'Challenge 2000' project, United Kingdom); (iv) motivating or learning through play (the 'DANT' project, Italy); (v) managing and communicating within the school and with the external community (the 'The Epal Project', United Kingdom, and 'Logineo', Germany); (vi) training and professional development ('The Belgrove College Poject', United Kingdom).

The contributions of the empirical part

Methodologically, four case studies (4 chapters) are presented. These are four different contexts that have used digital technology to meet specific needs. Each is a "classlab", i.e. according to the definition of the ANGE project's glossary[1] "a laboratory for supporting change in education in relation to digital technologies and the governance of action. The Class Lab concept is based on a conception of the development of 21st century competences of education stakeholders and learners in the training institution. The Class Lab is also a place for transforming the institution".

These are the following classlabs :

(i) The classlab of the G.S. Rakobski high school in Burgas, Bulgaria : this aims to develop new contexts for teaching and learning by means of the reverse class in a technological context, in order to respond in particular to the need generated by students who are unable to follow face-to-face classes.

[1] This concept and the other concepts underlying the ANGE project and its skills framework are defined in the glossary (appendix 6) http://classlab-ange.eu/o3-comment-accelerer-le-developpement-des-competences- actors-in-digital-education-and-in-a-digital-environment-universidad-de-salamanca-spain /

(ii) The classlab of the Novida Lukio Institute in Loimaa, Finland, following the national authorities' prescription to set up an evaluation system using digital tools.

(iii) The classlab of the Zwam St Vith Vocational Training Center in Belgium, whose students experience vocational training partly in companies and partly at the Centerand are confronted with the increasingly frequent use of new robotic and digital tools in the workplace.

(iv) The classlab of the middle and high school Paul-Claudel d'Hulst in Paris which, on the occasion of a merger of two establishments, created "La bulle de l'innovation" as an important element of the project of the new establishment.

These four classlabs are all attempts to develop the skills of those involved in education using digital technology and in a digital environment (the subject of this report). To study their effects, the SWOT analysis method was used. It made it possible to identify and cross-reference internal factors of a positive nature ("Strengths" or "Strenghts"), internal factors of a negative nature ("Weaknesses" or "Weaknesses"), internal or external factors that could have a positive influence ("Opportunities" or "Opportunities"), internal or external factors that could have a negative influence ("Threats" or "Threats"). Finally, in order to identify the competences developed by the actors of the four classlabs, a self-positioning procedure was carried out on the basis of a competence reference frame co-constructed by all the partners of the ANGE project[2] et à une identification des situations de context pour tous les acteurs[3].

To present the results of the four globalized analyses, the actors, accompanied by trainers and researchers from four higher education institutions partners of the ANGE project (the University of Salamanca, the University of Craiova, the Catholic Institute of Paris and the CEGEP of La Pocatière in Quebec) have formulated six hypotheses. Based on these, the following main results are formulated :

(i) The various uses of digital technology to promote innovation in schools have made it possible, thanks to a proactive attitude towards innovation on the part of the players, to improve exchanges and the quality of relations between teacher-pupil, teacher-teacher, director-teacher, school-community. This has

[2] Common skills repository co-constructed by the project stakeholders (annex 1)

[3] Common framework of skills and contextual situation (appendix 2)

made it possible to strengthen: the climate of collaboration, trust and mutual listening; collaborative work, exchanges of good practices and their external dissemination (national and international levels).

(ii) Collaboration between the school and the community (families, businesses, etc.) deserves special attention in the future. If the Burgas project has made it possible to establish relations with the families of students unable to attend classes in person, if the St Vith Centre has been able to forge close links with the local business community, more initiatives deserve to be undertaken with families in vulnerable situations (as the Covid19 crisis has revealed more acutely).

(iii) Thanks to the governance developed in the four classlabs (encouragement of innovation, management support for teachers, acceptance of their ideas and proposals, provision of resources, joint search for solutions to unexpected problems, better organisation of work, access to national and international actions, autonomous and proactive management...), the innovation processes have led to improved teaching-learning processes and school results[4].

(iv) The experiments set up in the four classlabs were an opportunity to set up or strengthen a model of decision and action based on shared leadership between the actors who participated. In order to broaden it, it is important to address the heterogeneity of digital training for teachers and the insecurity they show towards digital technologies.

(v) The existence of adequate computer equipment in the classrooms, the methodologies used by the actors of the classlabs and the previous participation of the schools in other projects have been favourable factors for the innovations undertaken. However, this force can become a threat if the meaning to be given to the use of technology is not incorporated: the motivation generated in pupils at the outset must not become distracting and cause them to lose the sense of what it means to learn; the use of technology to learn better must not be a factor of inequality, especially when pupils are asked to use their own devices in class or at home.

[4] The study conducted by Hervé Chomienne on the managerial practices of change management (appendix 2) of the 4 leaders of the experimentation sites highlights the desire to set up shared governance, as a lever for commitment and a vector for the recognition of innovative teachers http://classlab-ange.eu/wp-content/uploads/2020/12/Rapport-Management-changement-ANGE-ISM.pdf

(vi) The central hypothesis put forward by the actors concerned the improvement and development of specific and transversal competences of the actors involved in the four classlabs. Following the SWOT analyses, effects were in fact noted on three levels: within the school, among pupils and among teachers. Within the school, the most important effects are digital resource management, teamwork, oral and written communication strategies, shared leadership, and communities of learning and practice. Pupils' capacity for participation, imagination, discovery of new talents, greater cohesion between peers, collaborative work, greater motivation, peer tutoring, practice of self-evaluation and peer assessment, greater use of digital tools for pedagogical purposes, and above all, increased confidence. Teachers focused on the use and management of digital tools in their classrooms and for assessment, collaboration and teamwork, support between teachers, positive reflection in the face of mistakes made, changing attitudes and perspectives towards new or different methodologies from those they usually use, creating a dynamic in the classroom (more active) and in the school (more exchanges).

The actors involved in the four classlabs have themselves indicated their difficulty in precisely identifying the competences worked on in the situations created during the different scenarios. As this phenomenon is well known in the work on the evaluation of competences, the ANGE project took care to co-construct, with all the partners, a reference frame of competences with the aim, not of certification, but of self-positioning and development of an "emerging professionalism[5]". Presented in the appendix, this reference system includes 9 competencies, including 3 for the organisational pole, 3 for the communication pole and 3 for the reflexive pole. Each competency includes 7 levels or levels of mastery: the first two relate to mastering the competency in one's usual work environment; the third and fourth, in the broader project of one's home institution; the fifth and sixth, in the pan-European network; the seventh, as an expert at the service of new projects. The question was therefore not only to identify the competences, but also and above all at what levels or levels of mastery they had been developed, which also allowed the actors of the classlabs to project themselves towards future crossings of levels (the basis of "emerging professionalism").

[5] This concept and the other concepts at the basis of the ANGE project and its competency repository can be found in a "Glossary", available at http://classlab-ange.eu/o3-comment-accelerer-le-developpement-des-competences-des-acteurs-de-leducation-grace-au-numerique-et-dans-un-environnement-numerique-universidad-de-salamanca-espagne/

The results of the self-positioning strategy were as follows:

(i) The nine competences of the reference framework have all been mastered at least at level 4: they have made an original contribution to their institution's project.

(ii) Three competences were at level 5 (development of competence in the pan-European network) for a majority of actors: co-constructing a "community of learning and practice" (76.9% of actors); using digital resources to communicate with the different actors (84.6%); adopting a critical and metacognitive posture to analyse one's practices (76.9%).

(iii) Two competences have reached Tier 6 (original contribution to the pan-European network) : co-constructing a network, pan-European or international, of change support classlabs (85.7%); piloting by developing shared leadership (85.7%).

(iv) Although this is not the most representative level for all the actors who have self-positioned, the classlabs have enabled a majority of actors (more than 50%) to reach a broader level of expertise (level 7 = support new projects) for 7 competencies of the reference system: using digital resources to communicate with different actors (54.5%); using digital resources to continue training (58.3%); adopting a critical and metacognitive posture to analyse their practices (58.3%); collaborating with internal and external partners (61.5%); co-constructing a community of learning and practices (61.5%); using digital resources to develop innovation (66.7%); co-constructing a national, pan-European or international network of classlabs (76.9%).

(v) One skill is at the highest level (7), that of expertise for new projects: co-constructing a professional and institutional project (81.8% of the actors in the classlabs).

In conclusion, the classlabs have enabled processes of professionalism to emerge and are contributing to the construction of a European education area marked by innovation. An unfinished symphony, but a symphony

INTRODUCTION

Technological development and the multiple modes of communication in which we are immersed have gradually shaped and demanded new educational spaces, as well as a questioning of the purposes of education and the teaching and learning processes themselves.

Currently, it can be said that the availability of technological resources in schools is increasing, although their physical presence in classrooms and other spaces does not guarantee their integration into the school curriculum. In fact, the use that teachers make of these resources is not growing at the same rate, either due to a lack of technological training, or due to a lack of pedagogical training that implies a prior reflection on the why and for what of their use, and the ability to use these resources in close relationship with other elements of the curriculum (objectives, contents, methodology, forms of evaluation...), including the teacher and the student body, the organizational structure of the center, etc. We cannot forget that information and communication technologies (ICTs) must be used in the classroom, not as an end in itself, but as a means to improve student teaching and learning.

If we want to avoid the introduction of new and substantial changes in the curriculum from a simple superficiality or a concern for modernity, as has sometimes been the case with the use of technology, it is necessary to rethink in some way the curriculum and the school as a whole, according to the roles that its different members play. Reflection on the why, for what and how of integrating ICT into the curriculum, the administrative and organizational requirements that arise from this integration and the skills that teachers need to carry it out are aspects that cannot be ignored or neglected when talking about educational innovation mediated by the use of technological resources. It is also essential, as this study/research will show, to develop the roles and skills of the management team in terms of leadership and a proactive attitude to encourage the changes and improvements that educational innovation requires; as well as the development of effective governance or, which is the same thing, the design and implementation of educational policies that truly focus on improving teaching and learning through innovation processes, in which the collaborative work of teachers, the creation of spaces and time for joint reflection and the provision of support of all kinds are not a mere declaration of intent in the drafting of an education law, but the real and daily exercise in its subsequent implementation. According to these assumptions, it is considered that the success of the changes addressed by an education center, and in particular by its teachers, will depend both on their commitment to change itself, which generates any innovation, and on the support they receive in their requests for training and in the way they make their implementation viable.

The constitution of the educational center as a digital ecosystem is a creative and committed process that requires, as has already been pointed out, that teachers develop a whole range of skills to design, select and adapt the different technological resources to the requirements of each teaching process and, above all, to the characteristics and interests of the students. These skills, which can be acquired in many ways and in different contexts, always bearing in mind the possibilities that ICTs themselves offer for the professional development of teachers, are the main guarantee for extracting the full potential of technologies in the curriculum. As has been pointed out in other early work on this topic (Quintero and Hernández, 2005, p.307), this potential is not

something intrinsic, but is related to the ability of teachers to interpret and articulate their actions from them. In other words, the potential of ICTs lies not only in their attributes, in the technical and pedagogical quality of their design, but in the framework of the didactic-pedagogical methodology in which they are inserted and used. In this dynamic, teachers' knowledge, perceptions and attitudes towards the media will become determining factors for their integration in curricular processes.

Educational administrations must be aware that the use by schools of the different languages and systems of representation promoted by digital resources requires that they make available to all members of the educational community centers with sufficient infrastructure and knowledge, know-how and a sense of why and how ; the result of the processes of reflection and collegial formation in which they are involved.

These thoughtful moment and training are essential to study, in contexts of experimentation and action research, the effects of technology in terms of possibilities, without giving up optimism, but also adopting cautious and critical positions if they are deemed necessary. At present, we have sufficient information to think of the digital world in terms of possibilities for innovation, but further research is needed to enable us to continue to determine the best uses of ICTs, as well as to study in depth the possible factors that condition the success or failure of their use in a context of innovation.

Taking into account these basic reflections, the study that we present in the framework of the European project ERASMUS+ ANGE : Digital Anchoring in the Governance of Schools, has the main objective of answering the question posed in the title, How to accelerate the development of the competences of education actors thanks to digital technology and in a digital environment?

As a thread running through the two parts in which this production is organized, and which will be presented in greater detail later, six hypotheses were formulated that guided both the theoretical foundation and the case studies, and the conclusions drawn from each of them; as well as those that will be presented at the end of the work, the result of a final reflection.

These assumptions, which will be addressed at other points in the work, are as follows:

1. Thanks to a proactive attitude on the part of the actors (steering committee, teachers), digital technology can influence the different relationships between the actors in education (teacher-student relationship; teacher-teacher; school management - teachers) and thus promote pedagogical innovation.an effective partnership between the school and the community (families, companies, etc.) can be a gas pedal for the development of digital infrastructure and pedagogical innovation in schools.
2. Governance that clearly promotes processes of educational innovation in schools ensures academic success in terms of teaching and learning.
3. The experimentation conducted in the four classrooms is considered a process of pedagogical innovation, as it provides the necessary conditions for the leadership of the change management team, a responsive and motivated group of teachers, and a process of reflection and continuous evaluation on real change and improvement of the teaching and learning processes.
4. he existence of adequate computer equipment in the classrooms, the methodologies used in the classroom laboratory, as well as the continuous participation of the center in other innovation projects with previous and/or current ICTs, are aspects that contribute to establish an innovation process based on the experimentation carried out.

5. The implementation of innovative experiments in schools contributes to improving the acquisition and development of specific and transversal skills (management of digital resources, teamwork, oral and written communication, etc.).

The detailed study of these hypotheses required us to reflect in a first part of a more theoretical nature, around some themes and concepts that are explained there and which, moreover, will form the basis of the second part, with a clearly applicative orientation, where four case studies are analyzed that constituted the "classlab" in the context of the developed project.

The theoretical basis consists of three chapters, in which the following topics were discussed :

- The first chapter reflects on the conceptualization of educational innovation, focusing on a series of factors that facilitate and hinder it, as well as the different scenarios in which the innovation takes place. It also addresses the question of why it is necessary to innovate and what are the necessary conditions for doing so, paying particular attention to the role of governance, the leadership of the management team, the characteristics of the innovative teacher, and communities of practice and learning as an opportunity for exchange and cooperation between an educational center that develops innovation processes, and the advisors, researchers, and other external supports that monitor and advise on innovations, always with a view to mutual learning. This chapter ends with a reflection on the evaluation of educational innovation.
- In a second chapter, the role of the school as a basic unit of change is discussed in detail, analyzing how a school's policy and philosophy in the face of this change determine its effectiveness in terms of innovation. The answer given in this chapter to the question of how to support the professional development of innovative teachers is particularly interesting, given that the aim of such support is to foster collective reflection, awareness in order to increase resources and the acquisition of skills, but focusing not only on the innovative teacher, but also, and above all, on the management team.
- A third and final chapter, in which good educational practices with ICT for innovation are conceptualized and characterized. In this chapter, after a suggestive reflection on ICT as elements at the service of innovation, and not only of school modernization, the different modalities of innovation in education are worked on, considering the value that ICT plays in it, and focusing on an innovative practice that affects the whole school, and in which its members are involved. The chapter ends, with the intention of interweaving the more theoretical part of this work and the empirical part, with an analysis of a few examples of good or innovative educational practices in different countries, through the appropriate use of ICT.

The second part of this production, of a more empirical nature, includes four case studies, designed on the basis of different classlab in which four centers involved in the whole ANGE project actively participated. In this way, the work is organized in an experimental way. Based on the description and interpretation of the latter, each chapter ends with an analysis of the weaknesses, limitations, strengths and possible opportunities, using the SWOT technique; and a descriptive study of the six hypotheses raised. More specifically, the case studies are as follows: Chapter 4 presents the case study of the G.S. Rakovski Gymnasium De Bourgas (Bulgaria), based on the classlab entitled: the development of new teaching and learning contexts through the reverse classroom in a technological context. Chapter 5 deals with the study of the classlab carried out at the Novida Lukio Institute in Loimaa (Finland), on evaluation as pedagogical practice. Chapter 6 looks in more detail at the classlab developed at the Zwam St Vith vocational

training center (Belgium), whose aim was to answer the question: how to set up a policy for integrating and using digital tools in student training ? Chapter 7 describes and analyzes the classlab planned and developed at the Paul-Claudel D'Hulst high school (Paris), entitled the Innovative Bubble.

This question allowed us to deepen the competency reference framework developed in the ANGE project, in which a whole series of competencies, organized according to an organizational, communicative and reflective approach, are unpacked. Their acquisition in what we have called a digital ecosystem is essential for all the actors in the teaching and learning process of an educational center. This reference of competencies, presented in the appendices, is carefully analyzed in a conclusions section, in which the competencies that each class has enabled to acquire are highlighted.

The paper concludes with some general conclusions that address, in a comprehensive manner, the qualitative description of each of the six hypotheses, in light of the joint reflection carried out on the four case studies. But it also, and fundamentally, provides an answer to the question with which this work began: how to accelerate the development of the skills of those involved in education through computing and in a digital environment? This question has enabled us to deepen the repository of skills developed as part of the ANGE project, in which a whole series of skills organized according to an organizational, communicative and reflective approach are gradually being distilled, the acquisition of which in what we have called a digital ecosystem is essential for all those involved in the teaching and learning process in an educational center. This reference of competencies, presented in the appendices, is carefully analyzed in a conclusions section, in which the competencies that each class has enabled to acquire are highlighted.

We hope that the reading of this research will serve as a starting point for continued reflection on the possibilities of technological resources for educational innovation. We are living in a moment of uncertainty, but a unique moment, in which the pandemic caused by Covid-19 has allowed us to verify the educational opportunities that these resources offer us, as well as their possible perversions if they are used randomly and without deep reflection on the why and for what of your work. We encourage the reader to consider this unfinished work and to enrich it with his own experiences, perceptions and thoughts, in the context of a learning community with other colleagues who have the same concerns.

FIRST PART

INNOVATION AS AN ENVIRONMENT AND PROCESS FOR THE DEVELOPMENT OF E-SKILLS

INTRODUCTION

In this first part, it is considered fundamental to address some of the themes that are at the basis of the second part of the production and that allow us to answer the question that gives the title to the work presented.

How to accelerate the development of digital skills in a digital environment, necessarily refers to the initial consideration of the concept of innovation, its characterization and its consideration as an ideal process for the development of environments in which it is possible to develop digital skills that foster innovation processes to improve the teaching and learning of students.

In a second step, and without losing sight of the objectives of the work, the consideration of the educational center as a basic unit of change is addressed. It is in the context of an educational center where there is a management team that acts as a driver of change, teachers who are stimulated to plan and develop innovations, where there is the possibility of carrying out innovation projects aimed at developing, improving or accelerating the development of digital skills. We cannot forget the importance of a governance that is sensitive to these changes and that promotes spaces and times for reflection for all the agents involved in this type of innovation.

Finally, in the third chapter, the good practices induced by the use of information and communication technologies are conceptualized. The chapter ends, with the intention of interweaving the more theoretical part of this work and the empirical part, with an analysis of a few examples of good or innovative educational practices in different countries, thanks to the appropriate use of ICT.

It is considered necessary to include this first part of a more theoretical nature as a basis for the part in which a more exhaustive study will be carried out on four cases in which different centers that participated in the project have designed and put into practice classlabs as a means of innovation in mediated environments through the use of ICTs. A series of questions closely related to the characteristics that these four scenarios presented had to be conceptualized and explained: (1) the implementation of innovation processes or, at least, the initial and progressive reflection of these processes. (2) The consideration of the educational center as the basic unit in which innovation takes place and the possibility that ICTs are considered as instruments at the service of innovation and as tools whose use promotes this innovation. And (3) The characterization of good innovative practices mediated by the use of digital resources.

We hope that this first part will be of interest to the reader and will allow him to better understand and situate himself in the second part, which is of a more empirical nature.

CHAPTER 1: APPROACH TO THE CONCEPT OF EDUCATIONAL INNOVATION

Azucena HERNÁNDEZ MARTÍN[a]
Ana IGLESIAS RODRÍGUEZ[a]
Yolanda MARTÍN GONZÁLEZ[b]
Marta MARTÍN DEL POZO[a]

[a] Department of Didactics, Organization and Research Methods, University of Salamanca, Spain.
[b] Department of Library Science and Documentation, University of Salamanca, Spain.

Introduction

In the 21st century, all education revolves around the knowledge society, which focuses on achieving one of the most ambitious challenges: lifelong learning. Where, as Fernández (2010) puts it,

> The subject must be able to manipulate knowledge, to update it, to select what is appropriate for a specific context, to learn continuously, to understand what is being learned, and all this in such a way that he or she can adapt it to new situations that are rapidly changing. (p.15)

It is in this perspective that educational policies, management teams and teachers must strive to introduce methodological changes and training models adapted to the type of person that the knowledge society requires. There is no doubt that modifying and/or changing teaching and learning methods is proving to be more complex than originally anticipated. These changes require adaptation processes on the part of both teacher and student, since until now these methods have been teacher-centered and nowadays they revolve around the student, looking for contextualized and complex learning situations, focused on the development of students' ability to apply and solve problems that are as real as possible (Iglesias, 2010, 2018).

The achievement of these objectives depends largely on teachers, because only they, as the main protagonists in the development of innovative processes, can help transform educational institutions and classrooms into dynamic and creative spaces, facilitators of learning, promoters of the values of coexistence and citizenship. In short, they are spaces capable of offering appropriate responses to the educational needs of students, families and communities (UNESCO, 2016).

The quality and equity of education systems depend to a large extent on the professionalism and commitment of teachers, who must be sufficiently prepared and trained to promote change and innovation in educational institutions, in full coordination and commitment to educational policies and the needs and particularities of the contexts in which schools are located.

According to UNESCO (2014),

> Educational innovation is a deliberate and planned act of problem solving, which aims to achieve greater quality in student learning, overcoming the traditional paradigm. It is about transcending academic knowledge and moving from the passive learning of students to a conception where learning is an interaction and is built between all. (quoted in UNESCO, 2016, p.3)

Since education does not start from scratch, teachers and students must embark together on a path that is probably not new, but which is filled with innovative educational experiences according to the context, situation and needs of those involved.

In this chapter, it is the introduction not a chapter, introduction serves to present the work and therefore can not be substantial. We will first try to approach the concept of innovation using different definitions, analyzing what different specialists say about it. Similarly, we will highlight the most significant aspects that characterize educational innovation. We will also discuss, on the basis of a review of the literature on the subject, the reasons why it is necessary to innovate, the conditions for innovation, in terms of governance, management, innovative teachers, etc. Finally, attention will be paid to the analysis of the main criteria for the success of an innovation and the conditions under which the success of an innovation can be evaluated or assessed.

1.1. What is educational innovation ?

Educational innovation is closely linked and associated with the concept of pedagogical renewal, which is why it is considered a complex concept that lends itself to multiple readings and interpretations (Cañal de León, 2002). Like any other educational concept (didactics, teacher training, school organization and management, etc.), it is conditioned by ideology, power relations in the control of knowledge, socio-cultural contexts, economic and political situations, socio-cultural contexts, educational policies, and the degree of involvement in innovation of different educational agents.

Similarly, educational innovation is not a one-time activity, but a process, "a long journey or journey that stops to contemplate classroom life, the organization of schools, the dynamics of the educational community and the professional culture of teachers" (Carbonell, 2012, pp. 11-12).

The objective of any educational innovation is to change a reality, by modifying teachers' conceptions and attitudes, methods and interventions and by improving, according to the degree of commitment of the agents involved, the teaching and learning processes.

From all of the above, and in trying to answer the question: Are innovation and change synonymous with process? it can be stressed that innovation is necessarily associated with change and improvement. While it is true that not all change implies improvement, it can be said that all improvement has been generated by change. In accordance with this idea of innovation as change, one definition of innovation can be that of a process of incorporating something new into an existing reality, a change in practice, in the development of teaching and learning strategies and in the very dynamics of the place where this innovation is carried out (usually the school). Both innovation and change are experiences that acquire particular significance in practice.

Taking this definition as a reference and trying to qualify much more what educational innovation implies as a process of change, we can indicate that as a multidimensional concept it implies :

1. Substantial dimensions of innovation, involving significant changes in materials, strategies, content and organization of the school. This is what some authors call institutional innovations, as all members and aspects of an institution are involved.

2. More partial dimensions, called optional innovations, which are those carried out by a professor or a group of professors, without the participation or direct involvement of other members of the institution.

3. According to various authors, there are six ways of innovating, provided that they involve improving teaching and learning processes:

    - Addition: when something new is added that complements the educational system without changing other parts or structures. For example, the introduction of resources or audiovisual media that help to modernize the school, but which do not represent an innovation if they do not generate any change.

    - Reinforcement: teachers' knowledge and skills are strengthened (e.g., through school-based training that contributes to the updating or development of teachers).

    - The elimination of a certain element or behavioural pattern (exams, certain forms of competitiveness, etc.).

    - The replacement of one element by another by substitution (the manual by shelves, one manual by another, etc.).

- The modification of elements, actions, functions (changes in teaching methodologies, program content).

- Restructuring, which would involve a new organization in every sense of the word, would affect the entire institution and involve most educational agents (innovations in the roles of teachers, for example, from speaker to facilitator, etc.).

In short, and paraphrasing Fernández (2016),

> Educational innovation is a set of changes introduced systematically into an educational practice and consistent with the different areas of knowledge in the educational field, as well as with the objectives that are expressed and shared with the community members as a concept of improvement. (p.31)

Focusing now on the concept of reform and its relationship with innovation and change, while we have already referred to the fact that innovation is associated with change, this does not mean that it is necessarily related to educational reform or reform processes, for two reasons (Cañal de León, 2002, p.12) : (a) Because the area of reform is "macro" in nature and affects the education system as a whole. Whereas the field of innovation is "micro" and moves to a more reduced and localized context in the classroom, school or educational community; and, (b) Because many reforms specified in education laws, both in their intentions and in their generalized application (the educational reform of a certain law, for example), do not always stimulate innovation; on the contrary, they sometimes ignore it, paralyze it or make it difficult.

This occurs especially when educational policies exert rigid control over the official curriculum through the imposition of textbooks and other technocratic and normative devices, as well as through increasing bureaucratic colonization of schools and educational activity. There is evidence that principals or management teams are more preoccupied with administrative than pedagogical aspects because of the pressures and demands of solving immediate and urgent problems. Or it occurs when schools lack resources of all kinds and, as a result, are more concerned with simple survival than with the introduction of new ideas or proposals. In both cases, teachers' autonomy is seriously reduced when it comes to engaging in innovation processes. It is then difficult to undertake any kind of journey (Cañal de León, 2002, p.12).

In short, reform understood at the macro level will facilitate change and innovation if, both in its intentions, specified in a law and in its subsequent developments, and in its application, it is truly committed to innovation.

1.1.1. Factors facilitating and hindering educational innovation

Among the key factors that foster innovation, and therefore change, are teachers who work in a coordinated and collaborative way in schools and who are committed to a holistic education that links students' experiences and the social issues they face to the school culture.

But, in addition, other fundamental factors must be considered to promote innovation (De la Torre, 1998; Carbonell, 2012; UNESCO, 2016):

- The importance of a national education administration that is sensitive to, recognizes and supports field experiences if it promotes the autonomy of schools and teachers, avoiding the familiarization with centralization in some countries.

- The presence of a management team that provides leadership to foster change. Achieving innovation necessarily implies considering the management team as the engine of change.

- The existence of strong teacher teams and a receptive educational community. In general, innovation is born where there is a strong and stable team of teachers with an open attitude to change. With people who are particularly active in the team and who make the innovation process dynamic.

- The importance of exchange and cooperation networks, critical advisors and collaborators, and other external support. Innovation is enriched by exchange and cooperation with other teachers through the creation of virtual and face-to-face networks to facilitate the exchange of ideas and critical reflection on them. For example, it is very interesting to create networks of connected and associated schools according to different objectives and areas of reflection and work, but also to have external references and support: advisors, teachers from other places who visit the schools, the existence of groups and movements for pedagogical renewal, networks of researchers and innovative schools that meet periodically, etc.

- The approach to innovation and change in a territorial context. The involvement of a certain urban or rural area in the changes will give the school more opportunities for improvement, as it will benefit from pedagogical and institutional approval and support.

- The ecological climate and symbolic rituals, i.e. innovation, require an atmosphere of well-being and trust, in which there are good interpersonal relationships (humor, relaxed and creative atmosphere, even pleasure that does not contradict seriousness). Equally important is the ritual culture that develops

over time: habits, behaviors, stories, languages that shape and strengthen group membership.

- The institutionalization of innovation as opposed to isolated and sporadic innovative activities. Institutionalization means that these activities are part of the dynamics and functioning of the school and the classroom.

- Experience, reflection and evaluation. Opportunities and possibilities must be created so that innovations can be experienced intensely, thoughtfully reflected upon and rigorously evaluated. These are very complex and difficult to measure processes, but this does not mean that we should give up trying to use all possible methods to access the knowledge of each phase, its educational potential and the results obtained through the innovation.

However, not everything is good in educational innovation. There are also factors that make them difficult, of a very diverse nature. Among the most common are poor personal relationships, lack of commitment to share common goals and projects, lack of coordination, passivity, resistance to change, lack of leadership, defensiveness of teachers, accommodation and conservatism, etc. (Santos, 2000).

In addition to these factors, other factors impede innovation (Heredia, 2004; Carbonell, 2012; UNESCO, 2016) :

- With the strength of the status quo, i.e., the centers do not want to detach themselves from their principles, established power relations, traditions, etc., it is more appropriate for some of them to maintain their situation as it is at the moment.

- The dynamics of change - the ambiguity, lack of certainty, uncertainty and complexity of objectives - give rise to greater intensity and excitement in the interactions between the different layers of power, making them more visible and making their development impossible.

- The resistance and routine of teachers, which manifests itself in aspects such as corporatism, conservatism, the functionalization of the profession, and the rejection of anything that implies change for fear of criticism.

- Individualism and internal corporatism, considered the most negative version of isolation, academic freedom and autonomy, power struggles between small corporate groups within the school, confrontations to obtain more resources and privileges, etc.

- The effects of educational reforms in a country, depending on their origin and the regulations they entail; sometimes these reforms are excessively bureaucratic, not conducive to change, with little opportunity to exercise the autonomy and

creativity of teachers; and, consequently, innovations.

- The paradoxes of the double curriuculum. On the one hand, teachers wish to innovate, but sometimes find that this innovation needs longer periods, activities that extend over time and that are in contradiction with the objectives and content that the law establishes for a school year, and which must be developed over a certain period of time. This situation leads teachers to see the need to "sacrifice" at certain stages of teaching, their desire to innovate in order to meet the curriculum requirements established by law.

1.1.2. Scenarios for educational innovation: where do the innovations lie?

Cañal de León (2002, pp. 20-25) sets out five scenarios for change: (1) the design and organization of knowledge; (2) the center's educational project; (3) participatory democracy; (4) collaboration with the family; and (5) city/educational community or school/environment dialogue.

Scenario 1: Knowledge Design and Organization

Due to the speed of change in the information and knowledge society, and the importance today that the knowledge and content that is taught and learned can be transferred to any different context and situation in which it was learned, the need to think of education as a continuous process of lifelong learning increases even more (Iglesias, 2010, 2018). "It is said that too much information produces disinformation" (Cañal de León, 2002, p.20), so it is important to develop strategies in people that allow them to select information, contrast it, critically analyze it and then transform it into knowledge that is culturally relevant, socially useful and psychologically adapted to the students' interests and needs. The key to achieving this goal is to break with the fragmentation of knowledge and to make way for globalized and interdisciplinary knowledge, in order to form democratic people, open to all and committed to a global education and multiple intelligences; capable of dealing with the problems of daily life, of looking at the environment to interpret and transform it, of working in teams, of putting into practice global and reflective thinking, of generating questions and not just looking for answers, of stimulating personal curiosity and that of others, and of using their knowledge for the benefit of collective progress.

Scenario 2: The Centre's educational project

The educational project of the center is a document that collects and defines the identity of the educational center and its specific characteristics. It is a dynamic and flexible document that, in order to be truly useful, must be revised, reconstructed, invigorated and made more concrete every day, thus becoming an element of democratic participation, capable of making the functioning of the center coherent and giving

meaning and coherence to everything that happens there. This is undoubtedly the ideal environment for shaping the innovation projects that the center wishes to develop and put into practice, the methodological strategies, the relationship with the environment, the models of organization, management and democratic participation, the distribution of time and space, etc.

Scenario 3: Participatory Democracy

This scenario is directly related to the previous one, since the implementation of the innovative objectives of the Center's educational project, involves the creation of a new pedagogical culture in which the pedagogical team is committed to working cooperatively to reflect on a new way of teaching, oriented towards a critical understanding of reality, which promotes the formation of a freer, more active and democratic citizenship (Carbonell, 2012). This scenario thus becomes the ideal place to develop the most powerful tools for learning democratic values: participation and dialogue. Participation that promotes debate and argumentation; and dialogue that raises questions, is sensitive to freedom and equality, and fosters collaboration and autonomy.

Democracy is a philosophy of life and a way of thinking about social relations. It is the balance between reason, feeling and morality, and it empowers individuals, teachers, the educational community and society as a whole (Cañal de León, 2002, p.23).

Scenario 4: Working with the family

Although many steps have already been taken with regard to collaboration between the family and the school, there is still a long way to go in this area, where differences continue to appear between the two groups, often due to a lack of information or insufficient communication about what is happening in classrooms and centers. Regardless of these circumstances, the two groups are destined to understand each other, so it is essential to establish some kind of formula that will strengthen their level of communication and collaboration. These include (Cañal de León, 2002, p.24): creating a climate of trust; providing information in a language close to their own; involving parents in the problems and uncertainties of school education; giving them a greater role in governing bodies and involving them in decision-making on important issues affecting the school community; encouraging their active collaboration in the preparation, revision and implementation of the school's educational project; opening up the school and the classroom to their participation, among others.

Scenario 5: The city as an educational community or school-environment dialogue

One of the most widespread and oldest criticisms is that the knowledge taught in school is unrelated to and not transferable to the environment. And this criticism becomes at the same time the great challenge for education systems. It is the function of schools to plan, select, synthesize and integrate the culture of the territory into the curriculum. But to do this, the school must go out to explore the city, to discover the immense possibilities of a city in permanent movement, in constant evolution, full of diverse cultural experiences, artistic creations, "communicative landscapes" (posters, advertisements, urban signs,

elements of sustainability, etc.), social networks and other cultural possibilities that the urban territory offers.

For Carbonell (2008, 2012), the territory, in addition to being a cultural capital, fulfills a socio-educational function that requires profound changes in the dialogue between school and city. In this respect, and very slowly, this discourse has given rise to different didactic proposals that act in a double perspective: a) from class methodologies to school trips, didactic itineraries, exploration and research trips on the environment, visits, work projects, etc.; b) from the school to the city, the territory is a cultural capital, and the city is a cultural capital, and the territory is a cultural capital. and, b) from the resources for the development of these methodologies, through the offer in many municipalities of didactic departments in museums, libraries and other institutions, the publication of didactic guides for the knowledge of different aspects of the city, the offer of leisure houses, farms and school gardens, different services and cultural promotions (cinema, theater, etc.); or the collaboration of the police or the army in different school programs, among others (Martínez Bonafé, 2010, p.528).

1.1.3. Why is it necessary to innovate ?

To address this aspect, the reasons given by Sola (2016, pp. 41-52) will be examined. This author proposes six important reasons that allow us to answer and reflect on this question.

1. *It is necessary to innovate because educating is more than teaching*

If social, political and economic changes make it necessary to train people to think in terms of a fairer and more humane world, we must advocate for a school that does not remain essentially memoristic and repetitive. As Pérez (2008) notes, the school of the 21st century continues to transmit information with a value of change and not of utility, that is, the acquisition of academic content serves to have good grades and to progress in school, "to cover the stages of a career by obtaining the necessary points in each of them to be able to participate in the next" (Sola, 2016, p.42). This corresponds to a meritocratic school that can become more and more distant from society. Unfortunately, if this is how one understands school, one does not live in it and learn to live in it, one does not understand daily life and does not intervene in it, if necessary.

As opposed to a transmissive and indoctrinating school where the emphasis is on the acquisition of knowledge and instruction, we must emphasize the need for a school that bets on the education of creativity, originality, not only in specific subjects or disciplines with specific contents, but through different methods and models of relationship, where reflective and critical thinking prevails over effective thinking.

2. *There is a need to innovate because there is a need to educate about the diversity of cultural experiences in educational centers.*

As Francesco Tonucci (1978) said, "the school-factory" is fundamentally focused on the production of similar and homogeneous people. But there are two problems that cannot be forgotten (Sola, 2016): (a) The students, who in this case and following the metaphor of the school-factory would be the raw material of schools, are very diverse due to social, familiar, environmental, genetic, motivational, etc. factors. Therefore, a homogeneous school does not make sense, it is not possible; and, (b) The production of identical people requires the existence of an equally homogeneous, very closed educational system that guarantees this similarity and homogeneity among the students (the manufactured products). Since this is not possible because many students do not meet these quality requirements, the school classifies the people who pass through it (more or less well, more or less workers, more or less obedient or not, etc.).

Given these two problems, why is innovation necessary? Because in the face of the similarity established between school and a factory, schools or educational centers must be understood as "spaces for cultural experience, for the recreation of culture, for rich and diverse experiences, for relationships with people, ideas, values, cultures, for creative manipulation, for intimate emotion in the face of discovery, for personal growth" (Sola, 2016, p.44). And according to this, any process of innovation in the school can address issues related to cultural experience and stimulate divergent thinking, that is, teaching all members of the educational community to think differently.

3. *It is necessary to innovate because technologies facilitate pedagogical evolution.*

While it is true that the categorical rejection of information and communication technologies (ICTs) by teachers has virtually disappeared, a certain scepticism and ignorance about the role that ICTs can play in education persists.

This lack of knowledge, as well as certain policies of educational administrations, have favored and continue to favor the physical introduction of ICTs in the centers, without this being accompanied by a reflection on the changes that this implies in terms of organization, selection and methodological proposal of contents, formulation of activities and evaluation.

> The enormous power of technologies, including the ease with which various materials, activities and tasks of all kinds can be found, reused, reproduced and redesigned, can represent a pedagogical and didactic involution in all its rules, since it is easy to succumb to the aspect, to the packaging, without paying much attention to the type of learning that is promoted, to the type of relationship of the subject with the information, to the way in which the creation of knowledge or its simple storage and reproduction is promoted or inhibited. (Sola, 2016, p.46)

And with this, the possibility that technological tools are a means of changing teaching and learning situations is lost, as well as in the research and organization of information to build and share knowledge.

The development of innovation processes therefore allows for technology not to be an end in itself and for change to be curriculum-driven and not technology-driven. In this case, this will be the case when it can be said that support is not the only thing that has

changed and that the didactic potential it has is used for different forms of expression and in exchange and collaboration activities of a very diverse nature.

4. *Innovation is necessary because school no longer prepares for employment*

Despite the progress that today's society is experiencing at all levels, the curriculum continues to focus mainly on the transmission of basic knowledge that supposedly prepares for professional performance, without being aware of the great ignorance that exists as to what the configuration of activities and occupations of the most immediate future will be.

Schleicher (2016), Deputy Director of Education at the OCDE, states that :

Today's schools must prepare students for economic and social change faster than ever before, for jobs that do not yet exist, for the use of technologies that have not yet been invented, and for solving social problems we do not yet know will arise. (p.2)

This means that the knowledge and content that is taught to people must serve them so that they can transfer what they know and apply it to new situations. In other words, "the world no longer rewards people only for what they know, but for what they can do with what they know" (Schleicher, 2016, p.2).

Therefore, personal and professional success in the society of the 21st century will depend, to a large extent, on an education focused on various aspects such as ways of thinking (creativity, critical thinking, problem solving, decision making, etc.), work methods (communication and collaboration skills), work tools (various technologies), social and emotional skills that promote relationships and working together. Only in this way will future citizens be prepared to enter the labor market as active, critical, autonomous and able to adapt to the multiple, changing and uncertain circumstances in which jobs are currently found.

5. *It is necessary to innovate because the evolution of the educational system is based on innovation.*

The idea of an evolution of the educational system based on the development of innovation processes, i.e. from the bottom up, requires laws that allow autonomy for centers and teachers to specify a minimum common curriculum and to develop it according to solid and public arguments that can be analyzed and criticized, that favor changes in the selection of contents, in the definition of activities, in the programming of

tasks, in the form of grouping, in the organization of time and space, and in evaluation systems.

6. *Innovation is necessary because teacher training needs to be improved.*

Innovation should be seen as involving and referring to the teacher. All the research conducted on this subject agrees that this factor is a key element of education systems: a quality teacher, an excellent teacher is the real agent of change.

Their training is therefore crucial because the student's problem is no longer that of access to information. The difficulty currently lies in developing a series of digital skills that will enable them to analyze, classify, organize and make sense of the information available. It is therefore necessary for the teacher's role to change from that of a transmitter of knowledge to that of a guide, advisor or tutor who is in the best possible conditions for the student to learn. This change of role requires that the teacher be able to formulate good questions, select problems, raise exercises, provide materials, provide time, space and organization, evaluate progress and difficulties, etc.

These aspects make innovation a necessity. Teacher training, as many studies indicate, is improved more by processes of reflection on practice than by other training strategies such as course participation or study. This reflection is fostered by the implementation of non-routine practices based on universal certainties.

Therefore, processes of experimentation and innovation are fundamental to the continuous improvement of teacher education, just as in-service training is an essential condition for teachers to perceive the importance of developing innovation processes in a meaningful way. In other words, it is necessary to be trained in innovation, but at the same time innovation, participation in it, "is the best training strategy if, in addition, it is associated with shared reflection among colleagues" (Sola, 2016, p.51), with collaborative work.

So, when can training be considered to promote or facilitate the development of innovation ?

- Research shows that teacher education is improved primarily through processes of reflection on practice, and better than through other training strategies such as participation in training courses.

- A form of training that takes place in the workplace is important, where teachers are confronted with problems and dilemmas that arise in real practice.

- It is a horizontal, non-hierarchical formation process that takes place between equals and takes on meaning and significance in the concrete framework of the relationships that occur in the workplace.

- It is based on collaboration, trust and support, which are essential to deal with the complexity and uncertainty that always accompany innovation processes.

- It is conceived as a non-formal, but reflective and critical strategy, emotionally charged, exciting, a model of professional development that is less dependent, more autonomous and confident in the abilities and knowledge of the teaching staff.

1.2. The conditions for innovation : the role of educational governance, leadership and the innovative teacher?

Each institution That is, they have their own culture, which is determined by their organization, policies, regulations, practices, values and systems that govern them and make them different from others (Ramírez, Ramírez and Rodríguez, 2017).

Like any institution with deep-rooted ideas, changing organizational cultures means changing beliefs, being ready to take on challenges, redesigning the educational centers themselves, bringing about changes in culture and institutional learning and in each of its members; and having the commitment of its members. Without all this, it is impossible for changes and innovations to meet the centers' adaptation needs and the demands of external elements (personal, institutional, social, students, etc.).

To carry out this task implies that whoever exercises leadership and promotes change, be it in educational policies that are specified in laws and that mark the educational pulse of a country, the regional and local educational administration, as well as the management teams of the centers, must have a thorough knowledge of the context, the organizational culture, and the objective they want to move towards, in order to carry out the processes, the information channels, and the adequate monitoring of everything that happens (Gairín, 2000 ; Gairín and Muñoz, 2008). In this way, the educational center becomes a basic unit of change (Goodlad, 1983; González, 1988; Escudero, 1989, 1990).

According to Ramírez, Ramírez and Rodríguez, (2017), "a culture of innovation can be characterized as the environment in which beliefs, practices, processes,

interrelationships and evaluation systems converge to promote transformations and improvements" (p.136).

This aspect requires the consideration of all the actors involved in the development of the innovation project: the government and educational administrations, the director or management team of the educational center and the teachers. The government and educational administrations are responsible for defining the policies and processes of educational change and, therefore, for ensuring that the goals, policies, objectives and scope of their proposals follow the guidelines and are interpreted by the schools in accordance with the established requirements.

1.2.1. Approach of the concept of Governance

The term governance is characterized by a high degree of complexity and ambiguity, so much so that there is no consensus among the different authors to give a clear definition (Rhodes, 1996; Stoker, 1998; Lessard and Brassard, 2009; Santos, 2010; Guimarães-Iosif, 2012; Hoyler, Burgo, Bresler and Paulics, 2014). It is a polysemic concept that is also used in different ways and in different contexts (Subirats, 2009; Kehm, 2011; Del Castillo, 2012; Díaz, Cívis and Longás, 2013; Díaz-Gibson, Cívis, Carrillo and Cortada, 2015; Veiga dos Santos, Marins, Guimarães-Iosif and Pollom, 2016; Torfing and Díaz-Gibson, 2016).

The concept of governance emerged in the 1970s. It comes from the economic (corporate governance), political (global governance) and socio-political (modernization of public administrations, new public management, effective state) spheres; but it will not be until the mid-1990s, when governance begins to take on a special meaning, becoming the political slogan of neoliberal globalization (Veiga dos Santos, Marins, Guimarães-Iosif and Pollom, 2016).

Thus, we have, for example, that authors such as Subirats (2009) indicate that "we speak of governance as a new form of conflict regulation, characterized by the interaction and cooperation of multiple actors articulated in a network for the development of collective projects" (p.2).

Similarly, Kehm (2011) indicates that this concept: "[...] is used as an analytical category to explain the mechanisms for coordinating the activities of different actors, albeit interdependent, in a given field" (p.21).

Aguilar and Bustelo (2010) also include governance as :

the process or activity of directing or managing the company. Because it is a management activity, governance is an intentional activity, oriented towards the achievement of privileged social

objectives, and is a causal activity, in the sense that it is the action deemed ideal to achieve the privileged objectives. (p.32)

Reis (2013), on the other hand, states that "[...] it is the analysis of models of articulation and cooperation between actors and of institutional arrangements that coordinate social systems" (p.104). And other authors such as Veiga dos Santos, Marins, Guimarães-Iosif and Pollom (2016) explain that "[...] governance is the basic structure of an environment that fosters the network of pragmatic and cooperative ideas and models of behavior shared by a selected group of agents with different interests" (p.941).

All these definitions underline the imperative need for adequate coordination, cooperation and interaction between the different actors involved, albeit interdependent, which, through the creation of socio-educational networks, will enable good decisions to be made and procedures to be put in place to avoid and resolve conflicts, in order to achieve the adequate development of collective projects.

In recent years, modes of coordination have undergone significant changes that have led to a concept of multi-level governance (Kehm, 2011, p.24): the first level refers to a different organization of the agenda and the shift from national to supranational policies. This level is called "upward". The second level refers to the decentralization of decision-making powers from the state to, for example, the Autonomous Communities, and from these to schools. This level is called "downwards". And, the third level, consists of delegating management and decision-making from a state level to agencies (for example, accreditation agencies) that establish the basis for practices. This level is called "lateral".

All these levels generate new coordination practices through networks, as well as the "conceptual core of the new paradigm" (Subirats, 2009, pp. 3 - 5):

1. *Governance involves the recognition, acceptance and integration of complexity as an intrinsic part of the political process. Governance understood in this way implies that it should be conceived as a social learning process in which all actors involved share their knowledge and perceptions of reality and seek explanations and interpretations of problems.*

2. *Governance involves a system of government through the participation of diverse actors in pluralistic networks. This paradigm shows : (a) that there is a fragmentation of government responsibilities and capacities, since there is no permanent framework for negotiation due to the diffuse existence of a present authority; (b) that this fact causes great chaos, leading to a dispersion of knowledge among the different actors, since each of them has a different vision of the problems; (c) that "resources for effective policy development are distributed among a multiplicity of subjects"; and (d) that "public interventions cause a series of effects that are difficult to predict".*

3. *Governance implies a new position of public authorities in the processes of government, the adaptation of new roles and the use of new instruments of government.*

All these aspects suggest that these new network governance dynamics depend, to a large extent, on the context in which they are conducted, the actors involved in the process, the individual and collective capacity to deal with change, and the values, interests and objectives that guide the creation of the new organizational frameworks (Subirats, 2009).

According to several authors (Rhodes, 1996; Jessop, 1999; Lessard and Brassard, 2009; Santos, 2010; Rizvi and Lingard, 2010; Reis, 2013; Vegas dos Santos, Marins, Guimarães-Iosif, and Pollom, 2016), governance is presented as a form of polycentric coordination, where relations are asymmetrical and complex.

From the point of view of education, the state is no longer the one that "does everything", but it is the "coordinator of coordination"; and governance of education is no longer done only at the national level, but also at other levels (Dale, 2006).

Del Castillo (2012) argues in this regard that the management of the education system requires a type of governance capable of ensuring not only the stability but also the effectiveness and efficiency of the government. He added that to achieve this goal, changes must be made in four directions (p.643) :

a) Encourage the participation and articulation of the different actors (teachers, principals, supervisors, sector leaders, parents and other members of the local community), in the political process and especially in its implementation;

b) Generate new forms of management organization that lead to a less hierarchical and more horizontal system of relations between actors;

c) Revitalize, in the decision-making process, the functioning of existing collegiate bodies, both in the educational system and in schools and school zones ;

d) To encourage the construction of roles between the actors of the school community and the local community, all with the aim of creating the conditions for collective action around the transformation of schools, an essential premise for the improvement of quality.

In short, the objective of governance is to know the effectiveness, efficiency and efficiency of different forms of organization and the main keys to achieving this (Díaz, Cívis and Longás, 2013, p.217).

In this sense, Provan and Kenis (2007; cited in Díaz-Gibson, Cívis, Carrillo and Cortada, 2015, pp. 66-67), propose three different governance models, with their strengths and weaknesses depending on the context in which they are carried out, and which produce different effects on both professionals and the community :

1. Shared participation. In this type of governance, it is the members themselves who are responsible for the governance of the network, through their voluntary and equal participation. They become the main people responsible and accountable for managing internal and external relations, administrative matters and coordination.

2. Leading organization. In this model, the lead organization is usually an institution that has a central position with respect to community resources and beneficiaries. Key decisions and activities are coordinated by a lead organization, whose power is greater than that of the other members. This institution will provide the administrative and management support needed to achieve the objectives set, which in this case will be the same as those of the organization itself.

3. Administrative organization of the network. It consists in creating an organization independent from the rest in order to govern the network and its activities. It will be in charge of centralizing relations in an administrative organization, thus promoting the coordination and dynamization of the network, as well as equitable decision-making among its members.

As can be seen, government and leaders are particularly important in schools, as they are responsible for school success and for making the most of existing resources (Coronel, 2003; González, 2003; Díaz-Gibson, Cívis, Carrillo, and Cortada, 2015).

Taking advantage of existing resources is an indispensable condition for achieving the efficiency of educational centers, a question that requires, in turn, the establishment of inter- and intra-school synergies that value not only the human capital existing in the organization itself, but also the human and social capital available in the context in which it is immersed ; because this type of interaction based on healthy relationships and collaboration is typical of good pedagogical leadership (Daly, 2010; Castiñeira, 2011), given that its main objective is to maximize the potential of the teaching team (López, and Lavié, 2010; Barnett and McCormick, 2012).

Authors such as Castiñeira (2011) and Coronel (2003), although they attach great importance to the leadership and management functions that can be assumed by the same person, also stress the need to be aware of their differences. Thus, they say that management is about planning, developing and organizing plans, designing strategies and making technical decisions in all aspects related to the management of people, budgets and actions, among others. From a governance perspective, the question is how it is governed, but not who and why (Kehm, 2011). On the other hand, leadership would be one step ahead of direction and management, since its task is to implement real changes in the organization, based on a common and shared project. Its objectives are (Saz and Ospina, 2009; cited in Díaz-Gibson, Cívis, Carrillo and Cortada, 2015, pp. 64-65): "to mediate between members' differences (Bridging), promote a common work culture (Framing) and enable members to take action (Capaciting)". And, as far as management is concerned, it focuses on the actor (Schuppert, 2006), as opposed to

governance, which focuses on the institution. Both functions, management and leadership, are responsible for coordinating the members and the resources available to carry out the organization's own activities. While leadership and management are responsible for initiating, facilitating and guiding collaborative innovation.

All of these aspects highlight the need to create governance networks, which alone can promote collaborative innovation with a significant impact on educational outcomes (Renée and McAlister, 2011; Sørensen and Torfing, 2011; Torfing and Diaz-Gibson, 2016). The collaborative interaction that takes place between the different actors involved through these networks encourages the exchange of ideas, experiences, knowledge, perspectives, negotiations, etc., which make it possible to detect problems and challenges that schools face in new ways and to try to find different and innovative solutions to the relevant complex situations that arise. To achieve this goal, it is necessary to work together and collaboratively, as innovation is rarely the result of the work of isolated individuals and professionals. Each of the phases of an innovation project makes collaboration between the actors involved essential, as they are the best ambassadors when it comes to sharing and disseminating the innovation achieved and the results obtained, involving the community in the content of the innovation, its possibilities and limitations, and the benefits of the most innovative practices.

Having the leadership of the principal or all members of the management team is a key element for the success of educational innovations in schools, which will be enhanced if there are, in turn, creative teachers who are able to consolidate their ideas and projects. In this sense, the principal must act on the front line when it comes to implementing reforms and managing their effects. At the same time, they must guarantee flexible organizational systems and enable teachers to do their job, defining common goals and desires.

The director is a leader and, as such, must promote collaborative working environments, active contact between the parties involved (teachers, external support, inspectors, etc.), a common line of action, and make possible a regular time and space for joint work among teachers. Only in this way will resistance to change be reduced on the part of the most undecided participants, generated mainly by fear of the unknown, overwork, lack of material and technological resources, space and time, etc. It should be kept in mind that the role of managers in different European countries, such as Spain or France, is evolving towards strategic and change management functions. In other words, in addition to conventional leadership, it is essential to consider this figure as a transformer and a school manager (Gunter, 2012). This means that educational policies and governance should encourage school principals to become managers who lead teams of teachers, encouraging, coordinating and actively participating in innovative educational activities in schools, in order to contribute to better performance and, consequently, to students' academic success (Brest, 2011). Strategic and change management also implies that the director and his team play a more active role in the pedagogical management of the

school, providing appropriate responses to the different actors in the education system, such as tutors, students, teachers and families.

Another important role of the director in the educational center, and in an innovative context, is that of "facilitator", supporting a collective educational project, and this involves :

a) To encourage the design and development of innovative educational projects, and to initiate and promote more local educational dynamics at the school level, such as interdisciplinary and multidisciplinary pedagogical projects, or innovations in forms of student evaluation.

b) Rely on people who are also seen as leaders by other teachers, such as teachers who are more open to innovation, project leaders or temporary collaborative structures, such as project groups, thematic working groups, etc. (Attarça and Chomienne, 2013). These other leaders or relays (Barrère, 2006) constitute a form of intermediate pedagogical hierarchy on which principals can rely, helping to reduce or eliminate the dissociation that sometimes occurs between pedagogical and administrative logics.

c) To facilitate, as already indicated, the development of a culture of collaboration among innovation agents for the adequate development of the innovation process and the quality of education. Therefore, collaboration fosters professional dialogue, communication, exchange of ideas and experiences, values, the ability to learn together and the establishment of synergies for the realization of innovations that one person could not achieve alone, thus becoming essential factors and operating rules in the educational institution. And all this is possible if the director and his team promote the creation of Communities of Learning and Practice (COPs), understood as "forms of collaboration between people who pursue the same goal of common interest, and as a consequence of these interactions, there is learning that can be translated into new ideas and new products or innovations" (Ramírez, Ramírez and Rodríguez, 2017, p.140).

d) To promote among teachers, through training in the school itself, the acquisition of skills and techniques that improve the processes of self-revision, planning, development and evaluation. This training must be adapted to both individual and social needs, that is, it must be adapted to the reality of the problems that arise in the practice of teaching, recognized and valued by colleagues in the same professional field and by the institution itself.

e) Facilitate appropriate spaces to promote communication, multidisciplinary collaboration, dialogue, training and the generation of ideas, among the teachers of the educational center itself, or at the inter-center level.

6.1.2. The role of the management team in an innovative educational institution

Having the leadership of the principal or all members of the management team is a key element for the success of educational innovations in schools, which will be enhanced if there are, in turn, creative teachers who are able to consolidate their ideas and projects. In this sense, the principal must act on the front line when it comes to implementing reforms and managing their effects. At the same time, they must guarantee flexible organizational systems and enable teachers to do their job, defining common goals and desires.

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to reduce or eliminate the dissociation that sometimes occurs between pedagogical and administrative logics.

c) To facilitate, as already indicated, the development of a culture of collaboration among innovation agents for the adequate development of the innovation process and the quality of education. Therefore, collaboration fosters professional dialogue, communication, exchange of ideas and experiences, values, the ability to learn together and the establishment of synergies for the realization of innovations that one person could not achieve alone, thus becoming essential factors and operating rules in the educational institution. And all this is possible if the director and his team promote the creation of Communities of Learning and Practice (COPs), understood as "forms of collaboration between people who pursue the same goal of common interest, and as a consequence of these interactions, there is learning that can be translated into new ideas and new products or innovations" (Ramírez, Ramírez and Rodríguez, 2017, p.140).

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e) Facilitate appropriate spaces to promote communication, multidisciplinary collaboration, dialogue, training and the generation of ideas, among the teachers of the educational center itself, or at the inter-center level.

f) To promote among teachers, through training in the school itself, the acquisition of skills and techniques that improve the processes of self-revision, planning, development and evaluation. This training must be adapted to both individual and social needs, that is, it must be adapted to the reality of the problems that arise in the practice of teaching, recognized and valued by colleagues in the same professional field and by the institution itself.

g) Facilitate appropriate spaces to promote communication, multidisciplinary collaboration, dialogue, training and the generation of ideas, among the teachers of the educational center itself, or at the inter-center level.

We find several of these actions in the study carried out with the 4 heads of establishments of the ANGE experiment by Hervé Chomienne[6] (appendix 3).

[6] See the detail of the study in appendix 3
http://classlab-ange.eu/wp-content/uploads/2020/12/Rapport-Management-changement-ANGE-ISM.pdf

1.2.3 The figure of the innovative teacher

In addition to what has already been stated, it must be considered that for an innovation project to be considered as such and, therefore, to be carried out, the personal and professional involvement of the teaching staff is necessary, since they are the only agents of innovation that are essential for the transformation of educational activity to take place (Tejada, 2008; MEC, 2011). De la Torre (1994) has already made this clear when he stated that :

> The teacher alone constitutes a true subsystem of other subsystems such as innovation or education. His reflection on innovation, his pedagogical conception, his expectations, his personal and professional interests, his feelings, his family environment, the training he has received, his aptitudes, his resistance to stress, etc. constitute a complex picture that varies from one situation to another. Innovation will end up being what teachers make of it. (p.171)

Recognizing the essential, but not exclusive, role of the teacher in the innovation process necessarily implies entrusting him/her with the true role of program agent capable of redefining, restructuring or designing new innovations, and not just consuming them, by breaking the hierarchical relationship of dependence with the expert and building the innovation.

However, as Fernández (2016) points out, in order for teachers' professional development to be as rich as possible, two issues need to be transformed. The first relates to the need for teachers to be aware that their practice is an immense source of knowledge that requires reflection in order to improve and share it. This fact implies a change in the profile of the teacher that breaks with the tradition of teacher isolation, giving rise to a professional who is more collaborative than solitary, a promoter of participation, aware that he or she is no longer in possession of absolute knowledge, endowed with important organizational skills, open to experimentation and capable of modifying his or her methodology (Sangrà, 2001). The second issue involves authentic collaboration and joint work between universities, as centers of research on these topics, and schools, capable of speaking the same language, tackling the same problems, and seeking spaces to share concerns, experiences, etc. that promote and facilitate innovation and transformation in education.

The implementation of innovation projects requires teacher training because, as De la Torre (1994) pointed out in an already classic work,

> Innovation training is equivalent to learning, i.e. training to introduce change and improve the teaching and learning process. Preparing to innovate means having the knowledge, skills and

attitudes necessary for continuous professional improvement. Under these conditions, it is not possible to conceive of training other than as innovation or training for professional self-learning. (pp. 173-174)

Teacher training and professional development, as a fundamental part of improving education, both at the classroom and school level, involves keeping in mind a series of principles (Marcelo, 1994, pp. 184-187), which conceive it as :

- A continuous process, although composed of distinct phases. According to Fullan (1987), "professional development is continuous, interactive, cumulative learning, combining a variety of learning formats" (p.215).

- Integration into processes of change, innovation and curriculum development. Teacher training should be linked to curriculum development and should be understood as a strategy to facilitate educational improvement. In this regard, Escudero and López (1992) stated that "a well-understood training should preferably be oriented towards change, towards the activation of relearning in subjects and in their pedagogical practice, which in turn should be a facilitator of students' teaching and learning processes" (p.57).

- The connection of teacher training processes with the organizational development of the school.

- The integration between teacher training, in terms of actual academic and disciplinary content, and the pedagogical training of teachers.

- The integration of theory and practice in teacher education. Teachers, as teaching professionals, develop their own knowledge based on their personal experiences and backgrounds, which they are able to rationalize and assume as routine. To prevent this from happening, practice, understood as a source of knowledge, needs to be analyzed and reflected upon in its own action (Clift, Houston and Pugach, 1990; Tabachnick and Zeichner, 1991).

- In short, we can consider that the quality of education is undoubtedly determined by the quality of its teachers. And these principles make it easier for teachers to move from being consumers of knowledge to being generators of knowledge, acting as agents of change rather than subjects of change.

1.2.4 Communities of practice and learning. An opportunity for exchange and cooperation

Output 02[7] (Digital policies in the Quebec education system; management of establishments, educational innovation and governance), developed as part of the ANGE project, under the direction of Michéle Désrochers of the CEGEP de la Pocatière in Quebec, explained in detail how communities of practice and learning are groups of people who specialize in a given area of knowledge, who share a common passion for it, interacting regularly to improve what they do and/or learning to do it better. In this regard, it is essential to emphasize that CAPTIC[8] is an element of the NAP, a choice of teacher training by recognized and missioned peers; it is not in itself a community of practice; however, the fact that this modality exists, can lead to the creation of a community of practice.

Thus, communities of practice are groups of professionals who share practices, often communicate through different channels and develop a set of interdependent identities related to the work and cultural understanding of their group (Cox, 2005). Learning in communities of practice is interactive in nature, in which teachers access knowledge and information about, for example, innovation processes, action research, conducted at the center and in the classroom, through interaction, advice and mutual engagement with other teachers and professionals involved.

Deschenes and Desrochers (2019) assert that although communities of practice and learning communities imply significant change in educational practices, they can be powerful tools by providing an interesting space for reflection that helps teachers analyze their practices and innovate; and at the same time, they provide them with practical examples of how to plan, execute and analyze specific processes that can be carried out in the classroom, in defined and synchronized contexts, to foster change and improvement. In this regard, the authors point out that "organizational change studies in the field of sociology of organizations increasingly use a practice-based collaborative learning perspective to explain the role of agents in institutional change" (p.32).

Although these communities, as has been pointed out, are powerful instruments for reflection and the construction of knowledge and practices among different professionals, in our case, in the field of education, certain conditions must be taken into account for these communities to be "living beings", which are continually born, grow and reproduce themselves on the basis of tangible results. In this sense, and following the contributions of the aforementioned authors (Deschenes and Desrochers, 2019), the ideal conditions for the implementation of these communities, and for them to achieve the optimal results for which they were created are, among others, the following :

- The permanent concern to maintain contact and common interest between and with all members, in relation to the activities that are carried out.

[7]Output 02 http://classlab-ange.eu/wp-content/uploads/2020/05/OUTPUT-02-FR-Les-politiques-du-numeriqu-e-dans-le-syste%CC%80me-e%CC%81ducatif-que%CC%81be%CC%81cois.pdf
[8] CAPTIC Video https://www.youtube.com/watch?v=u-3wyw5v704&feature=emb_logo

- The follow-up of the needs expressed by the different members.

- The need for communication skills of a cognitive and socio-affective nature that enable all participants to understand what is being expressed and done. In this sense, it is important to start from well-defined and understood concepts and practices, and to create a friendly and receptive environment.

- The skills to be able to participate or create a friendly and receptive atmosphere within the community of practice.

- The relevance of having people who take the initiative, who give clear instructions with well-defined objectives, as well as creating a quality work environment and encouraging collaboration among the different members of an institution, and between them and other professionals who are part of the community of practice.

In the context in which we find ourselves, the ANGE project, these communities have been configured by groups of professionals who have established communication in synchronous and asynchronous contexts, thanks to :

- Short training courses in each of the partner countries of the ANGE project[9].

- *Transnational meetings* were developed in Spain, France and Canada, during which, for three or four days, collaborative work was carried out on different topics related to the objective of the project.

- The creation of a TwinSpace on eTwinning; a collaborative space for sharing project work, online communication and publication in which many documents provided by the different member countries have been integrated, and it includes, for example, reports on the four experiments and their evolution over the three years of the project, and exchanges between the professors directly involved and the university researchers in charge of advising the action-research process. It is also important to highlight the video section, which includes training documents and visual resources on different topics such as evaluation, governance or other issues dealt with in the short face-to-face training sessions, which have been recorded and can be consulted.

- A synchronous or asynchronous Think Tank[10] allowed many experts to intervene on topics related to the different aspects of educational innovation in a digital context in the context of training or webinars. As an example, we can cite some of the webinars organized.

[9] http://classlab-ange.eu/wp-content/uploads/2020/11/Referencement-des-formati-ons-de-courte-dure%CC%81e-FR.pdf

[10] http://classlab-ange.eu/wp-content/uploads/2020/09/FR-I-RECENSEMENT-DES-WEBINAIRES-I-PARTENARIAT-STRATEGIQUE-ANGE.pdf

Webinars
Adriana Gewerc Barujel. *Dilemmas and contradictions for the development of digital competence*
Bernard Hugonnier. *The work of the OCDE and the evolution of the headteacher's profession*
Clémence Mergy. Conférence *Innovating in school through design*
François Muller. *The digital crisis of school governance.*
L'équipe de l'ICP. *Discourses and Practices of Educational Innovation*
Laurent Tessier. *Digital literacy: a paradigm shift*
Marc Buissart. *Digital and governance: the conditions for success.*
Séverine Parent. *Learning, Digital and Governance*
Virginie Trémion. *Study of representations of innovations in the inverted classroom.*
Xavier Garnier. *How to anchor the FCL in the governance of institutions: issues and impacts*

Think Tank
Bernadette Charlier. *The use of digital tools in European countries (title to be specified)*
Bernadette Charlier. *Framework and tools to describe an action and innovation device and to understand its effects*
Bernard Hugonnier. *OCDE work on the governance and management of schools and the evolution of the headteacher's profession*
Carmen Alba Pastor. *Universal Design for Learning and Digital resources for inclusion in Education*
Daniela Căprioară. *E-technologies and challenges of the school*
Fabrice Fresse. *PISA - Global Skills*
Françoise Cros. *Innovating at school*

Ignacio Atal Teacher-Researchers: Collective Response to Educational Challenges
Jacques Cool. L*eadership and digital badges*
Jean-Marie De Ketele. *Co-construct a skills repository*
Marcel Lebrun. *Inverted classrooms, a precursor and prototype of the "school" in the digital age*
Marguerite Romero. *Creative uses of digital in a home school context*
Monica Gather Thurler. *Innovation at the heart of schools: what do we (more) know in 2020?*
Richard Wittorski. *Professional Activity, Professional Development and Learning Organization*
Vincent Dupriez. *School reforms and modes of governance*

It is also worth mentioning the regular exchange and advice given, through videoconferences, face-to-face meetings, and participation in different forums, between professionals from the educational centers that carried out the experiments or the classlab, and university researchers participating in the ANGE project (University of Craiova, ICP of Paris, CEGEP la Pocatière, and University of Salamanca).

To go a little further in what has already been underlined in the previous paragraphs, the constitution of a pan-European team of teachers, university specialists/researchers, heads of educational institutions and external evaluators of the project itself, has favoured, driven by a common interest, the construction of mutually supportive relationships that generate shared learning processes. We must consider, as has already been said, that educational innovation is enriched precisely by the exchange and cooperation with other teachers, through the creation of face-to-face and virtual networks that promote the exchange of ideas and critical reflection on them. From this perspective, educational innovation in a school is nourished, for example, by the creation of Associated Schools networks, based on common objectives and areas of reflection and work. Let us think, in this case, that although each of the four experiences, which will be explained in the second part of this intellectual production, have different characteristics in the social, economic and educational fields, they all have the same objective: to create contexts in which the curricular integration of technological resources contributes, not only to change, but above all to the improvement of the teaching and learning process. For all these reasons, it is extremely important to have external support and references such as university researchers, advisers, teachers who already have experience in the design and implementation of innovation processes and who can provide support

through their experience, reflection, benevolent questioning, or simply through their distanced view of the projects concerned.

The preceding paragraphs have highlighted the main potential of communities of practice and learning communities for educational innovation, but it is clear that difficulties of various kinds sometimes arise in these work dynamics, marked by limited time and space for collaboration and advice between professionals, as well as possible differences in approaches and epistemological approaches. The first challenge faced by these communities is, for example, the availability of time to carry out the activities required to make collaboration and advice effective.

However, limitations may also arise from differences in starting points, abilities, knowledge and skills among all professionals involved, especially if one starts from different social, educational and cultural backgrounds.

1.3. Evaluation of educational innovation. Success criteria and evaluation strategies

Educational innovation needs to be evaluated because, as Rivas (2000) points out, if its results are not verified and monitored, the innovation is incomplete because there is no information to know whether it has been beneficial or, on the contrary, disruptive, a situation that can occur in certain circumstances. Therefore, in the process of developing any educational innovation, it is not only necessary to focus on its scope, intentions, goals, objectives and adaptation to the school context, but it is also essential to carry out an analysis of the incidents that have occurred, as well as to verify the results obtained in relation to the previous situation. In other words, the evaluation of innovations, as González and Escudero (1987) point out, must represent one of the phases of the innovation itself.

Thus, evaluation should be understood in general terms as an ongoing process that must be integrated into educational practice throughout its development, and whose objective is to systematically gather information about the practice in question, in order to make value judgments, leading to appropriate decisions for the improvement of the educational act (Parra, 2011). Thus, the evaluation of educational innovation must have the same characteristics and objectives, that is, it must be part of the same innovation process in order to allow for the systematic collection of information, and that this information allows reflection and the generation of value judgments in order to make decisions to improve the educational innovation itself.

Once the concept of evaluation has been defined, it is essential to highlight several aspects related to it, as pointed out in an already classic, but reference work by González and Escudero (1987). On the one hand, these authors indicate that evaluation is a social practice that underlies a diversity of paradigms, metaphors or preconceived ideas that

will influence the design, development and use of evaluation data, as well as the meaning given to this practice.

On the other hand, evaluation is not only a technical issue, but also a socio-political issue, which means that the design and development of evaluation processes as well as the social use of the results are influenced by contextual, economic, cultural and socio-political factors. They also allude to the importance of the evaluator reflecting on considerations regarding the type of sampling strategies and measures that will be used to collect the information, because if variables that are not sensitive to change in innovation are measured and incorrect sampling strategies are used, this would lead to serious problems of validity and reliability of the data obtained. These issues need to be considered when evaluating ongoing educational innovations or when planning new innovations for implementation.

In discussing further the evaluation of innovations and how to proceed, Gather (2004) indicates that two types of evaluation procedures, internal and external evaluation, should be conducted in a coordinated manner. Internal evaluation is carried out from the institution or center itself, so it can be said to be self-evaluation. In terms of the aspects to be evaluated, we can mention the strengths and weaknesses of the innovation, the evaluation of student progress, the existence or not of a climate of trust, the working conditions or forms of communication between the participants in the innovation and its appropriateness. With regard to external evaluation, carried out by educators, researchers or other agents from outside the institution, it must be possible to guarantee a similar or higher quality than that of other similar institutions. However, both types of evaluation must result in effective, efficient and reliable data collection.

In terms of the specific aspects to be considered in evaluating an innovation, Whithaker (1998) talks about five particular aspects to be analyzed when institutions introduce changes: the quality of commitment, communication, interactions, initiative and responses to challenges. The first is the extent to which people feel genuinely engaged in the change process, collaborate with each other, identify with ideas, projects and goals, and participate and commit to both successes and failures that may occur. The second is the existence of a high level of understanding of plans, procedures and processes among participants, as well as an interest in achieving clarity, understanding, discussion of differences in interpretation, verification of information and elimination of ambiguities, so that there is a collective understanding on the part of all members that avoids malicious bias and unfounded hasty conclusions. In the third case, it emphasizes the sensitivity of individuals to the needs of other participants, the clarity and simplicity of the requests that participants make of each other, and the appreciation that is shown when good work is done. The fourth case refers, on the one hand, to the need for participants to take the initiative, not to miss an opportunity to make progress that, although small, could be significant; and, on the other hand, to the need for administrators to foster a climate of trust. In the latter case, the emphasis is on the individual and collective ability to respond to internal and external challenges, with

particular emphasis on the individual and collective ability to be creative and to make decisions about the future that respond to these challenges.

De la Torre et al (1998) point out a number of aspects closely related to the success of an innovation that could be evaluated. These authors point out that a key element contributing to the success of an innovation is the attitude of the teaching staff, because if there is a negative and resistant attitude towards the innovation, this will generate difficulties and blockages when it comes to putting it into practice. They also add that an innovation that does not generate any change in attitudes, conceptions, beliefs, skills, abilities and mastery of new teaching strategies and techniques among participating teachers cannot be considered successful.

For these authors, collaboration, involvement, leadership, and the degree of participation of people are also fundamental to the success of the innovation, because the greater the involvement of different members, the lower the cost and the better the results. In addition, teachers identify the innovation as their own, fostering collaboration and development of the different phases of the project. In addition, the importance of the director's role should be emphasized, as already mentioned in another point in this chapter, which is to provide leadership, stimulate the initiatives that are carried out, manage resources, set guidelines, provide services, remove obstacles and recognize the efforts and dedication of other members to the innovation. However, the knowledge and involvement of the students themselves and their legal guardians in the project is elementary, making its development possible and avoiding obstacles and resistance (De la Torre et al., 1998).

Finally, another fundamental aspect that these authors emphasize is the importance of teacher training for change, which should be characterized by the following aspects : it must be a continuous process and not something specific; it must be contextualized training, taking into account the specific reality of the center; it must prepare teachers in terms of disciplinary and pedagogical content; it must be integrated between theory and practice; it must have a totally close link between the training received by the teacher and what he or she is asked to teach afterwards; and it must be training that is integrated into the processes of change and innovation, and not something isolated and separate (De la Torre et al. , 1998).

In order to deepen the specific and concrete aspects that are taken into consideration when evaluating innovations, we can go to the calls for innovation projects that are in progress. For example, in different regions of Spain, through various calls, educational innovation projects have been selected and awarded, developed by teachers of different educational stages in the non-university field, valuing, supporting and disseminating these initiatives, which seek to provide new organizational, curricular, didactic, methodological and technological responses to the new and future circumstances that students have to face in this constantly changing world. Among the criteria that have been taken into account in the different calls (for example, in Orden ECD/1817/2018, of

Aragón, Orden EDU/390/2015 of Castilla y León and Resolución 149/2019 of Navarra) we can highlight some of them, such as :

- The participation of most teachers who make up a department or council of the same school, as well as students and other members of the educational community.
- The development of innovative educational solutions that allow the integration of new organizational frameworks and new digital materials.
- The quality of the educational materials and resources that have been developed as part of the innovation, especially the digital resources and their transferability to other centers and school contexts.
- The contribution of the projects to the development of various skills among the students.
- Sustainability over time of the innovative proposal and its possible application to other centers and contexts.
- The approach of authentic, contextualized and socially relevant life learning experiences.
- The participation and collaboration of other agents of the social context (such as NGOs, health centers, municipal councils, etc.).
- The existence of evaluation criteria and a well-defined evaluation process, and that they be linked to a teacher training plan.

Similarly, at the university level, universities encourage pedagogical innovation in higher education by issuing calls for innovation projects and evaluating them. As an example, the University of Salamanca (Spain), in its latest call for projects for innovation and improvement of teaching (University of Salamanca, 2019), took into account the first aspects of the evaluation of proposals for pedagogical innovation, referring to the coherence and consistency of the project, the relevance and career of the teaching team, and the relevance and innovative character.

In addition, once the projects are completed, the coordinators of each team must prepare a report on the work done, which will be evaluated by considering a series of indicators. For the work in question, the usefulness and quality of the results produced, as well as the impact of the projects on the academic results of the students, can be highlighted. Other universities that develop similar programs of pedagogical and teaching innovation (e.g. University of La Laguna, 2019; University of Las Palmas de Gran Canaria, 2020; University of Valencia, 2019) also evaluate other issues, such as the participation of teachers in training programs, the number of subjects that have been promoted by the innovation, the possibility of transferability to other subjects and degrees, their degree of

consolidation as a stable pedagogical practice, the impact of their results and their dissemination.

Once the aspects that it is necessary to evaluate in the innovations and that, in turn, suppose criteria of success in the same ones, it is necessary to underline that all of them can be evaluated through different strategies and instruments. The fundamental strategies and instruments for the evaluation of the innovation process are presented below, as well as some of the studies that have used them :

- Participatory observation, which allows to understand innovation processes from the point of view of one's own participants. Information is collected through social interaction between the researcher and the research subjects; and the researcher becomes a more or less active part of the innovation process to collect information in a non-intrusive way. It has been used in studies such as that of Tójar and Mena (2011).
- Interviews on the innovation process at different points (beginning, development and end) or with different participants, such as management, teachers, students, families and other professionals. They have been used in various researches, as in García-Valcárcel (2015), Goig (2012), Puentes and Cruz (2012), among others.
- Attitude scales towards the different constructions characteristic of the educational innovation project itself, as well as towards educational innovation in particular. They have been applied in studies such as García, Gracia, Fuentes, Lila and Pascual (2010).
- Innovation satisfaction scales or questionnaires, so that the level of satisfaction of the various participants in the process can be known. They have been implemented in different studies such as Ausín, Abella, Delgado and Hortigüela (2016), Bustamante et al (2016), Lozano-Díaz, Martínez and Torres (2019), Mérida, González and Olivares (2012), Pérez (2016), and Puentes and Cruz (2012).
- Ad hoc questionnaires were developed for the analysis and evaluation of the innovation itself, in order to be able to assess different issues, such as how the management function was exercised during the innovation process, the self-perception of the skills available or developed in the project, the digital or non-digital applications and materials that were used as a resource and educational tool in the innovation project; the limitations that were found and the aspects that should be improved in the future, among other issues. Studies in which they have been used are, for example, Alonso, Arandia, Martínez and Gezuraga (2013), Bustamante et al (2016), García-Valcárcel (2015), Goig (2012) and Puentes and Cruz (2012).
- Semantic differentials, which allow the extraction of information concerning the opinion of different participants (students, teachers, families or other agents)

based on two opposite poles on specific aspects of innovation. An example of a study that has applied this type of instrument is García-Valcárcel (2015).

- Observation registers, which allow quantitative and/or qualitative information to be collected while observing certain classes, dynamics or pedagogical innovation sessions, making it possible to interpret these data. An example of a study using this instrument would be García-Valcárcel (2015).
- Focus groups, which provide a qualitative in-depth look at the fundamental aspects of innovation. It has been used in studies such as Beloki et al (2011) and, Mérida, González and Olivares (2012).
- The analysis of the documentation, whether it is institutional documents of the center, innovation projects presented in the context of calls for awards or grants, student school productions or other types of documents. Some examples of studies that have used it are Azorín and Arnaiz (2013), Beloki et al (2011), Goig (2012) and Tójar and Mena (2011).
- Photography of relevant scenarios and spaces where the process of educational innovation develops, being able to analyze through it, for example, the distribution of elements and people. The study by Tójar and Mena (2011) is an example of the application of this method.
- The journal or field notes, which reflect what happened during the various conferences on innovation development and analysis. It has been used in surveys such as those of Alonso, Arandia, Martínez and Gezuraga (2013), Beloki et al (2011) and Tójar and Mena (2011).
- Tests to assess student learning and performance. Studies that use this technique include García, Gracia, Fuentes, Lila and Pascual (2010), Hidalgo, De la Blanca and Risueño (2011), Pérez (2016) and Puentes and Cruz (2012).

In conclusion, a synthesis could be made of the criteria for success or criteria that contribute to the satisfactory completion of a process of educational innovation :

- Involvement of all or most of the teaching staff in a department, school or school unit.
- Innovation must result in a change in teachers' attitudes, beliefs, perceptions, conceptions, skills and competencies.
- Teachers must have a positive attitude towards the innovation process.
- There must be a high degree of collaboration and involvement of teachers and the management team.

  Teachers and the leadership team must have the ability to respond to challenges by taking the initiative and being creative in their response.
- Students and their legal guardians must be aware of and participate in the innovation process.
- All members of the educational community (teachers, students, parents and non-teaching staff) must be engaged in the process of change.

- There must be good communication among the different members of the education community and an understanding of the plans, procedures and processes being implemented.
- Members of the educational community must feel identified with the ideas, projects and goals, understanding innovation as something that is their own.
- There must be a high level of satisfaction on the part of all members of the educational community.
- There must be a good climate within the organization, based on trust, listening, sensitivity and understanding.
- The educational objectives initially pursued must be achieved, whether it be an improvement in student performance or progress, a change in student attitudes, an improvement in the effectiveness of classroom processes and practices, an improvement in student cohesion and sense of identity, etc.
- The principal or senior leadership team should be characterized by providing leadership, stimulating the initiatives that are undertaken, managing resources, setting guidelines, providing services, removing barriers, promoting a good school climate, and recognizing the efforts and dedication of the rest of the members of the innovation.
- During the innovation development process, an analysis of strengths and weaknesses should be carried out continuously, so that these can be addressed as they are detected.
- Teacher training for change must be offered and must be characterized by the following qualities: continuous, contextualized, with disciplinary and pedagogical content, with integration of theory into practice, closely linked to the performance to be achieved, and integrated into the processes of change and innovation.

During the development of this first chapter, it became clear that educational innovation is a multidimensional process subject to multiple interpretations, depending on the culture of the educational centers, their beliefs, values, languages, symbolic rituals..., which means that as a process, it must be adapted to an educational context with its characteristics and peculiarities. The important thing will be to have a governance and an educational team sensitive to the changes and improvements that the center needs, as well as a climate of collaboration between all the agents involved in this innovative process. It was also stressed that it is important to innovate for a variety of reasons, among which stand out those that are intimately linked to changes in the social system, and that require a school that takes these changes into account and promotes them from within, also reflecting on how these changes change the culture of the school and can promote new ways of "doing teaching". But in addition, reference was made to essentially pedagogical and didactic reasons related to education for creativity and the introduction of technological tools as an additional element of the curriculum that, compared to others, can improve teaching and learning processes.

Finally, attention was focused on the evaluation of educational innovation as a transversal and longitudinal process that allows for the assessment of the design and planning of any innovation, such as its development or implementation. All these issues discussed in this first chapter serve to situate innovation, not in a vacuum, but in a specific context, that of the school. If educational innovation is seen as a process and not as a specific activity, it must be institutionalized, that is, it must be something continuous and normalized in the school, and the school as a deeply rooted institutional organization will be seen as the basic unit of change, which will involve changing beliefs, taking on challenges, establishing collaborative climates between the management team, teachers, students, families.... This will involve changing beliefs, taking on challenges, establishing a climate of collaboration between the management team, teachers, students, families and a culture of continuous experimentation that responds not only to the deficits or needs that the school may have at a given time, but also to the needs and hopes for improvement, in accordance with a constantly changing society.

To conclude this chapter, and with the aim of specifying the extent to which the theoretical study of the subject dealt with in it has made it possible to formulate the various hypotheses which we have already discussed in the introduction, and which will be the subject of a more detailed study in the second part of the work, we would like to point out that the development of this chapter has made it possible to formulate three of the six hypotheses put forward :

1) Thanks to a proactive attitude of the actors (steering committee, teachers), digital technology can influence the different relationships between the actors of education (teacher-student relationship; teacher-teacher; school management - teachers) and thus promote pedagogical innovation.

3. a governance that clearly promotes educational innovation processes in schools guarantees academic success in terms of teaching and learning.

The implementation of innovative experiences in schools contributes to improving the acquisition and development of specific and transversal competences (management of digital resources, teamwork, oral and written communication...).

CHAPTER 2 : THE SCHOOL AS A BASIC UNIT FOR CHANGE

Laurent TESSIER[11]

Professor at the Faculty of Education of the Catholique Institute of Paris, France.

Generally speaking, the word "innovation" evokes ideas of "novelty" or "change". For Cros (1999), however, an appropriate use of the term implies distinguishing it from these terms, but also from those of reform, revolution, mutation, adaptation, invention, discovery or even project[12]. According to Huberman's (1973, p.7) definition, innovation, especially in an educational context, is "a deliberate, measurable, sustainable and infrequent improvement". According to the author, an improvement can be considered an innovation when it is prolonged over time without undergoing significant transformations immediately. Élisabeth Fichez (2006), for her part, highlights the fact that an innovation manifests itself as a succession of steps in "the nature of the new introduction". The aim of innovation in education is to initiate changes in education systems. These innovations are not limited to new technologies, but can be understood in terms of services, partnerships, processes and services. According to the Conseil Supérieur de l'Éducation du Québec[13] , educational innovation is primarily aimed at the learner and his or her success: "Educational innovation is a deliberate process of transforming practices through the introduction of curricular, pedagogical or organisational novelty that is disseminated and which aims to achieve lasting improvement in the educational success of pupils or students".

Moreover, innovative practices in education differ according to the roles of the educational actors implementing them, even if they share a common objective. The same document thus proposes to study in a differentiated way the innovative teaching (activities proposed), pedagogical (organisation, classroom management) or didactic (way of teaching their subject) practices of teachers, the innovative practices of education professionals (approaches and methods of intervention), and those of school

[11] This chapter was coordinated by Laurent Tessier, Professor at the Faculty of Education of the Catholique Institute of Paris. It benefited from contributions from Rolland Adjalian, Vincent Affholder, Isabelle Argouarc'h, Chantal Arino, Marie Bouchere, Elodie Cavanna, Jean Courtade, Colombe De Jerphanion, Myriam Djellal, Anne-Sophie Durand, Florence Lafalaise, Blaise Mankana Mbeka, Olivier Maunand, Edith Mawakam, Sybille Menager, Coline Morel, Ida Diane Odjoussou, Antonin Paha, Louis-marie Rochard, Nicolas Salomon, Clémence Touche and Alcides Martinho Vaz Teixeira, as part of a continuing education module of the Institut Catholique de Paris for educational executives entitled "Change management and management".

[12] See also the Webinar session given by Françoise Cros on this subject as part of the ANGE project : https://youtu.be/J9GcljMbcnk

[13] Http://rire.ctreq.qc.ca/les-pratiques-innovantes-en-education-version-integrale/

administrators (implementation of procedures and policies). Innovation, particularly innovation in education, is perceived differently depending on the functions of the people it affects and on their objectives and obligations. Indeed, unlike a company where all the players are looking for a future profit, education structures see pedagogues, teachers, administrators and students working side by side, each with a different vision of the meaning of an innovation. Innovation in education must be understood by all stakeholders as bringing about a lasting improvement in one way or another. On the basis of this observation, Alter (2002) imagines three typical phases: initially an incentive for innovation by teachers or trainers on the part of the management; then a phase in which the management allows the 'innovators' to work; and finally a phase of institutionalisation of innovations in which they are rationalised, standardised, systematised or even made compulsory.

Innovation in education is developing in different types of institutions. But in all cases, insofar as it deconstructs and reformulates their very meaning, it must be managed institutionally at the risk of calling into question their founding values. For this to happen, any educational innovation must fit into the various aspects of the management of an educational institution: technical, financial, human, pedagogical and strategic.

Technical means to foster innovation in an educational establishment

Innovation gives rise to organisational, behavioural and cultural change, but primarily technical change. As far as the technical dimension is concerned, the means implemented in the innovation process may be multiple, but they can hardly be predefined. However, conditions can give rise to and encourage the setting up and development of innovative projects. In the specific case of a school, for example, the logistical resources include: classrooms, computer equipment, regulatory texts, reference frameworks (such as the methodological Vademecum "Innovating for a successful school" published in France in autumn 2011[14]), technical manuals, safety manuals, quality control equipment, etc. Access to these resources should not be negotiated, but rather facilitated, while the commitment to make available those that are lacking should be collective and not the business of the one or few who are at the origin of the innovation. Setting up a technical training programme open to all staff can also be a lever for innovation. Among the possible training courses, we can highlight those relating to project design and those aimed at a better mastery and optimal use of ICTE (Information and Communication Technologies for Education). Indeed, "innovation requires specific engineering in project mode" and on the other hand, "digital technology is a tool that accelerates innovation".[15] Moreover, mastery of ICT facilitates access to knowledge and information concerning new tools or new professional practices.

[14] http://ife.ens-lyon.fr/vst/da/detailsdossier.php?parent=accueil&d ossier=70&lang=fr
[15] https://www.cig929394.fr/sites/default/files/commun/innovation.pdf

More generally, in the register of resources conducive to innovation in an educational establishment, Cros (2002)[16] proposes a typology drawn up on the basis of a survey in various colleges of the Lyon academy. At the end of this survey, she identifies seven points :

- To have a place for exchanges between innovators (laboratory of ideas).
- Formalise innovation materially (credits, hours, rooms, meetings).
- Produce objects that crystallize (documents).
- Encouraging the mobility of Actors.
- Building socio-technical networks beyond the institution.
- Clear places for controversy.
- Appoint spokespersons who mobilise and maintain these networks.

Of course, beyond the school, we cannot overlook the role of the state, which in most countries retains a leading role in creating the technical conditions for innovation in schools and education. This may be expressed, for example, by the margin of manoeuvre left or not to teachers in the application of curricula and therefore in experimentation. As early as the 1990s, Finland adopted a three-level (national, municipal and school) curriculum :

> At national level, for example, there was a call for the development of a more child-centred, constructivist type of pedagogy, but it was up to the schools to apply this approach according to their own plans, values and choices in a number of areas: choice of subjects and cross-curricular content, distribution of teaching hours, organisation of assessment methods, addition of optional courses, etc. The schools were also asked to develop a more child-centred approach to teaching. (Ibid.)

From this perspective, Hellström (still cited by Rey and Feyfant) lists some twenty conditions favourable to innovation. The state can facilitate some of them, such as: the organisation of cooperation between schools and administrations, access to the necessary resources (time and money), methodological support for schools, a policy aimed at making school headmasters stronger pedagogical leaders and giving responsibility to project leaders, opportunities to reward innovative work and, above all, taking care of teachers and their well-being.

[16] See also the Webinar session given by Françoise Cros on this subject as part of the ANGE project : https://youtu.be/VZLTk6KwD0s

The human dimension of innovation

In order to create favourable conditions for innovative projects to succeed, the human dimension seems to be one of the determining factors. Sanséau et al (2014) indicate that the question of human relations is just as central as the points already mentioned, particularly everything concerning the relationship of the collective (or individual) to the hierarchy. If the headteacher places the institution in an innovative approach and is the initiator of the project, his or her investment becomes the guarantee that this dynamic will be maintained. Sanséau evokes the obvious link between the creative person and the project (the human being being de facto at the heart of innovation). By promoting innovation, the head of the establishment conveys to his employees an image of an establishment that enables them to reformulate their professional identities and their relationship to practice: the approach requires the creation of a new economy of negotiation (Wenger, 2005). The director should not be the only person responsible for the project and communication between the initiator and the staff should be a constant concern. Even more so, when a project arises from a need identified by his team or when a request is suggested, his role may evolve: no longer a driving force, but rather a 'facilitator' in the implementation of the project. It has also been shown that understanding the position of the manager is essential for project support: whether the idea is his or her own or comes from the field, if he or she wants to support innovation, he or she will have to be "a support and a guarantor of organisational resources" for the executive team. Conversely, a control posture will have the effect of slowing down innovative behaviour (Ibid.).

Supporting your team in its desire to set up a project therefore seems to be an essential aspect of a climate favourable to the development of innovation in a structure. Thus, each professional plays a role in this development, particularly through his or her motivation and involvement in the project :

> Mobilisation is indeed the first aspect and the necessary step in an experiment which would go beyond a strict, solitary pedagogical innovation, all the more so if it is designed on an institutional scale. Mobilisation is so much a condition for innovation that some authors suspect that the innovation effect would be reduced to a mobilisation effect, whatever measures are put in place[17]. (para. 10)

However, *paradoxical effects* can occur, particularly between the majority injunctions of a group of peers or influential people, the aspirations of the individual and the innovation project. In some cases, the individual is placed in a paradoxical position, receiving instructions to the contrary. The result is that the initial motivation of an individual or group is limited or negated. However, the commitment is maintained or can be maintained through a game of rewards, which may be more emotional than material. This aspect seems to be particularly important in setting up long-term projects. The questions of financial or material rewards for those active or solicited in the implementation of an innovative process would therefore not necessarily be central. This

[17] https://www.revue-projet.com/articles/2009-6-innovation-et-experimentation-scolaires/7534

is true in the hierarchical relationship as well as in the peer-to-peer relationship[18]. In spite of this, considering the volume of time required, the human dimension implies in itself a not insignificant cost: identification of needs, organisational meetings, pedagogical projects to be drafted, are all constraints which are essential to the smooth running of the innovation.

Innovation may also involve training for professionals who will be using a new service, especially when it is a new technology tool, as illustrated in the ANGE projects. While training of teaching staff in the use of equipment appears to be essential for the use of innovations, so too is the maintenance of the equipment and the staff responsible for keeping it in good condition. Some technical innovations require special maintenance that only specific professionals can carry out. By their action, the equipment is functional and usable by all, which seems imperative from the point of view of operational use. If the tool does not work when the teacher wishes to use it, this is not conducive to good conditions of use. The human dimension would then also include the beneficiaries of these innovations: the pupils.

An innovative project must finally make sense to learners (Wenger, 2005). It is therefore essential to gather and analyse their opinions on the use of the innovative system: are the needs identified by the teaching staff consistent with those expressed by the pupils? Is it adapted to their age, to all types of learning? Is it accessible to pupils, etc.?

Thus, motivation, coherence, organisation, training, interview, evaluation and permanent adjustments are all essential points relating to this human dimension of innovation. It is complex in the creation of conditions favourable to innovation as well as in its implementation: from the place of creation (field/hierarchy, individual or group), in its management (communication and relations with hierarchical superiors, and between peers), in its dynamics (motivation, rewards, reformulation/construction of professional identity) and in its maintenance over time (after implementation). This dimension, essentially social, may be limited by the financial aspect (volume of hours linked to involvement), but is above all dependent on the involvement of the players: a technological (or technical) innovation will necessarily be accompanied by an innovation in human practices (emotions and related adaptations).

The financial dimension

Not all innovative concepts launched within a school require financial investment. Thus, self-training for members of the educational community, peer training and spontaneous exchange groups can play an active role in the implementation of innovative practices, provided that teachers find them of personal interest[19]. If these are not spontaneously sufficient, if they need support or if the project is the unilateral result of the management's

[18] «*De plus, cette sensibilité exprimée ici au niveau de la relation manager-managé est à considérer sur le même niveau dans la relation managé-managé*» (Sanséau, Barrand, & Ferrante, 2014, p.41).

[19] See in this regard the issues of engagement and identity construction (Wenger, 2005).

will, the structure wishing to implement it should be fully aware of its resources or the financial possibilities to which it might be entitled. In this financial approach to innovation, it should be remembered that, historically, a school does not have the same type of objective as a company (which innovates by expecting a financial return in the medium or long term[20]), but that it must nevertheless be able to create the financial conditions favourable to the implementation of innovative projects in order to guarantee their feasibility (Auduc, 2018). If it is a private institution, it may be able to rely on its own funds and/or on financing aid, insofar as there is no interest for banks to lend money for innovation financing, as it does not involve the possibility of profit. If the school does not have sufficient financial resources or if it is a public school, it is the State, through the Ministry of National Education, which will be able to provide aid for the financing of innovative projects within the school. It should also be noted that education is becoming an increasingly competitive sector (Plassard et al., 2009) and that private establishments (including those under contract with the state) have an interest in remaining attractive - innovation being a factor in attractiveness.

The school rankings that appear each year in the press show this, and the work in the educational sciences reminds us of it: not all teaching contexts are the same, and pupils' careers are of course marked by their attendance at a particular school or college. The question of funding - material, financial and human resources - and attendance - the social origin of pupils - are the first differentiating factors put forward to explain unequally stimulating teaching contexts. However, if we look at the school experience as a whole, other factors such as well-being or cohesion appear, which are more difficult to quantify, but whose impact on pupils' achievements will determine whether or not they wish to pursue higher education. The fact that an institution encourages innovation by its staff should in this sense be understood as one of the elements of what some researchers propose to call the 'school effect'.

2.1The establishment effect and innovation

The 'establishment effect' is a sociological concept which appeared in the 1980s, with the advent of the 'single college', making it possible to study the capacity of establishments to build themselves up as autonomous entities, with their own capacities, independently of their publics. The aim here is no longer to consider the school system as a block, but to identify an organisation with an original style, its own resources, actors that can be mobilised, and which develops its own social relations. Users will then recognise that the establishment has characteristics which will give it an identity and even a particular value which will distinguish it from other structures. Taking an interest

[20] For an overview of innovation in the industry and/or for cost-effectiveness purposes, see e.g.: https://www.institutreindus.fr/projets/innovations-creatrices-emplois-industriels/

in the school and in the variables which influence its operation makes it possible to identify indicators which can be used by those involved in education. This approach questions the role of school policy in pupil achievement. The latter is no longer systematically reduced to its shortcomings or impediments.

However, while this type of approach is enlightening, it is not without perverse effects. Indeed, the desire to identify as finely as possible the modes of operation can lead to the creation of performance indexes, which are certainly quantifiable, but devoid of any explanatory power. Thus, criteria relating to teachers (such as the level of diploma) cannot suffice to justify the performance of pupils, and without concomitant questioning, this type of evaluation loses its meaning. This raises questions about the social relations at work in the school. Attention should be paid to the school as a social player and to its ability to mobilise resources.

The notion of the 'school effect' appears to be the result of several complementary factors: school selection, social selection and socialisation within the school itself. The effectiveness of the school can be measured in different ways: the academic performance of pupils, and the capacity to reduce social inequalities. This approach also implies the need to take account of pupils, as fully-fledged players in the school system, and to study their experiences in order to gain a better understanding of their impact on the school. Taking an interest in the school effect means not reducing schools to the productivity aspects of school results alone. The school therefore appears to be a complex social entity where different interests are expressed and whose resources and players, however varied, must converge towards a synergy that is beneficial to all.

Each establishment is required to make a diagnosis of its situation in order to set up a project that will provide solutions to the problems encountered. It is in this area of autonomy that each establishment - which is also subject to national directives - develops its own policy, its own DNA, bearing in mind that this "establishment effect" is understood here as the ability of an establishment to build an overall standard while taking into account a certain number of factors: the policy of the management team, professional cohesion within the establishment, the actions implemented and the relationship with the environment.

2.1.1 Institutional policy and innovation management

Like any organisation, the school has a style, a mode of social relations, a way of mobilising its stakeholders who meet through pedagogical innovations, teaching requirements or teacher training. All these elements place the headteacher in a situation which it is tempting to compare with the management of a company. The headteacher's role will depend on the recognition of his or her legitimacy and action - as determined by his or her supervisory authority - by the management and teaching staff. Since 2005, in France, for example, schools have been given greater leeway in the management of

innovative and educational projects. This is an opportunity for school heads to develop their managerial skills, thereby strengthening their legitimacy in pedagogical terms... provided they can demonstrate their leadership. On the other hand, a headteacher who is on the back foot, disillusioned or even professionally exhausted will have a negative impact on the school climate (Attarça & Chomienne, 2012). Formerly administrative managers, these professionals now find themselves assuming functions for which they have not necessarily been prepared. In turn managers, change managers, negotiators, facilitators and coordinators, they are confronted with new managerial aspects, have to build partnerships between different stakeholders, initiate cross-cutting projects, deploy new management tools, steer or support reorganisations. These are exercises for which - having exhausted the capital of legitimacy at the outset - the use of a hierarchical authority proves ineffective if it is not accompanied by an attitude that inspires confidence and even enthusiasm.

Teachers who identify first and foremost with their subject and enjoy a high degree of autonomy in carrying out their activities are reluctant to see the headteacher as a company director, with a right of oversight over what they consider to be their reserved domain: pedagogy. Creating a cohesive teaching team therefore remains a complex exercise. In schools where it does exist, teachers are always keen to maintain a degree of independence. They want to decide on the tools they use, the progress of the programme and the choice of texts they will work on, for example. This will not, of course, prevent them from following the policy defined by the headteacher and taking collective action to challenge their practice. In this case, the school effect, understood here as the ability to move from a class-centred project to a collective project, will be the product of a meeting between a teaching body that is receptive to the problems surrounding it and willing to remedy them, and a headteacher capable of mobilising his or her teams. This is undoubtedly the essential issue, if we want to consider the school as a unit of change: the leadership of the headteacher in collaboration with the teachers. Or to put it another way, for innovations to be institutionalised, there must be both a culture of innovation in the school and active leadership on the part of the management team. Finally, it is worth recalling that educational managers often stay in post for a shorter period of time than teachers... which leads to relativising the importance given to the management team and the headteacher in the school effect.

2.1.2The digital and the establishment effect

In Europe, the history of digital development in schools is associated with different national plans concerning this dimension of the education system. These plans have been designed almost always along the same three lines: equipment, resources and teacher training. The efforts made by national education policies have borne fruit, even if the complexity of some of these areas means that implementation is proceeding at different speeds. At present, we are verifying in the schools of the ANGE project that the

material part, in terms of equipment and resources, is often easier to put into practice, but that there is a difficulty in terms of teacher training and actual practices and uses of digital technology in the classroom. The issue is complex and one needs to take a closer look to understand its stakes. Here too, the question of the school effect has an impact on the way digital technology is experienced in schools. One of the current paradoxes in European schools is that schools can be well equipped technologically, without the pedagogy "following". While there are some teachers who manage to take advantage of the technologies they have at their disposal at school, and to integrate them into the way they build and deliver their teaching, others report difficulties, lack of training, but above all their reservations.

In schools, one of the causes of difficulties is the disparity in training among teachers in the use of digital devices. This disparity has various reasons, such as training at pedagogical level, but also the personal history of each teacher and his/her relationship/interest with technologies. As a result of these disparities, within the same school there are usually teachers who manage to integrate digital technology into their teaching activities (reverse class, e-learning during school time), other teachers who are not convinced of the benefits of using digital technology for pupil learning, and others who do not have the necessary training or skills. On the pupils' side, the relationship with technology is part of their lives. In a classroom context, digital means can help to attract the interest of pupils, or to create a dynamic which encourages confidence-building, particularly among pupils with more difficulties. But pupils also make their concerns heard.

The same applies to digital innovations in schools as to any other type of innovation: to succeed, not only must the social reality in which the school finds itself be considered, but all the players must be brought into the project. Without the commitment of everyone, we will not be able to talk about a school effect, but simply about the isolated actions/effects of certain players.

2.2. How can the professional development of innovative teachers be supported ?

As the saying goes, a person in hibernation for a hundred years coming back from the winter would feel disoriented everywhere but in a classroom. Because in a hundred years, while society has undergone countless changes, with the arrival of new behaviours and tools, the classrooms have not really changed. We still find the blackboard in front of a teacher's desk, facing pupils seated on tables lined up frontally. This Hibernatus would perhaps be astonished at the presence of a computer or a digital blackboard, but would realise that the time for profound changes has not yet come in the school.

It is often out of conviction against this immobility that so-called innovative teachers emerge, no doubt driven by a common conviction: what teachers pass on to students is first and foremost a passion for learning, the conviction that everyone has the power to invent themselves and to reinvent the world. Having defined what we mean by innovative teachers and how they identify themselves, we will now present how the institution can support their professional development in order to better educate students.

François Muller states that "professional development is concerned with the process of developing collective competences, and in particular with the coupling between individual practices, collective work organisations and training resources, with explicit reference to the local context and the pupil's' achievements" (Muller, 2017, p.274[21]). It is therefore a question here of considering the evolution of collective practices and not only of asking how innovative individuals learn. It is clear that providing long-term support for teacher training in order to develop their practices for the benefit of pupils is essential, not only in the process of educational innovation, but more generally for the life of the school itself. Since any innovation is underpinned by objectives aimed at pupils, it is therefore a matter of influencing, guiding and modifying professional practices in this direction[22].

The aim of professional development support is to promote collective reflection, awareness, increase resources, personal and professional assets in order to acquire skills and develop potential. Support for professional development, particularly but not only for innovative teachers, is the responsibility of a team manager, headteacher, academic leader or dedicated ministry, and can be deployed on several levels: administrative and managerial, material and financial, pedagogical and training.

2.2.1. Support based on an established administrative and managerial base

Professional learning within a school needs leadership. Since one of the roles of the manager is to decide, support for the professional development of innovative teachers is most often seen as the initiative of the headteacher or the management committee, which may or may not place this line of action among its priority choices. As Muller puts it, "the role of the headteacher is important in the professional development of teachers: it is expressed in the recognition, promotion and support of teamwork" (ibid.[23]). The summoning of a certain number of attitudes on the part of the leader or manager with regard to the management, facilitation, motivation and training of innovators implies a

[21] See also the webinar session given by François Muller on these issues in the framework of the ANGE project: https://youtu.be/qpDouwdw1sw

[22] A ce sujet, on pourra également se reporter à la séance de webinaire animée par François Muller le 23 novembre 2018 dans le cadre du projet ANGE: https://youtu.be/qpDouwdw1sw

[23] See also the webinar session led by Monica Gather Thurler on this subject: https://youtu.be/ugeNxFNhc5g

form of relationship and encounter which are of paramount importance[24]. Entering into contact with innovators, listening to them, providing them with insights into the feasibility of their project from an institutional point of view, dedicating time to exchanges (official consultation times) to help them formalise their project and bring them out of the isolation they may find themselves in. In the same sense, it is also essential to "improve team support, in terms of proximity, regularity and professionalism, and encourage meetings between novices and experienced innovators, in order to save both time and efficiency" (op. cit., p.45), as Muller also points out. Finally, being open to novelty, change and even encouraging change is also part of the supervisory action which is the responsibility of the manager.

On the other hand, taking an interest in innovative teachers and their activities means, for example, that the manager should take part in some of their training courses and thus discuss with them in a concrete way how learning can be optimised. The aim here is to act as a catalyst for motivation, provide human encouragement, support a project within the institution and encourage experimentation. Muller defines this role in the following terms: "helping to harmonise practices, leading the project through its various stages, helping to take stock, evaluating experimentation, encouraging the transfer of their dynamics and creativity from support workshops to courses" (op. cit., p.2). A form of institutional recognition for these personnel must be expressed, as André de Peretti and Muller point out,

> what then are the profound motivations of a professional, a staff member, to do more, to do differently, to change his practice, to evolve, if never in his institution, in his managers, and with his superiors, is mention made of his identified, recognised, valued skills and his needs? (by Peretti & Muller, 2016, p.174)

This institutional recognition could "start by taking more adjusted account of existing competences, by recognising achievements, by valuing initiatives" (Ibid., p.175). It could consist, for example, of awarding prizes to the most innovative projects. In the same spirit, Muller proposes a number of professional development schemes based on innovative teachers who learn :

- Recognise consultation times as working time and training time.
- Support a dynamic of innovative projects, provide a system of resources.
- Provide the teams with the means to analyse inhibiting blockages and defensive routines and the means to improve (collective self-assessment with external support/critical friend) (Ibid., p.47).

Finally, as innovation is often linked to local adjustments to improve or promote student success, appropriate space arrangements are necessary. The allocation of resources and negotiation with potential partners is also the responsibility of the manager. To this end, innovative teachers need to be provided with the necessary infrastructure and

[24] See in Annex 2, the study on managerial practices of change management, the different postures of leaders analyzed by Hervé Chomienne as part of the ANGE project

appropriate equipment for their own training and teaching practice. There is ample evidence that a learner needs to build a favourable and adequate spatial environment during certain phases of learning[25]. Materials and tools are therefore crucial in defining the situations and day-to-day teaching activities of innovative teachers. This will involve, for example, creating suitable meeting and working spaces, places for experimentation (rooms for pedagogical innovation, digital tools such as tablets, decompartmentalisation, ENT or any other material necessary for teachers to implement innovation and acquire professional skills). This requires financial resources and a real investment in terms of financial means which must be considered in the management of budgets, assets and facilities. The management and development of human resources can also be measured in terms of the field of training.

2.2.2. Pedagogical and training support

In pedagogical and training terms, innovative approaches to the professional development of teachers are needed. They consist in promoting and providing opportunities for self-training (personal research) and in-service training, which are the clearest ways of supporting the professional development of innovative teachers by helping them to consolidate their professional identity. A first step will be to offer these innovative teachers the opportunity to develop resources, deepen their knowledge, improve their skills and pursue innovation by building on the new learning they have acquired in order to pursue the acquisition of new skills. Encouraging formal and non-formal co-training and encouraging observation and analysis groups, with the result that experiences can be shared, are also part of this framework (Muller, op. cit., p.47).

In this sense, it is quite beneficial to encourage their participation in sessions, both internally and externally, to involve them in exchanges, networks and projects likely to influence them. This whole process will enable them to create new links, to encourage each other and even to support each other in the face of the unknown that is specific to the world of innovation. This is what Muller invites us to do when he proposes to foster "interactions between teachers, but also relations with other professionals or members of the educational community, both within and outside the educational unit" (Ibid., p.227). Going further, it is hoped that a community of practice will be set up, bringing teachers together to discuss their innovative experiences and share ideas as a means of support as such, as proposed in the Classlab ANGE. In addition, innovative teachers' forums, moments of dialogue and exchange on motivations, needs and possible difficulties help to avoid isolation and to learn from each other; this is known as peer learning.

25 http://www.cafepedagogique.net/lexpresso/Pages/2019/12/10122019Article637115610193625670.aspx

Above all, supporting the professional development of innovative teachers requires that they be given time to reinvest their new knowledge and skills in their daily practice. In France, the proposals of the Cellule Académique pour la Recherche et le Développement en Innovation et Expérimentation (CARDIE) thus contribute to the ministerial determination to encourage innovative initiatives. In this sense, it is indeed a support space, as is the MEIP (Mission for Evaluation and Pedagogical Innovation) which also offers benevolent and expert support to innovative teachers[26]. Moreover, in order for teachers to go beyond the gleaning of new ideas, it is necessary to "help them to harmonise practices, to conduct all the stages of their various projects, to help them to take stock of them, to evaluate experimentation, to encourage them to transfer their dynamics and creativity from support workshops to lessons" (Muller, op. cit., p.2). As Martial Gavaland states, "this way of bringing the triptych of mobility to life (spaces - technology - pedagogies) favours the acquisition of each pupil's knowledge with others and corresponds better to the profile of today's learners[27]".

Innovating in the field of education, i.e. "ensuring that pupils learn better, under better conditions, in a way that is more adapted to the modern world and the current state of science" (Muller, op. cit., p.167), requires investment in terms of time, materials, training and follow-up. But innovation is also beneficial for the teacher himself, as Muller points out,

> innovation is formative for teachers who embark on it; through it, they acquire new professional skills, innovators have a better and better mastery of IT tools, develop cross-disciplinary skills and open up to other practices. A sense of organisation, working habits, a global approach to their profession, but above all a strong conviction, appear to be assets that innovators draw from their experience. (Ibid., p.118)

thus contributing to making today's school a place for listening and sharing.

2.2.3 A single purpose : the contribution of innovative teachers to pupil training

The way in which schools are represented in the media is often focused on their real or supposed flaws: from the inequalities they produce or reproduce, the incivilities of teenagers to the chronic absences of certain teachers... In this bleak picture, innovative teachers are struggling daily, with the means at hand, to set up educational projects, alone or in teams. No solution will solve all the school's ills at a stroke, they know that. Despite this, innovative teachers do not hesitate to share their experiences with their peers, and above all to motivate each other. The new projects that some of them conceive and build often have the main merit of creating emulation, a dynamic in the school. In France, the council of innovative teachers known as Cniré (Conseil National

[26] http://ww2.ac-poitiers.fr/cardie/

[27] Martial Gavaland presented these experiences and reflections at the 11th Innovative Teachers' Forum in Paris on 23 November 2019.

de l'Innovation pour la Réussite Éducative) says no less: innovating enables schools to be fairer, to repair the real forms of social inequalities and injustices that schools produce. Wondering about the contribution of innovation in general and that of teachers in particular, Cniré asked himself, in addition to the question of inequalities specific to schools, the question of the effectiveness of innovative methods: "What are the conditions in your opinion for a team to be innovative and effective? What do you think are the conditions for a school to be innovative and effective? For an education system to be innovative and effective? ». Using a standard definition, efficacité defines the "ability of a person, group or system to achieve its aims, objectives or those set for it" (Literature). Innovative teachers are all the more effective when they meet three specific criteria set by this Council:

- Set clear objectives.
- Be able to evaluate themselves in order to measure how far they have come and how far they still have to go in relation to the objectives set.
- Be able to accumulate experience and pass it on.

Innovative teachers, with their strong commitment to continuous creation, inventing projects and new practices, no longer merely transmit knowledge to pupils, but create a learning environment to prepare their pupils for a world characterised by rapid change. As we have said, a real team dynamic is also created between these teachers, as long as they do not hesitate to question their teaching practices through confrontation and questioning in order to improve them. In fact, in addition to being a metanoia, i.e. a willingness to give oneself a different, supposedly better standard of conduct, innovation exalts the creative spirit, not only of the teachers, but above all of the pupils.

It is well known that it is now right to extol the merits of innovation as a way of revitalising our schools. Innovative teachers, those who are revolutionising their teaching practices, are legion, especially if we do not reduce innovation to digital tools alone. Teachers have taken up the challenge of becoming living intelligences whose daily activity is to seek to extract in everything, for their pupils, what Rabelais called the substantial marrow. It is easy to understand why school leaders gain by identifying and supporting these teachers, by giving them their attention, by providing them with the means and materials they need, and by involving them in the life of the school. The future of the school is at stake.

The detailed study of the themes dealt with in this chapter, which allows us to clarify and add nuances from different points of view, in the first chapter, allows us to focus on two of the hypotheses that have already been pointed out in the previous chapter (1 and 3), while at the same time favouring the formulation of a new hypothesis, the two :

2. An effective partnership between the school and the community (families, businesses, etc.) can be an accelerator for the development of digital infrastructure and pedagogical innovation in schools.

CHAPTER 3. CONCEPTUALISATION AND CHARACTERISTICS OF GOOD EDUCATIONAL PRACTICE WITH ICT FOR INNOVATION

This chapter has two main aims: one is to propose a conceptual model on the school that can be considered as an example of good practice, following the use of digital technology in education (to foster innovation in education); the other is to present some examples of good practice, of schools (outside the ANGE partnership) that are developing actions aimed at pedagogical innovation using digital technology. Being built in a systemic vision, the chapter starts, therefore, from a theoretical approach on what represents an innovative institution (using digital technology) and arrives, at the end, at a presentation of the 6 case studies that can help the reader to better understand what type of project can be set up to innovate with digital technology.

3.1. The purpose of ICT in achieving innovation in education

Florentina MOGONEA[a],
Rodica Nicoleta CONSTANDA[b],

[a] Senior Lecturer, Department for the Training of Teaching Staff, University of Craiova, Romania
[b] 1st year Master's degree, Faculty of Letters, University of Craiova, Romania

8.1.1. Use of ICT in education - from modernisation to innovation

Contemporary society is constantly and profoundly changing. Since education is the main driver of the social core, it should be the main driving force behind the developments that take place in a society. Thus, all these changes should also take place internally (as a process of reform, assimilation and continuous development). However, education does not always include all the aspects necessary to achieve a high level of education.

Based on the idea of a high-level educational act, the concept of digitisation becomes a main factor in the evolution of education as such. It is therefore necessary to discuss the use of ICT in the educational process and the concept/phenomenon of educational innovation/education.

Many recent studies highlight the need to use ICT in the education and training of young people. Approaches are diverse, either general, comprehensive, exhaustive or focused on specific, particular and issue-specific issues. Generally speaking, attention is focused on presenting the characteristics of NICTs (new information and communication technologies), the advantages they offer for each category of beneficiary, possible

limitations, and the requirements to be met to ensure the effectiveness of the activities in which they are integrated.

The use of ICT is most often associated with the idea of progress; according to a generally adopted meaning, technological innovation is linked to pedagogical innovation. In this context, digital tools are seen as a solution to the difficulties of the school, a solution to make the activity more effective, to increase pupil motivation (Rinaudo, 2010, as cited in Fluckiger, 2017, p.133; Bernard & Fluckiger, 2019, pp. 4-5). In a more general perspective, pedagogical innovation, made easy by ICT, is based on recent developments in both fields, on the progress made by each, separately, but above all on the way in which new technological achievements can be harmonised with recent theories and paradigms concerning training, teaching and learning (Kollias & Kikis, 2005). Whatever the level to which we refer, from the management of a school to the concrete level of a class, the level of teachers or pupils, the use of ICT is a necessity, a condition of activity, in the general context of a technological society based on simple and rapid communication.

But beyond this aspect of using digital technologies to increase business efficiency and improve results, they represent a premise for change and innovation. What is the link between ICTs and change, what are the modalities, forms and instruments by which they can be achieved, what requirements must be met in this respect, what are the roles of the actors involved in this process and the levels at which innovation occurs; there are aspects here which require clarification, explanation, examples and reflection.

8.1.2. Aspects and methods of achieving innovation in education through the use of ICTs

The valorisation of new communication technologies is possible and necessary at the level of all components of a school, as can be seen in Figure 1 :

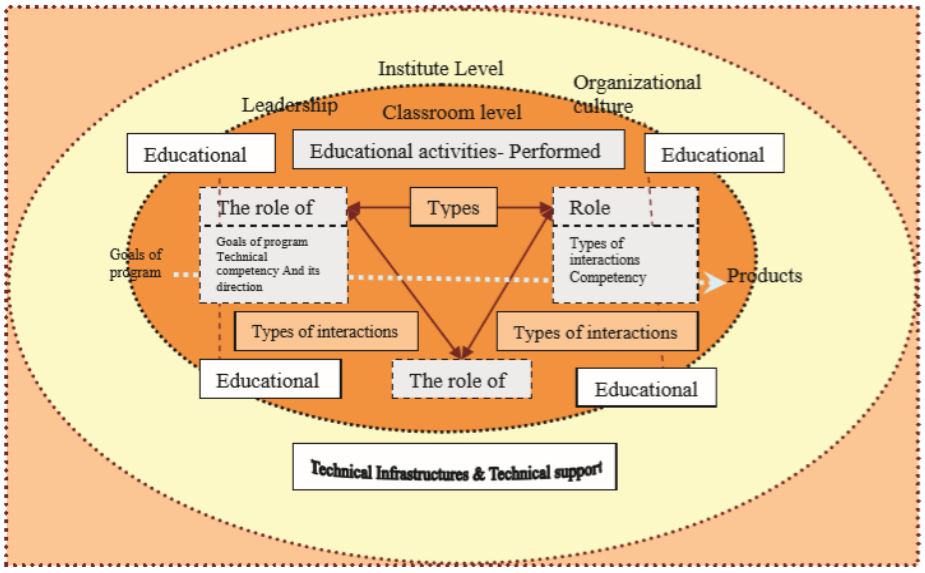

Figure 1. The role of ICT in education and training

(Bidarian, Bidarian, & Davoudi, 2011, p.1035)

The factors influencing the impact of digital technologies on innovation at school level can be grouped into two categories : exogenous (personal characteristics, work experience, community collaboration) and endogenous (skills, positive attitudes, work climate) (Losada, Karrera, & de Aberasturi, 2012, p.115).

We illustrate some of these factors, which have an important role to play in the implementation of communication technologies in order to bring about innovation : the roles/functions of technologies in the context of the school, outside it, the organisation of learning, the organisational climate, school management, school infrastructure and resources, and policies concerning the use of ICT (Nachmias et al., 2004, p.294).

We begin by analysing the link between the use of ICT at school and the possibility of the new technologies to produce innovation on the basis of the concrete elements of the classroom, respectively of fundamental teaching activities (teaching, learning, assessment). In the context of the digital age, teaching and learning cannot ignore the new communication technologies. Their use in teaching and learning activity not only contributes to the modernisation of the activity, but also represents a premise for innovation.

Thus, teaching can no longer be limited to traditional modalities, strategies, means, but must also make use of digital means, to be carried out not only in face-to-face variance, but also online, in virtual environments. Such teaching necessarily determines the changes in learning, which increasingly appear in the e-learning variant (Lietart, 2008). Many studies stress the importance of this mode of learning by the native digital generation, as well as the means of achieving it: collaborative, creative, integrative, situational learning (Mikre, 2011, p.119).

Sangrà and González-Sanmamed (2007, p.218) mention three cases of innovation in teaching activity using ICT:

- Use of the Internet as a learning tool.
- Collaborative learning.
- Virtual Learning Communities.

Evaluation, as an essential didactic activity, can benefit from the advantages and opportunities offered by ICT, both in terms of the ways in which it is carried out (e-evaluation) and of certain instruments (e-portfolio). E-learning platforms offer both the possibility of carrying out learning mediated by communication technologies, as well as evaluation and, implicitly, self-evaluation (Mogonea, 2015, p.863; Palagolla & Wickramarachchi, 2019, p.108).

Another essential dimension of the classroom, of the teacher's activity, is that of inclusion. Communication technologies are also useful in the case of children with special educational needs, whatever the type of disability, from sensory to intellectual. For example, access technologies make it possible to conduct learning activities for visually impaired students, providing them with real education and training opportunities (Pădure, 2014). Technological innovations thus produce innovations in terms of modalities, modalities of access to education for all these categories of students.

Figure 2 shows some of the most important implications of communication technologies on teaching activity, particularly on teaching and learning.

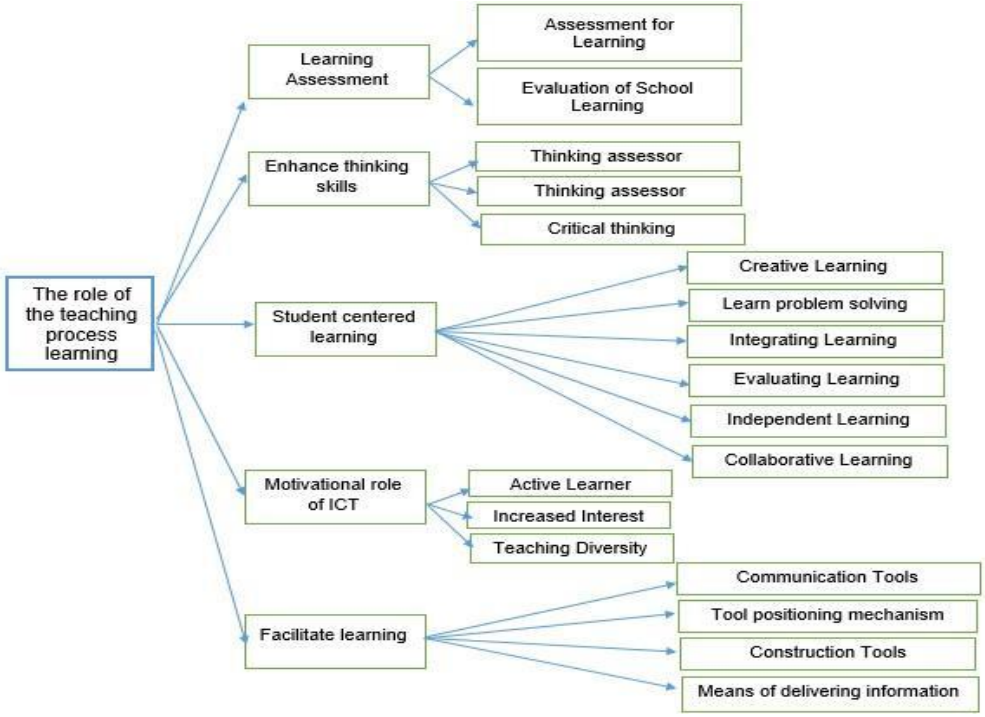

Figure 2. The role of ICT in the teaching/learning process

(Rahmani et al., 2006, cited in Bidarian, Bidarian & Davoudi, 2011, p.1039)

As can be seen, the role of ICT in the learning process is articulated around 5 axes: assessing learning, developing thinking skills, creating a student-centred learning environment, increasing motivation and also facilitating learning.

The traditional class is doubled by the version of the inverted class[28], which leads to important changes concerning the relationship between teaching and learning, on the weight of the direct, face-to-face activity carried out in class in relation to the indirect one, carried out at home, on the teacher-pupil relationship. The inverted class offers the students the possibility to study individually, to document themselves, to construct, in the initial phase, their own subjective knowledge and then to be able to confront their own knowledge with that of their colleagues and, in particular, of the teacher. In this context, the principles of constructivist learning are applied, principles which value both individual, independent, but also social, group activity (socioconstructivism). Thus, we note that even in the case of the use of new communication technologies in education for innovative purposes, different models can be identified on the basis of social theory, on the role of the social environment in learning. In addition to the socio-constructivist model mentioned above, Marcus' model (Langat, 2015) also emphasises the role of innovative behaviour in influencing the behaviour of others, in this context, communication channels having a key role.

The benefits of using ICT in schools can be organised around several important issues (Balanskat, Blamire, & Kefala, 2006, p.27):

About learning :

- Development of motivation and skills.
- Independent learning.
- Teamwork.

About education :

- Growing enthusiasm.
- Increasing efficiency and collaboration.
- Developing digital skills.

Beyond the opportunities and advantages offered, there are many obstacles which may interfere with the use of ICT in schools. In a 2006 study, Balanskat et al (cited in Palagolla

[28] For more information, see Marcel Lebrun's webinar Les classes inversées, a precursor phenomenon and prototype of "school" in the digital age, https://www.youtube.com/watch?v=rIi6aH2v4Lw

& Wickramarachchi, 2019, p.114) mention three categories of barriers, divided into three levels :

- At the level of teachers.
- At school level.
- The level of the system.

Palagolla and Wickramarachchi (2019, p.110) also mention a number of difficulties or barriers to the use of digital technology in education and schools :

- Gaps in initial teacher training in order to capitalise on school technologies.
- Poor English language skills of teachers, which mainly hinders the use of the World Wide Web.
- Lack of connectivity, especially in remote, rural and disadvantaged areas.
- Lack of teacher guides, resource books and sample documents on issues that support the program.
- Lack of awareness coupled with resilience due to poor attitudes and motivation towards ICT among teachers and headmasters..

Another level of exploitation of ICT is the development of teachers' skills in the use of digital technologies, both through initial professionalisation and in-service training programmes. The training/development of these skills is carried out on the basis of standards imposed by international bodies such as UNESCO (Marin, 2012, pp. 263-266). The 2016 OECD report mentions the need to develop teachers' digital skills. The same report emphasises the link between the use of digital technologies in schools, classrooms, by teachers and students and their performance in PISA tests.

The essential conditions for the effective implementation of new technologies in education, so that they contribute to innovation, are: proactive leadership, technical assistance, financial support, policies and procedures, training and assistance in the provision of hardware and software infrastructure (Newhouse, 2002, p.110).

3.2Pedagogical innovation by integrating ICT into educational practice at school level. General aspects and directions for action

Mihaela Aurelia STEFAN[a]
Alexandrina-Mihaela POPESCU[b]
Alexandra BALUȚĂ[c]

[a] Senior Lecturer, Department for Teacher Training,
University of Craiova, Romania
[b] Senior Lecturer, Department for Teacher Training,
University of Craiova, Romania
[c] Master, 1st year, Faculty of Letters,
University of Craiova, Romania

3.2.1 Introduction

The role of ICT in supporting education and the acquisition of key competences is essential in a digital society. The introduction of modern information and communication technologies at school is associated with significant changes in the educational process, with learning being approached from the angle of pupil/student interaction with the computer and collaboration with the teacher. This change in the education system has pursued a range of well-structured objectives, including: increasing the effectiveness of learning activities; the development of communication skills.

Virtual education represents an important step in this information age, it determines a better preparation of pupils/students[29] by putting them in situations of interaction and interactivity. Flexibility and diversification of the structure of training programmes, the use of interactive training strategies, learner-centred learning, transferability and professional mobility are some of the innovative trends in the Romanian education system, and in order to achieve these objectives, the development of skills in the use of ICT becomes a necessary precondition (Făt & Labăr, 2009, p.5).

3.2.2.Consequences of the use of ICT at school

The changes that have occurred as a result of the provision of digital equipment to facilitate managerial and didactic activity in schools have been highlighted in several relevant studies of the psycho-pedagogical literature. O. Istrate (2010) presents a summary of them. We highlight some useful data for our study :

a) At the level of **school administration** :

- ICT is used to reduce the expenses associated with the training process. Technology can improve access to quality education; ICT facilitates the provision of virtual and interactive learning experiences (Kozma, 2005).

- Equipping schools with ICT has an effect in terms of facilitating institutional communication and collaboration in the interests of education, as well as in the process of improving information, administrative and didactic activities at

[29] We observe that by "student" we mean any person in a learning situation, regardless of the system in which they are trained. Therefore, for the pre-university system, we also use the term "student".

the level of educational institutions; the priority orientation of the development of the use of ICT being taken into account by school headmasters, the development of pedagogical projects in collaboration with other schools or with other institutions of civil society (Potolea & Noveanu, 2008).

- ICT has a positive impact on the ability of administrators to communicate with parents and colleagues and to carry out their responsibilities more effectively (Kerr et al., 2003).

- At the level of school organisation, ICT promotes/accelerates, on the one hand, the crystallisation of a common core of modern pedagogical culture, a very important element of organisational culture, and, on the other hand, a more responsible attitude on the part of headmasters towards the teaching process. - learning, in relation to its actual effectiveness (Noveanu, 2004).

b) At the level of the **teaching process** :

- ICT contributes as much as possible to facilitating the achievement of the lesson objectives, followed by the facilitation of the didactic activity. In terms of the benefits for pupils, teachers consider that ICT promotes active, interactive and participatory learning; the use of new technologies contributes considerably to the appropriate achievement of differentiated education with pupils (Potolea & Noveanu, 2008).

- As regards the influence of ICT on the development of teaching strategies used by the teacher, the studies and reports draw the following conclusions: computers are particularly useful for adapting learning activities to pupils with special needs or learning difficulties; computers in the classroom facilitate teaching activity.

- ICT helps to facilitate the approach of active-participatory teaching strategies (Toma et al., 2009).

- ICT enables students to work according to their own learning styles; collaboration among students is better when using ICT (Balanskat, Blamire, & Kefala, 2006).

- Technology has a significant impact on students' participation in learning; teachers have found that using technology to facilitate creative project-based learning can motivate dissatisfied students in school (BECTA, 2008).

- New technologies facilitate the rapid transition from the exposure-based model of teaching to the student-centred model that includes constructivist teaching/learning strategies; a clear orientation towards constructivist

pedagogical practices can be achieved through the use of computers (Joița, 2006).

c) At the level of teachers :

At the level of teachers, ICT enables/encourages :

- Rethinking/reconsidering the process of teacher-student interaction ;
- A new vision on the assessment of student progress ;
- Expanding opportunities for professional development (Noveanu, 2004).

3.2.3 The profile of the educational establishment which invents educational practices through the use of ICT. General aspects and directions of action

The educational literature identifies various aspects concerning the conditions and criteria which a school must meet in order to innovate in educational practice using ICT. In this sense, by making a synthesis and starting from existing practices in Romanian education, we present below a series of recommendations which can sketch a possible profile of educational institutions on several dimensions (Balica et al. 2018)[30] :

3.2.3.1. At management level

- The existence, within educational institutions, of information and communication technologies and the Internet connection of the computer network.
- Concerns about the use of ICT should be addressed in Institutional Development Plans or Principals' Activity Plans; it is important for a school to take this clear direction for the integration of ICT, as long as the Teacher Assessment Sheet contains details about the use of technology in the classroom and every teacher knows that she is being assessed from this point of view.
- The need for systems engineers in the institutions that maintain computer networks and equipment in schools - computers, Internet network, installation of applications, video projectors, digital boards, educational software.

[30] The report analyses the policies and practices in the field of digital literacy, identifies the main favourable and unfavourable conditions at the Romanian level; the report is part of a transnational study elaborated on the basis of a common research methodology, using the instruments valid at the national level, in which also other countries, such as: Finland, the United Kingdom, Spain and Italy, participate.

- The use of information and communication technologies in administrative and/or secretarial and/or library activity.

- Train and motivate teachers in such a way that they wish to become involved in carrying out ICT-based projects.

- The introduction, in the annual teacher evaluation sheets, of a criterion for improvement in the area of digital skills.

- Supporting and facilitating the participation of teachers in in-service training courses to acquire digital skills and methodology concerning the integration of ICT in schools[31].

3.2.3.2. In terms of resources, of infrastructure

- Ensuring that all pupils and teachers have access to the computer network for documentation and information during and outside school hours; the existence of sufficient material resources so that at any time, in any school, digital knowledge can be practised and put into practice.

- Existence, endowment and security of the functionalities of the computer laboratories.

- The need to create electronic platforms to ensure that all teachers and students have access to videoconferences, live presentations, tests, etc., and that they are able to participate in them.

- Provide/improve/update/replace periodically the equipment and software used..

3.2.3.3. At the level of teachers

A large part of the responsibility for pedagogical innovation through the integration of ICT lies with teachers, whose duties are ultimately the key to success at school, which depends, of course, on material resources, but above all on interest in the study of ICT, training and a passion for finding the best methods, and professional experience. In this respect, we can make a few recommendations :

[31] In recent years, many training courses for teaching staff have been organised in Romania: ECDL curricula and examinations for all teachers, without discrimination with regard to specialisation, the course ICT Key Competences in the School Curriculum. In the official MEN curricula there is the CRED project (revealing curriculum, open education for all), etc. intended both for the creation of Open Educational Resources and for the in-service training of teachers and teachers for the realization of this kind of resources in the classroom.

- Good teacher training in the integration of ICT into the lesson.

- Promote the integration of ICT into teaching activity; apply student-centred training strategies in an environment focused on the use of ICT.Faciliter un accès équitable pour tous les étudiants aux ressources technologiques.

- Use technology to communicate and collaborate with all colleagues, parents and the community to stimulate and facilitate student learning.

- Use of ICT resources for objective and transparent evaluation.

The list of directions for action can be extended and completed (Kollias & Kikis, 2005, pp. 21-22) :

- To promote active and independent learning, in which students take responsibility for their own learning, set their own learning objectives, create their own study activities and/or assess their own progress and/or that of their colleagues.

- Create pedagogical contexts that enable students to research, organise and analyse information and to communicate and express their ideas in a variety of media forms.

- Engage students in collaborative learning, based on the project method, in which they work together on complex issues/themes ;

- Provide students with personalised instruction to meet individual needs.

- Address equity issues for students from different gender, ethnic or social groups and provide access to instruction or information to those who would not otherwise have access, for geographical or socio-economic reasons.

- Enabling the 'breaking down of the walls' of the classroom - for example, by involving others in the educational process, such as parents, scientists or professionals in the socio-economic field.

3.2.3.4. In terms of the school climate

- The educational environment consists mainly of teaching staff and students and is defined by the relationships between teachers, between them and students/students and their families, etc. The educational environment is also defined by the relationships between teachers and students. In order to achieve sustainable results, any innovation needs a favourable educational environment, i.e. cooperation, collaboration, trust and mutual support among those who make

up the educational environment; it is innovation that brings novelty, and continuity is represented by the environment, the organisational culture; studies on innovation in education place particular emphasis on the role of teaching staff in the process of innovation, on the characteristics, the behaviours they should have. The main characteristics of an innovative teacher are cooperation, collaboration, trust in others, willingness and readiness to innovate (Boiron, 2008).

- The school should be a welcoming and open space for those who study, a place where students spend their time, both during school hours and outside of them. As such, the school space should also allow for professional activities - learning, teaching, but it should also be a space for students to feel good, to read, to socialise face-to-face or through online networks (Florea, 2018)

3.2.4. Conclusions

There are various factors that influence pedagogical innovation, which can be both conducive to the initiation and evolution of innovation, as well as inhibitors of the innovation process. It all depends on the context in which they act, the management and involvement capacity of the institution, teachers, etc. These factors may include (Béchard, 2001, pp. 274-275) :

- Factors acting at the level of the environment : change in general - republishing of academic content in a changing society; emerging technology and pedagogy.

- Factors acting at institutional level: perception of the actors of change - dominated by negative perceptions of the financial resources allocated to higher education and the need to change curricula; formulation of strategies - analysis of the power and reliability of educational institutions in terms of identifying solutions, opportunities, ways of achieving the objectives they have set themselves; implementation - practical transposition of the solutions, strategies identified.

- Factors acting at the *level of climate* : the working climate can be that of collaboration between teachers or not; concerning the role of the manager, he or she can initiate, encourage collaboration, cooperation or he or she can have an attitude.

- Factors acting *at the classroom level* (teachers and pupils/students): favourable attitude to change or resistance to change, at the level of the teaching staff; motivation and job satisfaction or altruism; organisational culture of the school.

- Although it is designed to explain innovation at the level of higher education, this approach can be extended to the whole system.

- Digital resources represent an opportunity for the school, as the new tools offer great potential for innovation in educational practices and efficiency in the educational process. It is also a challenge, because the rapid development of digital uses requires in particular: a reinterpretation of teaching strategies; the renewal of evaluation methods; the analysis and reorganisation of school spaces and time.

3.3. Examples of good practice in the use of ICT to generate innovation in education[32]

Gabriela MOTOI[a]

Vlad Ovidiu CIOACĂ[b]

[a] Lecturer, Faculty of Social Sciences, University of Craiova, Romania

[b] Master, 2nd year, Faculty of Social Sciences, University of Craiova, Romania

In this sub-chapter we have chosen to present some examples of projects carried out in institutions in other European countries that are not part of the ANGE project. The idea of this presentation is the result of a reflexive practice based on the information in the two other sub-chapters (3.1 and 3.2). In particular, we have taken as our starting point Figure 1, which presented 'The role of ICT in education and training (Bidarian, Bidarian & Davoudi, 2011, p.1035)'. This figure shows us the three pillars or factors that are very important at the level of an institution in order to be able to innovate using digital technology: factors related to leadership, factors related to classroom level and thirdly, factors related to organisational culture. In the meantime, we have started to identify some institutions that can be recognised as examples of good practice, based on the criteria described in sub-chapter 3.2. and also on the figure mentioned above. Then, the projects that are implemented within these institutions bring together, by their goals, with the 4 projects of the ANGE classlabs within the ANGE project, which helped us to build our research hypotheses, to present the case studies on the four ANGE classlabs.

3.3.1. ICT as a means of facilitating and making communication processes in the school environment more effective - Project LOGINEO NRW (North Rhine-Westphalia, Germany)

[32] The examples of good practice presented in this chapter come from countries other than those that have become partners in the ANGE project. The case studies of the four experimental schools that are partners in the ANGE project will be presented in the 4th chapter of this study.

The use of social networks in schools is a debatable topic, as the purpose of conventional social networks (Facebook, Twitter, Instagram, etc.) can hardly be encompassed by objectives and activities of an educational and pedagogical nature. In this context, in 2018, 20 educational institutions in the federal state of North Rhine-Westphalia, Germany, participated in the development, implementation and testing of a social network with a purely educational purpose: LOGINEO NRW. The LOGINEO NRW project, launched in 2016, is implemented by the Medienberatung NRW and the municipal computer centre Niederrhein (KRZN).

The system is intended to be a communication platform that simplifies the processes of interaction within and between schools, in compliance with the provisions on the protection of personal data required by international, national, federal and private school regulations. Moreover, the complementarity of these provisions with the objectives of the platform has been an important challenge for the system creators and continues to be a focus of attention for the administrators of the technical infrastructure and the management of the school units, who benefit from special software created to supervise the compliance of these provisions within the platform (see the LOGINEO NRW platform).

Each user (students, teachers, administrative staff) has an account to which they have access by authenticating themselves with a user and a password. Once logged in, any user can communicate directly with another (e.g. the teacher with the student, the head of the institution with the teacher, the manager with the students, etc.) and groups can be created according to common interests (e.g. between teachers who teach a certain subject, between students participating in a certain competition, etc.). Meetings can be organised, calendars can be shared, such as for events on common social networks, and materials can be distributed in a protected cloud zone (Middendorf, 2017). Teachers can download learning resources with varying degrees of confidentiality. These can be intended for one student, a class, the whole school or all users of the platform. In addition, with the agreement of the management of the educational units and in accordance with the specificity of the analysis programmes, distance courses can be organised to ensure direct interaction between teacher and students. Currently, the LOGINEO NRW network is in a phase of expansion, both in terms of functionality and the number of schools invited to join the project.

In 2019, a team of researchers from the Universities of Hamburg and Paderborn tested the effectiveness of the LOGINEO NRW programme in the 20 teaching units, which are considered pilot school units. The research-evaluation report (Gerick, Eickelmann, & Steglich, 2019) recorded the existence of transformation processes in the organisational culture of the school units, measured, for example, by reducing the amount of paper used for communication within the organisation (through the programme, official information can be communicated, as requested by students from the institution's management), respectively for didactic activity (by solving the cards and assignments in digital format). There were no major differences in the effectiveness of the use of the

platform in primary schools compared to its use in secondary schools or in the higher levels of German pre-university education. In the last part of the report, the authors of the study recommend increasing the training of school staff for the correct use of the platform and benefiting from all the facilities it offers. In addition to support, the computer system needs to be improved so that certain functions become easier to use, and the design is also adapted for tablets and smart phones, not just PCs and laptops (Gerick, Eickelmann, & Steglich, 2019, pp. 96-97).

3.3.2. ICT as a means of implementing differentiated and student-centred learning - eLearning-Cluster Project eLC 2.0 (Austria)

Implemented as a pilot project since 2001, through direct collaboration between three partner schools in Austria, the project was among the first at international level to try to introduce information and communication technologies into the classroom to create the teaching document. - more effective and attractive learning. Recently, the network has been restructured and adapted to new trends in the field. It comprises more than 200 secondary schools and colleges in Austria and beyond. The principle on which the programme is based is as follows :

> Forms of teaching and learning require appropriate framework conditions in the context of the transition to the knowledge society, in order to develop and create a teaching space adapted to current requirements, such as the individualisation of the autonomous and technologically mediated learning process. (Baumgartner et al., 2017, p.95)

Specific to this platform, intended mainly for classroom work, are the psychological and pedagogical principles drawn from studies of learning over the past decades (Baumgartner et al., 2017, p.95). Thus, the programme represents a sub-instrument of the student-centred learning paradigm, ensuring the real and effective implementation of modern evidence-based pedagogy. The teacher has the possibility to develop teaching materials according to the needs and pace of each pupil, and the programme allows for continuous diagnosis and monitoring of progress. This is a very good example of how an ideal, theoretically based pedagogical model is operationalised in specific activities using ICT, finding its empirical applicability in the classroom.

3.3.3. An unconventional way of implementing ICT in the teaching process - Pegasolino Plus project (Kantonsschule Seetal, Switzerland)

In most cases, the didactic activity involves the use of digital equipment provided by the school unit and, implicitly, purchased from its funds. Within the Kantonsschule Seetal, two models have been implemented: BYOD (bring your own device), respectively COPE (corporate owned - personally enabled). The teachers involved in the BYOD system

brought their own devices, in contrast to those in the COPE system, who used the facilities provided by the school unit. Users of the BYOD system received an allowance in exchange for the use of personal equipment for teaching purposes.

The aim of the experimental programme was to see to what extent the use of personal devices (laptop, tablet, video projector, etc.) can motivate teaching staff to make more frequent use of information and communication technologies in the teaching activity. The result was favourable. Teachers pay more attention to personal devices because their maintenance and repair is not the responsibility of the institution, they use them more frequently and more easily because of their familiarity (Foster, 2017). The model can be implemented in schools with poorly developed technological infrastructure, as an alternative to purchasing expensive equipment from institutional funds.

3.3.4. ICT as a means of structuring and organising a learning environment - The Classroom of the Future/Klassenzimmer der Zukunft (KidZ) Project (Austria)

The Future Classroom/Klassenzimmer der Zukunft (KidZ) project was launched in 2013 and aimed to equip classrooms "with digital devices that function in an integrated way, at all times available to students, to offer associated options, communication and interaction" (Bundesministerium für Unterricht, Kunst und Kultur, 2013, p.3). In contrast to other digital programmes and networks, KidZ assumes that the definition of school is not virtual learning, promoted by other programmes, which could jeopardise the direct teacher-student relationship, but also the psychosocial relationships that are established within the student group. Information and communication technologies are useful as long as they do not affect, but promote direct interpersonal interaction. The solution is not the artificialisation of the pedagogical act, but the adaptation of the classroom, as an ecological space for learning, to the current demands and expectations of students, the market and society. Thus, as there is a smart house, the school must focus on the equipment and organisation of *smart classrooms*.

Providing courses with laptops, tablets, Internet, smart board and some facilities that guarantee the high level of environmental needs (e.g. through air conditioning systems, the layout of the space according to the specialists' indications, etc.) are understood as tools that transform the classroom - an attractive place and to facilitate the fulfilment of the curriculum requirements, creating a family environment, pleasant and in line with the requirements imposed by today's global society. By 2017, classes of the future had been organised in 15 schools in Austria (Baumgartner et al., 2017, pp. 95-132). The programme evaluation report (Machala, Mustafa, & Lindner, 2015) recorded a higher level of motivation among students learning in these classes and a much better developed set of digital skills, without compromising direct social interaction within the group. Increasing the interactivity of role-playing using the tablet (e.g. by generating

characters and tasks) is a good example where both dimensions are completed in these types of classes.

3.3.5. ICT as a tool for developing pupils' communication skills and as a catalyst for the school-community relationship - The Epal Project (Woodford Junior School, UK)

This innovative project was launched in early 2000 in the United Kingdom at Woodford Primary School (UK - Woodford Junior School). It is a project which used direct and simple communication (one-to-one communication), by e-mail, between 10-year-old children from Woodford Junior School and employees of a mobile phone company (Erickson), located more than 50 km from the community in which the school was located, for a period of one year. The pupils who participated in this project belonged to a marginalised community, exposed to the risk of material deprivation, from families whose parents had low aspirations, implicitly for their children, which may lead us to the conclusion, also favoured by recent studies in the field of educational sciences (Numa-Bocage & Păcurar, 2019, pp. 5-7), that ICT can also be used as a "facilitating tool for inclusive education" (European Commission, 2019).

Among the objectives of this innovative project, we can list: a) to improve communication and social skills of students, by putting them in contact with a person who is interested in dialogue with them and who encourages them to communicate by email; b) to offer students a role model (a mentor), a person outside their close social circle, who can share their professional experiences; in the long term, this objective aimed at developing students' professional aspirations, their willingness to continue their studies and, implicitly, to fight against dropping out of school; c) to develop students' digital skills: by accessing e-mail, students could become familiar with the Microsoft Outlook Express programme, learn how to send and open attachments to received or sent messages (Harris, 2002, pp. 451-452).

Twice a week, the students who participated in this project spent some time at the school writing to their mentors from the company mentioned above. The communication was done using a laptop from the school, which they could use at home.

During the implementation of the project, teachers reported that the pupils involved started to improve their attitudes towards educational tasks, develop their communication skills and show motivation and an increase in the world of work and professional life. Secondly, by participating in this innovative pedagogical experience, pupils improved their writing skills as well as their digital skills. Moreover, by means of e-mail rather than direct, face-to-face contact, pupils gained practical experience of a communication tool widely used in the labour market. Thirdly, the school's policy of encouraging pupils to take laptops home with them has given parents the opportunity to

learn about their children's activities at school and, to some extent, has helped to increase family communication. On educational and vocational topics. At the same time, for some pupils this project provided access to a computer for the first time outside school. Therefore, the project represented the school's vision of creating a digitally literate society (pupils, their parents, community members), by developing a school-family-community partnership. Moreover, the extended school (extended schools) (Genevois & Poyet, 2010, p.565), open 'outside the walls', favoured the emergence of new partners (family and community) which gave them more flexibility, 'by rethinking and redefining the school space, in relation to family or social' (Séré, 2010, pp. 30-31).

3.3.6. ICT as a tool for developing learning and collaborative work - Challenge 2000 Project (United Kingdom)

This project aimed to increase the ability to work in teams, using ICT, among secondary school students. Forty-four 11-year-old primary school pupils worked together in groups of four to seven pupils to solve puzzles and problems presented on a website - Challenge 2000, as part of a virtual trip around the world in a hot-air balloon. The pupils used the Internet for documentation and were assisted by teachers. As the balloon passed through other countries and geographical areas, questions and activities were used to raise awareness of their cultural identity, but also to develop the students' intercultural skills. The project targeted different subjects - geography, history, music, mathematics, ICT. The experiment lasted one year, with one hour per week, during which the pupils used the Internet for documentation and were assisted by teachers. Since it was available on the Internet, Challenge 2000 could also be used by pupils from other schools (Kozma, 2003, p.205).

3.3.7. ICT as a tool for improving communication skills through videoconferencing - The Belgrove College Project (United Kingdom).

This innovative project is a clear example of the principle that, through platforms, networks and forums, students and teachers from different geographical areas share their teaching-learning projects and can contribute to the development of collaborative learning, using digital media (Mangenot, 1997, p.119).

All teachers in the Modern Foreign Languages Department at Belgrove College in the UK were involved in this project. The tool used in this pedagogical experience was a multimedia tool: video-conferences with students from other countries, which enabled 20 students from Belgrove College to improve their oral and auditory skills in conversations with native speakers of other languages. For students studying French, the videoconference enabled them to attend sessions with French students who have

learned English. Videoconferencing sessions took place both during regular classes and as a voluntary activity during lunch breaks. The project took place over a period of 10 weeks. Teachers collaborated in the preparation of worksheets for each session to guide the conversations between the two groups of students. Students spent half of the session (about 20 minutes) asking questions in the other language and half of the session answering the questions in their mother tongue (Hammond, 2014, p.196). What was remarkable was that students were able to express themselves more quickly and effectively in a familiar language (French or English) through conversations with native speakers.

3.3.8. ICT as a tool for designing and implementing learning through play - DANT Project (Italy)

The DANT (Didactics Assisted By New Technologies) project was an experimental project carried out between 2000-2006 by IPRASE (Provincial Institute for Research, Training and Experimentation in Education), initially in the province of Trentino, then extended throughout Italy, and financed by the European Social Fund (Licht, Tasiopoulou, & Wastiau, 2017). This project involved 1000 teachers and about 10000 pupils aged 6-14 years and brought together teachers, experts and technicians to develop, test and use educational games in the teaching of mathematics and the Italian language (Patrick, 2011, p.63).

The project was carried out in several stages: firstly, a group of teachers was created who designed educational games, together with others who had technical expertise; secondly, a larger community of teachers tested the games in their own classrooms to identify their strengths and weaknesses and to recommend or suggest improvements; finally, the improved games were made available (online) to a large group of teachers who could use them in their daily teaching activity.

"Learning by playing" involved the creation of a large collection of educational software (made available to students via a CD-ROM): different types of games were offered in this collection, from "arcade" games to simulation games. Each game was designed to focus on a specific and precise subject (e.g. the four operations in mathematics, trigonometric tables, etc.). Video games have been used mainly in two ways: as a learning tool (as supplementary resources) or as the main learning tool used in teaching activities. Pupils played these games in small groups (in pairs, especially in primary schools, which generated a kind of "peer tutoring", a useful method in particular for solving content problems) or individually (especially in secondary schools).

During this project, it was observed that digital games have a significant educational value for students, facilitating better learning of the didactic content, offering them opportunities to develop transferable skills, such as: problem solving, critical thinking or

collaboration/teamwork. In addition, they have improved academic performance in subjects such as mathematics and Italian (Patrick, 2011, p.64).

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It is considered that these examples of good practice represent a point of passage from the theoretical to the applicative part of this intellectual production. Then, the 8 examples of good practice facilitate to the readers of this study the understanding on the issue of innovation in education, on the use of digital technology within institutions, at all levels (governance, teaching, organisational culture), to innovate in education.

In addition, the activity of documentation on other institutions, other countries (excluding the ANGE partnership) has helped us to build the hypotheses we started from in the framework of our qualitative approach (the 4 case studies that are present in the second part of this study).

Finally, we believe that the subject discussed throughout this chapter has given rise to the formulation of the last three hypotheses, which will be the subject of a more detailed analysis based on the case studies and the conclusions to be drawn from them. Specifically, scenarios four, five and six :

4. The experimentation carried out in the four classrooms is seen as a process of pedagogical innovation, as it provides the necessary conditions for the leadership of the change management team, a responsive and motivated group of teachers, and a process of reflection and continuous evaluation on real change and improvement of the teaching and learning processes.
5. The existence of adequate computer equipment in the classrooms, the methodologies used in the classroom laboratory, as well as the continuous participation of the centre in other innovation projects with previous and/or current ICT, are aspects that contribute to establishing an innovation process based on the experimentation carried out.

6. The implementation of innovative experiments in schools contributes to improving the acquisition and development of specific and transversal skills (management of digital resources, teamwork, oral and written communication, etc.).

SECOND PART

CASE STUDIES

INTRODUCTION

In the first part, devoted to the theoretical basis, the characteristics that characterise educational innovation and the role that technological resources can play in the service of innovative processes in a school which must be defined as a basic unit for change, thanks to collaboration between all the agents involved, advice and support from learning communities, clear leadership from the management team; and real support from the educational policies of each country. The main characteristics of innovative educational or innovative practices were also analysed, giving some examples from different countries.

Given the initial hypotheses and the experimentation carried out in the four schools that are part of the ANGE project, it is time to join theory and practice, building in these second part theories based on the analysis of four innovative practices, in which ICT plays a very important role.

Throughout this second part, answers will be given to the six hypotheses formulated in the introduction, which are reiterated in this section ; and which constitute the point of union between what has been revised at the theoretical level and the practices that are going to be.

The case studies presented in this book have been designed within the framework of the ANGE project, through the implementation of different classroom laboratories in which four educational centres have actively participated, such as G.S. Rakovski for Roman Languages (Burgas, Bulgaria), Novida Lukio (Loimaa, Finland), Paul Claudel-d'Hulst (Paris, France) and Zawm St. Vith (St. Vith, Belgium), three university teams from Spain, France and Romania and also the CEGEP de la Pocatière in Quebec.

Since the ANGE project, the "classlabs" are understood as a support laboratory, based on a partnership between a university or a research team, on the one hand, and a primary school or a secondary training centre, on the other hand, which serve to support change in education in relation to technologies and governance in education. Their purpose is to serve as a link in institutional transformation.

In fact, as indicated in the general introduction, the 4 institutions have carried out experiments according to a classlab approach, which aim to implement innovative projects related to digital technology and to ensure the increase in skills of the actors, including by promoting participatory governance.

Tableau 1. Objects / sub-objects and scenarios in the ANGE project

Lieux d'expérimentation	Objets/Sous objets déclinés en Scenarii[33]
G.S. Rakovski High School for Roman Languages (Burgas, Bulgaria)	The use of digital technology in distance learning for better inclusion
Novida High School (Loimaa, Finland)	Online evaluation
Paul Claudel-d'Hulst High School (Paris, France),	The development of innovative educational spaces and their impact on teaching and learning.
Training center Zawm St. Vith (St. Vith, Belgium)	The use of digital technology in vocational training and the conditions for learning with technology

The laboratory of G.S. Rakovski (Burgas, Bulgaria) focuses initially on the use of digital technology in distance education for better inclusion the use of digital technology in distance education for better inclusion (disability, foreign students, dropouts). The first question that guided the group's work was the following: how to use digital technology to enable students (who cannot attend courses or take exams) to follow training and obtain the corresponding diplomas?

The classlab of Novida Lukio (Loimaa, Finland) focuses on online assessment and how to create didactic situations to prepare students for virtual exams. The question that guided the group's work in this case is : how can evaluation and in particular self-evaluation be developed in various forms ?

Similarly, the classlab of the Paul Claudel-d'Hulst high school (Paris, France), first of all focuses on the development of innovative educational spaces and their impact on teaching and learning. The first question that guided the group's work was the following: how to transform a classroom into a place for research and experimentation ?

And finally, the classlab in Zawm St. Vith (St. Vith, Belgium) focuses on the use of digital technology in vocational training and the conditions for learning with technology. The research questions that have guided the centre's reflections are: how to offer online training, how to pilot pedagogical and technical options ?

[33] The list of the 11 scenarios produced by the 4 classbabs is provided in appendix 4.

The analysis of the work carried out in each of the scenarios was carried out through a qualitative study, in which the SWOT (Strengths, Weaknesses, Opportunities and Threats) tool was used as an analytical method. Using this tool, we seek to reflect on what happened throughout the development of the classlabs, and then to formulate reliable conclusions about it (Chang, & Huang, 2006; Lee, & Lin, 2008; Aliaga, Gutiérrez-Braojos, & Fernández-Cano, 2018). As Oliveira & Hernández (2011) point out: "SWOT analysis is a tool that facilitates objective assessment of the situation and correct decision-making" (p.6). And, furthermore,

> […] is a tool for strategic thinking, valid for diagnosis and planning, and not just a descriptive instrument.
>
> This method states that an effective way to build improvement strategies is through a conflicting analysis of internal and external factors. (Aliaga, Gutiérrez-Braojos, & Fernández-Cano, 2018, pp. 564-565)

Each of the elements that make up the SWOT is commented on in a double entry table, where it is possible to assess the qualities of the internal factors of a positive (strengths) or negative (weaknesses) nature, and to analyse the independent variables of the method studied that could have a positive (opportunities) or negative (threats) influence.

The SWOT analysis carried out in this study is narrative in nature, thus favouring not only a deeper and more detailed argumentation of each of the experimentations, but also a debate based on the relationship of the ideas and concepts studied, which allows conclusions to be drawn and a value judgement to be formed.

This analysis has also led to the formulation of six hypotheses, through which a descriptive response will be proposed regarding their realisation or not in the conclusions section of each of the case studies.

The assumptions are :

1. Thanks to a proactive attitude on the part of the actors (steering committee, teachers), digital technology can influence the different relationships between the actors in education (teacher-student relationship; teacher-teacher; school management) and thus promote pedagogical innovation.
2. An effective school-community partnership (families, companies, etc.) can be an accelerator for the development of digital infrastructure and pedagogical innovation within schools.
3. Governance that clearly promotes processes of educational innovation in schools ensures academic success in terms of teaching and learning.
4. The experimentation carried out in the four classlabs is considered a process of pedagogical innovation, as the appropriate leadership conditions of the steering team are provided for change, a receptive and motivated group of teachers, and a process of reflection and continuous evaluation on real change and improvement of the teaching and learning processes.

5. The existence of adequate computer equipment in the classrooms, the methodologies used in the classroom laboratory, as well as the centre's continuous participation in other innovation projects with previous and/or current ICT, are aspects that contribute to the establishment of an innovation process based on the experimentation carried out.
6. The implementation of innovative experiences in schools contributes to improving the acquisition and development of specific and transversal competences (management of digital resources, teamwork, oral and written communication, etc.).

CHAPTER 4. STUDY OF THE CLASSLAB CARRIED OUT AT THE G.S. RAKOVSKI HIGH SCHOOL IN BURGAS

Azucena HERNÁNDEZ MARTÍN[a]
Ana IGLESIAS RODRÍGUEZ[a]
Yolanda MARTÍN GONZÁLEZ[b]

[a] Department of Didactics, Organisation and Research Methods, University of Salamanca, Spain.
[b] Department of Library and Documentation, University of Salamanca, Spain.

How to enrich pedagogical methods with distance learning and thus change teaching and learning practices and enhance the skills of teachers and pupils in a digital context and through the reverse classroom.

4.1. G. S. Rakovski High School

The centre is located in Bulgaria, more precisely in the city of Burgas, a town on the shores of the Black Sea which, according to data provided by Eurostat, in 2018 had 411,579 inhabitants, making it the fourth most populous city in the country, after Sofia, Plovdiv and Varna.

The G.S. Rakosvki Institute is a secondary school that provides specialised training in the Romance languages (French, Spanish and Italian) to young people aged 14 to 19. The social background of its students is heterogeneous since some of them are descendants of immigrants who came to Bulgaria, others have special needs, there are also those who study for a long period of time, etc. The students are from different social backgrounds. This heterogeneity of the public has led the management and teachers to question the ways of implementing differentiation in learning to facilitate the success of the greatest number of students.

Admission to this centre is selective and, given its specialisation, access is by means of a national competitive examination. During the course of the training, the transition from one course to another is made by means of semester and end-of-year examinations, the latter being determined at national level. The centre achieves excellent results at the high

school, with a pass rate of between 95 and 100% for the 180 students who complete their studies each year.

At present, the school has a total of 833 students and 68 teachers, with an average age that is getting younger and younger, which facilitates the development of initiatives to move from a traditional teaching-learning model to a more innovative one, in accordance with the principles of education in a digital context. An example of this adaptation is the fact that the centre has five computer rooms and four multimedia rooms, but Internet connections were sometimes insufficient even at the beginning of the project. The centre also has a Moodle platform which is used by some teachers as a means of integrating new teaching practices into their classrooms, creating resources and designing homework assignments that students use to complement their regular lessons.

In its efforts to adapt to today's educational requirements, the Centre has been actively involved in more than 20 European projects in the field of teaching, digital technology and piloting over the last 20 years, some of which are still in the implementation phase (the largest project involved up to 25 teachers).

Among all these projects is the pan-European ANGE project, which aims to address good practice in the governance of projects using digital technologies and the exchange of practices between managers and teachers. This has enabled many teachers - especially those involved in language training - to collaborate more with each other through knowledge exchange, leading to a questioning of their own teaching practices and an openness to incorporating new ones. This external knowledge has also encouraged internal feedback through information and co-training (with the production of model lessons).

This exchange of knowledge and experience was achieved through meetings held at different levels and at different times. For example, the various multidisciplinary teams met regularly, as did the pedagogical coordination committee with the headmaster; twice a year, the teaching staff also met, and every two months, meetings were held with the coordinator of each level.

As all schools in Bulgaria are obliged to offer distance education to students who cannot attend face-to-face classes, this school welcomes young people with health problems, students whose families are temporarily going abroad, elite sportsmen and women and students who voluntarily decide to study outside the school for a certain period of time. However, these programmes are not entirely satisfactory for those who, due to their geographical distance, cannot attend classes. Faced with this situation, the Bulgarian Ministry of Education is encouraging the integration of ICT in schools, as their presence has so far been very timid and insufficient. In order to achieve this objective, the Ministry has launched a call for projects at national level to provide the most innovative schools with the necessary funds for the acquisition of technological devices.

At the same time, the center's participation in the ANGE project was proposed as a way of responding to the specific demands and trends that have emerged and are now

focusing on digital educational contexts. More specifically, it was the centre's management that stressed the need to participate in an international project of innovation in teaching, considering it as an opportunity to initiate a change in its teaching and learning methods and practices.

For the development and implementation of the ANGE project, a steering committee was set up, consisting of the headmistress of the school, her assistants, the administrative manager, 16 teachers and an ICT expert teacher, who has been working since the beginning of the project and who helps to organise and carry out the work as an experimental school. The school is based on the principle that it needs a leadership which is open to change, positive, which does not hesitate to cooperate, to commit itself to finding solutions and means, and to promote projects and teachers outside the school, both locally and nationally. Similarly, the presence of an ICT coordinator in the centre has made it possible to propose and conduct in-service training for teachers and students.

The steering committee meets formally every month, although it operates on a permanent basis and its members always find time to discuss problems to be solved. The committee was responsible for dividing the work among the different teachers representing the disciplinary fields involved in the project. They in turn shared with their colleagues the decisions taken within the committee. The meetings also established guidelines to be followed to ensure the progress of the project. This horizontal structure and delegated management is a constant in the projects in which the school has participated, both at European and national level. This method of collective work allows everyone to call on their colleagues to resolve difficulties with certain tools or working methods.

4.2. Experimentation scenarios

It should be noted that the experimentation carried out in this educational center included several scenarios[34] :

- Scenario 1 the acquisition of the MOODLE platform (steering situation of the establishment)
- Scenario 2 experimentation with distance education for dropouts (learning situation)
- Scenario 3 reverse class (learning situation)
- Another scenario relates to teacher training approaches between and by peers
- A final scenario concerns the managerial approach to change management

We will deal jointly with the development of the first two scenarios because we consider them to be closely linked in the planning and implementation of the experiment. We will

[34] See the details of the different scenarios in appendix 4

then turn to scenario 3. The other two scenarios are cross-cutting and will appear in the background throughout our study.

4.2.1. Development of scenarios 1 and 2 : the adquisition of the MOODLE platform and experimentation with distance learning for dropout students

The main resource available for experimentation was the Moodle platform, a learning tool designed to provide teachers, administrators and students with a single, robust, secure and integrated system for creating personalised online learning environments; and which allows consultation and access to different educational resources (quizzes, interactive tests, websites, etc.).

In the case of Burgas High School, Moodle was used as a technological tool for the application of the reverse class model. This scenario fits well with the innovative pedagogical objectives of the centre, and with a law in force in Bulgaria which obliges centres to have (online) distance learning facilities for those who cannot attend classes for various reasons (health or psychological problems, high-level athletes, etc.). In this sense, the ANGE project has contributed to improving this situation through the use of the Moodle platform, which the centre did not previously use for these cases.

Some of the activities carried out in the framework of this Moodle platform include :

- Online preparation of semester exams for students who are unable to attend classes, including self-assessment resources.
- Development of the reverse class, for example, in French and Italian classes.
- Internal peer-to-peer training session in the inverted classroom.
- Performance of a Kahoot at the end of the model lesson, by all students to close the lesson and relax the atmosphere a little.

In the case of students studying at a distance, teachers have integrated teaching materials, videos, self-assessment tests into the Moodle platform and/or used tools such as Skype or email to communicate with students and resolve doubts.

To feed this platform, qualified teachers have been asked to develop online resources so that these students can train and prepare for exams from home, using self-assessment tools. The development of these resources took place over one school year, and during the 2018-2019 school year they were tested with students. In addition, the management team decided to use the platform to achieve a second objective: to propose a reverse class system in certain subjects. Therefore, one of the challenges was to

increase the number of users of the platform in addition to offering more online resources to distance students, the first beneficiaries of the platform.

According to these basic ideas, the following general and specific objectives of the experiment are established.

Main objectives :

- Gradually transform teaching practices, using digital technology, to make them more varied and dynamic.
- Successful student learning using digital and technological resources (e.g. smartphones). This means that :
    - Teachers' knowledge and control of ICT.
    - Group work (teachers and students)
    - Make oral presentations.
    - Summarise and extract the most important ideas.
    - To motivate students in their learning and to make them masters of their own learning.

Specific objectives :

- Provide resources and remote exercises/tests for students who do not or rarely go to school.
- Create a learning platform designed to provide teachers, administrators and students with a single, robust, secure and integrated system to create personalised learning environments and facilitate communication between teachers and students. In addition to enabling a stronger relationship with parents.

4.2.2. Development of scenario 3 : the reverse class

Once it was decided that the centre would participate in the ANGE project, the next step was to carry out a survey to find out which teachers were interested in carrying out the experiment, which in this case consisted of applying the reverse classroom methodology. To this end, the school management team brought together the teachers who had used this methodology before, including the English teacher, the Spanish-French teacher, the Bulgarian teacher, etc., in order to organise themselves, as the reverse class requires

planning and work discipline, as well as reformulation of content, knowledge of ICT and acquisition of adequate materials, among other things.

Initially, the group consisted of 11 volunteer teachers plus two trainers - also high school teachers - who were willing to train other colleagues. Once the pedagogical group was set up, all the necessary time was invested to make sure that the different members had a good understanding of the methodology and all that its implementation would entail. In this process, the role developed by Nikolay Nikolov was crucial, as he always served as a reference in the project for the rest of the teachers.

Among the responsibilities assumed by this teacher is the provision of training courses that deepen the use of technology in the reverse classroom, which took the form of two face-to-face training sessions and one online session. Subsequently, small training or self-training sessions, developed within the framework of the ANGE project, were organised around the reverse classroom and also around the knowledge and possibilities of using different digital tools to organise courses with this methodological approach.

The headmistress proposed that during the first year, not too much work should be done on content in the reverse class, as the priority was that these teachers, having experience of this methodology, should show how they applied it in class to their other colleagues, in order to motivate them to integrate it also in their classes. Already at this stage, the teachers stress the importance of group work, of mutual help, because some colleagues master the technological resources while others are more familiar with the pedagogical requirements.

Finally, 16 teachers took part in the project, mainly language teachers, but also teachers of other subjects such as history or computer science, who give lessons, particularly at the so-called 'terminal' stage and to pupils studying at a distance.

In view of the fact that some pupils follow the curriculum in a non-presential manner for various reasons (high-level sportsmen and women, health problems, immigrants, school failures, etc.), the school management team (the headmaster, teachers, including the ICT teacher) decided to introduce a new method of teaching and learning, the reverse class for these pupils whose learning is autonomous, in order to help them prepare for and pass the end-of-year examinations.

The students who took part in the project are mostly senior citizens (final year) who come to the centre in person and also those who study at a distance, so the various activities proposed were carried out in class and independently at home.

As already mentioned, it was decided that during the first year of implementation of the reverse class, teachers would only organise 10-15% of classes using this new method. In the case of the subject Bulgarian Language and Literature and Foreign Languages taught at the centre, the programme consists of about 98 lessons per year, and for the other subjects of 108 lessons per year; however, these figures are approximate.

It is not possible to specify the number of hours per week and/or per month allocated to each subject as each is taught according to a different programme. Each teacher was free to choose the most appropriate time to apply the reverse class based on the material they were working on with the students.

The evaluation of the proposed activity was carried out using different criteria and instruments and enabled teachers to detect the difficulties encountered by pupils, seek appropriate solutions, modify the evaluation system and make the necessary adjustments.

As regards the types of assessment carried out, in the language course for example, these were carried out at two levels: individual and collective.

The individual assessment verified: 1) reading comprehension level; 2) listening comprehension level; 3) knowledge of civilisation; 4) oral expression; 5) pronunciation. The collective evaluation, on the other hand, made it possible to establish a dialogue and to raise situation scenarios.

Scenario 2 on the inverted class allowed us to verify the effectiveness of the proposed exercises/tasks since, after having worked individually, the students ask much more concrete questions in class, which improves their results. In addition, the simulated online tests allow students to work on the learning content at home, which facilitates better assimilation. Finally, oral and written formative assessment has proven to be the most appropriate way to assess the level of acquisition of knowledge and skills of students and to encourage their progress.

The evaluation of the reverse class is positive, according to the Spanish teacher, because this methodology has encouraged the participation, imagination and talent of the students to carry out and solve the tasks and exercises proposed. However, the fact that a group of students did not do the work allowed the teacher to give a comparative assessment of the motivation and involvement of the students.

On the other hand, the group work made it possible to value the cohesion between its members, the fact that students help each other, trying to make the best use of each one's abilities. This encouraged the teachers to establish individualised rules to allow everyone to develop in the group at the motor level and in terms of the ability to be in a group and to work together.

It has also been observed that the use of applications such as Kahoot has increased the motivation of students who, in general, are not very applied and who, nevertheless, have been involved in the resolution of the proposed activity, facilitating the acquisition of knowledge and, in particular, improving their academic results.

It has also been found that cooperative work contributes to improved learning.

On the other hand, students point out an improvement in communication between students and teachers, considering that with this methodology, this communication is closer, since it allows the teacher to talk more about you or in small groups with them.

Likewise, the students appreciated the use of digital devices in a positive way, as, in their opinion, their use better prepares them for the world of digital work in which they will have to perform at a professional level.

Nikolay Nikolov, one of the teachers who led this project, believes that if the necessary technological equipment and good wifi are available throughout the centre, the inverted classroom will encourage and help teachers to integrate ICT into their lessons and to see the positive effect that this methodology, and also the technology, have on pupils. On the contrary, one of the teachers interviewed and taking part in the experiment considers that not all content can be worked on using this methodology because, in her view, it is difficult for all pupils to work consistently and responsibly at home. According to her, in order to encourage them to do so, it is necessary that the students know that they are going to be evaluated on this knowledge later on, that is to say that in this case they are not going to work out of motivation, but out of obligation.

Another teacher stated that in the beginning students were very interested in this methodology because it was new, but later on they lost interest and need to be motivated for every task or activity they have to do, as is the case in the traditional classroom.

Despite their different considerations regarding the reverse class, both teachers agree that this methodology works very well with students who really want to learn and progress in their learning.

For distance education students, the use of the platform has helped to reduce the fear they often have of having to face learning on their own, and the use of Moodle has enabled them to connect with other students who can help them solve certain tasks and communicate with teachers, for example, to answer questions.

As for the management of the school, the director of the centre acknowledges that the experimentation promoted by the ANGE project, carried out around the inverted classroom, has brought many advantages and believes that it is necessary to continue combining the traditional methodology, of the classroom as we know it, with technological devices, given that the mobility of people is now a reality that can also be observed in this centre.

The involvement of the centre's management has been constant and necessary throughout the process. Its commitment to the use of ICT in a context of mobility for all people, especially students, has enabled digital tools to facilitate their learning wherever they are, while helping to promote communication, through technology, between teachers and students studying at a distance.

Teachers recognise and appreciate the important role played by the centre's management, as it provided them with the resources (training, technology, etc.) they needed to apply the reverse classroom methodology in their subject. They also emphasise the need for teamwork, since some were more proficient with digital cameras and others had previous experience in applying the teaching methodology.

4.2.3. Evaluation of the experiment

In order to deepen the study of the experience at G.S. Rakovski High School, the SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis technique was applied, in particular to the management team, the group of teachers and the students.

4.2.3.1. From the director and the management team

Table 2. SWOT analysis from the director and the management team (G. S. Rakovski).

Levers - Opportunities	***Brakes - Threats***
The presence at the centre of a "digital culture", through the regular use of an ORL, internal messaging and shared virtual spaces.	Computer equipment is sometimes insufficient: wifi network, teachers' equipment, room equipment (e.g. video projectors), operation of the network infrastructure, etc.
A well-established school culture of participation in Erasmus projects over the last 20 years: openness, exchanges, observation of other management and learning situations: informal professional development already in place among several teachers, mainly language teachers. Each year, around 20% of pupils and teachers take part in transnational mobility, but more than 60% of pupils and teachers benefit from the returns.	The weakness, or even absence, of an institutional system of continuing training encouraged by the Ministry. It is therefore necessary to commit to a policy of regular and long-term internal continuing training.
The strong investment of the management to achieve the initial intention, to find solutions to difficulties (technical, financial, organisational), to support the project on a daily basis abroad and to find the necessary financial means, for example, to equip the pupils when the families are not able to do so.	The need to be able to formalise the actions carried out and evaluate them in order to make them evolve.

	At the beginning of the project, the relative absence of an evaluation process based on clear and shared criteria
The parent's agreement to carry out the experience proposed by the centre and affecting their children (through an acceptance form made compulsory by the Ministry of Education).	The need for management to master both intentions and strategy, and to have a good understanding of the tools used, their potential for experimentation, a good knowledge of teachers, their reactions to digital technology, and their needs in the face of the difficulties and fears that may arise when entering into these pedagogical transformations.
Information for parents to reassure them and help their children to appropriate the tools and approach.	The management of the structure and the project is complicated by the fact that they are two large schools located in the same building.

4.2.3.2. From the teachers

Table 3. SWOT analysis from teachers (G. S. Rakovski).

Levers - Opportunities	***Brakes - Threats***
The training of the teachers taking part in the experiment is provided by an in-house trainer, partially relieved of his or her teaching duties, who has both a pedagogical and technical profile as well as reverse classroom experience: short face-to-face training + online exchanges in the form of start-up support + tutoring.	Teachers have a very heterogeneous digital and pedagogical culture, which can generate resistance to the proposed transformations.
The previous experience of several teachers in using the platform in their	The commitment of "pioneer" teachers to pedagogical transformation is difficult to

classrooms: existence of a first basis of "digital pedagogical culture".	recognise financially because there is no system for paying overtime.
Team work to choose the learning contents that will be the subject of the reverse class, the approach to be applied and regulated, on the basis of an already existing culture of exchange and joint work.	Lack of time for teachers to train at home: the investment is personal and can only be made on a voluntary basis.
Information and support to students to help them familiarise themselves with the platform and the learning methodology (in the initial scenario and then in the reverse class scenario).	
Desire to participate in new innovation projects.	

4.2.3.3. From the students

Table 4. SWOT analysis from students (G. S. Rakovski).

Levers - Opportunities	***Brakes - Threats***
The existence, for the first two years, of compulsory training for computer science students, which they can take as an option in the continuation of their studies. A very gradual decrease in the drop-out rate as indicated by the teachers themselves, although this strength needs to be assessed over time to see whether it is maintained.	The students have a rather heterogeneous educational level, although they all entered high school through a selection system and with a certain cut-off grade.
More interest in the studies of some students, due to an increase in their motivation.	The team of students in question is random.

Full participation in the process since students are involved in their learning, are active and actors and this generates the possibility of improving their academic results by realising how far they have come and how far they still have to go.	
Practical application of the knowledge and skills learnt As a result, more learning is perceived Development of autonomy and teamwork : students become masters of their own learning.	

4.3. General conclusions of the study of hypotheses

All the information presented in the two parts that make up this study, both in the theoretical framework and in the description and analysis of the case studies that make up the empirical part, is aimed at answering the question initially posed, namely whether a digital educational context serves as an accelerator or a driving force for innovation and enables the development of competences in high school.

The results obtained from the experimentation carried out by this centre allow us to draw various conclusions, which we will now explain, before proceeding to the study of the hypotheses put forward.

The new methodology applied makes it possible, in the case of the evaluation process, to focus on the acquisition of competences and not so much on the assimilation of knowledge, as required by a more traditional educational model. This form of assessment is in line with the inverted class model in which pupils learn to locate and exploit reliable sources on the Internet themselves. Thanks to the ANGE project, the school's teachers have been accompanied by university professors and external peers, who have offered advice and suggestions to all members of the educational community in order to resolve some of the difficulties in applying this methodology.

In order for the center to become a driving force for educational innovation, thanks to the experimentation carried out, it must have technological resources and an adequate wifi network. It is also necessary to provide teachers with initial training in the use of digital resources so that they can apply them in the classroom, both physically and virtually.

As described above, it is necessary to create a working group of teachers who share their knowledge and previous learning in terms of the use of different digital devices and applications, as well as their teaching experiences. In short, a continuous culture of collaboration and lifelong learning needs to be established in the school in order to share and build knowledge.

Teachers need to become aware, over time and on a recurring basis, of the benefits that the use of ICT can bring to their subjects and to the motivation of their pupils. We must regard them as a means at the service of teaching and learning processes, not as an end in themselves, so that the introduction of these technologies must always be accompanied by personal and joint reflection by teachers on the why and wherefore of incorporating them, since, as we know, they do not in themselves bring about an improvement in the educational process if they are not placed in close relationship with other elements of the curriculum.

For a center, as we have concluded, to become a basic unit for educational change and innovation, it must have a management team that manages, in a delegated manner, the projects and initiatives through which this type of innovation experience is promoted and which is responsible for providing the tools and resources necessary for its realisation. In addition, it is important to have an ICT trainer, or ICT coordinator as he or she is called in some countries, who is responsible for developing and bringing together the technological and pedagogical skills of teachers, as well as a group of teachers who are motivated and involved in pedagogical change.

It is also necessary to rely, periodically, on the advice of the pan-European team that was part of ANGE (researchers and professors from the participating universities), as well as on the experts in the different topics that were dealt with throughout the three years of the project, through webinars and focus groups. With regard to the work of support and orientation of researchers and university professors (three professors from the University of Salamanca and one from the ICP in Paris), it should be noted that the development of skills based on the use of digital resources applied to methodological approaches such as the reverse classroom, has been nourished by various meetings, both face-to-face (short training courses and transnational meetings) and virtual (mainly by videoconference). The collaboration between the G.S. Rakovski centre and the university researchers was concretised by the constitution of a working group in which the necessary reflection, follow-up and orientations prevailed. Various written documents are available on the project's platform.

The experiment carried out at the G.S. Rakovski centre in Burgas became a real and necessary experiment during the containment suffered due to the health crisis caused by COVID-19. During this period, the relevance of digital technologies and resources for educational centres and the need to integrate them into teaching practices became evident. The results achieved seem satisfactory, as does the involvement of teachers.

Once these reflections have been made, which have brought us closer to the different answers to the initial question posed at the beginning of the conclusions, we consider it necessary to review, within the framework of the case study analysed, the six hypotheses that we were considering, considering that this is a qualitative analysis, the revision of these must necessarily be descriptive, since it is not possible to give completely affirmative or negative answers that confirm or refute the various hypotheses, but rather to enrich, from the context itself studied, in this case the classlab produced at the centre of the G. S. Rakovski, the conclusions already drawn.

The *first* hypothesis that we put forward was defined in the following terms: "Thanks to a proactive attitude of the actors (steering committee, teachers...), digital technology can influence the different relationships between education actors and thus promote educational innovation". In view of the information we have gathered, we can state that the proactive attitude has always existed, both on the part of the management team, led by the director herself, and on the part of the teachers involved and motivated to initiate and develop experimentation successfully.

The existence of a digital culture has also been noted, very well established in the centre, through its participation in numerous projects, so that there is a sensitivity and a constant concern for change and improvement in an educational environment mediated by the use of information and communication technologies. Digital technology has in fact influenced relations between teachers, since the very nature of the experiment has required all those involved to be aware, first and foremost, of the need for prior training or "digital pedagogical culture" in the use of the platform as an instrument in the service of reverse classroom methodology.

This training has led to an initial relationship between the most experienced teacher, Nikolay Nikolov, who trains and supports the other teachers involved. The relations between the teachers were intensified through teamwork aimed at selecting the most appropriate learning content for the inverted class and the approach to be applied.

However, we cannot forget that this culture of exchange and common work already existed at the centre, due to its continuous participation in different projects. For this reason, we consider that the process of educational innovation does not start with this classlab, but is already present in the centre's own trajectory, and is reinforced by this project in which the methodology of the reverse class requires another type of relationship between all the members of the educational community; in a new scenario, the moodle platform and its didactic possibilities. These relationships are also very directly observed between the teachers involved and the students, as the former have to support and inform the latter in order to become familiar with the two main elements of this experience: the use of a platform and a new learning methodology, the reverse class.

The *second* hypothesis was expressed as follows: "Effective collaboration between the school and the community (families, businesses, etc.) can accelerate the development of digital infrastructures and pedagogical innovation in schools". Few data allow us to

approach a certain degree of descriptive confirmation or refutation of this hypothesis, as the information provided does not explicitly indicate that some kind of effective school-community collaboration exists to facilitate educational innovation through the development of digital infrastructures. Nevertheless, there are indications of this when one observes a strong intention on the part of the management to support the whole project, seeking to provide solutions to technical, financial and organisational difficulties by seeking external economic support when families are not able to afford the costs associated with the use of the technology. As the case study indicates, "The school started from the premise that it needs a leadership open to change, positive, which does not hesitate to cooperate, to commit itself to finding solutions and means, to promote projects and teachers outside the school, both at local and national level".

And the support of the families in carrying out the experience has been fundamental, so that the students perceive the commitment and mutual agreement between the centre and their families, and have the necessary support at home.

The *third* hypothesis, "Governance that clearly favours processes of educational innovation in schools guarantees academic success in terms of teaching and learning", is, in our view, the one that is most confirmed throughout the case study. By understanding governance both at the macro level, i.e. the different educational policies and the possibilities they offer for innovation, and at the micro level, the steering exercised by the school management, we can influence certain aspects that indicate how this governance has been fundamental to the success of teaching and learning processes in the medium and/or long term.

Firstly, the information provided clearly indicates that the Bulgarian Ministry of Education has encouraged the integration of ICT in schools because their presence, until very recently, was timid and insufficient. To this end, the Ministry has launched a national project aimed at providing funding for the acquisition of technological devices to schools which are pioneers in the design and development of educational innovation processes. No information is available on the extent to which this call provided the necessary guarantee to provide all centres in Bulgaria with the technological equipment that meets the conditions indicated, but the fact that the G.S. Rakovski centre took advantage of this call and obtained active participation in this national project is a very valid indicator that greater performance is gradually being produced in terms of teaching and learning processes. The interest and sensitivity of governance, understood at the macro level, is guaranteed in this respect, although a greater commitment to in-service teacher training at the institutional level is needed to approach educational innovation with rigour, as the SWOT study shows in point 2.3.1.

Secondly, and at the micro level, the steering exercised by the centre's management team clearly promotes these processes of pedagogical innovation, change and improvement in teaching and learning. The management of the centre has always been an essential pillar when considering the positive aspects of change, cooperation and commitment between the centre and the teaching staff, as well as between the teaching

staff itself, teachers and students, families, etc. The management of the centre has always been an essential pillar when considering the positive aspects of change, cooperation and commitment between the centre and the teaching staff, as well as between the teaching staff itself, teachers and students, families, etc. Moreover, the fact that a management committee was set up with a horizontal structure involving the director, her assistants, teachers and the ICT coordinator, created specifically at the beginning of the ANGE project to organise and carry out all the work, shows the concern and certainty of its members that with all this it is possible to improve performance, both in terms of teaching and learning.

With the information provided and the concerns and reflections that, as university professors, we have exchanged with the members of the centre who participated in the project, it is not possible for us to say that success has been completely achieved, and therefore in the short term, because any change requires time, establishment, a change in concepts and the involvement of a progressively larger number of teachers, but it is considered that the centre is on the right path, even if this path must continue to be travelled, as it is still a long way off. This can be seen in the weaknesses noted in sections 2.3.2 and 2.3.3, starting with the implementation of the SWOT technique. However, these are weaknesses that serve as a starting point for knowing in which direction to continue working.

The *fourth* hypothesis was posed in global terms for the four case studies: "The experimentation carried out in the four classrooms is seen as a process of educational innovation, as it provides the right leadership conditions for change, a responsive and motivated group of teachers, and a process of reflection and continuous evaluation on real change and improvement of teaching and learning processes". Therefore, we consider it necessary to come back to this later, when the general conclusions of the whole production are established.

As far as the study that concerns us is concerned, and as has already been expressed in relation to the previous hypothesis, it is considered that the centre is immersed in a process of educational innovation, understood as a continuum, as indicated in Chapter 1 of this study. However, as we have already indicated, it is necessary to gradually involve as many teachers as possible, so that the school can be considered in itself as a basic unit of change, rather than leaving it in the hands of a few teachers who, on a voluntary basis, and with additional personal effort, take charge of it. Otherwise, there is a risk of weakening the process of educational innovation, understood as something global and continuous, by favouring specific actions that are not transferred to the school as a whole.

The *fifth* hypothesis expresses that "The existence of adequate computer equipment in the classrooms, the methodologies used in the classroom laboratory, as well as the continuous participation of the centre in other innovation projects with previous and/or current ICTs, are aspects that contribute to establishing an innovation process based on the experimentation carried out". Indeed, as has been expressed, the G.S. Rakovski

centre has a great deal of experience in participating in various innovation projects with ICTs prior to the ANGE project and has the appropriate technological infrastructure; although, as they themselves indicate, the computer equipment is still insufficient, as is the functioning of the network infrastructure itself. Although the situation can still be relatively improved, we are faced with a consolidated centre in terms of educational innovation, thanks to the use of ICT. Therefore, all this is considered to have contributed to establishing a process of innovation based on the classlab put into practice, although the members themselves involved in the experimentation were very aware of the limitations, expressed in the last part of the study, and we consider that it is precisely this awareness of the difficulties that will make it possible to overcome them, if the methodology of the reverse classlab in an online scenario such as that of the Moodle platform continues to be developed. In addition, we continue to rely on external advice from university teachers/researchers, other teachers who are experts in these working methodologies, as well as on the advice of the pan-European team set up by the ANGE project.

Finally, it was considered necessary to reflect on a hypothesis in which it was expressed that "The implementation of innovative experiments in schools contributes to improving the acquisition and development of specific and transversal skills (management of digital resources, teamwork, oral and written communication...). ». The detailed study of all the experiments carried out in this centre shows the acquisition and development of multiple, fundamentally transversal competences. As far as students are concerned, skills such as participation, imagination or the discovery of talent when carrying out certain tasks and activities have been encouraged. In addition, a greater ability to work in groups and greater cohesion between group members, taking advantage of personal abilities, which students perceive as an opportunity for enhanced learning, should be highlighted. They are also aware that the use of digital devices makes them more able to work at university level and, in the future, in a professional context.

With regard to the relationships that have been established between teachers and pupils, skills have also been developed to improve communication between them.

As for the teachers, they have developed a series of attitudinal skills, more proactive towards the effect, both of the methodology of the reverse class and of the use of the technology itself.

For all these reasons, it can be said that the development of this experience has contributed to the acquisition and/or consolidation of a whole series of transversal competences, in addition to the specific ones that have been developed with this methodology in the subjects in which it has been put into practice. This innovation has generated a series of results that we can appropriately situate in an innovative context, although, as has already been pointed out, it will be necessary to continue working at a more generalised level at the centre, and to influence the weaknesses observed by the various members of the educational community. This is what any process of educational

innovation consists of, continuing to progress, to review, to experiment, with the aim of improvement.

CHAPTER 5. THE STUDY OF THE CLASSLAB CARRIED OUT AT THE NOVIDA LUKIO HIGH SCHOOL IN LOIMAA

Marta MARTÍN DEL POZO[a]

[a] Department of Didactics, Organisation and Research Methods, University of Salamanca, Spain.

The title of the experiment conducted at the Novida Lukio Institute (Loimaa, Finland) was 'Evaluation as educational practice'.

5.1. The center of Novida Lukio

The centre of Novida Lukio is located in Loimaa, a small rural town of 16,500 inhabitants, situated in the province of Western Finland and part of the Southwest Finland region. It is about 150 kilometres from the capital of Finland, Helsinki, and about 70 kilometres from the population of Turku, the sixth largest city in Finland. The pupils come from different schools and have different skills. Classes are very heterogeneous.

Novida Lukio is a medium-sized upper secondary school, founded in 1916, located in the current building since 1958 and renovated in 2006. About 250 students from the municipal district of Loimaa and its surroundings study here. About 90 students finish their courses every year. Students follow 3 years of study with modular courses (75 to choose from), considering the fact that the school year is divided into 5 periods, each ending with a week of exams. The centre has 20 teachers, a director and a secretary. A member of the centre's team is in charge of organising and monitoring the examination weeks and checking the smooth running of the platform. Although all the teachers have been trained on the Abitti platform, this teacher (maths teacher) acts as a responsible and supportive person for the rest.

Organisationally, until the end of 2017 the institute was part of the educational organisation of the municipality of Loimaa, but from the beginning of the following year the institute became part of the Municipal Educational Consortium of Southwest Finland and its educational unit, Novida.

This institute is the only one in the region, so it must be a reference for parents and students. In this sense, both the quality of the climate at the school and the good results in the secondary school leaving test are two fundamental aspects of parental satisfaction.

The school has a tradition of well-established European projects, 12 since 2000, with a strong impact in terms of openness and meetings with external partners, as well as positive reactions from families, the community and contacts with companies that have enabled long-term collaborations. These projects have been of the Comenius and Erasmus+ type. Digital resources are important in the centre as it has a broadband wifi network, 40 laptops and 40 tablets, thanks to funding from the Finnish Ministry of Education through a project entitled 'Connecting ICT in upper secondary education', which was one of the first steps towards digitising the assessments of secondary schools. Similarly, pupils are trained in the use of technological tools in compulsory subjects.

In contextualising this case study in terms of the educational stage, it should be noted that this project is being carried out more specifically in the baccalaureate year. During the baccalaureate year, tests are carried out to check whether pupils have acquired the theoretical and practical knowledge required in the curriculum and whether they have reached maturity in relation to the objectives of upper secondary education. The award of the diploma enables the bachelor to continue his or her studies at a higher education institution.

In this sense, the baccalaureate examination is held simultaneously in all secondary schools in two calls, one in the spring and the other in the autumn. The student must take at least four tests, and Finnish is compulsory for all. For the other three tests, the student may choose from the following four subjects: the second national language, a foreign language, mathematics and one of the other subjects taken. In addition, the pupil may participate in one or more optional tests. In this way, the pupil obtains the baccalaureate when he or she passes all the compulsory tests. The diploma indicates the compulsory and optional tests taken, the level of the test and the mark obtained.

It should be noted that the Finnish national curriculum for this level of education is defined by the Ministry of Education, although it is open to all educational institutions. In this respect, schools, through a team of teachers, define the educational pathway of the pupil in more detail. Subsequently, this curriculum is approved by the municipality in a municipal council dedicated to education.

A new national curriculum for secondary school students has been adopted in Finland in 2016, with a growing concern for a numerical and multifaceted approach to assessment. The Ministry of Education wanted continuous and varied assessment of student learning. This interest is also in line with the desire to digitise teaching, particularly in the process of carrying out assessments, and thus to generalise the practice of digital final examinations for all subjects in the curriculum in 2019. Previously, all assessments were traditional, i.e. they were carried out in the classroom and required paper and pencil. This adaptation is demanding, as there is no time for this pedagogical transformation.

To implement all these changes related to numerical assessment, a platform has been chosen at national level. This platform was tested by teachers after they had been trained

in its use. For example, in Loimaa, the introduction of digital exams in the national platform was done gradually by the teachers who wanted to implement it, to be generalised in 2019 in all schools. This strategy was sometimes a little difficult for teachers, as they were not sure that they had a platform that was more or less adapted to their pedagogical needs, as it did not function in a stable manner. However, in general, Loimaa School welcomed the change. The vast majority of teachers were receptive to the idea of integrating more digital resources into their teaching using this platform.

Undoubtedly, all these changes require a great deal of effort on the part of teachers to ensure this evolution: training, integration of new digital resources and new approaches are necessary. Management teams and municipalities have worked closely together to consider the financing of equipment (infrastructure, network and laptops for teachers) and training to support teachers in this change. Parents have also been involved, since all pupils must now have a laptop for lessons. During the first year of implementation, laptops were lent to students who needed them. At present, if parents or legal guardians are unable to purchase a laptop for their child, community social programmes provide financial assistance for its purchase. Similarly, laptops can still be loaned out in special situations, such as for national exams.

This major change, in turn, is circumscribed in the organisational context of schools, in terms of management, resources, work and teacher training. In terms of management and resources, the school headmaster and teachers agree annually on course management, class timetables, school priorities and their development, and in particular on the integration of digital resources. Teachers decide freely on the use of digital resources in the classroom. Investment in digital resources depends on the school budget, which is allocated by municipalities and organisations close to the education sector. The Ministry of Education also contributes financially to the technological progress of schools.

As far as teaching work in Finland is concerned, the work of teachers is very independent, however, at present, the Baccalaureate examination guides the teacher to a certain extent, as students have to prepare for the examination.

On the other hand, as far as teacher training is concerned, the employer is responsible for the in-service training of teachers on the basis of collective agreements for the benefit of civil servants. The minimum duration of such training is three days per academic year, during working hours, and is therefore compulsory. The Ministry of Education also supports in-service teacher training, for example, by launching thematic training weeks on specific issues such as language teaching or assessment practice.

5.2. The scenario: the numerical evaluation

5.2.1. Planning of the experiment

Taking into account the need to implement digital assessment practices, due to the digital administration of Secondary School tests on a compulsory basis for the whole of Finland, as instructed by the Ministry of Education, as well as the scarcity of specific resources or manuals to guide them in this process, this experiment was designed with the idea of using digital resources beyond the final assessment. The aim was to carry out continuous formative evaluation, also in digital form, as well as to bring about changes in teaching practices, so that they are more active and oriented towards the development of students' transversal competences, especially those referring to self-evaluation and peer evaluation (there are evaluation moments at the beginning, during and at the end of the course module).

This system is based on the principle that a student who assesses himself and others understands what he is doing and what is expected of him, so that he learns better and succeeds better in his studies. In this sense, the idea for the project was initiated by some teachers at the centre who shared their ideas for working together with others. As this is a topical issue in Finland, which everyone is talking about, it was easy to attract the interest of other teachers to participate in the meetings.

Finally, the participants in the classroom laboratory were the school headmaster and 5 teachers of different subjects (languages, mathematics, biology, geography and physical education), known as the "pioneers". It should be noted that one of them is responsible for the Abitti platform (national digital assessment tool) which we will explain in more detail in a later section, and another is also a study advisor for students. In total, about 80 students have benefited from the laboratory, divided into 4 groups of 20 students each.

5.2.2. Scenario development

Given the starting situation of the project, the general objective is to develop new digital assessment practices, inspired by the official process of the Digital Baccalaureate examination, and to develop pupils' self-assessment and peer evaluation, using different types of digital resources.

And, as specific objectives, the following points were raised :

- Use new digital assessment tools and methods.
- To diversify the pedagogical situations that can be offered to students through digital resources, so that they can be more active in their learning.
- Strengthen the role of continuous evaluation.
- To familiarise students with the methods of self-evaluation and peer review.

- To improve students' assessment skills so that they can improve their performance in the future.

- Raising students' awareness of their own learning through self-assessment and peer review.

- To increase the motivation of students and teachers.

- Develop collaborative exchanges between teachers.

As far as spaces are concerned, the experimentation was carried out in the usual spaces of the pupils' classrooms. It is relevant to point out that, due to the choice of subjects made by the pupils, they make up random and punctual groups, which makes it difficult for a class to feel its own sense of identity.

As far as the period of experimentation with students is concerned, it should be remembered that the year is divided into 5 periods of about 6 or 7 weeks, all ending with a week of examinations. In this sense, the experimentation with the students was carried out at the beginning of the third period of the school year until the end of it (28 November 2018 - 24 January 2019), coinciding with the intermediate part of the school year, and taking place in the subjects taught by the teachers participating in the project (English, Mathematics and Chemistry). In these, assessment practices were carried out at the beginning of each course module, as well as throughout the six weeks, with training tests, self-assessment tests and peer evaluation tests, and also at the end of the course module.

Les activités menées avec les élèves ont tourné autour de l'évaluation, de l'auto-évaluation et de l'examen par les pairs, en utilisant une variété de ressources numériques. En ce sens, les ressources numériques utilisées dans l'ensemble du classlab ont été principalement les suivantes :

- Microsoft Office 365, highlighting the use of Microsoft Forms, Microsoft OneNote and Microsoft Teams. These tools are easy to use for sharing documents and commenting on responses, and offer many possibilities (videos, images, forms...). However, in the early days, their use was not easy for teachers. Regarding their use, for example, at the time of self-evaluation, the teacher shared a list of objectives that each student had to colour in, depending on whether they had achieved them (they were coloured green) or not (red).

- Läksyvihko (www.laksyvihko.com) : Finnish online tool with mathematical exercises, which gives teachers the opportunity to send homework, see the students' exercises, see how they develop them, and give feedback. Pupils can also share their own exercises with other pupils if they wish. In addition, the teacher can receive information about the pupils' self-evaluation, and the pupils can indicate if they wish to do so: (1) they did the task, (2) they understood it, but

with help, (3) they did it, but still have questions about it, (4) they tried, but could not do it, and (5) they did not do it. This tool is free, easy to use, teachers see the work of students in real time, and it is good for simple formative assessments and self-assessments, although it requires an Internet connection and sometimes works slowly. On the other hand, students can share their work, but cannot comment on the work of others, concluding that it is not good for peer evaluation.

- Kahoot (https://kahoot.com/) : One of its advantages is that students appreciate it and it is easy to get the results once they have been done, as they can be downloaded into a data file. However, it does not show the processes by which learners got there, but only provides the answer, and has a limited range of question types and response times.

- Abitti (https://oma.abitti.fi/) : Finnish national tool for conducting examinations. It should be noted that all teachers should know how to use this tool because of its importance, as well as teach their pupils how to use it in each subject. For this reason, it should be used regularly in examinations throughout the course. Therefore, one of the teachers in the school acts as a support person for the use of the tool by the teachers and is responsible for its proper functioning during the examination weeks.

- Moodle (http://moodle.novida.fi/) : a learning platform that enables the creation of online environments for the teaching and learning process, where different types of learning materials can be downloaded, as well as tasks and quizzes.

- Peda.net (https://peda.net/loimaa/loimaan-lukio/kansainvälisyys/aandlgdl and https://peda.net/info/en) : Finnish learning platform for e-learning, coordinated by the Finnish Institute for Pedagogical Research at the University of Jyväskylä.

- Technological devices such as laptops and smart phones, following the trend called BYOD (Bring Your Own Device), whereby personal technological devices are brought to the centre. Students have their own laptops and smartphones, and teachers have laptops provided by their employers.

These digital resources have been used in the following situations :

- Diagnostic test at the beginning of each course module (Microsoft Office 365, Microsoft Forms, Läksyvihko).

- Self-assessment for setting objectives and assessing learning competences (Peda.net).

- At least two training tests during the six-week course, using a multiple-choice test with immediate feedback for students (Peda.net) and a production test, corrected by the teacher (Abitti).

- Peer Review. Home-based peer-reviewed tasks (Microsoft Office 365, Microsoft OneNote). Pupils create a test for another pupil and correct it, or pupils write an assignment and another pupil gives them feedback on it (for this purpose the teacher provides a form to be used by the pupils, so that the feedback is anonymous), or a presentation is made (anonymous feedback is also received on a form via Peda.net).

- Final exam with Abitti, which includes questions for the self-evaluation of the course.

Considering each of the subjects of the teachers participating in the lab, Table 7 shows the tools used in each case.

Table 5. Digital resources used in each topic and purpose of their use (Novida Lukio).

English	- Diagnostic test: Peda.net (multiple choice test). - Formative evaluation test: Peda.net and Quizlet. - Peer evaluation: Peda.net and paper (anonymous). - Listening exercises: Otava platform (extract from the school book "Insights"). - Final exam : Abitti. - Self-evaluation: Peda.net and Abitti (at the end of the course).
Mathematics	- Diagnostic test : Kahoot. - Formative evaluation test : Läksyvihko. - Peer evaluation : Läksyvihko. - Final exam : Abitti. - Self-assessment : Microsoft Office 365.
Science	- Diagnostic test : Microsoft Office 365 Teams. - Formative evaluation test : Microsoft Office 365 Teams. - Final exam : Abitti. - Self-assessment: Microsoft Office 365 Teams and also questions sent to students after the final exam via forms.

As for the other specific activities carried out by teachers, beyond the student evaluation activities, two training sessions (in November 2018 and April 2019) can be highlighted, focusing on learning Microsoft Office 365 tools for creating questionnaires and evaluation tests, as well as for classroom management. The first session provided an opportunity to learn the basics and develop ideas on possible ways of using these tools. In the second session, good practices were shared, experiences were discussed and other issues were learned from this tool. Similarly, for the development of the classlab, other activities were carried out, such as an English course and a mathematics course, which focused on the complementary numerical tools to be used in these subjects for diagnostic assessment, self-assessments, peer reviews and final evaluations. It also provided a comparative analysis of the advantages and disadvantages of each of these numerical tools.

In view of all the above, it can be said that the role of the headmaster in the realisation of the pedagogical scenario was one of trust and laisser faire towards the teachers. The director supported the creativity of the teachers, trusted the ideas that emerged on pedagogical practices, since the teachers know what is best for the students. In the same way, the headmaster was interested in each of the practices that the teachers wanted to implement and test, which is an aid to pedagogical action.

The role of the teachers in the classroom laboratory was to plan and stimulate different learning activities for the students so that they could develop their assessment, self-assessment and peer evaluation skills using digital resources. Within this general framework, they designed activities, assessment tests (diagnostic, self-assessment, peer and final assessment), as well as revised and corrected tasks for the students.

In terms of the role of the students, the evaluation role throughout the experience was remarkable, as students had to evaluate themselves and their peers in terms of activities, exercises and tasks.

5.2.3. Evaluation of the experiment

In general, before presenting the SWOT analysis corresponding to each of the basic agents in this classlab, we will refer to certain aspects to be taken into consideration concerning the evaluation of the classlab.

With regard to the evaluation of the classlab by teachers, it should be noted that, despite the financial efforts made to acquire digital tools and devices, the centre should provide for different strategies and conditions which encourage exchanges between teachers in order to consolidate innovative practices surrounding the evaluation of learning in the formative and summative sense. The time needed to set up the classlab has not made it possible to consolidate collaboration between 'pioneer' teachers as much as desired.

In addition, the classroom laboratory brought about many changes for the teachers, as they had to modify their practices by creating new situations that would allow students to learn more independently. This meant that teachers had to plan a large number of tasks to be carried out in the classroom or at home. This led to a change in the teacher's posture, who became a guide or support for the student in his or her learning, in addition to teaching concepts in the classroom. Nevertheless, thanks to the planning and work of the project's teachers, the implementation of differentiated activities related to digital formative assessment was achieved, allowing students to self-assess themselves, assess other classmates, as well as work individually or in teams independently.

As far as participation in the European ANGE project is concerned, this participation allowed them to learn by sharing, as the teachers were enriched by the experiences of others and the diversity existing in the pan-European team, all in terms of tools, situations and teaching practices. This was achieved through video conferences (such as those held in September 2018 and March 2019 on the state of progress of the experiment), transnational meetings, short-term training (for example, Course 2 held in the same locality as this centre in February 2018, and Course 3 held in Quebec in April 2018), the support team which formulated recommendations and the reactions received from the rest of the project participants made it possible to make progress and continue learning, even considering, according to the teachers, that the exchange times during the transnational meetings were short and did not allow them to enter as much as they would have liked into the discussions which would have been necessary, to which the language barrier must be added. With the introduction of the classlab, teachers have learned that they have the right to make mistakes, to fall and to get up again, understanding error as a source of learning. They also conclude that change requires leadership, not just leadership in itself, and that to get out of the comfort zone and therefore take risks, one must have confidence in the management and trust in the management.

A SWOT analysis is presented below as a specific evaluation of the experience by each of the agents involved.

5.2.3.1. From the director and the management team

Table 6. SWOT analysis from the director and management team (Novida Lukio).

Levers - Opportunities	***Brakes - Threats***
The Ministry of Education's proactive policy on digital skills development and assessment.	The management is primarily concerned with the proper application by all teachers of the ministerial directives, but it does not make the initiative of the "pioneers" of this classlab a priority for the center.

A certain culture of shared governance and leadership: the management is willing to consult teachers on many issues related to pedagogical organisation and school life. The implementation of the ministerial obligation to digitise secondary school exams is one example.	Educational practices are unlikely to change without management pressure. Therefore, a strong commitment from the management is needed to encourage teachers to participate in the project.
The headmaster gave the teachers the space to be themselves and to try out the different technological tools. The headmaster supported the teachers' ideas and creativity.	

.3.2. From the teachers

Table 7. SWOT analysis from teachers (Novida Lukio).

Levers - Opportunities	*Brakes - Threats*
The Ministry of Education's proactive policy on digital skills development and assessment.	The new secondary school curricula begin to operate in 2020 for implementation in 2021, an issue that will attract the attention and efforts of teachers.
The good will of the work team in terms of developing the use of digital resources in the courses.	The culture in upper secondary education is still very individualistic when it comes to teachers, and everyone does what they think is right in their classrooms in terms of the use of tools and methods.
Carrying out internal training courses on digital tools and their proper use in teaching practices (Abitti, which is the digital assessment platform, and Microsoft Office 365). The training focused on technical and pedagogical aspects, with exchanges of ideas and practices between teachers. The "pioneers" were able to take advantage of	Little time for exchanges, except within the same disciplinary group. More strategies and better conditions for teacher exchanges are needed to consolidate innovative practices around continuous assessment of formative and summative learning.

these moments to share their experimentation, better understand the support needs of other teachers and convince them to join the project.	
The presence among teachers of Riitta Salmenoja (who is also a national mathematics trainer), which involves local training.	The time that needs to be invested and spent from personal time by teachers to create new educational situations and new activities, and to exchange with other teachers participating in the classroom laboratory.
Quality digital resources, in terms of infrastructure, networks and personal technological devices, as well as the willingness to find appropriate solutions to ensure that all students have access to digital devices.	Digitisation of final evaluations is accepted (due to an institutional obligation), but there is no particular motivation to reflect collectively on new teaching practices (e.g. the development of student self-evaluation), as the results are good and parents, like students, are for the most part satisfied.
The ANGE project, as a vector for opening up to other contexts, for discovering other practices, other uses of digital tools and which can enable the management and other teachers to take an interest in the transformations desired by the "pioneers". The meetings held in the framework of the ANGE project and in the specific development of the classlab allow to go out of the comfort zone. Teachers have been enriched by the experience of others and the diversity of others (in terms of tools, situations and teaching practices), and have learned to have the right to make mistakes and even to fail.	The non-existence of a class group per se, since students, due to their choice of subjects over a period of time, form random and ad hoc groups.
A certain culture of shared governance and leadership: the management is willing to consult teachers on many issues related to pedagogical organisation and	The organisation of school time into periods of 6/7 weeks for a group of pupils, which makes it difficult to continue

school life. The implementation of the ministerial obligation to digitise secondary school exams is one example.	educational activities and to evaluate their effects.
The choice of "pioneers" to implement this experimental strategy, step by step, and the opening and exchange with other teachers on the basis of "evidence". In this way, institutional opportunities (external and internal) can be used to try to convince and train new teachers with regard to the classroom laboratory.	There are few guides and teaching materials specifically for numerical assessment. There are no specific resources available for the transition to digital assessment, which means that teachers need to carry it out autonomously in order to improve their teaching and meet this need.
Digitisation makes evaluation more diverse and different types can be applied, such as self-evaluation, peer review or multiple choice with immediate feedback.	It would be important for more teachers from the centre to participate in the classroom laboratory.
The work of teachers is very independent, and they can use the digital tools they want.	In the framework of the ANGE project, the exchange times during the transnational meetings were short and did not allow to enter into discussions that would be necessary, also taking into account the language barrier.

.3.3. From the students

Table 8. SWOT analysis from students (Novida Lukio).

Levers - Opportunities	***Brakes - Threats***
Quality digital resources in terms of infrastructure, networks and personal technological devices, as well as the willingness to find appropriate solutions to ensure that all students have access to digital devices.	Lack of belonging to a proper class, since students, because of their choice of subjects over a period of time, form random and ad hoc groups.
All students benefit from a specific digital culture course.	Sometimes having the technological resources available can mean a few moments of distraction.

Students are highly motivated in the use of digital resources.	There is no need to change things because the climate at the school is pleasant and the results are rather good.

5.3. General conclusion and study of hypotheses

As a conclusion to this case study, and taking into account both the theoretical issues discussed in the previous chapters of this document and the more specific aspects raised in this case, it can be stated that technology can indeed be an accelerator of innovation and skills development in educational institutions.

In particular, it can be said that digital resources have made it possible to develop a diversity of skills in this experimentation. For example, as far as teachers are concerned, competences have been developed concerning the use of digital tools for the implementation of digital assessment practices (referring to self-assessment, assessment by parts, formative and summative assessment), competences referring to how to carry out and assess different pedagogical situations that enable students to acquire the expected competences, collaborative and supportive skills among teachers, as well as learning the value of error as a source of learning and the enrichment that comes from learning from the experiences and diversity of others (in terms of tools, situations and teaching practices), because it is by sharing that one learns.

As far as students are concerned, they have acquired transversal competences in self-evaluation and peer evaluation, competences relating to reflection on the activities carried out and on their learning, and competences relating to the use of digital tools for educational purposes.

However, in order to carry out innovative processes that make skills development possible through the use of digital resources, certain conditions are required to make them possible.

As for technological resources, it is necessary to have quality resources, such as technological devices (computers, tablets, smartphones...), as well as a broadband network allowing to use the Internet on these devices in an efficient way. In the case of the Loimaa classlab, it can be stated that the available resources are adequate.

Teachers need time to collaborate, exchange experiences, reflect and support each other in developing their own digital skills as well as the digital skills of their students. When they have little time to carry out these processes, teachers cannot collaborate and take advantage of the richness of different opinions and experiences. Better conditions need to be created to encourage exchanges in order to consolidate innovative ICT practices. In the case of Loimaa, as the SWOT analysis indicates, little time was devoted to exchanges except within the same subject group. More strategies and better

conditions promoting exchanges between teachers are needed to consolidate innovative practices surrounding the assessment of learning in the formative and summative sense.

Consequently, teachers need time to develop and improve their own ICT-related teaching practices, and this time should be allocated to them as part of their working hours. In the case of Loimaa, as we saw earlier in the SWOT, teachers had to invest and devote personal time to create new educational situations, new activities and to exchange views with the teachers participating in the classroom laboratory.

Teachers also need training, materials and guides to help them in change processes for the development of digital skills. In the case of Loimaa, teachers have received training on different digital resources, but it is clear that there are few guides and specific teaching materials to help them make the change involved in digital assessment, which means that teachers carry it out autonomously in order to improve their teaching and respond to this need.

In terms of leadership and management, educational practices are unlikely to change without pressure or action from management or even governments. It is therefore necessary for management to make a strong commitment to encourage teachers to develop new educational practices related to ICT and the development of these skills. The management team must also support teachers' initiatives and creativity by helping them when they wish to undertake new ICT-related practices. In the case of Loimaa, we can point out that the director gave teachers a space to try out different digital tools, supported teachers' ideas and creativity, and established a culture of shared governance and leadership, consulting teachers on many issues related to the organisation of teaching and school life. However, although we can point out that these last conditions have been met, other aspects have not, as the management has not made a firm commitment to encourage teachers to implement new educational practices, nor to allow more time for sharing and collaboration among the innovative teachers who participated in the project, nor to encourage the integration of the whole educational community in a common project. In addition, it is important to bear in mind the context in which this classlab is taking place, i.e. the Finnish education system, which is achieving very positive results, being internationally recognised for the performance of its students. The satisfaction of parents and students with these good learning outcomes may be a factor that leads to less interest in innovation and improvement practices, when these are already considered to be of high quality and achieve the expected objectives.

Once the above conclusions have been drawn, it becomes necessary to provide answers to the hypotheses initially put forward to guide this intellectual production.

The first hypothesis was put forward in the following terms: "Thanks to a proactive attitude on the part of the players (steering committee, teachers, etc.), digital technology can influence the various relationships between education players and thus promote educational innovation". In this respect, we can point out that thanks to the proactive and participatory attitude and the willingness to use digital resources of the different

educational agents who participated in the classlab organised at the Novida Lukio centre in Loimaa, be it the director, the teachers involved and the participating students, it has influenced the relationships arising from the educational process among these participants, which took place in a climate of collaboration, trust and listening, which has also led to the promotion of innovation. However, innovation needs to extend beyond the group of students and teachers involved, so that it is a structural innovation, which would allow better relations to be established between the whole educational community of the school and promote pedagogical innovation at school level, and not only by individual teachers.

The **second hypothesis** was about : "Effective collaboration between the school and the community (families, companies, etc.) can accelerate the development of digital infrastructures and pedagogical innovation in schools". In this sense, when there is effective partnership and collaboration between schools and the community, for example with families, it promotes the development of digital infrastructures and pedagogical innovation in schools. As can be seen in Loimaa's laboratory, pupils are required to have their own laptops for class work, which are paid for by parents or legal guardians. However, if this is not possible, the community assists in the acquisition of these resources, and they can also be provided to students who need them in certain situations. This makes it possible to carry out activities related to educational innovation with digital resources, as without them it would be impossible to carry them out.

The **third hypothesis** put forward is: "Governance that clearly promotes the processes of educational innovation in schools guarantees academic success in terms of teaching and learning". With regard to the experimentation in Loimaa, despite the fact that there is a certain culture of shared leadership, in which teachers are consulted on issues related to the organisation and life of the school, and the head teacher supports some teachers when they come up with ideas and are creative, the key aspect that has enabled and encouraged innovation has been the high level of autonomy of teachers and the availability of the technological means necessary to do so, which contributes to better results in terms of teaching and learning.

The **fourth hypothesis** was put forward in the following terms: "Experimentation is considered a process of pedagogical innovation, as it provides the conditions for leadership of the change management team, a responsive and motivated group of teachers, and a process of reflection and continuous evaluation on real change and improvement of teaching and learning processes". As for the process carried out at the Novida Lukio centre in Loimaa, it can be considered as a process of pedagogical innovation, but only at the level of the "pioneer" teachers who participated in the classroom laboratory, and not at the level of the whole school. The teachers involved were active, responsive, participative and motivated. However, they tried to be leaders for other teachers and allowed other teachers to participate and join the experiment, but this was not possible. On the other hand, the "pioneer" teachers, throughout the experimentation, carried out processes of reflection and continuous evaluation on what

was being done, reflecting and sharing with the researchers of the pan-European team issues such as the tools to be used, how to achieve real improvements in teaching and learning processes in general and how to develop student assessment skills so that students can become aware of their learning and thus achieve better results in the future.

The fifth hypothesis was mentioned: "The existence of adequate computer equipment in the classrooms, the methodologies used in the classroom laboratory, as well as the continuous participation of the centre in other innovation projects with previous and/or current ICTs, are aspects that contribute to establishing an innovation process based on the experimentation carried out". As we have seen, the educational innovation process carried out at the Novida Lukio centre in Loimaa has been made possible by the fact that the centre has adequate technological infrastructure (laptops, smartphones, tablets, high-speed Internet and the various digital tools), both in the classrooms and by the pupils themselves, and at the disposal of teachers by the administration, to the methodologies and resources used in the classlab (a digital evaluation process referring to peer and self-evaluation, using various technological tools), as well as to the participation of the centre in other projects.

Finally, **the sixth hypothesis** was put forward in the following terms: "The implementation of innovative experiments in schools contributes to improving the acquisition and development of specific and transversal skills (management of digital resources, teamwork, oral and written communication, etc.)". As we have seen in the innovative experiment carried out at the Novida Lukio centre in Loimaa, the implementation of this type of innovation process has contributed to the acquisition and development of a diversity of competences, both transversal and specific, of teachers and students. As far as teachers are concerned, we can point out that competences have been developed concerning the use of digital tools for the implementation of digital assessment practices (related to self-assessment, assessment by parts, formative and summative assessment), competences on how to carry out and assess different pedagogical situations with which students can acquire the expected competences, collaborative skills, teamwork and support among teachers, as well as learning the value of error as a source of learning and the enrichment that comes from learning from the experiences and diversity of others (in terms of tools, situations and teaching practices), since sharing promotes learning. As for students, they have acquired transversal competences in self-evaluation and peer evaluation, competences related to reflecting on the activities carried out and on their learning, and competences related to the use of digital tools for pedagogical purposes.

In this way, as a summary of those reported in the SWOT analyses in relation to what has been written about the hypotheses, we can highlight the existence of good will and a participatory and proactive attitude of the working team with regard to the development of the use of digital resources in the courses and the existence of a proactive policy of the Ministry of Education on digital and on the development of evaluation skills **(hypothesis 1).** In addition, there is a willingness to find appropriate solutions to make

digital devices available to all pupils through collaboration between families, the school and the community, so that they can carry out the work in the classroom **(hypothesis 2).** There is also a certain culture of shared governance and leadership, although the management should be more involved and make the initiative of the 'pioneers' of this experimentation a priority for the centre **(hypothesis 3).** Furthermore, the use of digital resources was made possible thanks to the goodwill of the school staff, just as the head teacher supported the ideas and creativity of the teachers and gave them the space to be themselves and to try out different technological resources, although a stronger commitment from the management would be needed to motivate teachers to participate in the innovation in order to ensure that innovation occurs at the level of the whole school **(hypothesis 4)**. Similarly, the existence of quality digital resources, in terms of infrastructure, networks and personal technological devices, and participation in the ANGE project, as well as in other previous projects, as a vector for opening up to other contexts and discovering other practices and uses of digital tools, contributed to the innovation process of this experimentation **(hypothesis 5).** Finally, the carrying out of internal training courses on digital tools, as well as the participation in the own experimentation have contributed to the development of specific and transversal competences related to the use of digital tools, reflection and evaluation both among students and teachers, thus contributing to an adequate participation in new innovation proposals, to adequately face digital evaluation as well as to face day by day the digital society in which we are **(hypothesis 6).**

CHAPTER 6. STUDY OF THE CLASSLAB CARRIED OUT AT THE ZWAM ST VITH VOCATIONAL TRAINING CENTRE

Michaël BOURGATTE[a]

[a] Senior Lecturer HDR, Catholique Institute of Paris, France

The title of the experiment is as follows: How to set up a policy of integration and use of digital tools in the training of pupils ?[35]

6.1. ZWAM St Vith

The ZAWM training centre in Saint Vith is located in German-speaking Belgium. Its three main characteristics are :

- A Franco-German bilingual learning context.
- State-of-the-art vocational/professional training.
- An institution focused on theoretical and practical learning that mobilises cutting-edge digital technologies.

The center has 75 teachers, most of whom (95%) come from companies and teach in the educational establishment on a fee basis; there are therefore few statutory staff.

The centre trains apprentices on a sandwich course (150 to 200 people complete their training every year) in a wide variety of professional sectors. It also offers continuing education for working professionals (around 30 per year). Apprentices are trained both at school (1 day per 5 days) and in companies (4 days per 5 days). As a result of their partnership with companies, they are confronted, as a school, with the requirements that these companies have to meet.

At the end of primary education, Belgian pupils can move on to technical or vocational education. Technical education is organised in two sections: transitional technical education (TR) and qualifying education (TQ). Both start at the second level, continue at the third level and may end with a seventh preparatory year for higher education. If they complete grade 6, students are awarded a Certificate of Study of Grade 6 (CE6P), which

[35] This chapter was coordinated by Michaël Bourgatte, HDR Lecturer at the Institut Supérieur de Pédagogie - Faculty of Education of the Institut Catholique de Paris. It benefited from the contributions of Rolland Adjalian, Vincent Affholder, Isabelle Argouarc'h, Chantal Arino, Marie Bouchere, Elodie Cavanna, Jean Courtade, Colombe De Jerphanion, Myriam Djellal, Anne-Sophie Durand, Florence Lafalaise, Blaise Mankana Mbeka, Olivier Maunand, Edith Mawakam, Sybille Menager, Coline Morel, Ida Diane Odjoussou, Antonin Paha, Louis-marie Rochard, Nicolas Salomon, Clémence Touche and Alcides Martinho Vaz Teixeira, as part of an in-service training module for educational managers entitled "Innovative devices".

is issued by the Governing Board. These courses prepare students for working life, but provide access to higher education on condition that the student obtains a Certificate of Higher Secondary Education. Apprenticeships are for young people aged 15 or 16 and last between one and three years depending on the sector. Apprentices undergo on-the-job training in companies, 3 or 4 days a week in the tertiary or industrial and craft sectors. The management of the school is therefore in direct contact with all the stakeholders in its territory: the regional authorities, companies, corporations and industries, but also other training centres in the region.

The participation of ZAWM in the ANGE project questions very precisely the issues of employment and professionalisation which are at the heart of the European Union's (EU) concerns (Eurostat, 2020). The responses that the EU is trying to provide to these concerns are expressed in different ways, but mainly around support for education and innovation. Since 2014 and the establishment of the Europe 2020 programme, digital innovation has effectively taken its place in the Digital Agenda (D.A.) (Digital policies in secondary education in Europe, 2020). This agenda defines 7 areas of action considered as priorities, including increasing investment in research and innovation, as well as promoting a digital culture. The issue of digital inclusion in education is a response to the problem of youth unemployment. Various programmes mention this concern (Investing in Europe's Youth: Commission launches the European Solidarity Corps, 2020). These findings, based on the e-Skills initiative, indicate that 40% of the European workforce does not have the digital skills needed to carry out certain tasks and, on the other hand, 40% of companies are unable to find the ICT specialists they need. It is also as a result of this state of affairs that the Erasmus+ programme (What is Erasmus +? - Erasmus+, the European Commission's education, training, youth and sport programme, 2020) has identified areas of teaching and learning to be promoted[36]. In this sense, and since 2016, the EU has allocated a budget of 200 million euros to the Erasmus + programme (Sectoral Alliances for Skills | ERASMUS+ France/Education Training Agency, 2020).

Vocational training - which is discussed here at the ZAWM centre - is a special case because of its close link with the business world: the teachings of the training centres must find immediate application in the workplace. This concern is signified in the Entrepreunaria 2020 action plan, which supports the development of skills adapted to labour market trends (Entrepreneurship 2020 Action Plan | European Economic and Social Committee, 2020). This support is reflected, in part, in the text of 2.5.2018, which recommends Member States to "ensure that learning programmes are adapted to the needs of the labour market and provide benefits for both learners and employers" (European Framework for Quality and Effective Learning: Questions and Answers, 2020) (Points 2, 3 and 10). This calls for competences to be adapted to the labour market, as well as training support for teachers and trainers to regularly update their competences.

[36] In addition to enabling learner mobility, financial support is provided for innovative actions and for bringing together professional circles and training courses.

In addition, the EU supports the implementation of these recommendations through financial and legal support. For example, it is possible for a company to modernise its computer and/or digital equipment by applying for EU funding through the COSME programme (European Framework for Quality and Efficient Learning: Questions and Answers, 2020).

There is a well-established culture of European openness at ZAWM, 14 projects over the last 10 years: every year pupils and teachers take part in transnational mobility, opening up to new contexts and new practices. Pupils are generally rather in favour of this, hoping to access more dynamic courses that are more in tune with what they experience in companies.

We can therefore see that ZAWM is resolutely concerned about the future and the professionalisation of its learners. On this territory, as elsewhere in Europe, the challenge is to achieve the full success and professional fulfilment of students in training. In order to make this possible, the governance project of this establishment is a major challenge: contact with industrialists and the local economic fabric, relations with political bodies, integration of innovation at the service of educational performance. All this is to ensure that the learner becomes a qualified and competitive professional (examples of student pathways are available on video and online, such as the one for training in mechanics on agricultural machinery[37] or lorries and buses[38]).

Erich, the director, has a decisive role in motivating people to use digital technology, particularly in line with institutional texts, but also with regard to the innovations that are implemented in companies (he has to take into account their requirements, but also the quality of the services provided by suppliers, not to mention the cost-service-profitability ratio, particularly with regard to the durability of the investment, especially when we know that digital tools are rapidly becoming obsolete). It also makes decisions on the purchase of equipment and, lastly, is responsible for informing its teams on the issue of using digital databases.

The role of the deputy director, Thomas, who is interested in the subject of digital for training, but who has not received any specific training, is to motivate his colleagues in the use of digital, support decision-making in the purchase of equipment, as well as carry out monitoring and keep teams informed on the use of digital resources.

Information and instructions circulate internally at the centre through a number of channels :

- Staff meetings

[37] https://www.youtube.com/watch?v=GKkDdEqj8A8
[38] https://www.youtube.com/watch?v=Av41nqPq33A

- Class councils
- The meeting of teachers in charge of coordination
- The teachers' meeting
- Meetings between the management and specialised teachers (specialised groups)
- Meetings with companies
- Working meetings with the higher authority
- The "Digital" working group
- The ILIAS work platform
- Personal interviews with teaching staff

On a more sporadic basis, the team members exchange with professionals from companies in the framework of work meetings, but also with teams from the AHS (Autonomous University of Applied Sciences of the German-speaking Community).

The ANGE project therefore came at the right time, as it has made it possible to channel the attention of the training team around the use of digital technology in pedagogy, which has led to the setting up of numerous experiments over the last 3 years. Teachers are trying, according to their possibilities, to integrate digital technology more and more into their lessons. The main obstacle concerns problems such as the handling of equipment, the mastery of storage media or access to Wifi. These are the reasons why teachers may, from time to time, be reluctant to accept initiatives aimed at increasing the use of digital technology. And then there is also the large number of services, applications or technological tools that make choices difficult (what is the capacity of teachers to make decisions, to train themselves and to sustain the use of the tools they are going to mobilise in their pedagogy).

6.2. The experiment

6.2.1. Context

In Belgium, the theme of Crafts 4.0 is becoming more and more important within companies. Electronic systems and machines, electronic documentation, CAD, CNC, BIM[39] are an integral part of their daily life. Companies therefore expect training

[39] https://www.autodesk.com/solutions/bim; https://www.bimportal.be/nl/bim/algemeen/bim/; http://hochtief-vicon.com/vicon/BIM-Welt/Was-ist-BIM-42.jhtml ;

institutions such as ZAWM to provide suitable courses at all levels (from apprentices to skilled workers, managers and executives to senior staff). However, in addition to a general labour shortage in the region, there are major deficits in the mastery of digital tools among older employees already in the workplace, but also among young people entering the job market.

ZAWM must therefore put digital technologies at the heart of its students' training. But it is obviously not a question of training in digital, ex nihilo. Training courses must be in direct contact with the realities on the ground, so that young people are operational as quickly as possible and their skills are adapted to the requirements of the labour market.

The experimentation in this establishment includes two complementary scenarios: a first pedagogical scenario around the integration of digital technology for the development of practical professional skills, but also for the development of transversal skills; a scenario around a governance project of the centre which is intended to be innovative and which is put at the service of experimentation. The task is therefore twofold :

- Provide access to useful training materials. Either by acquiring computers, tablets, adapted tools (digital welding stations, e.g. with Soldamatic), applications for computers or tablets, etc., or by purchasing the necessary equipment. Or by promoting student access to these technologies within the company by imagining partnerships with them.

- Imagine adapted training courses integrating the use of digital technologies. Training courses that meet the concrete needs of companies.

Thus, the centre and the company must work hand in hand. They are asked both to determine the right tools to invest in and to help finance purchases. In most cases, needs are established through direct contact between specialist teachers/management and training institutions. These establish the concrete needs of companies and the economic fabric, and deduce the technical skills to be passed on to apprentices.[40]

The first axis of experimentation for the ZAWM of St Vith, within the framework of the ANGE project, is that of thinking about the equipment : what are the priorities for purchase and how can the training spaces be fitted out to accommodate the new equipment ? How can we come to an agreement with local companies to access their machines, make training in their premises operational and thus avoid having to acquire expensive equipment? Erich, the head of the training centre, is determined to invest in line with companies' needs. However, the size of the centre gives him little budgetary margin. This requires careful choices, finding additional funding and considering a strategy over several years to avoid as far as possible the obsolescence of the hardware

http://fit4bim.eu/203/; https://www.ecolechezsoi.com/formation/btp/maitrise-fondamentaux-bim.html?&gclid=EAIaIQobChMI49WUhum14AIVgud3Ch2lIQuGEAAYAyAAEgJRRfD_BwE#src=gaw&utm_source=google&med=int&cmp=effi-sn-BIM&utm_campaign=effi-sn-BIM&utm_content=BIM&utm_term=formation%20bim&utm_medium=cpc

[40] Voir le détail des scenarii dans l'annexe 4

or software used. The professionals from the business world who teach at the centre are often not very present and therefore not very mobilised. On the other hand, they are familiar with the digital tools used in companies and they help Erich in his choices, but also the other members of the teaching team in their use.

He also has a very clear willingness on Erich's part to take advantage of the ANGE project to upgrade the skills of his collaborators (especially in view of what is happening in other countries) and to rethink the governance of his institution. Above all, it is a question for him of encouraging greater participation of his teaching team in the reflection on the centre's project (better adapting the curricula, finding examples of practices and use of digital tools, purchasing, etc.). In this respect, the experience in Loimaa, Finland, within the Novida Lukio school complex, has been particularly rich in lessons for Erich and his close collaborators where they have been able to discover many ways of using digital technology in teaching. There was already a culture of dialogue within the team before the ANGE project, in particular a certain culture of informal exchange (discussion between teachers, consultation of teachers for decision-making: purchasing, project set-ups, etc.). But this European project has made it possible to establish a formalised dialogue through meetings and, even more so, around the creation of a "digital" working group. Thus, the context of the ANGE project very largely accompanied the desire to see a principle of horizontal governance take hold. The objective is to create a common culture so that everyone also takes responsibility in their field of competence and disseminates.

The second area of experimentation concerns the use of digital technology in training and assessment of pupils with content accessible online when the pupil is in a company. But also, to improve their follow-up throughout their training. A teacher, Martina, but also a teacher (also assistant director), Thomas, are particularly attentive to the deployment of this axis of the project.
Who are the actors involved in the experiment ?

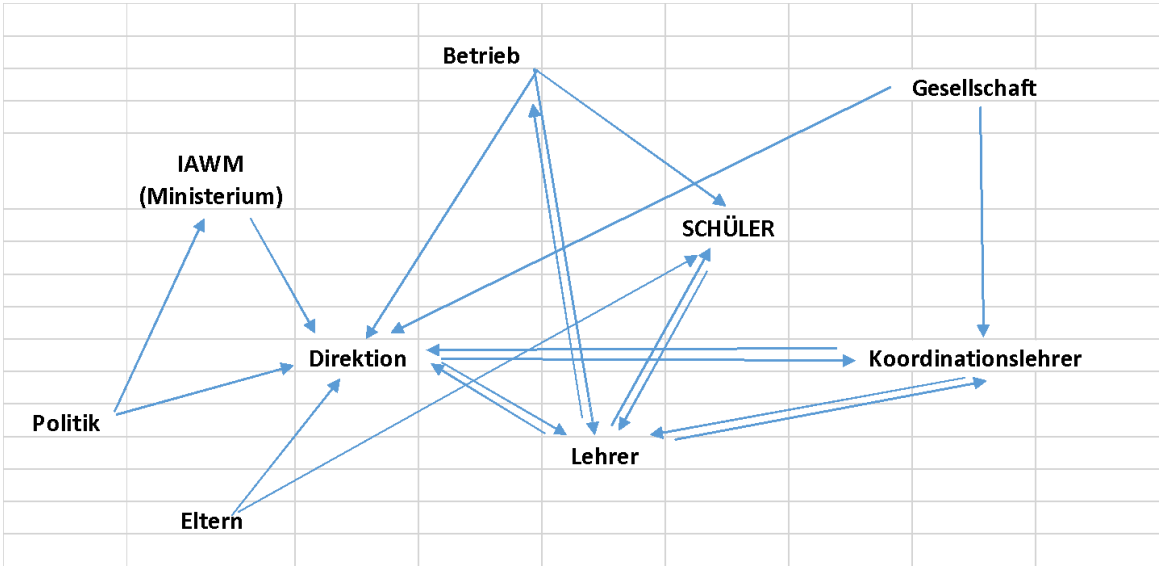

Figure 3. Actors in the experiment (ZAWM St Vith)

Table 9. The actors of experimentation (ZAWM St Vith)

Betrieb	***Companies***
Gesellschaft	*Company*
IAWM (Ministerium)	*IAWM (ministry)*
Schüler	*Students*
Direktion	*Direction*
Koordinationslehrer	*Teachers in charge of coordination*
Politik	*Politics*
Lehrer	*Teachers*
Eltern	*Parents*

In addition, it should be noted that to launch an innovation at ZAWM, there are 3 basic things to consider: money, IT staff and the deployment of a dissemination process. (1) The financial means are primarily public money and depend on the budgets allocated. ZAWM, as a vocational training centre, spends 75% of the subsidies on training infrastructure. It is therefore becoming urgent for politicians and the Ministry to create a specific funding fund to promote digitisation. (2) On the issue of IT staff, it is essential that an IT specialist be made available to the training centres if they are now to establish their expertise definitively. The tasks of this person would be: installing and maintaining computer equipment; training and supporting teaching staff in their computer work; monitoring and providing new information to teaching staff (which may involve setting up training sessions). (3) Finally, as a result of the mobility undertaken as part of the ANGE project, it became clear to the team members that a group of experts should be set up within the institution to support colleagues and discuss digital teaching methods and the use of new technologies, applications and programmes in courses. In this last area, the creation of an appropriate space could make sense. At least, this is a short- or medium-term project of Erich's. The structure of the group could take the following form :

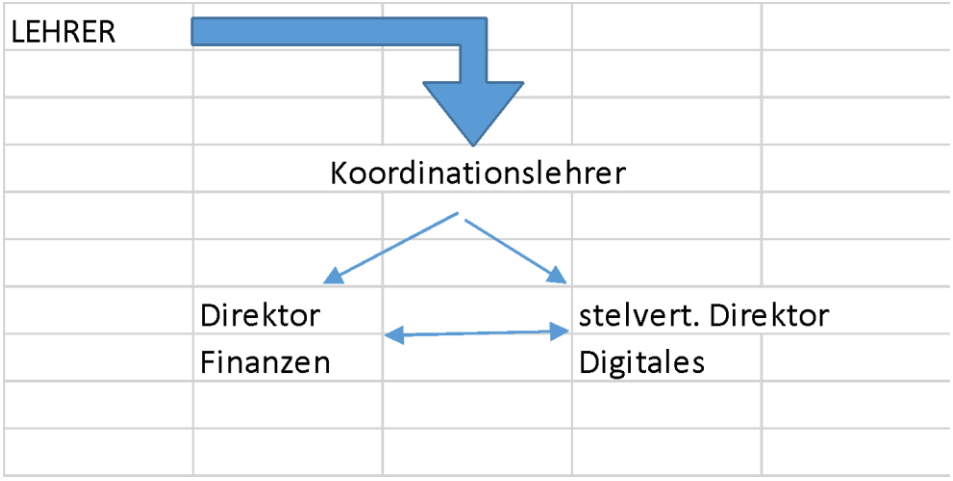

Figure 4. Group structure (ZAWM St Vith)

Table 10. Group structure (ZAWM St Vith) [French translation of the indications in German]

LEHRER	Teachers
Koordinationslehrer	Teachers in charge of coordination
Direktor Finanzen	Chief Financial Officer
stelvert. Direktor Digitales	Deputy Director in charge of digital

6.2.2. Development

Participation in the ANGE project was discussed between Erich and his pedagogical team during a meeting, before committing himself. This time of collective work revealed that the teachers (integrated and external contributors) share a strong attachment to the training centre and its image. Although not all of them are innovators, there is no strong resistance to the development of digital technology, more fears of not always being able to master the tools, especially among the older trainers, fears that the equipment does not always work very well, and fears about the lack of time to engage in new pedagogical engineering that includes digital technology (which requires prior domestication of the tools). These fears were shared by the more technophile students, who had acquired an empirical culture, in autonomy, but were not always certain that they would be able to enter into a process of knowledge transmission with the students. This culture was acquired thanks to the equipment already present in the school (computers, the ILIAS work platform, etc.) or at home.

Working around educational digital technology then involves a pedagogical organisation that meets the objectives identified by the teaching staff and is linked to the students' professional project. But also an organisation in terms of space planning and project management (the premises are not well adapted to the new teaching practices brought

about by the use of digital technology. The internet connection is too weak. There is a lack of a technician capable of supporting teachers and trainers and of dealing with all the technical aspects, equipment and malfunctions. The principle of reserving rooms for access to equipment needs to be rethought, as do investment policies).

Once the points of attention were identified, ZAWM decided to join the ANGE consortium and commit to the project. Its main objective is to create continuity in the students' career path by offering them pedagogical activities that respond as closely as possible to the needs of the market and to their own needs in terms of professional integration. To achieve this, the courses are designed by the teachers in such a way that the pupils can find their way professionally, in particular by adapting and/or customising the content as far as possible. For this to be possible, the school must work in close cooperation with the world of work and the companies in which the pupils are placed on a sandwich course. For the training centre, this means always responding to new technological configurations and the regular appearance of new tools (L'articulation école/entreprise : une combinatoire incertaine - Persée, 2020). Furthermore, it implies training teachers in the use of these technologies so that they can then carry out their pedagogical mission.

In response to these objectives, the school has equipped itself with various tools used on a daily basis by the students: computer rooms or tablets equipped with software, but also with state-of-the-art technology. For the time being, the ZAWM has a computer room with 15 PCs for the pupils and a PC for the teacher acting as an interactive whiteboard in a dedicated computer room, a set of tablets (Samsung) and a set of I-Pads for the classrooms and 10 laptops. Each room in the school then has a network connection, with Wifi accessible in most rooms. Finally, the special features of this vocational training centre include: numerical and laser measuring equipment, as well as numerically controlled machine tools (Computer Numerical Control or CNC) and Computer Aided Design - CAD (planning offices, within companies, are increasingly working in computerised form. CAD has long since made its way into development offices and small and medium-sized companies. Today, 2D drawing is already almost completely obsolete. 3D is widespread, as are drawing and planning assistance). It should also be noted that students are increasingly using their personal mobile phones.

There are several families of tools that are used in the establishment today :

- Classic computer-based services: office suite, for example, for learning how to make presentations, write official correspondence, etc.; online dictionary for bilingual German-French exercises; etc.

- Pupils also use learning apps, i.e. applications whose purpose is explicitly educational (the collaborative formative assessment service Quizlet is one of them).

- Software or applications directly related to their (future) professional activity: such as 3D modelling software, this digital measurement application.

- Finally, they are led to handle professional technologies: such as digital welding stations that enable them to carry out virtual welds and thus learn, as close as possible and without risk, to master precision gestures, and then to observe the result in detail (zoom on the welds, 360° rotating vision).

A suite of services or technologies that facilitate the teacher's work in lesson preparation, follow-up, empowerment, personalised support, setting up collaborative activities or evaluation.

But there are limits to this project. The first is the impossibility (both financially and in terms of space) for the establishment to have many facilities: a single computer room which requires teachers to organise their booking schedules well; shelves which have to be shared; welding simulators which also need to be shared and therefore to conduct repeated activities, pupil by pupil. In addition, new technologies are evolving rapidly. Every three to five years, new technologies appear on the market, which implies a significant rate of equipment renewal and therefore investment (purchase and training of teaching staff in their use). One solution lies in the coordinated purchase of equipment with companies or the direct purchase of equipment by the company, which is then made available to pupils. The challenge for industrialists: to train people with skills ready for employability at the end of the course. There is also the question of maintenance of the equipment purchased to ensure that it remains operational while it is being used.

Understanding the governance of a school requires exploring how projects are implemented and how they are monitored and coordinated by the head teacher or a board committee. Careful exploration of ZAWM's governance has revealed that it is (now - and under the effects of the ANGE project) of the 'coordinated' type, i.e. Erich, the headteacher, feeds back or collects information, then synthesises it, both from his teaching team and from industry, but also from politicians. This then enables him or her to take decisions on the organisation of curricula and material investments as a team. We can therefore see the important place that teachers now occupy, firstly by making recommendations for the implementation of material investments, and secondly by proposing types of collaboration with enterprises.

Finally, the student is an important part of this system, since he is the interface between the training centre and the company in which he works on a sandwich course on a daily basis. He or she can therefore also be a source of suggestions (particularly when the training centre's equipment is inappropriate, when the trainer is unaware of a change in the way things work within the company or professional environment that the student practices on a daily basis, etc.).

A new stage was then reached at the beginning of 2020, in the context of the Covid-19 health crisis that has affected the planet. The teaching team discovered that it had quickly adapted to containment by offering online training. This experience and expertise attracted the attention of other training centres that were less well prepared (or not prepared at all) and came to consult Erich and his teaching team for support that was

both technical (what software or applications could be used?) and pedagogical (how to script distance learning courses?). Furthermore, the experience of the distance teacher and the beginning of work on mixed teaching methods (use of digital technology to ensure follow-up when the student is in the company) has led the ZAWM team to reflect on ways of better steering the pedagogical and technical choices, as well as to succeed in offering structured online training (full or mixed). This led to the creation of a steering committee. This committee is working on these issues :

- Discover digital services and applications for teaching and learning.
- Exploring teaching and learning methodologies using technology.
- To train colleagues in the use of digital technology and the discovery of certain digital pedagogies such as serious games or virtual reality.
- Engage apprentice students in the use of technology to prepare them for the trades of tomorrow.
- Improve the processes of innovation in the governance of the establishment on the model of the welding courses: purchase of digital welding stations and fitting out a space for this course in the centre (the use of digital welding stations allows students to train at their own pace and at the ZAWM without blocking the equipment in the companies).

An action which, at all levels, makes it possible to respond ever better to one of the injunctions of the government of the Wallonia-Brussels federation: 'to adapt the governance of the school system with a view to making its various actors accountable, improving the steering of the system and its performance, and optimising its organisation and resources' (Louis, 2018, p.68). To this end, ZAWM refers to the areas of governance listed by Christian Maroy (2013), namely: improving educational effectiveness (graduation results), promoting equity (reducing performance gaps according to socio-cultural origins), improving efficiency (comparing expenditure and investment with the effectiveness and equity of the system). The ZAWM training centre also refers to a series of fundamentals in its governance model: transparency, openness, integrity, impartiality, competence, efficiency and confidentiality[41].

This experiment conducted at the St Vith centre aims to raise the awareness of all those involved in the digitisation of the establishment. It should make both teachers and pupils, and even companies, aware of the need to encourage training and make optimum use of the materials available. Indeed, companies are increasingly confronted with digitisation processes and expect training institutes such as ZAWM to provide appropriate training.

[41] https://www.youtube.com/watch?v=fwT3NQu659A

Throughout the duration of the ANGE project, the ZAWM teams structured and specified their training offer around the use of digital technology according to the needs of the labour market. Attention was focused on training the pedagogical teams and students. In addition, empowerment and creativity were the keywords of this project to digitise the centre, in response to the expectations of the public authorities, but also of industrialists. With digital technology, teachers can conduct their lessons in a more personalised way and pupils can work at their own learning pace. Course content can be transmitted in a more optimal, complete, targeted and attractive way. In any case, this contributes to students assimilating the subjects taught with greater autonomy and individual responsibility. Over the past three years, the teaching team has also observed that there has been a strengthening of the pupils' sense of confidence: they feel that their teachers trust them more and that they give them more responsibility. This situation has moreover led to an ever-increasing decline in the use of lectures in favour of project-based, reverse or personalised teaching methods, which involve pupils in activities and responsibilities.

A number of technologies have "invaded" the school and contribute to the transformation of activities: the BIM platform which allows planning projects to be implemented: people write less - they dictate on their IPhone; texts are read by devices; translation programs are increasingly precise (SESAM); CNC programming is carried out directly by post-processors from 3D drawings, etc. A whole range of applications are also used for evaluation : Quizlet, Quiziss, Adpuzel, survey@monkey, Kahoot, Socrative, etc.

The question of the impacts of the experiment is currently being evaluated, but it looks very positive. Indeed, digitisation has made it possible to enhance the image of schools and work-linked training in general. It has increased the reputation and attractiveness of the training and work-linked training courses on offer, making it possible, in the long term, to combat the lack of qualified staff. Secondly, thanks to this digitisation project, there has been an increase in motivation among both students and teaching staff. Lastly, apprentices are becoming familiar with these new technologies at an increasingly early age, thus improving their integration into the world of work.

6.2.3. Evaluation of the experiment

In order to deepen and synthesise the study of the experience carried out at the ZAWM St Vith vocational training centre, the SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis technique was applied, in particular to the management team, the group of teachers and the students.

6.2.3.1. From the director and the management team

Table 11. SWOT analysis from the director and management team

Levers - Opportunities	*Brakes - Threats*
Support/relationship with companies.	Budgetary resources, as margins are narrow and large-scale projects require external funding to be sought.
Culture of collaboration and exchange.	Network/Wifi.
Experimental approach and accepted as such: trials/errors, exchanges, advances.	Cost of materials that quickly become obsolete.
Involvement in the European project ANGE.	
Suitable premises.	
Innovation - willingness to innovate.	
Always listening to companies.	
Image of the school.	
Centre for training at the forefront of the digital issue	

.3.2. 6.2.3.2. From the teachers

Table 12. SWOT analysis from teachers

Levers - Opportunities	*Brakes - Threats*
Management support.	Size of the premises too small.
Support/relationship with companies.	Absence of a technician.

Motivation of teachers.	Recurrent technical problems that make teachers insecure.
Culture of collaboration and exchange.	Network/Wifi.
Involvement in the European project ANGE.	The time needed for teachers to invest in discovering the tools, their functionalities and their integration into new pedagogical situations.
Experimental approach and accepted as such : trials/errors, exchanges, advances.	Too little time to pass on the basics.
Adequate premises.	Remain up to date, at the level (technology is evolving rapidly).
Training of teaching staff.	Reluctance on the part of several (older) teachers.
Innovation - willingness to innovate.	The fear among a majority of teachers that they do not feel they are "living up" to expectations (their own and those of their students).
Always listening to companies.	No continuous training prior to experimentation, very heterogeneous personal digital culture.
Attachment of teaching staff to the training centre.	The management of new classroom situations due to the use of digital tools, in particular smartphones (potential distraction of pupils: messages, photos...).
	Lack of easy-to-use applications and few previous "modeling" practices.

.3.3. 6.2.3.3. From the students

Table 13. SWOT analysis from students

Levers - Opportunities	*Brakes - Threats*
Support/relationship with companies.	Size of the premises too small.

Motivation of students.	Network/Wifi.
Experimental approach and accepted as such: trials/errors, exchanges, advances.	The management of new classroom situations due to the use of digital tools, in particular smartphones (potential distraction of pupils: messages, photos...).
Adequate premises.	Lack of easy-to-use applications and few previous "modeling" practices.
Hours of free lessons.	

6.3. General conclusions of the hypothesis study

ZAWM is a vocational training centre based on a German apprenticeship model where the students are at the heart of the process and whose career path is highly valued: they work mainly in companies and are subject to strong constraints in terms of work organisation. They need to be pegged to reality, they capitalise on knowledge that can be immediately exploited. Students must be autonomous and learning must be delivered in an ergonomic and practical manner. In this poly-linguistic context, digital tools appear as a resource to help learning and memorisation of vocabulary. Collaboration is also intensely supported thanks to the computer tool. Finally, the close relationship between teacher and pupil which has been established aims to decompartmentalise knowledge. The aim of this model is to put the pupil in a position of strength to ensure his employability at the end of his training. The ZAWM website states that "statistics from the employment office show that more than 92% of journeymen find a job as quickly as possible" (*Das ZAWM Zentrum für Aus- und Weiterbildung des Mittelstandes-Weiterbildungen Ostbelgien, Meisterkurs, Geselle, Berufsschule-Ziele und Leitbild der Lehrlingsausbildung, 2020*).

On the side of teachers, it should be remembered that they have no specific training in the use of computer systems and now use digital technology according to the knowledge they have acquired by themselves, in particular by searching on the Internet and implementing, for some, elementary things (Word, Excel, PowerPoint), for others more complex things (with applications on mobile phones, CAD, CNC, digital footage, etc.). Today, they have entered into a dynamic of better mastering the fundamentals of digital technology and evaluating the educational added value of digital technology. They are experimenting more and know how to better support students, notably by organising the time devoted to activities and personalising teaching. They also share their experiences to feed each other.

To conclude on this analysis and provide elements of answers to the 6 hypotheses that preside over our reflection, we will say that:

1. The ZAWM management team and the pedagogical team have a proactive attitude towards the integration of digital in their school project. Their participation in the ANGE project is a strong indication of this. This attitude must, first of all, help them to establish and perpetuate a tripartite relationship between the apprentice-student, at the centre, the training establishment and the company in which the apprentice-student is on a work-study programme. In addition, it should enable better collaboration between the training centre and the companies in order to rationalise and optimise investments (purchase of equipment, fitting out of spaces, etc.).

2. Digital technologies are having an undeniable impact on the project to establish the ZAWM in St Vith. And at all levels. Digital technology is helping to establish the working relationship between the training centre and the companies. In addition to the purchase of equipment and the fitting out of spaces, pedagogical innovation involves continuous and tenuous exchanges that enable us to be as close as possible to the reality of the market, in order to provide the best possible training for apprentice students, future professionals in a changing industrial world.

3. ZAWM's governance model has evolved considerably in recent years, probably less in relation to digital than to the general philosophy of pedagogy that accompanies the integration of digital in education. The management has placed more trust in its pedagogical teams, abandoning a top-down model in favour of a more horizontal approach to relations between the institution's staff. Nevertheless, digital technology has made it possible to establish relations between the teams, if only in their communication (exchange of e-mails, preparation of meetings, organisation of events or meetings, etc.). Investment in teaching materials has also been an issue at the heart of the school's project.

4. The result of this collaborative work between administrative staff and teachers (cf. hypothesis 3) has led to a better working atmosphere, better personal investment and, ultimately, a better governance strategy for the institution. We can therefore see to what extent digital technology and digital-related issues have played a central role in the reconfiguration of the educational and governance models of schools, at least those of the ZAWM (even if it is at least possible to go up in general terms on these conclusions when we compare them with those obtained in the other three classlabs and in other schools attended here and there in the context of our professional activity).

5. The issue of staff with both technical and pedagogical skills is a real problem today. And this is an issue that will have to be tackled not only by governments,

but also by Europe. Indeed, it is clear that technicians have poor pedagogical skills, while teachers often have minimal technical mastery. Integrated teachers are therefore involved in processes of pedagogical innovation, but have little concern about technology, how it works and what it contains. Professionals, for their part, are more in a state of technical enchantment, eager to open the black box of the digital machine to get to its heart, when the pedagogical question escapes them a little: they give lessons; but are they fundamentally rethinking their pedagogy in this new context? One can doubt it.

6. Innovation has undoubtedly enabled ZAWM to move the establishment project forward. Only in the context of the Covid-19 pandemic did ZAWM become a reference centre for many staff and other training centres who turned to it for information (how to set up online pedagogy? How to use this or that tool, technology...? Etc.). Today, digital technology is present everywhere at ZAWM: to communicate, exchange, collaborate, teach... With computers, tablets, but also (and above all) digital professional equipment : soldering stations, measuring devices...

The assessment of this school project therefore shows a clear desire to integrate digital technology into the service of learning and assessment, but also in the actual structuring of the school project (what strategic choices will be made for the future of the school, based on the use of digital technologies in education?) Once this assessment has been made, the development of future thinking will focus on the following areas :

- A critical approach to the use of digital terminals (computers, tablets) by means of a survey to take stock of the advantages and disadvantages for both teachers and pupils.

- Imagining future scenarios to set the framework for the school's relationship with the company around the specific issue of digital technology : purchase of new technologies ? Doing distance learning? Focus on training in the company ? Increase the number of short continuing education courses for adults for those who are already employed ?

- The concept of competences must henceforth occupy a central place in the process of analysing the school-business relationship and training proposals, including initial training.

- Formalise the principle of more participatory governance and developed cooperation between teachers and management.

- Be attentive to the question of student motivation by being more in tune with the world of work.

The results of this experimentation carried out in a classlab approach can be summarised as follows :

Table 14. The results of this classlab project (ZWAM St Vith*).*

Feedback on the experiment	Feedback on the context ANGE	Action lines - Regulation
The teachers who have embarked on the project are more comfortable with digital technology and are gradually proposing new teaching situations: they are moving away from lectures to more individualised learning and more active group lessons. Pupils have appropriated digital tools for learning (whereas they were focused on playful or communicative uses). Pupils' initiative has been improved. They feel that teachers trust them more and give them more responsibility. Increased motivation of all stakeholders. Apparent satisfaction of the companies involved. Given that, as a vocational training centre, we are 75% dependent on infrastructure grants, it is important that politicians and the regional ministry create a specific funding fund to promote digitisation. Setting up of a "digital" group led by one of the director's assistants, to	Inspiring meetings and visits with peers: strong legitimacy, a vector of motivation and a potential lever of influence for management. Influence on reflection on the training model: teachers involved in the project and taking part in exchanges are gradually moving towards a more active, more empowering, more collaborative model: the central role of times for pedagogical exchanges and regulation. Visits and observations make it possible to overcome the fear of digital technology, discovering simple tools and accessible teaching situations, encouraging curiosity, arousing envy and "risk-taking". Reinforces and legitimises the role of management in its role of support, facilitation and technical-pedagogical monitoring (most trainers do not have the time). Little impact on the governance of the structure itself, already	Regular surveys of teachers and pupils should be conducted to measure satisfaction, identify shortcomings and regulate the project. Conduct a survey within the companies that will hire the students who will benefit now and who will graduate to see their opinions and also to see the effectiveness of the chosen scenarios. Build an evaluation of the effects of the experiment on the various stakeholders (the hiring of a trainee is planned in the spring to carry out these evaluation questionnaires). Contact the regional authorities to obtain consideration of the specific funding needs related to the development of digital training. Continuing to finance the acquisition of new digital equipment, considering constraints (educational requirements, company expectations, product durability, cost structure, etc.). Inform and share regularly on the progress of projects, purchases, constraints, etc. Increase opportunities to demonstrate that the experiments are working well, to convince other teachers/trainers to take the plunge. Establish a partnership with another French Language Training Centre (Belgium) to create exchanges between apprentices. Create an Erasmus+ type partnership with other vocational schools offering work-linked training.

facilitate exchanges on the pedagogical aspects of training, suggest tools and uses, and help support colleagues who want to give it a try. Hiring of a part-time technician to maintain the equipment, support teachers in their first steps as users in class and provide training time for staff. Regular technical and pedagogical training courses set up by the management. Development of informal exchanges on the basis of what the first "experimenters" have achieved in their courses. Need to have a sufficient number of adapted and equipped premises.	with participation and regulatory bodies; except for the need to formalise the different stages of the transformation. The researchers' contributions are experienced as too theoretical, too far removed from the realities of the structure and the training activities, very much rooted in the pragmatic world of the company.	Create a network of dual training institutions and/or create databases with teachers who provide documents/experience stories, advice - on the model of the innovative bubble of PCH.

CHAPTER 7. THE STUDY OF CLASSLAB CARRIED OUT AT PAUL-CLAUDEL D'HULST HIGH SCHOOL IN PARIS

Gabriela MOTOI[a]

Alexandrina-Mihaela POPESCU[b]

[a] Lecturer, Faculty of Social Sciences,
University of Craiova, Romania

[b] Senior Lecturer, Department for the Training of Teaching Staff,
University of Craiova, Romania

7.1. Paul Claudel d'Hulst High School – General presentation

Paul Claudel d'Hulst High School (Paris, France) is a recent school complex belonging to Catholic education under state contract, born from the merger in 2016 of two establishments (of different educational character - collège/lycee) located in two separate buildings a few hundred metres apart, one of which is partly classified as a "historical monument", which does not facilitate the fitting out of rooms and equipment. The school currently has around 1,000 pupils, 460 of whom are in lower secondary school and 550 in upper secondary school. The teaching team is made up of 82 people.

The activities of the Paul Claudel Hulst high school are based on 4 fundamental principles[42] :

- To have an ambition for everyone ;
- To accompany carefully the choice of orientation ;
- To train men and women who are open to the world ;
- To arouse curiosity, wonder and commitment.

The two schools of origin (high school and middle school) had quite different professional cultures, marked by the groups they catered for: pupils with very heterogeneous levels and a certain professional culture of academic support and peer exchange, on the one hand; rather successful pupils, parents expecting academic excellence, and a

[42] *"Definition and stakes of governance in a Parisian school"* - presentation by Mrs. Alexandrine Lionet, Director PCH Paris (at the Short Term Training - C5, in the framework of the ANGE Project) - Paris, 18-21 January 2019.

professional culture also marked by this academic excellence and rather tinged with individualism, on the other. The majority of parents come from fairly well-off social classes, but with great disparities.

The fact that the latter is the recent product of the merger between 2 separate establishments (in terms of positioning and students welcomed, but geographically close to the heart of Paris) has led to a common and unifying educational project for the new establishment. In this context, the development of digital teaching devices is an element that can bring teaching teams closer together and facilitate the care of pupils whose educational level is less homogeneous than before. In addition, Parisian demographic trends are unfavorable in the 7th arrondissement (to the benefit of the neighboring 15th arrondissement), which increases competition between establishments, whether public or private. This therefore assumes that establishments must differentiate themselves, in particular through the implementation of original projects.

As far as the infrastructure of the school is concerned, the digital equipment is rather limited, in premises that are difficult to adapt. A strong point is that a mobile cart equipped with shelves was acquired, in connection with the opening of the "learning lab", in the year preceding the start of the ANGE project.

Directly, the school has developed a digitally-focused training programme for students who can choose a "digital and computer science" baccalaureate speciality at the high school. The development of digital projects and devices intended for students and teachers (including participation in the ANGE project) has helped to legitimise and operationalise the acquisition of this speciality, which is not very widespread in the school's catchment area, and therefore a differentiating factor, and has been appreciated by the students' parents.

7.2. Experimentation : "the innovative bubble"[43]

7.2.1. Planning of the experiment. Pre-context of the experimentation

On taking up her duties, in order to complete the merger, the new headteacher benefits from the construction of a new building. A "learning lab" has been created and set up to test new educational situations using digital technology, with the main aim of considering the heterogeneity of pupils through differentiated practices. Digital technology was already considered as an object potentially common to the teams and potentially federating within the framework of the new project to come.

[43] See the details of the scenarios in appendix 4

Small groups of teachers who are open to these uses meet from time to time in secondary schools : there is, for example, the "explorers' circle" and in secondary schools, the "café at the end of the corridor".

When she took office, the diocesan supervision asked the new headteacher to work on the drafting of a common school project to create a new dynamic specific to the new school and a united team (even if the two buildings remain): the headteacher needs to create all the conditions favourable to exchanges and meetings between the two "cultures", to think about a management that allows the emergence of the new project, she is therefore questioned in this respect when the ANGE project starts. The merger is also based on a new organisation of the school's management since, since 2018, there is only one head of school, for both entities, assisted by a strategic council composed of "specialists".

In 2016-2017, a European Erasmus project, "Reporters without Frontiers[44]", has enabled several teachers at the Paul-Claudel d'Hulst high school to exchange with European partners, to open up to new pedagogical situations using digital technology, which has made it possible to feed several work sessions in the "learning lab" which is then experiencing its first steps of an "innovative bubble", to the benefit of the training of the first teachers who wish to share their practices and discover new tools. This project enabled selected teachers and students to develop a multicultural experience through exchanges and occasional trips abroad over three years.

The first consultations on both the school project and digital development, both within the management team and with volunteer teachers, began just before the ANGE project. The arrival of PCH among the partners of the European ANGE project has accelerated the creation of a digital steering committee which associates the headmistress (Mrs. Alexandrine Lionet) and a few volunteer teachers, one of whom (Mrs. Alix de La Fayolle) is in charge of the porting of the ANGE project within the school.

Its recent creation requires the establishment to work on its image and its specificities, which distinguishes it from other establishments, particularly in its catchment area. This is part of the backdrop to the whole process of designing the new school project, which focuses on opening up to the world and considering the heterogeneity of the students. Digital technology will be one of the elements of this broader reflection, as will the questioning of what can be the governance of a team within which we want to promote pedagogical innovation.

To sum up, we can say that there were already experiments carried out within the PCH high school, before the ANGE project. Among these experiments and projects, we can mention the following :

a. *The learning lab* : this is a space that enables teachers to propose new ways of

[44] For more information on the "Reporters without Frontiers" project, and on the activities carried out by Lycée PCH in this project, go to https://paulclaudel-hulst.fr/tag/reporters-without-frontiers/.

working to their pupils, including by using mobile digital equipment.

b. A partnership between the Catholique Institute of Paris (ICP) and PCH around the "film workshops": digital and didactic of the image. These workshops were based on analytical and oral work that required students to use a specific aspect of the learning lab. This partnership enabled the training of teachers in the Celluloïd application, which helps teachers to manipulate and annotate videos[45].

c. *Reflection on the learning lab and TPE* (Travaux Personnels Encadrés - Bac exam) as a privileged place to bring students to identify their problems through collaborative reflection and peer remediation.

d. Specialist teaching offered to students: ICN (computer science and digital culture) in Seconde; ISN (computer science and digital science) in Terminal.

In addition, the school's concerns on the digital issue have been appreciated by other organisations: in 2017, the PCH high school of Paris won the 2017 Pedagogical Innovation Prize in Cachan (an event organised by the association Apprendre et Réussir) for its experimentation with the inverted class, accompanied by Jean-Charles Cailliez[46].

Before starting the experimentation, an initial needs assessment process was put in place. Among these needs, on which the two phases of the experimentation were based (as will be seen below) are the following :

- Encouraging encounters and exchanges between teachers from two different institutions with two different cultures, so that a common dynamic and a joint project (*developed in Phase 2 of the experiment*) can gradually emerge.

- Welcoming heterogeneous pupil profiles around a differentiated pedagogy whose design should be based on the potential of digital tools; encouraging the participation of all pupils and their ability to be active whatever their academic talents (*developed in Phase 1 of the experiment*).

- Train volunteer teachers in the use of digital tools relevant to the needs linked to differentiation and lead them to develop their own pedagogical situations (*developed in Phase 2 of the experiment*).

- Moving from a rather solitary and vertical management style to a more participatory and collaborative management style, which involves teachers to a

[45] This training in the Celluloid application for PCH teachers also continued as part of the ANGE project. We can mention, for example, the training workshop “Instrumenting the inverted classroom and collaborative practices around video with Celluloid” (led by Laurent Tessier, ICP Paris) at the Short-term training (C7) as part of the ANGE project (Craiova, Romania - November 2019)

[46] "Definition and challenges of governance in a Parisian school" - presentation by Mrs. Alexandrine Lionet, Director of PCH Paris, at the Short Term Training - C5, in the framework of the ANGE Project, (Paris, France - 18-21 January 2019)

greater extent, relying on the voluntarism of the management and the commitment of the "pioneer" teachers: moving from the encouragement of a few scattered initiatives to the impetus of an in-depth movement (*developed in Phase 2 of the experiment*).

- Create and enhance the institution's new identity, based, among other things, on the dynamics of innovation linked to the use of digital technology (*developed in the two phases of experimentation*).

7.2.2. Development of experimentation. Presentation of one of the scenarios de l'expérimentation.

The objective of the experiment at the Paul Claudel d'Hulst high school in Paris is based on two pillars: 1) creation of a "digital pedagogy" workshop; 2) study of the impact of digital environments on the overall pedagogical configuration of a school, in the sense of a more open steering which tends to set up a form of participative governance.

By analysing the experimentation carried out by PCH, we can say that it comprises two phases (which take place at the same time):

- **Phase 1 of the experiment : "*Rethinking space in the classroom: digital as a factor of pedagogical innovation*"**

This first phase of the experiment stems from what the headteacher calls "the new need to transform the high school into the high school of tomorrow" (A.L., headteacher). In fact, transforming[47] the high school into a high school of tomorrow meant developing digital technology as an element of the high school's transformation, taking into consideration the current challenges of governance in educational establishments and the conditions for the emergence of dissemination networks in digital uses. In fact, it is a reflexive approach on which we also worked within the framework of the ANGE training workshops, held in Quebec, in April 2018[48].

Also, during the training workshops held at the PCH high school, in January 2019, in the framework of the ANGE project, the project team had the opportunity to see such an experiment in a French class (Seconde). In addition, on the project website (and the Youtube channel) there is also a presentation of such an experiment[49]. The French class

[47] On the transformation of the school, using digital technology, see Romuald Normand's Webinar "The great transformation of the school", held as part of the Think Tank ANGE - April 20, 2020

[48] In particular, the training workshop "Digital governance in education: Preparing the school of tomorrow ... from today" led by Thierry Karsenti, Director of CRIFPE, full professor at the University of Montreal (C3 ANGE training, La Pocatière Quebec, April 18, 2018)

[49] To see more about the PCH experiment, conducted in a French class, go to https://www.youtube.com/watch?v=Xmqt_nwp2hQ&feature=youtu.be (video produced by the ICP Paris

was built with the use of tablets (by the pupils). They could access the tasks that needed to be accomplished, either by accessing a link that was on the digital board, or by using a "Flash code". The pupils worked in groups of 2-3 people to complete the tasks of the assignment. This experiment helped them, by giving them more responsibility, by involving them more in the completion of the assignment ("it's their duty"). In short, the aims of this experiment were firstly, to identify the contributions of the implementation of an innovative pedagogy in a learning sequence; secondly, to understand the challenges of innovative pedagogies in the management of heterogeneity; thirdly, to identify the benefits of innovative pedagogies in the management of heterogeneity.

This experimentation aims at changing the classroom space, it becomes modular, which is highly appreciated by the pupils, who can move wherever they want and this can generate a different atmosphere, compared to the traditional classroom. Even if this situation can give the illusion of dispersion, in the classroom the atmosphere is different: "there is another atmosphere, there is always seriousness and the acquisition of skills[50]". The use of digital technology in the lessons and the idea of rethinking the pedagogical space is well appreciated by the students: "the work is more interesting, it's a different work than in a normal classroom, because we are on our computers or our tablets and sometimes we forget that there is also a teacher in the room". This shows the fact that digital technology develops independent work, on the one hand, and collaborative work, on the other.

The experimentation carried out at the PCH high school takes place in other disciplines, not only French: in mathematics, geography and even music. In relation to the discipline " Music ", as the teacher also appreciates, even if at the beginning he was reluctant to use digital, he started to use the Digital Whiteboard in his lessons, he found this new way of teaching very interesting and now his lessons are completely digitised.

This first phase of the experiment was, as the director says, "*a real reflection on governance*" (A.L., head of establishment). In this way, digital technology became a space, so "*the reflection was as dazzling as the experimentation imposed the passage to a new phase of experimentation*". This phase, which we call - Phase 2 "The Innovative Bubble: digital as an element of teacher training" is presented below.

- **Phase 2 of the experiment : "The innovative bubble : digital as an element of teacher training"**

This scenario is about the creation and development of a peer-to-peer training venue, led by a mathematics teacher. It is a form of training inspired by the CAPTIC model, which operates within CEGEP La Pocatière (partner of the ANGE project)[51]. PCH's

team, in collaboration with the team of the Lycée Paul Claudel d'Hulst Paris, in the framework of the ANGE project)

[50] Same

[51] For more details on the operation of the CAPTIC, at the CEGEP of La Pocatière, see the study "Les politiques du numérique dans le système éducatif québécois : pilotage des établissements, innovation pédagogique et gouvernance", developed as part of the ANGE project, available at http://classlab-

innovative bubble was also developed thanks to the Quebec training workshop, in which PCH teachers participated in April 2018[52].

It is a training session (at the Learning Lab) on lunch time, which better fits the teachers' schedules. The training time is limited, between half an hour and three-quarters of an hour. However, the 30' session is not enough to cover the essential: the pedagogical situation that allows the use of the digital tool mentioned in the training. In addition, the dissemination of information on training through the institution's newsletter is a form of recognition, but is not enough to promote the approach and attract new colleagues. Training time is a time during which the trainer presents either a software program, a tool or an idea for teaching practice that teachers can implement.

The experimentation of the Innovative Bubble (for teacher training) has made it possible to modify the student-teacher relationship : "*the classroom space is no longer a coercive space; we move in the same direction, we capture their attention more quickly*" (F.C., French teacher).

Although the number of teachers participating is still limited, this experiment has, however, had a positive impact: it has generated informal exchanges in the teacher's room, and the temptation to innovate has grown among a greater number of teachers. However, it is difficult, if not impossible, to measure precisely the real impact, as it is impossible to know what these teachers have implemented in their classrooms.

This experiment, which includes training teachers to use digital technology in the classroom, has also helped them to work better with "fragile" pupils who "*feel immediately set in motion by the digital tool*" (A.L., headteacher). Thanks to digital technology they are in a position of self-confidence, they can also succeed in an assignment more easily than in a traditional classroom. This is an expression of the fact that digital technology can make it possible to create "variations that will adapt to the different needs of the pupils, by proposing adapted solutions[53]".

In order to motivate other teachers to participate, the training course has been expanded (in 2019) to include a three-session session that covers the handling of the tool, the discovery of its functionalities and the pedagogical situations in which it can be used, as well as discussions on user feedback.

ange.eu/o2-les-politiques-du-numerique-dans-le-systeme-educatif-quebecois-pilotage-des-etablissements-et-innovation-pedagogique-et-gouvernance-cegep-la-pocatiere-quebec/.

[52] For more information on the CAPTIC training workshop (led by Mr. Martin BERUBE - educational advisor), held at CEGEP La Pocatière, as part of the ANGE project (April 2018), https://www.youtube.com/watch?v=08zkaIXIkPA&list=PLhXeTXEikn-aFalQI0tMJE7DObRjp3RR8&index=5&t=0s

[53] See Francois Taddei's webinar, "Quelle école pour demain ?", held in the framework of the Think Tank of the ANGE project - 20 April 2020 available at https://www.youtube.com/watch?v=X85ifZJR4MQ&list=PLhXeTXEikn-a9EXJuwm9I0d1SY2oP8WWj&index=14

Throughout the implementation of the Innovative Bubble workshops, the management has supported and encouraged the project, and more broadly the dissemination of digital technology in classrooms, through several actions:

- The creation of a steering committee (COPIL) to involve volunteer teachers in decisions on digital deployment (vision of shared governance).
- The design of a system of varied and complementary meetings and their formalization: information, organization, animation, traces and capitalization.
- The implementation of a proactive internal communication policy to formalise and promote the work of COPIL and the "innovative bubble": formal invitations by the management secretariat, reports by email to the members of COPIL; presentation to the entire educational community with visual support (PPT/Prezi) at educational meetings (10 minutes), articles in the school's Newsletter.
- Support for partnerships related to experimentation (with the Catholique Institute of Paris, as part of the ANGE project).
- Financing of equipment and financial support for the purchase of "premium" licences for the applications used in the "innovative bubble" and then in class by the experimenters (Padlet, Kahoot, Quizz...).
- The hiring of staff dedicated to technical issues
- The recognition of the teacher who runs the classlab, teacher training through the payment of a salary.
- Recognition of the commitment of the pioneers by a specific remuneration.
- The search for formal recognition of continuing education: preparation of a file with the Fédération des associations pour la formation et la promotion professionnelles dans l'enseignement catholique (Federation of Associations for Professional Training and Promotion in Catholic Education) to take charge of "in-service training".

7.2.3. Evaluation of the experiment

In order to deepen the study of the experience at the PCH high school, the SWOT analysis technique was applied, in particular, in relation to the management team, the group of teachers and the students.

7.2.3.1 From the director and the management team

Table 15. SWOT analysis from the director and the management team (Paul Claudel d'Hulst high school).

Levers - Opportunities	*Brakes - Threats*
A very promising ministerial context for the deployment of digital technology for the benefit of teaching and learning.	The common school culture has yet to be built: differences in professional interests and pedagogical priorities.
Structuring and formalisation of a managerial practice in question, which tends towards a form of shared governance, of which the ANGE steering committee, now the digital steering committee, is the symbol.	Ongoing training is done on personal time and is not financed.
Establishment of shared governance that encourages teachers to become involved in the life of the school (based on the identification of "innovative" leaders, their support, and the identification and strengthening of their skills).	The activities of the "innovative bubble" have gradually become more structured, but exchanges on feedback are lacking.

.3.1. 7.2.3.2. From the teachers

Table 16. SWOT analysis from teachers (Paul Claudel d'Hulst high school).

Levers - Opportunities	*Brakes - Threats*
The majority of teachers are committed to their schools, even if their projects do not focus on the digital environment.	A majority of teachers have little or no training in the use of digital tools (fear of technology, little desire to be insecure, fear of the time it takes to train and think about new situations). The first few months of operation of the "innovation bubble" have not borne the

	expected fruit in this respect, as take-up remains very marginal.
Pioneering" teachers are already committed to using digital technology in their lessons, some of them finding themselves in the "innovation bubble" that is taking its first steps.	The presence of the technician is considered insufficient in a start-up period during which technical insecurity is a powerful brake on transformation.
Presentations during educational days on the digital field, which helped to nourish the first exchanges.	The heterogeneity of middle and high school teachers.
Development of individual and collective skills.	The "learning lab" used is on the premises of the high school, which does not make it easy for secondary school teachers to come.
	The skills worked on remain informal, poorly identified, which does not facilitate sharing and capitalisation.

.3.2. 7.2.3.3. From the students

Table 17. SWOT analysis from students (Paul Claudel d'Hulst high school).

Levers - Opportunities	*Brakes - Threats*
Development of the investment of all pupils, by valuing pupils with educational difficulties in order to get them back into learning, thanks to their taste for digital tools.	Infrastructure and terminal facilities are too limited. The use of pupils' personal terminals leads to inequalities and the fear of many teachers of disruptive recreational uses.
Development of transversal competences, which will usefully complement the more "academic" competences and help them to better integrate into higher education and more generally into the professional world and society of tomorrow (see expected competences).	Pupils with heterogeneous profiles.

Put the pupil at the centre of his learning by stimulating his activity and getting him to pass it on to his peers.	Problems linked to adolescence or the lack of attention from pupils when they use their smartphone in class, for example, which can be a hindrance to pedagogical innovation.
Curiosity, motivation for new modalities, linked to the use of digital technology and which put the pupils in activity and responsibility	Weariness if the pedagogical situations proposed are not clearly at odds with traditional practices; or if their variety is not sufficient

7.3. General conclusions of the study ; validation of the hypotheses of the qualitative approach

When we questioned the 6 hypotheses resulting from the research proposals, we were only able to retain 5. We lacked data to evoke the second hypothesis which highlights the quality of the links with the environment and, in particular, with the parents.

For a number of teachers, the experiment has clearly led to better individual monitoring of each pupil and better differentiation according to the pace and skills of each pupil. This situation was also observed in the experiments that were presented at classroom level (at the C5 short course, as part of the ANGE project, in January 2019). In addition, the experimentation has allowed innovations in the preparation of certain courses such as the inverted class, more targeted formative evaluations (Quizz, Kahoot) which make it possible to standardise the working time of the pupils, particularly under the influence of workshops followed during the short training in Finland.

At the same time, the experiment enabled the teachers who took part to improve their work within the educational community: with other teachers (through the dissemination of good practice, encouraging teamwork - thanks to their participation in the Innovative Bubble); with parents (better responding to their request for more individualised follow-up when their child has difficulties). All of this validates hypothesis 1 of our qualitative approach, according to which, thanks to a proactive attitude on the part of the players (steering committee, teachers), digital technology can influence the various relationships between education players (teacher-student relationship; teacher-teacher; school management) and thus promote pedagogical innovation.

As far as their training is concerned, participation in the training activities of the Innovative Bubble has enabled them to start identifying the competences to be acquired or further developed, on the one hand, and the competences acquired, on the other hand.

For the pupils, the use of digital technology in the classroom and, therefore, the transformation of the classroom space (which is no longer a formal space is coercive), into a more mobile space, has enabled them to acquire knowledge of different subjects

(such as French, mathematics, music, history-geography), to learn more easily and more regularly. This validates hypothesis 6 of our research approach according to which the implementation of innovative experiences can contribute to improving the acquisition and development of specific and transversal skills (management of digital resources, teamwork, oral and written communication, etc.).

In addition, it seems that the use of digital technology has allowed a better development of transversal competences: social interaction (communication with other pupils, with teachers): increased confidence; thanks to the change in the teacher's positioning, the pupil dares to show more initiative in his personal work, asks questions.

In addition, the use of digital technology in a new teaching space has enabled pupils to mobilise their expertise to support other pupils in their own learning (formal or "spontaneous" tutoring) and to mobilise their skills in the service of a common teaching objective and, more generally, in the service of the life of the establishment.

At school level, the experiment has led to the development of an educational community (admittedly not large in relation to the number of teachers involved) which is also mobilised for other future projects, and for a good visibility of the school in the network of Catholic schools, which may, in the future, encourage change, and a process of reflection and continuous evaluation on real change and the improvement of teaching and learning processes. This observation therefore validates hypothesis 4 of our research approach, even if it is only a partial validation, because in the context of the PCH high school we are talking about a restricted group of teachers who participate in the Bulle Innovante.

The lack of buy-in by a significant number of teachers underlines the fact that there is a gap between the willingness of the head teacher and the perception of teachers. So, on the one hand, there is talk of a pro-active attitude (she was indeed able to encourage those who wanted to embark on innovations), but at the same time, there is still a reluctance on the part of teachers (the experiment has not had much impact beyond this small circle).

However, the institution's previous experience in digitally-related projects may be a motivating factor for teachers (who are not currently involved) to participate in the experiment. In addition, the fact that there are teachers (not many, it is true) participating in Bulle Innovante and in the training for a University Diploma in Digital Technology, partially validates hypothesis 5, according to which the centre's continued participation in other innovation projects with previous and/or current ICT, are aspects which contribute to the establishment of an innovation process based on the experimentation carried out.

For school governance (management and steering committee), the experiment has made it possible to design, implement and evaluate a form of steering to encourage the emergence of shared governance of educational transformations and create a secure framework for teachers' pedagogical initiative, thus validating hypothesis 3 of our

qualitative approach, according to which governance that clearly favours processes of educational innovation in schools guarantees academic success in terms of teaching and learning. We must appreciate here the willingness of the headteacher, faced with the semi-failure of what happened on the innovation bubble (not many teachers involved), to work with volunteer teachers to draw up a Digital School Plan (on the model of the Quebec Digital Plan, which was presented in detail by Quebec colleagues during the training days at the CEGEP de la Pocatière and then, from another angle during the training days in Craïova[54]) to set out a vision and objectives, share them and broaden the base of committed teachers, while taking advantage of feedback from the project to fit out the dedicated room, the innovative bubble and the inclusion of two of the "pioneer" teachers in a DU "Teaching with digital technology" proposed by the Catholique Institute of Paris.

Consequently, the experiment carried out at the Paul Claudel d'Hulst high school Paris was able to speed up the consideration of digital issues, and highlighted the need for more shared governance, but also the issue of financing equipment and its maintenance and that of teacher training and recognition.

The health crisis has highlighted the skills, often informal, acquired in the project, but which have proved very useful for the most committed teachers. They were also able to support a certain number of their colleagues in the appropriation of tools, but also in the process of pedagogical scriptwriting. All these elements reinforce the management's willingness to launch the work of co-constructing the digital plan, by having researchers from the Catholique Institute of Paris support this process.

[54] For more details on Quebec's Digital Plan, see the study "Les politiques du numérique dans le système éducatif québécois : pilotage des établissements, innovation pédagogique et gouvernance", developed as part of the ANGE project, available at http://classlab-ange.eu/o2-les-politiques-du-numerique-dans-le-systeme-educatif-quebecois-pilotage-des-etablissements-et-innovation-pedagogique-et-gouvernance-cegep-la-pocatiere-quebec/.

CHAPTER 8. FINAL CONCLUSIONS

Ana IGLESIAS RODRÍGUEZ[a]
Yolanda MARTÍN GONZÁLEZ[b]
Azucena HERNÁNDEZ MARTÍN[a]

[a] Department of Didactics, Organisation and Research Methods,
University of Salamanca, Spain.
[b] Department of Library and Documentation,
University of Salamanca, Spain

As has been indicated, on various occasions throughout the work carried out, the main objective we set ourselves with this study was to answer a key question: ***How can we accelerate the development of the skills of those involved in education thanks to digital technology and in a digital environment ?***

The answer to this question is determined, to a large extent, by three fundamental actions that have been researched and studied in depth during the development of this production.

The first one is related to the issues addressed, both in the theoretical and empirical part of this work, through a detailed description and analysis of several scenarios resulting from the classlab experiments that make up this study (G.S. Rakovski for Roman Languages, Burgas, Bulgaria; Novida Lukio, Loimaa, Finland; Paul Claudel-d'Hulst, Paris, France; and Zawm St. Paul's College, Paris, France; and Zawm St. Paul's College, Paris, France). Vith, St. Vith, Belgium) and the consultancy work carried out by professionals belonging to three university teams from the University of Salamanca (Spain), the Catholique Institute of Paris-ICP (France) and the University of Craiova (Romania), as well as the CEGEP de la Pocatière in Quebec (Canada), within the framework of the ANGE project.

The second action concerns the confirmation or refutation of the six hypotheses proposed, from a qualitative and descriptive point of view, on the basis of the data provided by the centres that carried out the experiments.

And, the third action is determined by the Competence Repository co-constructed throughout the three years of the project, by the different actors of the ANGE project during training and virtual meetings. If all the competences are identified, it remains to complete, for each category of actors, the proposals of situations which illustrate these competences in context (annex 1) and the situations that illustrate these skills in context (Annex 2).

It can therefore be said that the answer to the initial question posed, in the light of the conclusions obtained in the four classlabs examined, in the SWOT analysis carried out (annexe 5) and in the verification or refutation of the six hypotheses set out, is as follows.

With regard to the **first hypothesis** defined in the following term : "Thanks to a proactive attitude on the part of the actors (steering committee, teachers), digital technology can influence the different relationships between the actors in education (teacher-student relationship; teacher-teacher; school management) and thus promote pedagogical innovation", it should be noted that, in general, the experiments have had a positive influence on relations between teachers (through teamwork, dissemination of good practice, participation in projects) and also with families. In all cases, the improvement of the relationships that emerged during the educational process between the participants through a climate of collaboration, trust and mutual listening was also emphasised, leading to greater interest and promoting innovation. Similarly, it is evident that the classlabs have greatly fostered the relationship between teachers and students, establishing much closer links and interactions between them.

In any case, the proactive and participatory attitude of the educational agents involved in the classlabs stands out as a significant aspect.

In addition, the SWOT analysis allowed us to see how the participation of centres in digital innovation projects such as ANGE is an opportunity to promote exchange and innovation through knowledge and the implementation of new forms of educational action, and shared reflection both nationally and internationally.

With regard to the **second hypothesis** formulated as follows : "Effective collaboration between school and community (families, businesses, etc.) can accelerate the development of digital infrastructures and pedagogical innovation in schools", the four classlabs agree that this hypothesis could not be explicitly verified. In some cases, there seems to be a strong intention on the part of the administration to support these innovation projects, by seeking technical, financial and organisational solutions. In other cases, it is the school itself that takes the initiative when families point out their vulnerable situation, with the school in these cases taking responsibility for providing pupils with, for example, computers. They also agree that the support of families and/or businesses has been fundamental in the realisation of the classlab. Finally, we believe that the teams of the 4 training structures are committed to working on this issue of the relationship with parents, particularly in Burgas in the context of their reverse classlab scenario. On the other hand, it is necessary to insist on the close link between the St Vith centre and the companies of the local fabric in the emergence of the experimentation.

Here, active listening and collaboration with the business environment and social entities is considered a fundamental aspect in responding to digital labour market initiatives, particularly in the vocational training centre. However, funds are still insufficient for the

acquisition of devices and applications that facilitate the matching of the educational and professional sectors.

With regard to the **third hypothesis**, which is formulated as follows : "A governance that clearly encourages processes of educational innovation in schools guarantees academic success in terms of teaching and learning", one could say that, in our opinion, this is the one that is most confirmed in the different scenarios.

At the micro level, the four cases agree that the support provided by the management team and, above all, by headmasters has been fundamental (support for teachers, acceptance of ideas and proposals, granting greater autonomy to teachers, provision of technological resources, finding solutions to unexpected problems that arise, setting up management committees for better organisation of work, etc.). And, at a macro level, in some of the centres, the possibility that they have had the opportunity to access or participate in national projects proposed by the Ministry of Education to obtain funding to acquire technological devices is highlighted.

It is therefore seen as a strength to have a proactive management team at the centre, which exercises governance in a shared manner and respects the autonomy of teachers. However, the support and recognition of ministerial bodies for innovative initiatives in schools is still not sufficient, despite the fact that there is a strong commitment to the integration of ICT in the educational sphere.

With regard to the **fourth hypothesis** put forward in global terms : "The experimentation carried out in the four lab classes is considered a process of educational innovation, since it provides the right conditions for the leadership of the change management team, a receptive and motivated group of teachers, and a process of reflection and continuous evaluation on real change and improvement of the teaching and learning processes", the four cases agree that the experiments carried out can be considered a process of educational innovation, especially at the level of the centre and of the "pioneer" teachers who participate in them.

Although the number of teachers involved in the classlabs was not very high, all of them are distinguished by their desire to be involved in decision-making, to participate in the reflection on the evolution of the scenario: in other words, to participate actively in the governance of the school.

However, it was found that digital training for teachers should be further encouraged, as it is heterogeneous, which sometimes makes it difficult for teachers and students to participate actively in innovation projects. In addition, there is also the insecurity that some teachers feel towards digital technologies, which in these cases has been overcome by working together with their colleagues and by their willingness to invest in innovation.

The fifth hypothesis states that "The existence of adequate computer equipment in the classrooms, the methodologies used in the classroom laboratory, as well as the continuous participation of the centre in other innovation projects with previous and/or

current ICTs, are aspects that contribute to establishing an innovation process based on the experimentation carried out".

In this respect, the participating centres agree that the process of educational innovation has been possible because they have some experience of having participated in other projects; and because, to a greater or lesser extent, they have the appropriate infrastructure and the necessary IT equipment and tools to be able to carry it out. In spite of this, they show that the IT equipment is still insufficient.

On the other hand, the application of methodologies based on the use of ICT offers a clear opportunity for educational innovation since it increases students' motivation and interest in their own teaching-learning process. What is a priori regarded as a strength becomes a threat if it is not properly applied, since the four experiments carried out have also shown that the incorporation of technologies causes greater distraction for students, as well as a certain inequality when it is they who have to bring their own equipment into the classroom.

Finally, with reference to **hypothesis 6**, "The implementation of innovative experiments at school contributes to improving the acquisition and development of specific and transversal skills (management of digital resources, teamwork, oral and written communication, etc.)". "schools show that, without a doubt, the scenarios implemented have contributed to the acquisition and development of various specific and transversal competences by pupils and teachers.

Among the competences acquired by pupils are: ability to participate, imagination, discovery of talents for tasks, greater cohesion between peers, collaborative work, greater initiative, increased motivation, peer tutoring, self-assessment and peer evaluation, reflection, use of digital tools for pedagogical purposes, more dynamic use of classrooms and school spaces, greater social interaction, increased confidence, management of digital resources, etc.

And, in the case of teachers, they focus on the use and management of digital tools for classrooms and for assessment, collaboration, teamwork, support between teachers, positive reflection in the face of mistakes made, changing attitudes and perspectives in the face of new or different methodologies from those they usually use, developing more active and personalised classes. At the same time, it should be remembered how difficult it is for those working in the field to properly identify the competences worked on in the situations created in the different scenarios, and when they do identify them, how difficult it is sometimes to evaluate them and to value this evaluation, both for pupils and teachers, and a fortiori for managers.

In order to assess in more detail what level of competences enabled the development of the four classes, a competency framework was co-developed (annex 1).

According to the definition offered by standard UNE 66173 (2003), a Competence Reference is the "document that establishes the set of competences useful for the organisation, in the present and in the future, considering the increasing levels of

complexity of each of them" (p.6). In our case, the Competence Reference is articulated in three different poles : an organisational pole, a communication pole and a reflexive pole.

The ***organisational pole*** includes all the capacities and skills that make it possible to carry out the actions planned in the different phases that are part of a project. They help us to coordinate and prospect the planned tasks and processes, i.e. they enable us to explore future possibilities on the basis of current indications. The main aim of this skill is to contribute to carrying out the actions previously established in the project as estimated, in order to avoid dispersion, improvisation in the execution of tasks and lack of planning.

This competence is linked to good management capacity, adequate decision-making and a high level of responsiveness on the part of all actors involved. To this end, it approaches the important aspects of the project in a comprehensive manner and from an integral vision that allows the nature of the processes, actions, plans and the essence of the project to be taken into consideration. Likewise, a fundamental role in this process is played by, on the one hand, adequate management and use of the resources available for the execution of the project, which is essential in order to be able to face the challenges that arise during the course of the project; and, on the other hand, appropriate leadership that is distributed and flexible among the different members who carry out the work, where the success of the project is determined, to a large extent, by motivation, incentives and recognition of achievements.

In addition to implicit and/or tacit knowledge, **the *communication pole*** implies a contextualised use of this knowledge or actions. This competence is generally linked to social experience, needs, motivations and action. It promotes communicative interaction, personal treatment and community life, giving rise to spaces of representation where cultural codes are constructed and constantly renewed through strategies of participation, cooperation and conviction. This competence implies knowing how to situate oneself in the communicative context of each specific community, in its various social, cultural and ideological formations. Its effectiveness depends, to a large extent, on the ability to reflect and is fundamental to developing the collegial thinking that is characteristic of a community of learning and practice. Similarly, it is a fundamental skill for conducting actions in negotiation, teamwork, conflict management and leadership. It is also linked to environmental adaptation, ethical awareness and appropriate use of digital resources in planning and organisational processes, reflection, communication, innovation, etc.

And, **the *reflexive pole*** brings into play the capacities and skills of a person or professional facing a challenge, task, problem or project by mobilising the knowledge, experience, moral and emotional dimension necessary to achieve a successful resolution in concrete situations, as well as the improvement of their action or praxis in the professional scenario in which they evolve at every moment. This competence invites to look back on lived experiences and to look for situations of improvement, such as

innovation in one's own practice, to become aware of one's way of thinking, to modify certain forms of facing reality and even to change one's mentality and to recognise other forms of thinking and acting. It is competence that professionalises the teacher and makes him or her increasingly autonomous.

Table 20 shows, in a comparative manner and by means of an estimation scale, the degree of achievement of these competencies according to the performance standards and the levels of achievement that comprise them (Achieved, Not Achieved, In Progress). To this end, and once again based on standard UNE 66173 (2003, p.7), the three elements involved in a competence have been considered:

- One **person** (an agent). This person has a value system (based mainly on his or her culture, beliefs and circumstances, past and present). Their behaviour is conditioned by their aspirations (which determine their motivation and willingness to learn). He or she has the capacity to learn (which serves as a basis for his or her willingness to evolve). They have general and specific knowledge. This set of intrinsic elements shapes the person's identity.
- A **field** and **an application environment**.
- An **authority** that evaluates and recognises. A legal and regulatory framework and a hierarchical system of the organisation, which may include a specific area, [...], with responsibilities and powers to influence the competence of the relevant staff of the organisation.

Table 20 has been drawn up on the basis of information provided by the headmasters of the four high schools participating in the ANGE project, using the reference framework designed by Jean Marie de Kételе and other researchers.

Table 18. Competence reference framework applied to the four classlab by the directors of the high schools.

ORGANISATIONAL POLE				
CO1 : Co-construct a national, pan-European or international network of classlabs ("classlabs support laboratories"). change").				
	BURGAS	**LOIMAA**	**PCH**	**ST VITH**
P1: Experiment one or the other proposal of a classlab in her daily work environment.	A	A	A	A
P2 : Turns his daily working environment into a classlab.	A	A	A	A
P3 : Participates in the development of the classlab of his establishment.	A	A	A	A
P4 : Contributes in an original way to the development of his establishment's classlab.	A	A	A	EC
P5 : Participates in the development of a national, pan-European or international network of classlabs.	NA	A	A	A
P6 : Contributes in an original way to the development of a national, pan-European or international network of classlabs.	NA	NA	NA	EC
P7 : Mobilises its expertise to support other national, pan-European or international projects.	A	NA	NA	EC
CO2 : Steering by developing distributed leadership.				
	BURGAS	**LOIMAA**	**PCH**	**ST VITH**
P1 : Takes responsibility within his daily work environment towards the actors he is in charge of.	A	A	A	A
P2 : Distributes responsibilities among the actors he is in charge of within his daily work environment.	A	A	A	A
P3 : Takes on certain responsibilities within his/her institution.	A	A	A	A

P4 : Demonstrates leadership within his/her institution.	A	A	A	A
P5 : Takes responsibilities within a network of external actors.	A	NA	A	A
P6 : Demonstrates leadership within a network of external actors.	A	NA	NA	A
P7 : Places its leadership at the service of a reflection on practices (learning, pedagogical or steering) and the effects of networks of actors at national, pan-European or international level.	A	NA	NA	A
CO3 : Using digital resources to develop innovation.				
	BURGAS	**LOIMAA**	**PCH**	**ST VITH**
P1 : Uses digital resources in his/her daily work environment to facilitate or support his/her personal practice (learning, teaching or piloting).	A	A	A	A
P2 : Uses digital resources in his or her daily work environment to strengthen interaction with the actors in his or her care.		A	A	A
P3 : Is interested in new resources acquired or likely to be acquired in his/her institution.	A	A	A	A
P4 : Actively engages with stakeholders in the institution in the experimentation of forms of use of digital resources enabling innovative practices (learning, pedagogical or piloting).		A	A	
P5 : Addresses digital resources and usage practices (learning, teaching or piloting) carried out at national, pan-European or international level.	A	A	NA	A
P6 : Actively engages with actors of a national, pan-European or international project in the experimentation of forms of use of digital resources allowing innovative practices (learning, pedagogical or piloting).	EC	NA	NA	A
P7 : Mobilises its acquired expertise to support other innovation projects.	A	NA	NA	A
COMMUNICATION POLE				
CC 1 : Co-constructing a community of learning and practice.				
	BURGAS	**LOIMAA**	**PCH**	**ST VITH**
P1 : Accompanies the actors he is in charge of in his daily work environment.	A	A	A	A

P2 : Makes his or her daily work environment a learning community.	A	A	A	EC
P3 : Is interested in the practices (learning, pedagogical or steering) and innovations of the players in his/her institution.	A	A	A	A
P4 : Sharing practices (learning, pedagogical or steering) and innovations between players to make one's institution a learning organisation.	A	A	A	A
P5 : Is interested in the practices (learning, pedagogical or steering) and innovations of players from outside the institution.	A	A	A	A
P6 : Sharing practices (learning, pedagogical or piloting) and innovations with external actors in the framework of a national, pan-European or international co-learning network.	EC	A	A	A
P7 : Puts its acquired expertise at the service of the development of co-learning networks at national, pan-European or international level.	NA	NA	NA	EC
CC 2 : Collaborate with internal and external partners.				
	BURGAS	**LOIMAA**	**PCH**	**ST VITH**
P1 : Responds willingly to requests or solicitations from the actors he is in charge of.	A	A	A	A
P2 : Establishes partnerships with the actors for whom it is responsible.	A	A	A	A
P3 : Responds willingly to requests or solicitations from those involved in his or her institution.	A	A	A	A
P4 : Establish partnerships with actors in the institution.	A	A	A	A
P5 : Responds willingly to requests or solicitations from actors outside his/her institution.	A	A	A	A
P6 : Establish partnerships with actors outside the institution.	EC	NA	NA	A
P7 : Mobilises its expertise to reflect on practices (learning, pedagogical or steering) and the effects of the partnership at national, pan-European or international level.	EC	NA	NA	EC
CC 3 : Use digital resources to communicate with the various stakeholders.				
	BURGAS	**LOIMAA**	**PCH**	**ST VITH**

P1 : Uses digital resources in his or her daily work environment to communicate information with the actors in his or her charge.	A	A	A	A
P2 : Uses digital resources in his daily work environment to set up an interactive information processing system between the players he is in charge of.	A	A	A	
P3 : Uses the institution's digital communication resources in accordance with the prescribed rules.	A	A	A	A
P4 : Exploits the institution's digital communication resources for various collaborative projects with internal or external players.	EC	A	A	A
P5 : Focuses on digital communication resources used at national, pan-European or international level.	A	A	NA	A
P6 : Actively engages with stakeholders in a national, pan-European or international project in the use of common digital communication resources.	EC	NA	NA	A
P7 : Mobilises its acquired expertise to support the implementation of digital communication devices.	A	NA	NA	A
REFLECTIVE POLE				
CR1 : Co-constructing a personal and institutional professional project.				
	BURGAS	**LOIMAA**	**PCH**	**ST VITH**
P1 : Participates willingly in training courses for personal professional development.	A	A	A	A
P2 : Proactively solicit training or coaching opportunities for personal professional development.	A	A	A	A
P3 : Participates willingly in training courses for the development of a collective or institutional project.	A	A	A	A
P4 : Proactively soliciting training or support opportunities for the development of a collective or institutional project.	A	A	A	A
P5 : Participates willingly in training courses to contribute to the co-construction of a national, pan-European or international project.	EC	A	NA	A

P6 : Proactively solicit training or coaching opportunities to contribute to the co-construction of a national, pan-European or international project.	NA	NA	NA	EC
P7 : Mobilises its expertise to support external personal and institutional professional development projects.	NA	NA	NA	EC
CR2 : Adopt a critical and metacognitive stance to analyse one's practices (learning, teaching or piloting).				
	BURGAS	**LOIMAA**	**PCH**	**ST VITH**
P1 : Regularly evaluates the effects of the practices (learning, teaching or piloting) carried out in his daily work environment on the players he is in charge of.	EC	A	A	A
P2 : Analyses what in its daily functioning (practices, postures, desired effects) needs to be regulated or questioned.	EC	A	A	A
P3 : Co-evaluates with stakeholders the effects of the practices (learning, pedagogical or steering) carried out with reference to the institution's project.	EC	A	A	EC
P4 : Co-analyses with actors what in the institutional functioning needs to be regulated or questioned.	EC	A	A	EC
P5 : Co-evaluates with actors of the national, pan-European or international network the effects of the practices (learning, pedagogical or piloting) carried out in partnership.	NA	NA	NA	EC
P6 : Co-analyses with national, pan-European or international network actors what needs to be regulated or questioned.	NA	NA	NA	EC
P7 : Mobilises its expertise to support external projects of critical and metacognitive analysis of practices (learning, pedagogical or piloting).	NA	NA	NA	EC
CR3 : Using digital resources to continue training				
	BURGAS	**LOIMAA**	**PCH**	**ST VITH**
P1 : Regularly consults information sites for professional use.	A	A	A	A
P2 : Engages in distance learning modules with reference to a personal professional development project.	A	A	A	A
P3 : Participates in training modules proposed by his/her institution as part of a digital development project.	A	A	A	A

P4 : Engages by using digital resources in a team or network of co-training and professional co-coaching.	A	A	A	A
P5 : Participates digitally in training modules organised as part of a national, pan-European or international project.	EC	A	A	A
P6 : Engages by using digital resources in a national, pan-European or international network of professional co-training and co-coaching.	NA	NA	NA	A
P7: Mobilises its expertise to support external co-training and co-coaching digital network projects.	NA	NA	NA	A

Source : Compilation based on De Ketele's Competence Framework (2020).

Scale of values : Achieved (A) ; Not achieved (NA) ; In progress (EC)

To sum up, the study carried out allows us to conclude that the group of people who make up an institution is the most powerful and creative tool available to an educational centre. It is therefore the responsibility of management teams, in addition to first identifying, then recognising, valuing and mobilising the potential of teachers in their schools, to be able to mobilise this potential in order to achieve the school's objectives. To this end, they must motivate teachers and provide them with the means to feel satisfied and willing to participate in the activities and projects proposed to them, which will lead to the smooth running of the institution, resulting from the synergies that are created between members of the educational community.

The incorporation of digital infrastructures in classrooms is already a reality in practically all educational centres, although, as we have seen, some of them still indicate that these infrastructures are insufficient. However, as has been made clear throughout this work, the mere physical integration of the different tools does not guarantee pedagogical innovation, understood in terms of change, improvement and transformation. Educational innovation induced by the use of technological resources implies considering them not as an end in itself, but as a means to improve teaching and learning processes. In other words, the important thing is to think about what will be done with them and the added value they bring. And in this sense, we would like to end by providing some recommendations to the management teams of the centres and, above all, to their teachers, when reflecting on good educational practices mediated by the use of technological tools :

- Improvisation is not possible when ICT is used in the classroom. Technologies for didactic use should entertain, amuse and generate learning; but they should not be used to fill the gap when the teacher does not know what to do with his or her pupils

- Imagination and creativity are priority qualities for making the most of the benefits and potential of technology in relation to the rest of the elements of the curriculum.

- Changing the teaching role, becoming a learning facilitator so that students, with your advice and help, build their knowledge and learn more independently.

- Commitment to collaborative learning methodologies between colleagues in the centre and in other centres in order to share experiences, ideas and doubts about the use of technology in the classroom.

- Optimising ICT, knowing that it is the way in which it is used which will give educational value to the activity carried out, improve pupils' performance and encourage them to learn in a meaningful way. The methodology or teaching strategies planned are those which will determine the learning process which will be developed by the pupils.

- ICT should not only be used as a resource for the learning that students do in different subjects and courses, it should also be used to develop specific digital and information skills.

- Make technology available to all students to cope with and respond to diversity.

- The teacher will never be replaced by a technological tool because the power of the latter lies precisely in what he decides to do with it. It is also true that a good teacher will not be replaced by technology, but perhaps by another who, besides being good, knows how to use it.

Without a doubt, the ANGE project has been a formidable lever to accompany projects that are often already present in the minds of the actors involved in the experiments. The fact that it ends in a few weeks does not mean the end of the changes and dynamics involved, quite the contrary: in each case, the initial project has evolved, all the more so with the health crisis, which has enhanced the skills acquired throughout the project.

CHAPTER 9. BIBLIOGRAPHICAL REFERENCES AND WEBSITES

Accès au financement - L'Europe est à vous [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à https://europa.eu/youreurope/business/finance-funding/getting-funding/access-finance/index_fr.htm

Aguilar, L.F., & Bustelo, M. (2010). Gobernanza y evaluación: una relación potencialmente fructífera. *GAPP. Revista Gestión y Análisis de Políticas Públicas,* 4, 23-51.

Aliaga, F.M., Gutiérrez-Braojos, C., & Fernández-Cano, A. (2018). Las revistas de investigación en educación: Análisis DAFO. *Revista de Investigación Educativa, 36* (2), 563-579. https://doi.org/10.6018/rie.36.2.312461

Alliances sectorielles pour les compétences | Agence ERASMUS+ France/Éducation Formation [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à https://agence.erasmusplus.fr/fiches-pratiques/alliances-sectorielles-pour-les-competences/

Alonso, I., Arandia, M., Martínez, I., Martínez, B., & Gezuraga, M. (2013). El aprendizaje-servicio en la innovación universitaria. Una experiencia realizada en la formación de educadoras y educadores sociales. *Revista Internacional de Educación para la Justicia Social, 2* (2), 195-216. Disponible à http://www.rinace.net/riejs/numeros/vol2-num2/art10.pdf

Alter, N. (2002). *L'innovation : un processus collectif ambigu. Les logiques de l'innovation.* Paris : la découverte.

ANGE-projet européen sur les Classlabs [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à http://classlab-ange.eu/

Attarça, M. & Chomienne, H. (2012). Les chefs d'établissement : de nouveaux managers au sein d'organisations en mutation. *Management & avenir*, *5* (55), 215-232.

Attarça, M. & Chommienne, H. (2013). Les chefs d'établissements publics scolaires français face aux enjeux de la nouvelle gestion du système éducatif. *@GRH*, *4* (9), 35-66.

Auduc, J-L. (2018). *Le système éducatif français aujourd'hui : de la maternelle à la terminale*. Vanves : Hachette éducation.

Ausín, V., Abella, V., Delgado, V., & Hortigüela, D. (2016). Aprendizaje Basado en Proyectos a través de las TIC. Una Experiencia de Innovación Docente desde las Aulas Universitarias. *Formación Universitaria, 9*(3), 31-38. doi: 10.4067/S0718-50062016000300005

Azorín, C.M., & Arnaiz, P. (2013). Una experiencia de innovación en Educación Primaria: medidas de atención a la diversidad y diseño universal del aprendizaje. *Tendencias Pedagógicas,* 22, 9-30.

https://repositorio.uam.es/bitstream/handle/10486/14074/66018_0.pdf?sequence=1

Balanger, S. (2019). *Le Classlab St Vith*. Vidéo accessible en ligne à l'adresse : https://www.youtube.com/watch?v=BPnPRCFS2fM&feature=youtu.be&list=PLGZ7LCna5-M4dlhfy7Msko8fZjdGuptpQ

Balanskat, A., Blamire, R., & Kefala, S. (2006). *The ICT Impact Report. A review of studies of ICT impact on schools in Europe*. [en-ligne] Disponible à https://pdfs.semanticscholar.org/6288/63abac8753bcb827f641f596f9e6e2ad5ab7.pdf?_ga=2.258256076.716127525.1583663891-1383360423.1560176793

Balica, M, Botnariuc, P., Făniță, A., Iacob, M., Iftode, O. & Sarivan, S. (2018). *IO3 – Raport de cercetare : Condiții pentru integrarea tehnologiei digitale în practicile educaționale din România.* [en-ligne] Disponible à http://decode-net.eu/wp-content/uploads/2018/05/IO3_Romania_National-Report.pdf

Barnett, K., & McCormick, J. (2012). Leadership and team dynamics in Senior executive leadership teams. *Educational Management Administration & Leadership*, *40*(6), 653-671.

Barrère, A. (2006). Les chefs d'établissement face aux enseignants : enjeux et conflits de l'autonomie pédagogique. *Revue Française de Pédagogie*, 156, 89-99.

Baumgartner, P., Brandhofer, G., Ebner, M., Gradinger, P., & Korte, M. (2015). *Medienkompetenz fördern – Lehren und Lernen im digitalen Zeitalter*, Nationaler Bildungsbericht Österreich, 2, 95-132, [en-ligne] Disponible à https://www.bifie.at/wp-content/uploads/2017/05/NBB_2015_Band2_Kapitel_3.pdf.

Béchard, J.P. (2001). L'enseignement supérieur et les innovations pédagogiques : une recension des écrits. *Revue des sciences de l'éducation*, XXVII, 2, 257-281.

Bechard, J-P. & Pelletier, P. (2001). *Développement des innovations pédagogiques en milieu universitaire : un cas d'apprentissage organisationnel*. Sherbrooke : Editions du CRP.

Bechard, J-P. (2001). L'enseignement supérieur et les innovations pédagogiques. *Revue des sciences de l'éducation*, *27* (2), 257-282.

BECTA. (2008). *Harnessing Technology Review 2008: The role of technology and its impact on education*. London : BECTA.

Beloki, N., Ordeñana, M.B., Darreche, L., González, M.N., Flecha, A.C., Hernando, M.C., Alonso, A., Mosquera, A., & Sanz, Z. (2011). Innovando el Practicum de Educación Social: una experiencia de trabajo colaborativo. *Revista de Educación,* 354, 237-264. http://www.revistaeducacion.educacion.es/re354/re354_10.pdf

Bernard, F.X., & Fluckiger, C. (2019). Innovation technologique, innovation pédagogique. Éclairage de recherches empiriques en sciences de l'éducation. *Spirale - Revue de Recherches en Éducation*, 63, 3-10. doi:10.3917/spir.063.0003.

Bidarian, S., Bidarian, S. & Davoudi, A.M. (2011). A Model for application of ICT in the process of teaching and learning. *Procedia - Social and Behavioral Sciences,* 29, 1032-1041. doi:10.1016/j.sbspro.2011.11.336

Boiron, M. (2008). *L'innovation en question(s)*. *Tout a été dit, tout a été fait, il ne reste que l'avenir à inventer,* [en-ligne] disponible à https://gerflint.fr/Base/Baltique3/Boiron.pdf

Brest, P. (2011). Le leadership dans les organisations publiques : le cas des chefs d'établissement de l'enseignement secondaire. *Politiques et Management Publiques*, *28* (3), 333-351.

Bustamante, J.C., Larraz, N., Vicente, E., Carrón, J., Antoñanzas, J.L., & Salavera, C. (2016). El uso de las píldoras formativas competenciales como experiencia de innovación docente en el grado de magisterio en educación infantil. *ReiDoCrea*, 5, 223-234. https://zaguan.unizar.es/record/56832/files/texto_completo.pdf

Cadre européen pour un apprentissage efficace et de qualité : questions et réponses [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à https://ec.europa.eu/commission/presscorner/detail/fr/MEMO_17_3586

Cañal de León, P. (2002). *La innovación educativa.* Madrid : Akal.

Carbonell J. (2008). *Una educación para mañana.* Barcelona: Octaedro.

Carbonell, J. (2012). *La aventura de innovar. El cambio en la escuela.* Madrid : Morata.

Castiñeira, A. (2011). Prolegòmens al lideratge educatiu a Catalunya. *Escola catalana, 46*(468), 3-11.

Chang, H. H., & Huang, W.C. (2006). Application of a quantification SWOT analytical method. *Mathematical and Computer Modelling, 43*(1), 158-169.

Clift, R.T., Houston, W.R., & Pugach, M.C. (1990). *Encouraging Reflective Practice in Education: An Analysis of Issues and Programs*. New York: Teacher College Press.

Commission Européenne. (2019). *Digital Education at School in Europe. Eurydice Report*. Luxembourg : Publications Office of the European Union.

Coronel, J.M. (2003). Liderazgo y gestión en las organizaciones educativas: algunas tareas pendientes de resolver, algunas propuestas para desarrollar. *Organización y gestión educativa: Revista del Fórum Europeo de Administradores de la Educación,11*(6), 9-13.

Cousin O. (1993). L'effet établissement. Construction d'une problématique. *Revue Française de Sociologie, 34* (3), 395-419.

Cousin O. (1996). Construction et évaluation de l'effet établissement : le travail des collèges. *Revue française de pédagogie*, 115, 59-77.

Cox, A. (2005). What are Communities of Practice?. A Comparative Review of Four Seminal Works. *Journal of Information Science*, 31, 527-540.

Cros, F. (2002). *Les logiques de l'innovation*. Paris : La découverte.

Dale, R. (2006). Globalização e reavaliação da governação educacional. Um caso de ectopia sociológica. En A. Teodoro, & C.A. Torres (Orgs), *Educação crítica & utopia: perspectivas para o século XXI* (pp. 60-80). São Paulo : Cortez.

Daly, A. (2010). *Social network theory and educational change*. Cambridge, MA : Harvard University Press.

Das ZAWM Zentrum für Aus- und Weiterbildung des Mittelstandes - Weiterbildungen Ostbelgien, Meisterkurs, Geselle, Berufsschule - - Ziele und Leitbild der Lehrlingsausbildung [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à http://www.weiter-mit-bildung.be/lehrlingsausbildung/ziele-und-leitbild-der-lehrlingsausbildung/

De la Torre, S. (1994). *Innovación curricular. Proceso, estrategias y evaluación.* Madrid : Dykinson.

De la Torre, S. (1998). Una propuesta innovadora de formación integral para la Universidad del siglo XXI. En *V Congreso Interuniversitario de Organización de Instituciones Educativas* (pp. 907-918). Madrid : Universidad Complutense.

De la Torre, S., Jiménez, B., Tejada, J., Carnicero, P., Borrell, N., & Medina, J.L. (1998). *Cómo innovar en los centros educativos. Estudio de casos*. Madrid : Editorial Escuela Española.

De Peretti, A. & Muller, F. (2016). *Mille et une propositions pédagogiques pour animer son cours et innover en classe*, Paris : ESF.

Del Castillo, G. (2012). Las políticas educativas en México desde una perspectiva de política pública: gobernabilidad y gobernanza. *Magis, Revista Internacional de Investigación en Educación, 4*(9), 637-652.

Deschenes, M.C. & Desrochers, M. (2019*). O2 - Les politiques du numérique dans le système éducatif québécois. Pilotage des établissements et innovation pédagogique et gouvernance.* Étude développée dans le cadre du projet Erasmus+ 2017-1-FR01-KA201-037369, *L'ancrage du numérique dans la gouvernance des établissements* (ANGE).

Díaz, J., Cívis, M., & Longás, J. (2013). La gobernanza de redes socioeducativas: claves para una gestión exitosa. *Teor. Educ., 25*(2) 213-230.

Díaz-Gibson, J., Cívis, M., Carrillo, E., & Cortada, M. (2015). El liderazgo y la gobernanza colaborativa en proyectos educativos comunitarios. *Pedagogía Social. Revista Interuniversitaria, 26,* 59-83. doi:10.7179/PSRI_2015.26.03

Eif.org - European Investment Fund [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à https://www.eif.org/

Escudero, J.M. (1989). El centro educativo como unidad de cambio. En *Jornadas de Innovación y reforma educativa.* Vitoria.

Escudero, J.M. (1990). El centro como lugar de cambio educativo. La perspectiva de la colaboración. En *Primer Congreso Interuniversitario de Organización Escolar.* Barcelona.

Escudero, J.M., & López, J. (1992). *Los desafíos de las reformas escolares*. Sevilla: Arquetipo.

Făt, S., & Labăr, A.V. (2009). *Eficiența utilizării noilor tehnologii în educație. EduTIC 2009. Raport de cercetare evaluativă,* [en-ligne] Disponible à https://www.elearning.ro/resurse/EduTIC2009_Raport.pdf

Fernández, A. (2010). *Nuevas metodologías docentes.* Instituto de Ciencias de la Educación. Universidad Politécnica de Valencia. Disponible à http://roble.pntic.mec.es/jprp0006/tesis/metodologia/nuevas_metodologias_docentes_de%20fernandez_march.pdf

Fernández, M. (2016). ¿Qué es la innovación educativa?, En M. Fernández, & N. Alcaraz (Coords.), *Innovación educativa. Más allá de la ficción* (pp. 27-40). Madrid : Pirámide.

Fichez, E. (2006). Recherche sur l'innovation en éducation. Les repères des sciences de l'information et de la communication. *Distances et savoirs*, *4* (4), 545-556.

Florea, C.P. (2018). Importanţa TIC în educaţia românească. *EDICT.Revista Educației*. [en-ligne] Disponible à https://edict.ro/importanta-tic-in-educatia-romaneasca/

Fluckiger. C. (2017). Innovations numériques et innovations pédagogiques à l'école. *Recherches,* 66, 119-134. [en-ligne] Disponible à https://hal.univ-lille3.fr/hal-01588403/document

Forster, S. (2017). *Evaluation des Projekts Pegasolino Plus. BYOD für Lehrpersonen an der Kantonsschule Seetal*, [en-ligne] Disponible à https://kantonsschulen.lu.ch/-/media/Kantonsschulen/Dokumente/Projekte_Gymnasium/Evaluation_des_Projekts_Pegasolino_WEB.pdf.

Fullan, M. (1987). Implementing the implementation plan. In M. Widden, & I. Andrews (Eds.), *Staff Development for School Improvement* (pp. 213-222). London : Falmer Press.

Gairín, J.G. (2000). Cambio de cultura y organizaciones que aprenden. *Educar,* 27*,* 31-85.

Gairín, J.G., & Muñoz, J.L. (2008). El agente de cambio en el desarrollo de las organizaciones. *Enseñanza & Teaching,* 26*,* 187-206.

García, J.F., Gracia, E., Fuentes, M.C., Lila, M., & Pascual, J. (2010) La innovación educativa desde la metodología: Mejora de las actitudes y competencias científicas de los

alumnos. *Escritos de Psicología, 3*(4), 1-10. http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1989-38092010000300001

García-Valcárcel, A. (2015) (Coord.). *Proyectos de trabajo colaborativo con TIC.* Madrid : Síntesis.

Gather, M. (2004). *Innovar en el seno de la institución escolar.* Barcelona : Graó.

Genevois, S., & Poyet, F. (2010). Espaces numériques de travail (ENT) et *école étendue*. *Distances et savoirs*. *8 (*4), 565-583.

Gerick, J., Eickelmann, B. & Steglich, E. (2019). *Abschlussbericht zur prozessbegleitenden Evaluation der Einfuehrung von LOGINEO NRKV an Pilotschulen*, [en-ligne] Disponible à https://kw.uni-paderborn.de/fileadmin/fakultaet/Institute/erziehungswissenschaft/Schulpaedagogik/PDF/190706_Abschlussbericht_LNRW_FINAL.pdf

Goig, R.M. (2012). La webquest como innovación educativa en el ámbito de la educación vial. *Enseñanza & Teaching, 30*(1), 63-84. Disponible à https://campus.usal.es/~revistas_trabajo/index.php/0212-5374/article/view/9297/9590

González, M. T. (1988). La revisión basada en la escuela: una estrategia de innovación educativa. *Anales de Pedagogía,* 6*,* 27-35.

González, M.T. (2003). El liderazgo en tiempos de cambios y reformas. *Organización y gestión educativa: Revista del Fórum Europeo de Administradores de la Educación, 11*(6), 4-8.

González, M.T., & Escudero, J. M. (1987). *Innovación educativa: teorías y procesos de desarrollo*. Barcelona : Editorial Humanitas.

Goodlad, J. (1983). The school as workspace. En G.A. Grifins (Ed.), *Staff development* (pp. 36-61). Chicago : Nsse.

Guillaume et al. - De la Nouvelle Gouvernance du Système Éducatif en .pdf [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à https://matheo.uliege.be/bitstream/2268.2/5858/1/De%20la%20Gouvernance%20du%20Syst%C3%A8me%20%C3%A9ducatif%20en%20FWB.pdf

Guimarães-Iosif, R.M. (2012). Introdução. En R.M. Guimarães-Iosif (Org.), *Política e governança educacional: disputas, contradições e desafios diante da cidadania* (pp. 17-23). Brasília, DF : Universa: Líber Livro.

Gunter, H. M. (2012). Le leadership scolaire, restructuration managériale de l'organisation de l'établissement scolaire, *Éducation et Sociétés*, 30, 59-74.

Hammond, M. (2014). Introducing ICT in schools in England: Rationale and consequences. *British Journal of Educational Technology*. *45* (2), 191-201.

Hannan, A. English, S. & Silver, H. (1999). Why innovate? Some preliminary findings from a research project on 'innovations in teaching and learning in higher education. *Studies in higher education*, *24*(3), 270-289.

Harris, S. (2002). Innovative pedagogical practices using ICT in schools in England. *Journal of Computer Assisted Learning*. 18, 449-458.

Heredia Manrique, A. (2004). *Curso de didáctica general.* Zaragoza: Prensas Universitarias de Zaragoza.

Hidalgo, J., De la Blanca, S., & Risueño, J.J. (2011). La innovación educativa en la educación de adultos como mejora del proceso de enseñanza-aprendizaje. *Escuela Abierta*, 14, 83-109. Disponible à http://www.ceuandalucia.es/escuelaabierta/pdf/articulos_ea14pdf/ea14_hidalgo.pdf

Hoyler, T., Burgo, F., Bresler, R., & Paulics, V. (2014). Governança ajuda ou atrapalha? Re exões sobre a gestão educacional local. *Revista Interdisciplinar de Gestão Social*, *3*(2), 81-102.

Huberman, A.M. (1973). *Expérience et innovation en éducation*. UNESCO : BIE.

Iglesias Rodríguez, A. (2010). *Apuntes de Didáctica General para maestros y profesores de las distintas etapas educativas. Diseño de Programaciones y Unidades Didácticas por competencias.* Salamanca: Degratis Editores.

Iglesias Rodríguez, A. (2018). *Proyecto Docente e Investigador*. Salamanca: Universidad de Salamanca. Inédito.

Investir dans la jeunesse de l'Europe : la Commission lance le corps européen de solidarité [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à https://ec.europa.eu/commission/presscorner/detail/fr/IP_16_4165

Istrate, O. (2010). *Efecte şi rezultate ale utilizării TIC în educaţie*. [en-ligne] Disponible à https://www.researchgate.net/publication/255568939_Efecte_si_rezultate_ale_utilizarii_TIC_in_educatie

Jessop, B. (1999). The changing governance of welfare: recent trends in its primary functions, scale, and modes of coordination. *Social Policy & Administration*, *33* (4), 348-59. doi:10.1111/1467-9515.00157

Joiţa, E. (2006). *Instruirea constructivistă – o alternativă. Fundamente. Strategii*, Bucarest: Aramis.

Kehm, B.M. (2011). *La gobernanza en la enseñanza superior. Sus significados y su relevancia en una época de cambios*. Barcelona : Octaedro/ICE-UB.

Kerr, K.A. et al. (2003). *Quaker Valley Digital School District : Early Effects and Plans for Future Evaluation.* [en-ligne] Disponible à http://192.5.14.110/pubs/technical_reports/2004/RAND_TR107.pdf

Khouaja E-M. & Moullet S. (2016). Le rôle des caractéristiques des établissements dans le décrochage scolaire. *Formation emploi*, 134, 7-26.

Kollias, A., & Kikis, K. (2005). *Pedagogic Innovations with the use of ICTS. From wider vision and policy reforms to school culture.* Barcelona: Publicacions i Edicions de la Universitat de Barcelona.

Kozma, R. (2005). *National Policies that Connect ICT-based Education Reform to Economic and Social Development*. Human Technology, SRI International, University of Jyväskylä. [en-ligne] Disponible à http://www.humantechnology.jyu.fi/articles/volume1/2005/kozma.pdf

Kozma, R. (Ed.). (2003). Ed. *Technology, innovation and educational change. A global perspective*, Eugene, OR: International Society of Technology in Education

L'articulation école/entreprise : une combinatoire incertaine - Persée [en ligne]. [s. d.]. Disponible à https://www.persee.fr/doc/forem_0759-6340_2001_num_75_1_2431

Langat, A.C. (2015). Barriers Hindering Implementation, Innovation and Adoption of ICT in Primary Schools in Kenya. *International Journal of Innovative. Research & Development*, *4*(2), 1-11.

Lee, K.L., & Lin, S.C. (2008). A fuzzy quantified SWOT procedure for environmental evaluation of an international distribution center. *Information Sciences, 178* (2), 531-549.

Les politiques du numérique dans l'enseignement secondaire en Europe - Ange [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à http://classlab-ange.eu/les-politiques-du-numerique-dans-lenseignement-secondaire-en-europe/

Lessard, C. & Brassard, A. (2009). Education governance in Canada, 1990-2003: Trends and significance. En C. Levine-Rasky (Ed.), *Canadian perspectives on the sociology of education* (pp.255-274). Don Mills, ON : Oxford University Press.

Licht, A.H., Tasiopoulo, E. & Wastiau, P. (2017). *Open Book of Educational Innovation*. *European Schoolne*t:Brussels.

Lietart, A. (2008). ELearning : L'innovation pédagogique des enseignants qui utilisent une plateforme numérique. *Knowledge Construction in E-learning Context*, 398-420.

LOGINEO NRW : *Datenschutzerklärung LOGINEO NRW gem*. Art. 13, 14 DSGVO. [en-ligne] Disponible à https://www.logineo.schulministerium.nrw.de/_LOGINEO-NRW/Dienstvereinbarung/Anlage3_Datenschutzerklaerung-LOGINEO-NRW-fuer-Schulen.pdf

López, J., & Lavié, J.M. (2010). Liderazgo para sostener procesos de innovación en la escuela. *Profesorado. Revista de Currículum y Formación de Profesorado*, *14*(1), 71-92.

Losada, D., Karrera, I. & de Aberasturi, E.J. (2012). Factors Facilitating Successful Educational Innovation with ICT in Schools. *Revista de Psicodidáctica, 17* (1), 113-134. [en-ligne]

Disponible à http://hdl.handle.net/10810/6522

Louis, G. (2018). *De la Nouvelle Gouvernance du Système Éducatif en Fédération Wallonie-Bruxelles : une Adhésion Collective par-delà des Oppositions Disruptives*. Disponible à https://matheo.uliege.be/bitstream/2268.2/5858/1/De%20la%20Gouvernance%20du%20Syst%C3%A8me%20%C3%A9ducatif%20en%20FWB.pdf

Lozano-Díaz, A., Martínez, A.M., & Torres, M. J. (2019). El aprendizaje-servicio como metodología de acceso a la innovación educativa. *RIDAS, Revista Iberoamericana de Aprendizaje Servicio,* 7, 122-130. doi:10.1344/RIDAS2019.7.8

Machala, S., Kucin, M., & Lindner, A. (2015). *Klassenzimmer der Zukunft. Schon heute Wirklichkeit. Das Werkzeug, Mobile Medien" im Unterricht – KidZ*, Viena: Projektbericht. [en-ligne] Disponible à https://www.imst.ac.at/files/projekte/1438/berichte/1438_Langfassung_Machala.pdf.

Mangenot, F. (1997). *Le multimédia dans l'enseignement de langues*. Paris : Retz.

Marcelo, C. (1994). *Formación del profesorado para el cambio educativo*. Barcelona: PPU.

Marin, S.M. (2012). The impact of technological and communication innovation in the knowledge-based society. *Procedia - Social and Behavioral Sciences,* 51, 263-267.

Maroy, C. (2013). *L'école à l'épreuve de la performance. Les politiques de régulation par les résultats.* De Boeck.

Martínez Bonafé, J. (2010). La ciudad en el currículum y el currículum en la ciudad. En J. Gimeno Sacristán (Comp.), *Saberes e incertidumbres sobre el currículum* (pp. 527-547). Madrid : Morata.

MEC (2011). *Estudio sobre la innovación educativa en España.* Madrid : Ministerio de Educación. Secretaría General Técnica. Subdirección General de Documentación y Publicaciones.

Mérida, R. González, E., & Olivares, M.A. (2012). Redes de aprendizaje escuelas infantiles-universidad. Evaluación de una experiencia de innovación. *Cultura y Educación, 24*(1), 95-110. doi: 10.1174/113564012799740849

Middendorf, W. (2017). Landesinitiativen zur Forderung des schulischen Lernens im digitalen Wandel. In Ch.Fischer (ed.), Pädagogischer Mehrwert? Digitale Medien in Schule und Unterricht , Waxmann Verlag GmbH, Göttingen, pp. 105-117

Mikre, F. (2011). The Roles of Information Communication Technologies in Education Review Article with Emphasis to the Computer and Internet. *Ethiopian Journal of Education and Sciences*, *6*(2), 109-126. [en-ligne] Disponible à https://www.ajol.info/index.php/ejesc/article/view/73521

Mogonea, F. (2015). Portfolio-tool for (self) evaluation of students-future teachers. *Procedia Social and Behavioral sciences,* 180, 860-864.

Muller, F. (2012). *L'innovation : une histoire contemporaine du changement en éducation*. Poitiers : CNDP.

Nachmias, R., Mioduser, D., Cohen, A., Tubin, D. & Forkosh-Baruch, A. (2004). Factors Involved in the Implementation of Pedagogical Innovations Using Technology. *Education and Information Technologies, 9*(3), 291–308.

Noveanu, E. (2004). *Impactul formativ al utilizării AeL în educaţie*. Bucarest : Centrul pentru Inovare în Educaţie. [en-ligne] Disponible à www.tehne.ro/resurse/TEHNE_Impact_formativ_AEL_2005.pdf

Numa-Bocage, L., & Păcurar, E. (2019). Le numérique par et pour l'éducation inclusive. *La nouvelle revue. Éducation et société inclusives*, 87, 5-27.

OECD (2016). *Innovating Education and Educating for Innovation: The Power of Digital Technologies and Skills*. Paris : OECD Publishing.

Oliveira, D., & Hernández, M. (2011). *El análisis DAFO y los objetivos estratégicos. Contribuciones a la Economía*. Disponible à https://www.redalyc.org/pdf/3579/357951171003.pdf

Orden ECD/1817/2018, de 31 de octubre, por la que se convoca a los centros docentes no universitarios sostenidos con fondos públicos de la Comunidad Autónoma de Aragón para desarrollar proyectos de innovación educativa durante el curso 2018-2019. BOA, núm. 223, pp. 38456-38466.

Orden EDU/390/2015, de 8 de mayo, por la que se convoca la selección de proyectos de innovación educativa a desarrollar por grupos de profesores de centros escolares sostenidos con fondos públicos de la Comunidad de Castilla y León, se convocan los premios a los mejores proyectos seleccionados, y se delega la competencia para su resolución. BOCYL, núm. 92, pp. 35003-35013.

Pădure, M. (2014). *Stiluri de învățare și tehnologiile de acces în contextul deficiențelor de vedere.* Cluj-Napoca : Presa Universitară Clujeană.

Palagolla, W.W., & Wickramarachchi, A.P. (2019). Effective integration of ICT to facilitate the secondary education in Sri Lanka. *ArXiv2019. Computers and Society*, 108-115. [en-ligne] Disponible à https://arxiv.org/ftp/arxiv/papers/1901/1901.00181.pdf

Parra, J.M. (2011). *Manual de didáctica de la educación infantil*. Madrid : Ibergarceta publicaciones.

Patrick, F. (2011). *Handbook of Research on Improving learning and Motivation through Educational Games. Multidisciplinary Approaches*, Information Sciences References, Hershey: IGI Global

Penalva-Icher, E. & Lazega, E. (2013). Remplacer l'etat ? Promotion et réseaux des partenariats public-privé en france. *La nouvelle revue du travail*, 2, 2-17.

Pérez, A. (2008). ¿Competencias o pensamiento práctico? La construcción de los significados de representación y de acción. En J. Gimeno Sacristán (Coord.), *Educar por competencias, ¿qué hay de nuevo?* (pp. 59-102). Madrid : Morata.

Pérez, A. (2016). Los cuentacuentos: una experiencia innovadora para el fomento de la competencia en comunicación lingüística a través del cuento en alumnos de tercer curso de educación primaria. *Multiárea. Revista de didáctica*, 8, 171-193. doi: 10.18239/mard.v0i8.1157

Plan d'action Entrepreneuriat 2020 | European Economic and Social Committee [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à https://www.eesc.europa.eu/fr/our-work/opinions-information-reports/opinions/plan-daction-entrepreneuriat-2020

Plassard, J-M. & Thanh, N. (2009). Liberté de choix des élèves et concurrence des établissements : un survey de l'analyse du pilotage des systèmes éducatifs par les quasi-marchés. *Revue d'économie industrielle*, 126, 573-586.

Potolea, D., & Noveanu, E. (2008). *Informatizarea sistemului de învăţământ: Programul S.E.I. Raport de cercetare evaluativă.* Bucarest : Universitatea din Bucureşti.

Provan, K.G., & Kenis, P. (2007). Modes of Network Governance: Structure, Management, and Effectiveness, *Journal of Public Administration Research and Theory*, *18*(2), 229–252.

Puentes, A., & Cruz, I.M. (2012). Innovación educativa: implementación de la física introductoria en la modalidad semipresencial. *Píxel-Bit. Revista de Medios y Educación*, 40, 125-136. Disponible à https://recyt.fecyt.es/index.php/pixel/article/view/61440/37453

Qu'est-ce qu'Erasmus + ? - Erasmus +, le programme pour l'éducation, la formation, la jeunesse et le sport de la Commission européenne [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à l'adresse : https://info.erasmusplus.fr/erasmus/102-qu-est-ce-qu-erasmus.html

Ramírez, Mª.S., Ramírez, D. del C., & Rodríguez, R. (2017). Promoción de una cultura de innovación en instituciones educativas. En Mª.S. Ramírez, & J.R. Valenzuela (Eds.), *Innovación educativa. Investigación, formación, vinculación y visibilidad* (pp. 135-156). Madrid : Síntesis.

Reis, I. (2013). Governança e regulação da educação: perspectivas e conceitos. *Educação, Sociedade & Culturas*, 39, 101-118.

Renée, M., & McAlister, S. (2011). *The Strengths and Challenges of Community Organizing as an Education Reform Strategy: What the Research Says.* Annenberg Institute for School Reform at Brown University. Disponible à http://schottfoundation.org/sites/default/files/resources/Community%20Organizing%20as%20an%20Education%20Reform%20Strategy.pdf

Resolución 149/2019, de 1 de abril, del Director General de Educación, por la que se regula la convocatoria de Proyectos de Innovación Educativa del Plan de Formación Permanente del profesorado durante el curso 2019/2020. Disponible à https://www.navarra.es/home_es/servicios/descargar-fichero/f9vnnmsT7kh8sWrGhvtjfrkDb33ZYr/Resolucion%20con%20Anexos%20Proyectos%20Innovacion%202019-20.pdf

Rhodes, R.A.W. (1996). The new governance: governing without government. *Political Studies, 44*(4), 652-667. doi:10.1111/j.1467-9248.1996.tb01747.x

Rivas, M. (2000). *Innovación educativa. Teoría, procesos y estrategias*. Madrid : Síntesis.

Rizvi, F., & Lingard, B. (2010). *Globalizing education policy.* New York : Routledge

Sangrà, A. (2001). Enseñar y aprender en la virtualidad. *Educar,* 28*,* 117-131.

Sangrà, A., & González-Sanmamed, M. (2010). The role of information and communication technologies in improving teaching and learning processes in primary and secondary schools. *Research in Learning Technology, 18*(3), 207-220.

Sanséau, P-Y., Barrand, J. & Ferrante, G. (2014). La relation manager-managé au cœur de l'innovation. *L'expansion management review*, *1* (152), 36-43.

Santos, M.A. (2000). *La escuela que aprende.* Madrid : Morata.

Santos, B.S. (2010). *A gramática do tempo :* para uma nova cultura política. São Paulo : Cortez.

Saz, A., & Ospina, S.M. (2009). The Work of Leadership in Formal Coalitions-Embracing Paradox for Collaboration. En Z.V. Zwanenberg (ed.), *Leadership in Social Care* (pp. 103-128). London : Jessica Kingsley Publishers.

Schleicher, A. (2016). Desafíos para PISA. *Revista Electrónica de Investigación y Evaluación Educativa, 22*(1), 1-7. doi:10.7203/relieve.22.1.8429

Schuppert, G.F. (2006). Zauberwort Governance. Weiterführendes Forschungs- konzept oder alter Wein in neuen Schläuchen? WZB-Mitteilungen (WZB News), 114, 53-56.

Séré, A. (2010). Le numérique comme vecteur de recomposition de l'espace scolaire. *L'Ecole numérique*, Dossier *ENT : vers la généralisation ?* Paris : PUF.

Sola, M. (2016). ¿Por qué es necesario innovar? En M. Fernández, & N. Alcaraz (Coords.), *Innovación educativa. Más allá de la ficción* (pp. 41-52). Madrid : Pirámide.

Sørensen, E., & Torfing, J. (2011). Enhancing collaborative innovation in the public sector, *Administration and Society*, *43*(8), 842- 868.

Stoker, G. (1998). Governance as theory: five propositions. *International Social Science Journal*, *50* (1), 17-28.

Subirats, J. (2009). Gobernanza y educación. En Asociación Internacional de Ciudades

Educadoras, *Educación y vida urbana, 20 años de ciudades educadoras* (pp. 227-240). Barcelona.

Tabachnick, R., & Zeichner, K. (Eds.) (1991). *Issues and Practices in Inquiry Oriented teacher education.* London : Falmer Press.

Tejada, J. (2008). Innovación didáctica y formación del profesorado. En A. de la Herrán, & J. Paredes (Coords.), *Didáctica General. La práctica de la enseñanza en Educación Infantil, Primaria y Secundaria* (pp. 311-332). Madrid : McGrawHill.

Tójar, J.C., & Mena, E. (2011). Innovaciones educativas en el contexto andaluz. Análisis multicaso de experiencias en Educación Infantil y en Educación Primaria. *Revista de Educación,* 354, 499-527. Disponible à http://www.educacionyfp.gob.es/dam/jcr:c3c13341-d61d-43db-9a02-4e3ab252d07c/re35420-pdf.pdf

Toma, S. (2009). *Teaching in the Knowledge Society: The Impact of the Intel Teach Program in Romania*. Bucharest: Agata.

Tonucci, F. (1978). *Por una escuela alternativa*. Barcelona: Gux.

Torfing, J., & Díaz-Gibson, J. (2016). Transformando la gobernanza para la mejora de la innovación educativa y social. *Pedagogía Social. Revista interuniversitaria, 28*, 99-111. doi: 10. SE7179/PSRI_2016.28.08

UNE 66173 (2003). Los recursos humanos en un sistema de gestión de la calidad: gestión de las competencias. Madrid : AENOR.

UNESCO (2016). *Texto 1. Innovación educativa. Serie "Herramientas de apoyo para el trabajo docente".* Perú : Representación de la UNESCO en Perú.

Universidad de La Laguna (2019). Convocatoria de proyectos de innovación educativa para el curso académico 2019-2020. Disponible à https://www.ull.es/portal/convocatorias/convocatoria/convocatoria-de-los-proyectos-de-innovacion-educativa-para-el-curso-academico-2019-2020/

Universidad de Las Palmas de Gran Canaria (2019). Resolución del Vicerrectorado de titulaciones y formación permanente de la Universidad de Las Palmas de Gran Canaria, de 26 de noviembre de 2019, por la que se publica la convocatoria de proyectos de innovación educativa para el 2020 de la Universidad de Las Palmas de Gran Canaria. Disponible à https://www.ulpgc.es/sites/default/files/ArchivosULPGC/innovacion-educativa/Innovacion%20Educativa/resolucion_convocatoria_pie_2020.pdf

Universidad de Salamanca (2019). Convocatoria de Ayudas a Proyectos de Innovación y Mejora docente 2019-2020. Disponible à http://formacionpermanente.usal.es/info/wp-content/uploads/2019/09/Convocatoria_Innovacion_docente_2019_2020.pdf

Universitat de València (2019). Resolució de 10 de juny de 2019, del vicerectorat d'ocupació i programes formatius, per la qual es convoquen les ajudes per al desenvolupament de projectes d'innovació educativa per al curs 2019-2020. Disponible à https://webges.uv.es/uvTaeWeb/DescargarAnuncio.do?codigo=ANUNCIO-S35-2019-1454

Veiga dos Santos, A., Marins Braga, I. C., Guimarães-Iosif, R., & Pollom Zardo, S. (2016). Governance: concepts and emergence in Brazilian Education. *Ensaio: aval. Pol. Públ. Educ., Río de Janeiro, 24*(93), 939-967. doi:10.1590/S0104-40362016000400008

Venmans, F. (2010). Le partenariat public-privé pour les bâtiments scolaires en communauté française. *Courrier hebdomadaire du CRISP*, *2067-2068* (22), 5-70. doi:10.3917/cris.2067.0005.

Vue d'ensemble - Eurostat [en ligne]. [s. d.]. [Consulté le 20 février 2020]. Disponible à https://ec.europa.eu/eurostat/fr/web/europe-2020-indicators

Wenger, E. (2005). *La théorie des communautés de pratique*. Québec : Presses de l'université de Laval.

Whithaker, P. (1998). *Cómo gestionar el cambio en contextos educativos*. Madrid : Narcea.

ANNEXES

ANNEX 1. COMPETENCY REFERENCE FRAMEWORK DESIGNED BYTHE ACTORS OF THE ANGEL PROJECT

ORGANISATIONAL POLE

CO.1: Co-construct a national, pan-European or international network of classlabs ("change support laboratories").

CO.1: Co-construct a national, pan-European or international network of classlabs ("change support laboratories").

P1: Experiments in her daily work environment with one or the other proposal of a classlab.

P2: Makes her daily work environment a classlab.

P3: Takes part in the development of the classlab in his/her establishment.

P4: Contributes in an original way to the development of his or her school's classlab.

P5 : Participates in the development of a national, pan-European or international network of classlabs.

P6 : Contributes in an original way to the development of a national, pan-European or international network of classlabs.

P7 : Mobilises its expertise to support other national, pan-European or international projects.

ORGANISATIONAL POLE

CO.2: Steering by developing distributed leadership.

CO.2 : Steering by developing distributed leadership.

P1: Takes responsibility within his or her daily work environment towards the actors in his or her charge.

P2: Distributes responsibilities between the actors he is in charge of within his daily work environment.

P3: Takes on certain responsibilities within his/her establishment.

P4: Demonstrates leadership within his/her institution.

P5: Takes responsibilities within a network of external actors.

P6: Demonstrates leadership within a network of external actors.

P7: Uses his/her leadership to reflect on practices (learning, teaching or steering) and the effects of networks of actors at national, pan-European or international level.

ORGANISATIONAL POLE

CO.3: Using digital resources to develop innovation.

CO.3: Using digital resources to develop innovation.

P1: Uses digital resources in his/her daily work environment to facilitate or support his/her personal practice (learning, teaching or piloting).

P2: Uses digital resources in his or her daily work environment to strengthen interaction with the actors in his or her care.

P3: Is interested in new resources acquired or likely to be acquired in his/her institution.

P4: Actively engages with players in the institution in experimenting with forms of use of digital resources that enable innovative practices (learning, teaching or management).

P5: Is interested in digital resources and use practices (learning, teaching or piloting) carried out at national, pan-European or international level.

P6: Actively engages with stakeholders in a national, pan-European or international project in the experimentation of forms of use of digital resources enabling innovative practices (learning, teaching or piloting).

P7: Mobilises its acquired expertise to support other innovation projects.

COMMUNICATION POLE

CC 1 : Co-constructing a community of learning and practice.

CC.1: Co-constructing a community of learning and practice.

P1: Accompanies the actors he is in charge of in his daily work environment.

P2: Makes his daily work environment a learning community.

P3: Takes an interest in the practices (learning, teaching or steering) and innovations of the players in his/her institution.

P4: Shares practices (learning, pedagogical or steering) and innovations between players to make his/her establishment a learning organisation.

P5: Is interested in the practices (learning, teaching or steering) and innovations of players from outside the institution.

P6: Sharing of practices (learning, teaching or piloting) and innovations with external players in the context of a national, pan-European or international co-learning network.

P7: Puts its acquired expertise at the service of the development of co-learning networks at national, pan-European or international level.

COMMUNICATION POLE

CC 2 : Collaborate with internal and external partners.

CC.2: Collaborate with internal and external partners.

P1: Responds willingly to requests or solicitations from the actors under his or her responsibility.
P2: Builds partnerships with the actors for whom it is responsible.
P3: Responds willingly to requests or requests from the players in his/her institution.
P4: Establishes partnerships with the players in the institution.
P5: Responds willingly to requests or solicitations from players outside his/her institution.
P6: Establishes partnerships with players outside the school.
P7: Mobilises its expertise to reflect on practices (learning, teaching or steering) and the effects of the partnership at national, pan-European or international level.

COMMUNICATION POLE

CC 3 : Use digital resources to communicate with the various stakeholders.

CC.3: Use digital resources to communicate with the various stakeholders.

P1: Uses digital resources in his daily work environment to communicate information with the actors he is in charge of.
P2: Uses digital resources in his daily work environment to set up an interactive information processing system between the players he is in charge of.
P3: Uses the institution's digital communication resources in accordance with the prescribed rules.
P4: Uses the institution's digital communication resources for various collaborative projects with internal or external players.
P5 : Is interested in digital communication resources used at national, pan-European or international level.
P6: Actively engages with national, pan-European or international project stakeholders in the use of common digital communication resources.

P7: Mobilises its acquired expertise to support the implementation of digital communication devices.

REFLECTIVE POLE

CR1 : Co-constructing a personal and institutional professional project.

CR.1: Co-constructing a personal and institutional professional project.

P1: Participates willingly in training courses for personal professional development purposes.
P2: Proactively solicits training or coaching opportunities for personal professional development purposes.
P3: Willingly participates in training for the development of a collective or institutional project.
P4: Proactively seeks training or coaching opportunities for the development of a project of a group or institution.
P5: Willingly participates in training to contribute to the co-construction of a national, pan-European or international project.
P6: Proactively solicits training or coaching opportunities to contribute to the co-construction of a national, pan-European or international project.
P7: Mobilises its expertise to support external personal and institutional professional development projects.

REFLECTIVE POLE

CR2 : Adopt a critical and metacognitive stance to analyse one's practices (learning, teaching or piloting).

CR.2: Adopt a critical and metacognitive stance to analyse one's practices (learning, teaching or piloting).

P1: Regularly assesses the effects of the practices (learning, teaching or steering) carried out in his daily work environment on the players he is in charge of.
P2: Analyses what in his daily functioning (practices, postures, desired effects) needs to be regulated or questioned.
P3: Co-evaluates with stakeholders the effects of the practices (learning, teaching or steering) carried out with reference to the institution's project.
P4: Co-analyses with stakeholders what needs to be regulated or questioned in the institutional functioning.
P5: Co-evaluates with actors of the national, pan-European or international network the effects of the practices (learning, teaching or steering) carried out in partnership.
P6: Co-analyses with actors of the national, pan-European or international network what needs to be regulated or questioned.

P7: Mobilises its expertise to support external projects of critical and metacognitive analysis of practices (learning, pedagogical or steering).

REFLECTIVE POLE

CR3 : Use digital resources to continue training.

CR.3: Use digital resources to continue training.

P1: Regularly consults information sites for professional use.

P2: Engages in distance learning modules with reference to a personal professional development project.

P3: Takes part in training modules offered by his/her institution as part of a digital development project.

P4: Engages in using digital resources in a team or network of co-training and professional co-coaching.

P5: Participates using digital resources in training modules organised as part of a national, pan-European or international project.

P6: Engages using digital resources in a national, pan-European or international network of co-training and professional co-support.

P7: Mobilises its expertise to support external projects of digital co-training and co-coaching networks.

ANNEX 2. REFERENCES OF THE SKILLS AND SITUATIONS IDENTIFIED BY THE ACTORS OF THE ANGEL PROJECT

ANGEL STRATEGIC PARTENSHIP
2017-1-EN01-KA201-037369 - Duration agreement 01/09/2017 - 31/12/2020

	Unit of Responsibility	School Principal	Teacher	Researcher / Trainer	Students
Organisational division - C01 Co-constructing a pan-European network of classlabs FINLAND (Change support laboratories)					
P1	Accepting to experiment in their daily work environment with one or other proposal of a class-lab	... is experimenting with its management team on new governance approaches... ...challenges current aspects of governance in its establishment ...	... experiments in his or her class with the use of shelves according to the method presented in the "Bubble"... ...uses the reverse class in some courses, following the presentation that has been made of it ...	... experiments with new ways to teach better in his or her institution ... is experimenting with new training schemes ...	... participates in the experimentation of an innovation in his or her class ...carries out the actions within the framework of the reverse class
P2	Make your daily working environment a class-lab	... together with its management team, constitutes a veritable laboratory for change management...	... makes its class an "innovative bubble"... ...uses the feedback from students in their use of the welding robot to review the teaching-learning process ...	...organises its teaching like a classlab ... sees his or her role as a teacher and trainer as a coach and not just a transmitter	...organises its learning activities in the spirit of the classlab ... is proactive in the application of the reverse class

		...organises its management team to be a body that accompanies change...		...	
P3	Participate in the development of the class-lab of his or her establishment	... participates actively in the establishment of the school's classlab ... assists in the development of the classlab of his or her establishment. ...	...exchanges and discusses with colleagues the results obtained in his or her experiments ...help in the organisation of colleagues' courses ...	... participates with colleagues in the setting up of classlabs within his or her higher education institution ... provides assistance in the development of one or other classlab of its institution ...	... actively participates in the setting up of the classlab of his or her establishment... ...exchange with pupils from other classes on their experience of the classlab
P4	To make an original contribution to the development of the class-lab of his or her institution.	... brings an original touch to his or her establishment's classlab ...leads a workshop to exchange with colleagues on the implementation of the classlab in his or her establishment. ...	...organises an introductory workshop on assessment software to facilitate remediation work ... runs a network for the exchange of good practice within the institution... ...	... brings an original touch to one or the other classlab of his or her establishment... ...leads a workshop to exchange with colleagues on the implementation of claslabs in his or her institution. ...	... makes an original contribution to the development of his or her school's classlab ...leads a discussion with students in the school about the experience of the inverted classroom

P5	Participate in the development of a pan-European network of class-labs	... participates in the transnational meetings of exchange on classlabs set up by the ANGE project. ... presents to European partners the innovations implemented in the classlab of his or her establishment... …	... participates in the transnational meetings of the ANGE project ... presents to European partners the innovations implemented in its establishment …	... participates in the transnational meetings of exchange on classlabs set up by the ANGE project. ... presents to European partners the innovations implemented in the classlab of his or her establishment... …	... participates in a network of student exchanges from several countries ... participates in an exchange session on the inverted class with pupils from other countries
P6	Make an original contribution to the development of a pan-European network of class-labs	...coaches European partners to set up their classlab... runs a network for the exchange of good practice within the European area. …	...coaches European partners in the use of a form of CAPTIC used in his or her institution ... runs a network for the exchange of good practices within the European area... …	...coaches European partners to set up their classlab... runs a network for the exchange of good practice within the European area. …	... runs a network of exchanges on the experience of the classlabs... ... makes an original contribution to the development of a pan-European innovation network
P7	Mobilising its expertise to support other pan-European projects	... creates a European network of institutions developing classlabs ... provides expertise to enable a network of institutions to network with other networks of institutions	... creates a European network of robot users facilitating vocational training ... provides expertise to enable a teacher network to network with other teacher networks …	... creates a European network of institutions developing classlabs ... provides expertise to enable a network of institutions to network with other networks of institutions	... creates a network of European pupils ...mobilises its expertise to support a network of European students under construction

		…		…	
ORGANISATIONAL DIVISION **C02 Steering the organisation by developing distributed leadership CEGEP**					
		School Principal	Teacher	Researcher / Trainer	Students
P1	Takes responsibility within his or her daily work environment towards the people in his or her charge	… exercises the responsibilities entrusted to him/her with regard to the players in his or her institution …leads change in his or her institution …	…carries out the responsibilities entrusted to him or her in relation to the pupils in his or her care …uses the numerical evaluation software according to the Ministry's requirements …	… exercises the responsibilities entrusted to him/her with regard to the players in his or her institution … ensures the pedagogical alignment (consistency with the training plan) of its training activities …	…carries out the responsibilities entrusted to it in carrying out the learning activities … participates actively in learning activities
P2	Distributes responsibilities among the actors he or she is in charge of within his or her daily environment	… entrusts colleagues with responsibilities according to their characteristics and needs …organises tutorials for less experienced colleagues …	… entrusts its students with responsibilities according to their characteristics and needs …organises tutorials within his or her class	… entrusts its students with responsibilities according to their characteristics and needs …organises tutorials for its students in difficulty …	… entrusts peers with responsibilities for carrying out learning activities according to their characteristics and needs. …uses the collaborative approach in carrying out classroom work

P3	Accepts certain responsibilities within his or her institution	...manages activities entrusted to it within the institution ...assumes responsibility for the proper use of the resources acquired within the institution ...	...manages activities entrusted to it within the institution ...assumes responsibility for the correct use of the welding robot that the company has just acquired. ...	...manages activities entrusted to it within the institution ...assumes responsibility for the proper use of the resources acquired within its institution ...	... accepts certain responsibilities within his or her class and institution ... assumes responsibility for the proper use of the resources acquired within its institution
P4	Demonstrates leadership within his or her institution	... is driving the "innovative bubble" set up within the institution... ...leads a focus group to prepare the establishment project ...	... is driving the "innovative bubble" set up within the institution... ...leads a focus group to prepare the establishment project ...	...leads a Teaching Commission set up within his or her institution ...leads a reflection group to prepare the institution's project ...	leads group activities within his or her class and school with a view to change or innovation. ...leads a think tank to prepare the institution's project
P5	Accepts responsibilities within a network of external actors	Accepts responsibilities within a network of external European actorspartners of the ANGE project ...	...agrees to participate in the transnational meetings of the ANGE project ...agreeing to represent their teaching colleagues to the European partners of the ANGE project ...	... agrees to participate in the transnational meetings of the ANGE project ... agreeing to represent their teaching colleagues in the European partners of the ANGE project ... agrees to contribute its expertise in the outputs of the ANGE project	... agrees to participate in the transnational meetings of the ANGE project ... agrees to contribute its expertise in the outputs of the ANGE project... ...

				…	
P6	Demonstrates leadership within a network of external actors	…coaches European partners in the use of a form of CAPTIC used in his or her institution runs a network for the exchange of good practice within the European area. …	…coaches European partners in the use of a form of CAPTIC used in his or her institution runs a network for the exchange of good practice within the European area. …	…coaches European partners in the implementation of their activities … makes a major contribution to an output of the ANGE project …	… demonstrates leadership within an external network of exchanges … contributes significantly to the outputs of the Angel Project
P7	Puts its leadership at the service of a reflection on the practices and effects of networks of actors at the pan-European level.	… runs a European network for the exchange of innovative practices … provides expertise to enable a network of headteachers to network with other school networks …	… provides expertise to enable a teacher network to network with other teacher networks …	… provides expertise to enable a network of headteachers to network with other school networks …	… runs a network for the exchange of innovative practices … brings its expertise to enable a network of students to network with other students
ORGANISATIONAL DIVISION **C03 Using digital resources to develop innovation BULGARIA**					
		School Principal	Teacher	Researcher / Trainer	Student
P1	Uses digital resources in his or her daily work environment in order to	…uses numerical tools to manage the establishment	…uses the digital resources made available by the institution …uses the numerical evaluation software according to the Ministry's requirements	…uses digital tools to provide its own teachings	…uses the digital resources made available by teachers

	facilitate or support his or her professional practice	...uses the institution's platform to communicate information ...	...	... puts documents on its institution's platform for the use of students or trainees ...	... enriches knowledge and skills through the use of digital technology
P2	Uses resources in his or her daily work environment to strengthen interaction with the actors of whom he or she is in charge	...uses digital tools that facilitate interaction between colleagues in the institution ... prefers to communicate with teachers using tools such as skype rather than email ...	...uses mainly digital resources that allow interaction within the classroom ...organises digital tutorials for pupils with difficulties ...	...uses digital tools that facilitate interaction with its students or trainees... ... prefers to communicate with its students or trainees using tools such as skype rather than by email ...	...uses digital resources to record individual contributions to group work ...exchange with peers using communication tools (discussion forum, meet...)
P3	Demonstrates an interest in new resources acquired or likely to be acquired in its establishment	... is on the lookout for digital resources that may be suitable for the institution ...attend demonstrations of new technologies ...	...manages digital resources within the institution ...assumes responsibility for the correct use of the welding robot that the company has just acquired. ...	... is on the lookout for digital resources that may be suitable for his or her higher education institution... ...attend demonstrations of new technologies ...	...assumes responsibility for the proper use of the digital resources that the institution has just acquired ... actively participates by offering self-discovered applications on the web
P4	Actively engages with colleagues within the institution in experimenting with forms of use of digital resources	... is driving the "innovative bubble" set up within the institution... ...leads a think tank within his or her institution to prepare	...leads a focus group to prepare for the implementation of digital resources in the institution ...	...leads a commission set up within the institution to manage digital resources ... runs a think tank within his or her institution to prepare	... actively participates in digital innovations in schools... ... provides feedback on innovative digital

	that enable innovative teaching practices.	the implementation of new digital resources... …		the implementation of new digital resources... …	activities and works with teachers
P5	Shows interest in the new resources acquired and in the practices of use carried out at the pan-European level	...find out about the digital platforms used by partner countries ...find out about specific digital tools for vocational training in other European countries …	...find out about the digital platforms used by partner countries ...find out about specific digital tools for vocational training in other European countries …	...find out about the digital platforms used by partner countries ...find out about digital tools that have proved their worth in other European countries... …	...discover the experience of his or her international counterparts and apply them by adapting them to his or her own situation ...seeks to widen the circle of technological tools in its international exchanges
P6	Actively engages with colleagues in the pan-European project in the experimentation of forms of use of digital resources for innovative pedagogical practices.	...is setting up a partnership with other European countries to share specific tools for vocational training. ...leads a workshop at European conferences on a software implemented in his or her establishment. …	...is setting up a partnership with other European countries to share specific tools for vocational training. ...leads a workshop with European colleagues on a software implemented in his or her establishment …	...is setting up a partnership with other European countries to share digital tools. ...leads a workshop at European conferences on a software implemented in his or her institution. …	...integrates his or her school's many European projects by flexibly manipulating innovative technologies ...seeks to achieve a synergy between the current reality and its future realisation in the ICT-dominated working life

P7	Use the expertise it has acquired to support other innovation projects	...runs a European network of robot users facilitating vocational training ...coache an international network for the development of a platform on digital tools ...	...runs a European network of robot users facilitating vocational training ...coache an international network for the development of a platform on digital tools ...	...runs a European network of remote evaluation software users ...coache an international network for the development of a platform on digital tools ...	...it has become autonomous and creates websites, blogs and contributes to the dissemination of digital skills... ...integrates different webinars and prepares for lifelong learning
COMMUNICATION CENTRE **CC1 Co-constructing a community of learning and practice PCH**					
		School Principal	Teacher	Researcher/ Trainer	Student
P1	Accompanies the actors under his or her responsibility in his or her daily work environment	...accompanies the colleagues of the management team in their tasks ...helps colleagues to solve their problems ...	...accompanies pupils in difficulty ...helps parents to take charge of their child's schooling ...	...accompanies the trainees in his or her charge ...helps the colleagues under his or her responsibility to solve their problems ...	... helps a classmate to solve a problem ... works in pairs
P2	Makes his or her daily work environment a learning community	...organises its management team into a community of learning and practice ...provides time and financial resources to create a	...organises his or her class into a learning community ...sets up projects where each pupil has a specific task, learns from other pupils and learns from other pupils ...	...organises its team of teacher-researchers into a community of learning and practice ...makes resources available to create a community of	... becomes tutor of a pupil in difficulty ... proposes exercises

		community of learning and practice …		learning and practice with close colleagues …	
P3	Is interested in the pedagogical practices and innovations of his or her institution	…regularly participates in practice exchange meetings in his or her institution …shows interest in innovative initiatives in its institution …	…regularly participates in practice exchange meetings in his or her institution …participates in the training courses set up by his or her institution …	…regularly participates in practice exchange meetings in his or her higher education institution …shows interest in innovative initiatives in his or her higher education institution …	…participates in consultations within the institution on teaching practices …questions the needs of the pupils and shares its proposals with the pedagogical teams…
P4	Sharing of teaching practices and innovations between colleagues in his or her institution	…discuss the different ways of implementing the inverted class with colleagues who practise it …analyse with colleagues the language skills assessments carried out using the new digital system set up in the establishment… …	…discuss the different ways of implementing the inverted class with colleagues who practise it …analyse with colleagues the language skills assessments carried out using the new digital system set up in the establishment… …	…discuss the different ways of implementing the inverted class with colleagues who practise it …analyse with colleagues the different forms of implementation of the competency-based and project-based approach …	…acts as a tutor for pupils with difficulties in other classes of the school …runs a club (for reading, scientific experiments…) within his or her establishment.
P5	Is interested in the pedagogical practices and innovations of players	…regularly consults the sites of partners who develop innovations…	…regularly consults the partners' websites …draws on educational resources from external sites	…regularly consults the websites of ANGE partners who are developing innovations.	…takes an interest in other educational models and discusses them with

	outside his or her institution	...draws on educational resources from external sites …	…	...draws on educational resources from external sites …	peers, teachers and others .... is documenting and presenting ... uses the results of its research to build its orientation project
P6	Sharing of pedagogical practices and innovations with external actors in a pan-European co-learning network	...shares its modes of governance with the partners of the ANGE project during the colloquium in La Pocatière (Qc) ...actively participates in a pan-European action-research on institutional governance …	...shares its pedagogical practices with the partners of the ANGE project during the transnational meeting in La Pocatière (Qc) ...actively participates in pan-European action research …	...shares his or her experiences as a trainer with the partners of the ANGE project during transnational meetings ...actively participates in a pan-European action-research on institutional governance …	.... actively participates in an exchange on the innovations carried out in several countries of the ANGE network. .... provides a comparative synthesis of the ANGE network's pedagogical practices.
P7	Leverages its expertise in the development of pan-European co-learning networks	...feeds into a European network of good governance practices ...is co-managing an international network for the development of a platform driven by communities of learning and practice...	...feeds a European network of didactic tools in its discipline ...coachee an international network for the development of a platform of educational resources. …	...feeds into a European network of good training practices ...is co-managing an international network for the development of a platform driven by communities of learning and practice...	.... is a source of proposals for participating in an international network of students. .... develops a lasting partnership between its institution and other institutions

		…		…	
COMMUNICATION CENTRE **CC2 Collaborates with internal and external partners St VITH**					
		School Principal	Teacher	Researcher/Trainer	Student
P1	Responds willingly to requests or requests from the actors in his or her environment for which he or she is responsible.	…listens to the members of the management committee …is anxious to respond as best as possible to the requests made to it... …	…listens to the requests of pupils and parents …is anxious to respond as best as possible to the requests made to it... …	…is attentive to the needs of its students and the trainees in its care... …is anxious to respond as best as possible to the requests made to it... …	…agrees to share its experience following the use of a new tool or the encounter of a new type of problem …is happy to respond to requests from teachers or practicum respondents
P2	Considers as "partners" the actors he or she is in charge of in his or her daily work environment	…assists colleagues on the management committee …is present when asked to take on a new coordination task within the steering committee …	…sees pupils and parents as partners in education and not as obstacles …sees colleagues from the previous and subsequent year as partners in improving learning …	…considers its students or trainees as partners and not just receivers... …works in collaboration, not independently, with his or her colleagues …	…considers other pupils as active partners and not as implementers when leading a working group …privileges cooperation rather than competition in its relations with others

P3	Responds willingly to requests or requests from colleagues in his or her institution	...sees pupils, colleagues and parents as partners in education and not as obstacles ...sees colleagues from the previous and subsequent year as partners in improving continuity of learning ...	...provides assistance to colleagues in the institution who ask for help with a problem... ...is present when asked to be part of a project in the institution ...	...willingly responds to requests from the Teaching Commission of his or her institution ...sees colleagues from the previous and subsequent year as partners in improving continuity of learning ...	...takes part in consultations at his or her school or in the company where he or she is doing his or her traineeship ...exchanges with other pupils in his or her school on the experiences they have had
P4	Considers as "partners" the colleagues of his or her institution	...does not impose his or her idea in the design and implementation of a project, but considers that the ideas of others should be considered with respect ...acts as a partner in collective actions carried out in the institution ...	...does not impose his or her idea in the design and implementation of a project, but considers that the ideas of others should be considered with respect ...acts as a partner in the collective actions carried out in the institution ...	...does not impose his or her idea in the design and implementation of a project, but considers that the ideas of others should be considered with respect ...acts as a partner in collective actions carried out in the institution ...	...acts as a partner to the teachers in the school or to the professionals in the place of work placement... ...actively seeks with the other actors in the establishment of responses to the needs encountered
P5	Responds willingly to requests or solicitations from outside the institution	...provides assistance to external colleagues who ask for help with a problem	...provides assistance to external colleagues who ask for help with a problem	...provides support to ANGE project partners who request it for an output	...responds to requests from customers and suppliers during his or

		...is present when asked to be part of a project involving colleagues from outside the institution ...	...is present when asked to be part of a project involving colleagues from outside the institution ...	...is present when asked to be part of a project involving colleagues from outside the institution ...	her work placement in a company. ...is present when asked to be part of a project with actors from outside the institution
P6	Sharing of pedagogical practices and innovations with external actors in a pan-European co-learning network	...does not impose his or her idea in the actions of the ANGE project but considers that the ideas of others should be considered with respect... ...acts as a partner in the joint actions carried out with the partners of the ANGE project. ...	...does not impose his or her idea in the actions of the ANGE project but considers that the ideas of others should be considered with respect... ...acts as a partner in the joint actions carried out with the partners of the ANGE project. ...	...does not impose his or her idea in the actions of the ANGE project but considers that the ideas of others should be considered with respect... ...acts as a partner in the joint actions carried out with the partners of the ANGE project. ...	...brings its expertise/know-how and shares its points of view during the ANGE project exchange meetings. ...acts as a partner in joint actions carried out with external players
P7	Puts its expertise at the service of the development of co-learning networks at pan-European level	...is considered as an expert with a major contribution to a component of the European project ...is called upon in international projects to help the actors to design and implement them. ...	...is considered as an expert with a major contribution to a component of the European project ...is called upon in international projects to help the actors to design and implement them. ...	...is considered as an expert with a major contribution to a component of the European partnership project ...is called upon in international projects to help the actors to design and implement them. ...	...is considered as an expert in an international exchange club (reading, science experiments...) ...is called upon to share its experience in co-learning networks

COMMUNICATION CENTRE CC3 Use digital resources to communicate with the different actors CRAIOVA					
		School Principal	Teacher	Researcher/Trainer	Student
P1	Uses digital resources in their daily work environment to communicate information with the various players in their charge	...uses digital resources to communicate within the executive committee ...uses the National Education platform for its coordination tasks ...	...uses digital resources to communicate with parents ...uses WhatsApp to send homework to its students ...	...uses digital resources to communicate with its students or trainees ...uses his or her institution's platform to communicate and coordinate the activities for which he or she is responsible... ...	...uses digital resources to communicate with other students in his or her class or with his or her teachers ...uses his or her school's platform to deposit the documents requested by the teacher ...
P2	Uses digital resources in its daily work environment to set up an interactive information processing system between the players for whom it is responsible.	...favours digital resources that allow for greater interaction in order to carry out its coordination tasks ...uses interactive spreadsheets to coordinate planning within the institution ...	...uses tablets to enable group work, the progress of which is perceived on the spot by the players... ...uses applications to work interactively with all students ...	...favours digital resources that allow for greater interaction in order to carry out its coordination tasks ...favours interactive digital tools for distance learning ...	...uses interactive spreadsheets in problem-solving activities ...uses applications that allow you to work interactively with your peers ...
P3	Uses the institution's digital communication	...uses the institution's platform for all aspects of	...uses the institution's platform for all aspects of management required by the institution	...uses the institution's platform for all aspects of	...uses the institution's platform for all aspects of

	resources in accordance with the prescribed rules	management required by the institution ...uses the institution's platform to deposit documents …	...uses the institution's platform to deposit documents …	management required by the institution ...consults the institution's platform to follow the changes in the regulations. …	management required by the institution ...consults the institution's platform to monitor the changes brought about by the pandemic crisis …
P4	Leverages the institution's digital communication resources for various collaborative projects with internal or external colleagues	...uses the institution's platform to deposit documents for discussion by colleagues within the framework of a project ...makes use of the institution's digital resources in the design and implementation of a joint project …	...uses the institution's platform to deposit documents for discussion by colleagues within the framework of a project ...makes use of the institution's digital resources in the design and implementation of a joint project …	...uses the institution's platform to deposit documents for discussion by colleagues within the framework of a project ...makes use of the institution's digital resources in the design and implementation of a joint project …	...uses the school's platform to deposit documents to be discussed at the class reps' meeting ...makes use of the institution's digital resources in the design and implementation of a preparatory survey for the settlement project …
P5	Expresses an interest in digital communication resources used at European level	...adapts to use digital resources to communicate effectively with European partners ...is interested in the digital resources used by other European partners to	...adapts to use digital resources to communicate effectively with European partners ...is interested in the digital resources used by other European partners to	...adapts to use digital resources to communicate effectively with European partners ...is interested in the digital resources used by other European partners to	...adapts to use digital resources to communicate effectively with pupils in another country ...is interested in digital resources used by

		communicate with the various stakeholders... …	communicate with the various stakeholders... …	communicate with the various stakeholders... …	partners in a European network …
P6	Actively engages with pan-European project colleagues in the use of common digital communication resources	...uses the different possibilities of videoconferencing (e.g. Zoom) to become actively involved in the activities of the ANGE project. ...uses any digital resource (e.g. Skype) to maintain contact with any of the partners in the ANGE project. …	...uses the different possibilities of videoconferencing (e.g. Zoom) to actively engage in the activities of the ANGE project. ...use each other's digital resources (e.g. Skype) to maintain contact with one or other of the ANGE project partners. …	...uses the different possibilities of videoconferencing (e.g. Zoom) to actively engage in the activities of the ANGE project. ...uses any digital resource (e.g. Skype) to maintain contact with any of the partners in the ANGE project. …	...uses the different possibilities of videoconferencing (e.g. Zoom) to actively engage in student-led activities related to the ANGE project. ...use each other's digital resources (e.g. Skype) to maintain contact with one or other of the ANGE project partners. …
P7	Mobilises its acquired expertise to support the implementation of digital communication systems	...is considered as an expert with a major contribution in the field of digital communication networks ...is called upon to support the setting up of a communication network between partners …	...is considered as an expert with a major contribution in the field of digital communication networks ...is called upon to support the setting up of a communication network between partners …	...is considered as an expert with a major contribution in the field of digital communication networks ...is called upon to support the setting up of a communication network between partners …	...creates a network of students on the proper use of digital technology ...is called upon to support the setting up of a communication network between students …

REFLECTIVE POLE CR1 Co-constructing a professional personal and institutional project SALAMANCA					
		School Principal	Teacher	Researcher/Trainer	Student
P1	Is willing to participate in training courses for personal professional development purposes	...is happy to take part in the training offers that are sent to him or her... ...participates in training courses that he or she personally finds useful ...	...is happy to take part in the training offers that are sent to him or her... ...participates in training courses that he or she personally finds useful ...	...is happy to take part in the training offers that are sent to him or her... ...participates in training courses that he or she personally finds useful ...	...is happy to take part in the training offers that are sent to him or her... ...participates in training courses that he or she personally finds useful
P2	Proactively soliciting training or coaching opportunities for development purposes	...when faced with a difficulty or problem to be solved, requests training to deal with it ...accepts a new task or function on condition that he or she is able to follow an appropriate training course ...	...when faced with a difficulty or problem to be solved, requests training to deal with it ...accepts a new task or function on condition that he or she is able to follow an appropriate training course ...	...when faced with a difficulty or problem to be solved, requests training to deal with it ...accepts a new task or function on condition that he or she is able to follow an appropriate training course ...	...when faced with a difficulty or problem to be solved, requests training to deal with it ...accepts a new task or function on the condition that he or she can benefit from appropriate support ...
P3	Willingly participates in training courses to contribute to the	...is happy to enrol in the training courses planned by the institution	...is happy to enrol in the training courses planned by the institution	...is happy to enrol in the training courses planned by the institution	...willingly participates in the educational activities planned by the institution

	development of his or her institution's project	...takes part in training courses which he or she considers to be linked to the school project ...	...takes part in training courses which he or she considers to be linked to the school project ...	...participates in training courses that he or she feels are linked to the project of his or her university teaching institution ...	...takes part in training courses which he or she considers to be linked to the school project ...
P4	Proactively solicits training or coaching opportunities to contribute to the development of their institution's project.	...seeks training courses that will be adapted to the new orientations of the establishment project ...requests support from a person who has led an innovation in order to carry out his or her own innovation ...	...seeks training courses that will be adapted to the new orientations of the establishment project ...requests support from a person who has led an innovation in order to carry out his or her own innovation ...	...looks for training courses that will be adapted to the new orientations of his or her institution's project ...requests support from a colleague who has led an innovation in order to carry out his own innovation ...	...looks for training courses that will be adapted to the new orientations of his or her institution's project ...requests support from a partner who has carried out an innovation in order to carry out his or her own innovation
P5	Willingness to participate in training courses to contribute to the co-construction of the pan-European project	...is happy to take part in the training courses planned by the ANGE project. ...participates in training courses offered to him and in connection with the development of the European classlab ...	...is happy to take part in the training courses planned by the ANGE project. ...participates in training courses offered to him and in connection with the development of the European classlab ...	...is happy to take part in the training courses planned by the ANGE project. ...participates in training courses offered to him and in connection with the development of the European classlab ...	...is happy to take part in the training courses planned by the ANGE project. ...participates in training courses offered to him and in connection with the development of the European classlab.

					…
P6	Proactively soliciting training or coaching opportunities to contribute to the construction of the pan-European project	…is looking for training courses that will enable progress to be made in the construction of the European classlab... …request support from a European partner to register in a European Education Area …	…is looking for training courses that will enable progress to be made in the construction of the European classlab... …request support from a European partner to register in a European Education Area …	…is looking for training courses that will enable progress to be made in the construction of the European classlab... …request support from a European partner to register in a European Education Area …	…is looking for training courses that will enable progress to be made in the construction of the European classlab... …request support from a European partner to register in a European Education Area
P7	Mobilises its acquired expertise to support external staff and institutional professional development projects	…is considered internationally as an expert with a major contribution in the field of professional development and coaching... …is called upon internationally to support the setting up of a professional development network for the education stakeholders concerned. …	…is considered internationally as an expert with a major contribution in the field of professional development and coaching... …is being called upon internationally to support the establishment of a teacher professional development network... …	…is considered internationally as an expert with a major contribution in the field of professional development and coaching... …is called upon internationally to support the setting up of a professional development network for the education stakeholders concerned. …	…is considered as an expert with a major contribution in the field of tutoring of pupils with difficulties …is called upon internationally to support the establishment of a network for reflection and development on the student's profession.
REFLECTIVE POLE **CR2 Adopt a critical and metacognitive stance in analysing its CETA practices**					
		School Principal	Teacher	Researcher/Trainer	Student

P1	Regularly evaluates the effects of the practices carried out in his or her daily work environment on the actors he or she is in charge of.	...regularly assesses with his or her colleagues on the management committee the progress made in terms of learning. ...before the beginning of each term or year, takes stock of the needs to be met in the institution... ...	...regularly assess with pupils or parents in terms of learning progress... ...before the beginning of each quarter or year, take stock of the practices that have worked or not worked ...	...regularly reviews education and training activities with his or her colleagues on the Education Commission ...takes stock, before the start of each term or year, of the needs to be met in his or her education ...	...takes the trouble to self-evaluate his or her own productions and compare them with those of his or her peers ...exchange on the effects of class council practices.
P2	Analyses what in its daily functioning (practices, postures, desired effects) needs to be regulated or questioned.	...tries to identify, through the assessments carried out, the causes of what has worked more or less well, both in its own practices and in those of other actors ...tries to identify what, in the coordination activities for which it is responsible, relates to the more or less good use of digital technology or to the conditions of use or educational aspects, etc. ...	...tries to identify, through the assessments carried out, the causes of what has worked more or less well, both in its own practices and in those of other actors ...tries to identify what, in the learning sequences, is more or less good use of digital technology or conditions of use or pedagogical aspects, etc. ...	...tries to identify, through the assessments carried out, the causes of what has worked more or less well, both in its own practices and in those of other actors ...tries to identify what, in the coordination activities for which it is responsible, relates to the more or less good use of digital technology or to the conditions of use or educational aspects, etc. ...	...identifies its margins of progress within the framework of class life and class councils, ...assesses autonomously, among peers or with his or her teacher, his or her daily functioning, which needs to be regulated or questioned.
P3	Co-evaluates with colleagues the effects of the practices carried out with reference to the establishment project	...participates in meetings with colleagues from the institution to review the implementation of digital anchoring... ...participates with colleagues in meetings on the use of the	...participates in meetings with colleagues from the institution to review the implementation of digital anchoring... ...participates with colleagues in meetings on the use of the reverse classroom in the school ...	...participates in meetings with colleagues from the institution to review the implementation of digital anchoring... ...participates with colleagues in meetings on the use of the	...participates in the school life councils ...participates in quality control activities in his or her institution

		reverse classroom in the school …		reverse classroom in the school …	
P4	Co-analyses with colleagues what in the institutional functioning needs to be regulated	...tries to identify, through the assessments carried out on the development of digital anchoring in the institution, the causes of what has worked more or less well, both in its practices and in those of the other players... ...tries to identify what, in the exchanges on the development of the reverse class in his or her school, can improve my own way of doing things …	...tries to identify, through the assessments carried out on the development of digital anchoring in the institution, the causes of what has worked more or less well, both in its practices and in those of the other players... ...tries to identify what, in the exchanges on the development of the reverse class in his or her school, can improve my own way of doing things …	...tries to identify, through the assessments carried out on the development of digital anchoring in the institution, the causes of what has worked more or less well, both in its practices and in those of the other players... ...tries to identify what, in the exchanges on the development of the reverse class in his or her school, can improve its own way of doing things …	...identifies the elements of regulation in situations of conflict and tension in its establishment ...tries to identify, through the assessments carried out on the development of digital anchoring in the institution, the causes of what has worked more or less well, both in its practices and in those of the other players...
P5	Co-evaluates with colleagues in the pan-European network the effects of the practices carried out in partnership	...willingly participates in the review meetings planned by the ANGE project. ...confronts with European partners the effects of the various innovations undertaken... …	...willingly participates in the review meetings planned by the ANGE project. ...confronts with European partners the effects of the various innovations undertaken... …	...willingly participates in the review meetings planned by the ANGE project. ...confronts with European partners the effects of the various innovations undertaken... …	...takes part in review meetings in the framework of European projects ...compares the effects of the projects experienced in different European contexts

P6	Co-analyses with colleagues in the pan-European project what needs to be regulated or questioned	...tries to identify, through the transnational meetings of the ANGE project, what is transposable in its institution and in its own framework practice ...tries to identify what, in an output of the ANGE project for which he or she has been asked, can inspire his or her practice... …	...tries to identify, through the transnational meetings of the ANGE project, what can be transposed in his or her institution and in his or her own teaching practice ...tries to identify what, in an output of the project for which he or she has been asked, can inspire his or her practice …	...tries to identify, through the transnational meetings of the ANGE project, what is transposable in his or her institution and in his or her own practice as a researcher/trainer ...tries to identify what, in an output of the ANGE project for which he or she has been asked, can inspire his or her practice... …	...tries to identify, through the transnational meetings of the ANGE project, what is transposable in his or her institution and in his or her own pupil practice ...tries to identify what, in an output of the project for which he or she has been asked, can inspire his or her student practice …
P7	Mobilises its expertise to support external projects of critical and metacognitive analysis of practices.	...is invited to an international meeting to mobilise its expertise to critically analyse a report on digital in the European space... ...is asked by an international network to provide methodological guidance on how to conduct a critical assessment of the activities carried out. …	...is invited to an international meeting to mobilise its expertise to critically analyse a report on digital in the European space... ...is asked by an international network to provide methodological guidance on how to conduct a critical assessment of the activities carried out. …	...is invited to an international meeting to mobilise its expertise to critically analyse a report on digital in the European space... ...is asked by an international network to provide methodological guidance on how to conduct a critical assessment of the activities carried out. …	...is invited to an international meeting to mobilise his or her student expertise to critically analyse a report on digital in the European space... ...is called upon by an international network of exchanges between students to guide them methodologically on how to conduct a critical assessment of the activities carried out. …

REFLECTIVE POLE CR3 Using digital resources to continue PKI training					
		School Principal	Teacher	Researcher/Trainer	Student
P1	Regularly consults information sites for professional use.	...regularly consults sites to improve its skills in the field of governance ...uses specialised sites to discover the technologies that will be used in companies tomorrow and that will have to change the way in which people learn to work. …	...regularly consults teaching sites to improve his or her teaching skills ...uses specialised sites to discover the technologies that will be used in companies in the future and will have to develop its teaching of professional practice... …	...regularly consults sites to improve his or her skills in education and training ...uses specialised sites to enrich the distance learning it is responsible for... …	...regularly consults sites to acquire new skills ...regularly consults sites to enrich the skills acquired in class ...regularly consults sites to conduct classroom activities around information retrieval...
P2	Follows distance learning modules in reference to a personal professional development project	...follows a distance learning course on the use of a welding robot used in vocational training ...is undergoing distance learning on a new application that he or she would like to use to improve his or her coordination tasks …	...follows a distance learning course on the use of a welding robot used in vocational training ...takes a distance learning course on a new application that he or she would like to use in his or her classroom …	...undergoes distance education training on the different forms of distance education, their possibilities and limitations ...is following a distance learning course on a new application that he or she would like to use to improve his or her tasks as a researcher/trainer …	...follows distance learning in a particular context (geographical isolation, illness, recent pandemic context) ...follows a distance learning course to complete his or her course knowledge (registration to Moocs platforms)

P3	Takes part in training modules offered by his or her institution as part of a digital development project	...is happy to take part in the training courses planned by the institution to develop a stronger and more appropriate digital anchorage... ...takes part in training courses to develop collective skills in the digital field with his or her colleagues. ...	...is happy to take part in the training courses planned by the institution to develop a stronger and more appropriate digital anchorage... ...takes part in training courses to develop collective skills in the digital field with his or her colleagues. ...	...willingly enrols in the training courses planned by his higher education institution in order to develop a stronger and more suitable digital anchorage there ...takes part in training courses to develop collective skills in the digital field with his or her colleagues. ...	...is willing to enrol in the courses planned by the institution to take part in university and faculty life ...is happy to enrol in the training courses planned by the institution to enrich his or her knowledge... ...is happy to enrol in the courses planned by the institution to become familiar with distance learning...
P4	Uses digital resources to engage in a team or network of co-training and co-coaching professionals	...uses the institution's digital platform to create with colleagues an internal co-training and co-coaching network ...requests remote support from a person who has led an innovation in order to carry out his or her own innovation ...	...uses the institution's digital platform to create with colleagues an internet network for co-training and co-coaching ...requests remote support from a person who has led an innovation in order to carry out his or her own innovation ...	...uses the institution's digital platform to create with colleagues an internal co-training and co-coaching network ...requests remote support from a person who has led an innovation in order to carry out his or her own innovation ...	...uses the institution's digital platform to access course content ...uses the school's digital platform to communicate with classmates and the teaching team ...uses the institution's digital platform to carry out collaborative activities (wiki, forum, blog)

P5	Participate digitally in proposed training modules organised in the framework of the pan-European project	...is happy to participate in the training courses planned by the ANGE project on the development of digital anchoring among the project partners. ...participates in training courses on the use of digital technology to create a European Education Area. ...	...is happy to participate in the training courses planned by the ANGE project on the development of digital anchoring among the project partners. ...participates in training courses on the use of digital technology to create a European Education Area. ...	...is happy to participate in the training courses planned by the ANGE project on the development of digital anchoring among the project partners. ...participates in training courses on the use of digital technology to create a European Education Area. ...	...participates in training courses on the use of digital technology in the framework of what is proposed in the ANGE project. ...find out about the ANGE training modules used by teachers in its courses
P6	Uses digital resources to engage in a pan-European network of co-training and co-coaching	...is committed to the creation of a European Teaching Area using digital tools. ...co-accompanies a European partner and is thus part of the creation of a European Education Area. ...	...is committed to the creation of a European Teaching Area using digital tools. ...co-accompanies a European partner and is thus part of the creation of a European Education Area. ...	...is committed to the creation of a European Teaching Area using digital tools. ...co-accompanies a European partner and is thus part of the creation of a European Education Area. ...	...uses the teaching platforms of the Erasmus mobility programmes ...uses digital resources from Erasmus projects to improve training ...
P7	Mobilises its expertise to support external projects of digital co-training and co-support networks	...is considered internationally as an expert with a major contribution to the creation of digital networks for professional development and support.	...is considered internationally as an expert with a major contribution to the creation of digital networks for professional development and support.	...is considered internationally as an expert with a major contribution to the creation of digital networks for professional development and support.	...shares his or her experience of the digital tools used throughout his or her schooling

		...is internationally solicited to support the members of an international network for the professional development of the education actors concerned. …	...is sought after internationally to support members of an international network for teacher professional development... …	...is internationally solicited to support the members of an international network for the professional development of the education stakeholders concerned. …	in the framework of the creation of a European network ...runs a European network for sharing digital co-training tools.

* Each partner organisation had the task of listing all the situations for a skill identified in the common frame of reference for competences.

Annex 3 : Governance and management of schools and digital educational projects: main lessons learned from the ANGE Project regarding their interactions

Hervé Chomienne, Lecturer in management sciences and management

at ISM-IAE

Versailles Saint-Quentin

Paris-Saclay University, UVSQ, Management Research Laboratory

Larequoi

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Introduction

The ANGE project (Anchoring the Digital in the Governance of Institutions) "focuses on the study of the anchoring of the digital in the governance of middle and high schools, as well as the transformations it induces". Based on action research organized in classlabs, it therefore questions the capacity of the deployment of digital technologies in the pedagogical practices of schools to constitute a lift for transforming their relationships with their stakeholders (governance), their steering (management) and, more broadly, their operation.

Three main research questions guided the ANGE project:

- Does the deployment of innovative projects linked to digital technology have an impact on the governance of institutions, by making it more participatory?

- Does the classlab Ange approach promote the development and success of innovation projects?
- Does the classlab Ange approach allow all the actors involved to gain skills and thus participate in their professional development?

The purpose of this research report is primarily to provide proposed answers to the first question and, more indirectly, to the other two, while being aware of its limitations.

Indeed, the 4 schools studied offer a wide variety of situations from all points of view. First of all, they are located in 4 different countries and are therefore in institutional and educational systems whose characteristics are heterogeneous, especially in terms of the centralization or decentralization of their operation in relation to their respective supervisory ministries and therefore in terms of decision-making autonomy vis-à-vis their internal and external stakeholders.

Secondly, their specific characteristics are not homogeneous either, notably in terms of size, speciality (general, international or professional), geographical location (rural or urban), experience in terms of participation in European projects and/or experience in digital education.

Finally, the interviews conducted concerned a limited number of actors: each time, the head of the school and one or two members of the pedagogical team most involved in the project.

Our late integration, in the last phase of the ANGE project, and the health situation since March 2020, have not allowed us to have more perspective on the evolution of the projects carried out in each establishment and at the same time to participate in the regular groupings of the actors of these projects. Therefore, our analysis is mainly based on interviews aimed at making an assessment, at the end of the project, of its progress in conjunction with the management of the establishment.

In a complementary way, we base ourselves on the analyses carried out by Jean Duchaine, for each establishment, "from the initial intentions to the different phases of implementation of the experiment". By crossing our interviews and these analyses, we will propose below a transversal analysis of the lessons that we can try to draw from these projects in terms of change management and support.

We also wish to discuss the interactions between the institution's strategic management (or governance), its operational management and project management: how do the usual managerial practices, prior to the project, influence the conditions of its deployment and how does the management of this deployment challenge the usual managerial practices? What are the effects of the institutions' participation in the ANGE project on their relationship with their internal and external stakeholders, and therefore on the governance of the institution?

In order to structure the presentation of our results, we have chosen to mobilize the theoretical framework of the contextualist approach to change, which we will present very briefly in the first part. The objectives and content of the ANGE project will then be recalled as they constitute the main common point of the participating institutions: the steering and animation system of this project created physical and virtual spaces where the actors of each institution puts, where they exchanged ideas and practices and where they were able to co-construct common working methods. Finally, we will show, in the following chapters, how their environment as well as their managerial practices of establishment and project constitute explanatory factors enlightening the conditions of deployment of educational digital projects.

1) Synthetic presentation of the general theoretical framework of the analysis: change management and contextualist approach

If change, inherent to all forms of life, is an omnipresent phenomenon in human societies, the development of a field of knowledge and methods aimed at understanding its dynamics and trying to better control it takes shape in the twentieth century. The problem of implementing the missions entrusted to organizations thus gives rise to management (or administration), while the need to adapt them regularly to changes in their environment, while considering the human factor, is arousing interest in "change management". A body of knowledge and formalized practices in change management developed from the 1990s onwards, with the proliferation of major structuring projects whose results were mostly disappointing in relation to initial expectations (in particular numerous mergers,

reorganizations and the deployment of integrated information systems). Thus, beyond the legal and technical difficulties induced by the implementation of these projects, the human factor appears to be a major factor of complexity and uncertainty.

Thus, the purpose of change management is twofold:

- Attempt to best achieve the objectives of the change project (in terms of efficiency, costs, deadlines) and/or to create a favourable context for the emergence of desirable changes;

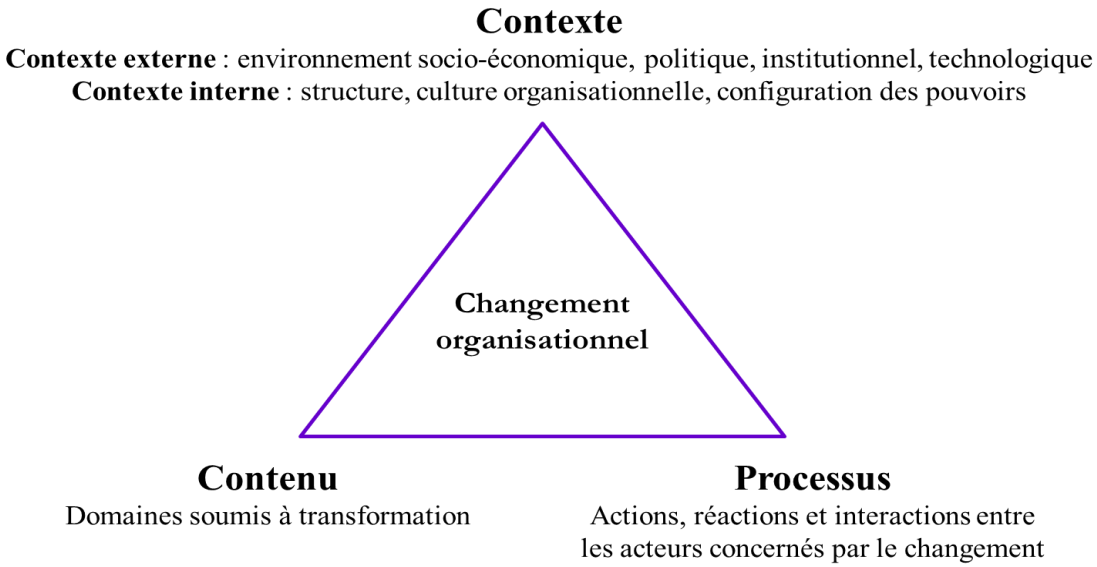
- involve the stakeholders concerned so that at best they are active contributors (or even initiators) or at worst the psychosocial risks and negative effects of change are minimized.

Knowledge in change management comes essentially from a crossover between notions from the field of human and social sciences mobilized in the theory of organizations, organizational behavior and management with the observation and analysis of concrete situations of change. Thus, the crossed views of professionals and consultants with those of researchers offer a significant production of case studies, studies, analyses and recommendations, both nationally and internationally. For example, in the French-speaking world, the work of D. Autissier et al. (2016, 2018), C. Bareil (2008, 2012, 2019), P. Bernoux (2011), I. Brouwers (1997), F. Dupuy (2020), F. Pichault (2013), R. Soparnot (2004) or A. Vas (2005) are as much academic as they are prescriptive.

The contextualist approach to change (Petttigrew, 1990) allows us to address the questions it raises from a systemic perspective, namely: what are the issues at stake in change, in what context does it occur and with what effects on its content and process? What is the area undergoing transformation and for what purposes? Who are the stakeholders, what are their concerns about the change, what effects can they expect and what behaviors should they adopt? What is the most appropriate process for implementing the desired change in the best possible way?

How can we ensure the sustainability of the changes implemented and how can we ensure that the negative effects of the changes are minimized?

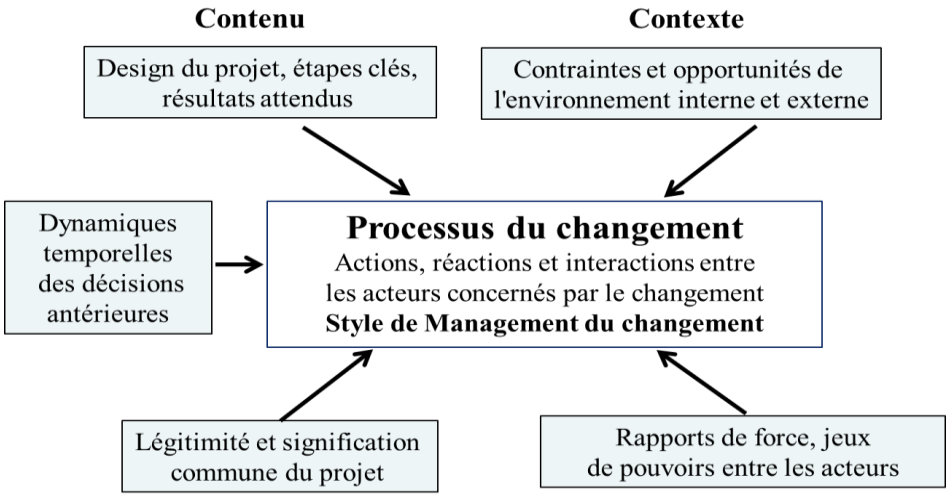
The contextualist approach considers change not as a more or less articulated sequence of events over a given period of time, but aims to "make explicit the mechanisms and processes through which this change has come about". It makes it possible to highlight "the contexts in which change emerges, the antecedents that give it meaning, while tracing over time the way in which it is maintained, transformed and eventually disappears" (Brouwers et al., 1997, p. 29). From this perspective, three dimensions make it possible to apprehend, through their interactions, the dynamics of change: context, content and process.



Adapted from I. Brouwers et al. 1997

Each pole represents an essential dimension for understanding the historical and process dimensions of change. Sequences of continuous and interdependent actions and events make up the process, and provide a better understanding of the different aspects of the emergence of change. In this model, the interactions between internal and external actors and contingency factors help shape the change process, which itself contributes to the evolution of certain aspects. These

factors are therefore not only static constraints but are also potentially affected by the change process. Thus, the context is partly a given that is imposed on the change process and partly constructed by it. The perceptions, representations and concerns of stakeholders also contribute to constructing the organizational context and have a direct influence on the content and process of change, as shown in the diagram below.



Adapted from F. Pichault (2013) and I. Brouwers et al (1997)

Thus, resolutely systemic, the contextualist approach to change "seeks to explain how variations in the organizational context over time, combined with events (changes), contribute to forging organizational practices and making them evolve" (Brouwers et al., 1997, p. 28).

2) **Presentation of the ANGE project**

ANGE, a European ERASMUS project for the Anchoring of Digital in the Governance of Institutions, which brings together 9 European and Quebec partners: universities, high schools, training centers, network of institutions.

The starting point of the ANGE project is to study the way in which the deployment of digital technology in the framework of pedagogical and/or organizational

experimentation projects can have significant effects on both the governance and management of schools. On the role of the actors but also on the development of their skills and more broadly on their professional development.

To achieve this, for more than three years, the leaders, dozens of teachers and hundreds of students from the schools involved in the project have been experimenting, implementing and piloting digital transformations in four European schools in Finland, Belgium, France and Bulgaria. Although they have different characteristics and institutional environments, these schools have initiated comparable pedagogical, organizational and/or managerial experiments, in which digital technology plays a central role. They have all also been led to ask themselves questions of a similar nature in terms of governance, steering, leadership and professional development throughout the course of the project. Finally, they also had to make choices in terms of equipment and digital applications to serve their educational projects, whether they involve the development of reverse classes, workshops and/or projects, but also different forms of student evaluation (self-evaluation, peer-to-peer, diagnosis, formative or digitized summative).

These experimenters were accompanied by a pan-European and international team of researchers and trainers from Romania, Spain, Quebec and France. Taking the form of an action research organized in classlabs working face-to-face or remotely, the ANGE project has resulted in regular meetings allowing structured exchanges and training in connection with the experiments undertaken so that everyone can learn from each other, develop common working methods, to advance their thinking and productions in the service of digital educational projects conducted in each institution. The participants were thus able to discover new work situations and acquire new skills, listed in a common repository of skills co-constructed by all the actors of the project.

The experimentation approaches in terms of digital technology for education that were initiated by the institutions were pre-existing (at least in the form of an intention) to their involvement in the project. However, it was an opportunity to accelerate these approaches through formalization, productions, steering

committees, regular reporting to the actors of the ANGE project in order to feed the collective learning of its members regarding the lessons learned from the experiments.

3) **The importance of the external and internal context of the school as a major contingency factor in the deployment of an educational digital project.**

As indicated in the introduction, the four institutions studied are quite heterogeneous, both in terms of their external environment and their internal characteristics and operating methods. These elements constitute contingency factors which, without being deterministic, influence the implementation of the digital projects resulting from their participation in the ANGE project. It is therefore appropriate to identify these elements and to try to estimate to what extent they affect positively, negatively or remain neutral in the implementation of digital projects.

a) The external environment of the institution: more or less supportive institutional and local contexts

The issue of digital development for pedagogy in schools is a topical issue in the four countries and is attracting the interest of different stakeholders, but to different degrees.

It is sometimes driven by national reforms, such as in Finland, which aim to support the implementation of a new national curriculum for high school students reflecting a growing concern for the digital world, notably through the introduction of digitized final exams for all high school subjects via the integration of online exams on a national platform. Nevertheless, the functioning of the Finnish education system is decentralized at the local level: a team of teachers determines the educational path of students and this work is then approved by a municipal council dedicated to education in the municipality, all within a general national framework. Thus, for the Noviada Lukio High School (NL), the ANGE project is a complementary contribution, especially in terms of methodology and international comparison, to

an approach framed nationally but developed by volunteer teachers wishing to mobilize digital tools in their pedagogy.

For the ZAWM vocational training center in Saint-Vith, Belgium, it is essentially a question of adapting the pedagogy of its training courses to the needs of the companies that host its apprentices and send their employees on training courses, and to the changing expectations of young people due to the role of digital technology in daily and professional life. The CFA's mode of operation appears to be highly decentralized and above all influenced by the expectations of its closest stakeholders: the companies that host (and then recruit) the learners, whose changing needs and behaviors are also an important factor in developing the use of digital tools in training. ZAWM is also in regular contact with comparable schools that are experiencing the same developments and facing the same challenges, which enable it to identify common concerns in terms of pedagogy, to move forward together and create a form of emulation. This is facilitated by the fact that teachers are working simultaneously in different schools in the region. Finally, former students contribute to accompanying these changes because some of them also become self-employed, recruit apprentices and support them in a way that is consistent with the school's teaching methods. In this context, regular national reforms, linked to changes in government, are essentially perceived as too frequent and are a hindrance to pedagogical innovations. Thus, they appear to be time-consuming and to entertain the energy of educational stakeholders from a continuous effort to evaluate teaching practices.

Concerning the G.S. Rakovski High School (GSR) in Bourgas, Bulgaria, the national level appears to be essentially an incentive and promotes innovative pedagogical actions, notably via a national project for an innovative school where digital technology plays an important role. The Bulgarian State also requires schools to set up educational support systems for students who are "unable to wait" in order to prepare them as well as possible for national exams and competitions. However, the development of digital tools that promote distance learning and support would enable them to take over from the current unsatisfactory systems.

This is an incentive element that accentuates the legitimacy of the development of educational digital projects. Nevertheless, the regulatory framework concerning the considering of distance learning activities, via digital tools, is not yet aligned with their development, which poses problems of taking these activities into account in the service of teachers.

Finally, the College-High School Paul Claudel d'Hulst (PCH) in Paris is a private Catholic establishment under contract which must therefore deal with two guardianships: on the one hand, the Ministry of National Education, which finances and supervises private establishments under contract in a manner comparable to public establishments, and on the other hand, the General Secretariat for Catholic Education, in particular on administrative , pedagogical and pastoral questions proper to Catholic education. These two institutions do not seem to have a direct impact on the involvement of PCH in the ANGE project, and more broadly in the development of educational digital projects. They would nevertheless have the possibility to contribute to the impulse of initiatives in this field through calls for projects or national plans of development and investment, notably in the area of teacher training or support for the equipment of schools. Local and regional authorities can contribute to improving the technical infrastructure and equipment of schools and students, for example through the deployment of the "digital schoolbag" for students. However, replacing textbooks with tablets or laptops equipped with digital textbooks is not without its difficulties. Teachers and families need to be prepared for this change, as it contributes to changing the way schools learn in the classroom and in the home. Thus, such a change requires coordination between stakeholders, which is often very imperfect and proves to be at least as destabilizing as it contributes to pedagogical innovation projects. Moreover, it is also highlighted that the structural reforms regularly undertaken by the Ministry tend to polarize the attention of the stakeholders and focus energies to the detriment of internal developments that would be more incremental, especially in terms of pedagogical practices.

In conclusion, the actors interviewed in the four institutions noted that the external institutional environment is relatively favorable to the development of digital educational projects, but recurring national reforms and regulatory and budgetary constraints are significant obstacles.

In fact, everyone has noticed that the development of digital tools and their uses in our societies is exerting a diffuse, but increasingly sensitive pressure to integrate them into pedagogy. Nevertheless, with what means, at what pace, in what way and to what extent? This issue is not addressed in a global way by public and supervisory institutions. At best, they create incentives and support for local initiatives or deploy specific means in the form of master plans, equipment plans, platforms or digital work environments, with varying degrees of performance. However, without a global and systemic approach, these means are difficult to integrate coherently with existing structures (both organizational and technical) and pedagogical practices. Moreover, as students already spend a lot of time in front of their screens on a daily basis, teachers and families sometimes express their anxiety, or even hostility, to the fact that even more time is spent in the context of school learning. Thus, the institutional and societal environment appears to be quite ambivalent as a factor influencing the development of digital educational projects: it appears to be a strong incentive, but the nature and conditions of deployment of such projects appear to be largely undetermined in the face of the difficulties of a material and human nature that they encounter.

The characteristics of the educational institution in which such projects are initiated are another contingency factor to be considered.

b) **The internal environment of the institution: more or less facilitating characteristics**

When asked about the internal stakeholders that are important for the dynamics of digital projects such as those developed in the framework of ANGE, our interlocutors mainly refer to teachers, students and their families. The internal governance bodies of schools (such as Boards of Directors, pedagogical committees or other animation or decision-making mechanisms) are not

spontaneously evoked, except in the case of PCH. In the case of the latter, the OGEC is an essential stakeholder for the functioning of the school, especially for allocating its own resources to projects. In this context, PCH's participation in the ANGE project had a decisive impact in legitimizing to the OGEC Board of Directors the financing of equipment dedicated to the creation of a learning lab (e.g. equipment in mobile carts, adequate furniture, shelves, PCs, etc.). Without this dedicated budget allocation, the project could not have been initiated in this form. In addition, we will come back later on to the fact that PCH was reorganized following the merger of two establishments with heterogeneous characteristics, shortly before its participation in the ANGE project, and that a new head of establishment, who was the first in this position, took over the management of the project. The ANGE project is therefore a minor (but not without stakes) aspect of a highly structuring change project within the framework of a new strategic establishment project.[55]

For all institutions, the issue of mobilizing volunteer teachers to contribute to the project is essential. Each time, it is a question of a few teachers, already involved in more or less formalized approaches to pedagogical innovation, who are embedded in the project and constitute its driving force. The fact of integrating a European project like ANGE appears to be both a means of enhancing and deepening approaches already initiated, of better formalizing them, but also of involving new actors and experimenting with new avenues of action. The fact of meeting management and educational teams from other countries and sharing questions and experiences is an important motivating factor unanimously expressed by our interlocutors. They are looking forward both to exchanging on concrete examples of the use of digital tools aimed at changing their teaching

[55] The Catholic Educational Management Organizations (OGEC) are the legal, economic and financial supports of Catholic educational institutions. Responsible for the economic, financial and social management of the establishment, the OGEC exercises this function considering the establishment project, the Statute of Catholic Education, and the supervisory authority. The OGEC is the employer of the headmaster and of non-contract staff (not paid by the State). As associations under the law of 1901, the OGECs are composed of volunteers (parents, school relations recognized for their skills in terms of management). Source Www.apel.fr/scolarite/lenseignement-catholique/letablissement-scolaire/lorganisme-de-gestion-ogec.html

practices and to taking a step back from the methods of student evaluation. Thus, the exchanges during meetings between participants of the ANGE project (including academics) allowed them to reflect on alternative methods of evaluating students to the traditional evaluation centered on their knowledge. For example, the evaluation of their learning to learn skills, which is consistent with the reverse class where students learn how to find credible sources on the internet and how to exploit them. This openness, both international and academic, is a complementary element to stimulate the participating pedagogical teams, who can then relay this knowledge to their colleagues and try to mobilize them more effectively.

Indeed, the main internal obstacle that is highlighted by all our interlocutors is the availability of the pedagogical teams to free up time to participate in workshops, animations, training sessions or other participatory devices aiming to encourage and accompany them in the evolution of their pedagogical practices, in particular via digital means. This availability is at the same time an objective problem of temporal availability but also a problem of cognitive availability and/or willingness to re-interview one's pedagogical practices. And not without arguments: recurrent reforms and time-consuming curriculum changes, the increasing weight of time devoted to student evaluation and correction, difficulty in finding niches where a significant number of teachers are available at the same time, disciplinary specificities that make the mobilization of such tools more or less relevant, whose added value is not always, obvious problems (unstable networks, equipment or applications), or aversion to these tools...

Thus, a necessary (but not sufficient) condition for hoping to disseminate new pedagogical practices more widely, beyond a few experiments carried out by convinced, even passionate, teachers, is first of all to offer an adapted material environment, especially in terms of room layout and technical configurations. Our interlocutors have systematically expressed to us the importance of offering technical security, and if possible comfort, to users so that this parameter is not a source of concern when they use digital tools.

The other condition for hoping to make pedagogical practices evolve, progressively and durably, is to be able to mobilize a few committed teachers who master and have experimented in class with the tools and methods that we wish to deploy more widely. This presupposes that these people are able to devote time to train and support other teachers in new pedagogical practices, and that the latter consider these evolutions legitimate and accept such support. In view of the pedagogical autonomy of teachers, the organization of their working time and the importance of disciplinary identities, this is not at all obvious. All the more so since the means to enhance the commitment of teachers in this process of support and evolution of pedagogical practices are essentially symbolic.

Students, and to a lesser extent their families, are an essential stakeholder in educational digital projects since they are the beneficiaries of the pedagogical evolutions experienced. Concerning the students, the use of digital tools in class (or upstream to prepare an inverted class), at a distance for specific teaching or support or during evaluations, seems to go in the direction of the increasing presence of these tools in their daily life. These uses are all the most valued when they are factors of interaction at the service of an active pedagogy, alternating moments when students search and do by themselves (alone or in autonomous or accompanied teams), and moments of exchange, debate, presentations or more ""masterful framing on the part of teachers. In their own specific context, all schools therefore face a real challenge with regard to the students to develop teaching methods in order to make them all the more involved and actors in their training. Nevertheless, the question of the means made available to them in the school (premises, digital tools, stable Internet connection, adapted software) constitutes a first difficulty because it assumes an important and regular investment to ensure its functioning and evolution. In addition, there is the question of personal equipment, within the families, of the students as well as their access to an Internet connection. While the equipment can be loaned out as part of local authority support plans, this is not systematic, complex to manage and does not solve the problem of access for all to a good quality Internet connection. Finally, families may be reluctant to see the development of the use of digital tools for educational purposes outside the

classroom for two main reasons mentioned by our interlocutors, in addition to the additional financial efforts that this could hack. On the one hand, their children often have too much screen time, which would be increased by the use of digital tools to prepare their lessons and do their homework. On the other hand, parents unfamiliar with these tools and who would be all the more difficult to accompany and/or control the work done by their children.

These different contextual factors around and within the institution are contingency factors that influence its relations with its stakeholders, and therefore its strategic and operational management. Nevertheless, they are not deterministic, i.e. they do not mechanically lead to the choice of this or that method of managing the establishment and the projects initiated there.

4) The characteristics of the school's strategic management: brakes, drivers and new opportunities for interaction with stakeholders

We have highlighted the influence of context on the dynamics of developing and deploying educational digital projects. Some elements of this context are independent of the field of action of school heads (e.g. the regulatory framework, national reforms, technical developments...) even if they may have room for interpretation and maneuver in the way they integrate them into their schools. Others relate, at least in part, to the way they interact with their external and internal stakeholders, in other words the way they strategically manage their school on a daily basis. In this case, the aim is to develop (in a more or less formalized manner) and implement a strategic project to carry out its missions, which is, on the one hand, a local version of the orientations of its supervisory authority and, on the other hand, voluntary local initiatives from management, in interaction with its main stakeholders. Participation in the ANGE project is part of the latter logic and provides an opportunity for the management teams of the establishments to contribute to their establishment project in a way and at a time that is deemed appropriate. This participation is also an opportunity to develop project management methods whose necessarily collegial, participatory and transversal

character naturally articulates with a comparable daily management or to challenge a more centralized or, conversely, backward management.

A. The strategic and daily management of the head of establishment: practices aligned or called into question by the management of the digital project and support for its integration into teaching practices.

In terms of strategic establishment management, the four establishments offer three distinct types of managerial positioning of the head of school. None is, in absolute terms, more desirable or efficient than another, but it may be less facilitating in the process of developing and deploying a digital project aimed at changing educational practices.

In the case of NL and ZAWM, the choice ofleaders to get involved in the ANGE projectseems to be strongly influenced by the opportunity of this project to structure and accelerate the response that their institutions must bring to pressures from their external environment. In the first case, the urgent implementation of a reform of student evaluation involving the systematic use of digital tools, in the second a strong awareness that it was necessary to meet the explicit expectations of the host companies of apprentice students regarding the mastery of digital tools in the exercise of their profession and to adapt pedagogy to the changing expectations of young people. In both cases, the leaders are not involved in the pedagogical aspect of the project but are in support of acquiring the resources necessary for its implementation and more broadly to create the conditions for the development of pedagogical experiments by volunteer teachers. Their management focuses on relations with external stakeholders, particularly in the case of ZAWM where the head of the school uses his school's participation in the ANGE project as a lever to accelerate the dissemination of digital educational tools in professional teachings in order to improve its positioning vis-à-vis the companies that welcome its apprentices and that are major stakeholders. Onthe other hand, on the administrative and financial aspects of their institution, which operates quite autonomously from supervisory authorities that set fairly broad regulatory frameworks. Thus, a project like ANGE helps to stimulate voluntary teacher

initiatives, to structure their actions a little more and to enhance them, but without interfering with the usual role of the leader with teachers.

Regarding PCH, the ANGE project is initiated in a particular context of fusion between two institutions which originallyorigine, had different characteristics (welcomed audiences, professional cultures, parental expectations...). The main mission of the newly arrived head of school is therefore to ensure the success of this complex merger where prestigious but old premises coexist, and a new building that offers the opportunity to develop a "learning lab" adapted to educational experiments mobilizing digital tools. Taking over a new institution by a head of school whose first position in this position is, always a challenge. This is all the more important when it comes to building an establishment project setting new guidelines and a new operating framework for all stakeholders of the merged institution. The development of such a project is a key factor in the success of the process of accompanying the major change that constitutes this merger. This particular internal context has a major influence on the management of the establishment but also on the positioning and dynamics of the ANGE project. Indeed, in conjunction with the creation of the "learnig lab", the participation of an educational team in this project allows to highlight the potentially unifying nature of digital technology to help bring together pedagogical practices aimed at taking care of students with more heterogeneous characteristics than before. The fact that teachers from the two former schools met occasionally to discuss the use of new teaching tools also provides fertile ground for identifying project participants. Finally, the recruitment of a new teacher,, one of whose missions is to ensure the animation of the ANGE steering committee, is a complementary factor that helps to give this project a potentially structuring aspect in the implementation of the new school project. Thus, the development of new pedagogical practices around digital represents a real managerial challenge for the head of school, especially since his board of directors has granted him dedicated resources to acquire equipment.

The project then appears to be a potentially important but minor brick in view of the other changes in progress, especially the implementation of the new school project

but also the reform of the high school and the baccalaureate. In the face of such changes to be led, it seems legitimate for a head of school to seek to control the situation through a rather direct management that can help to reassure the actors and channel their actions in the proper direction through the mobilization of planning and coordination mechanisms. Nevertheless, it is difficult to make such management coexist with the animation of a project team that requires a strong delegation and the development of a context conducive to cooperation, even collaboration, between actors mobilizing to experiment and innovate. Thus, a strong impulse and involvement of management in such a project is an easier element to launch it and legitimize it with stakeholders. Nevertheless, it can also be a hindrance to its development if it appears too intrusive in terms of its orientations and control, even if, de facto, the participants have a fairly broad autonomy in their actions.

Finally, GSR has been used, to designing and participating in Europeanprojects, particularly in the field of digital education, for the past twenty years. The ANGE project is then articulated in a complementary way with the current projects, and this in a national context where the issue of the development of digital tools in les établissement schools is encouraged. The operation in project mode is therefore familiar to the school's teams: creating newteachingresources and experimenting with new methods of working with students are practices that are no longer part of experimentation. They are fully integrated into the school's usual management, especially since it has teachers fordistance education, dedicated resources and d'a culture of exchangeof practices in workshops where questions onadoptions, methodologies and digital are addressed. des questions sur les ap The management of the establishment appears to be particularly favourable to the emergence and sustainability of such practices. Indeed, its delegative character,, and based on horizontal cooperation rather than hierarchical coordination,, is entirely consistent with the project mode and the creation of a favourable context for innovation and collaboration. The head of the school has been in the position for

many years, in an attractive institution and which seems to benefit from a relatively stable environment which allows its actors to focus on continuous improvement of its pedagogical functioning. Although certain elements of context are obstacles to the development of the use of digital pedagogical tools (regulation, technical difficulties in the school and withinthestudents' family), the relationships of trust that seem to be established between management, administrative teams and teachers constitute an internal context particularly conducive to the development of innovative projects. Thus, in the context of projects but also outside, teachers form working groups to carry out collective productions. This collective work allows everyone to turn to their colleagues to solve difficulties with certain tools or methods of work. Once installed, this mode of operation strengthens the mode of delegated management and consolidates collaborative practices between the institution's stakeholders. Indeed, delegating means being able to share with the staff the meaning and the framework of the missions to be accomplished, the methods being left to their discernment.

However, this means ensuring that they are able to assume that autonomy and feel responsible for the results and effects produced. This cannot be decreed and is built gradually, especially through daily interpersonal relationships and the regular development of informal and formal projects, promoting collaborative work.

a. Between project management and "gardener's strategy": from organizing the deployment of new devices to creating a context for the emergence of new practices and their ownership

The four institutions studied show that deliberate and emerging projects are not mutually exclusive but tend to strengthen. Thus, the existence of a regular practice of collectivework, in small teams,, self-formed spontaneously by teachers, constitutes an environment conducive to the development of more formalized projects. We can see that in all of these cases, the majority of the participants in the ANGE project had already participated in working groups and were familiar with the project logic. Symmetrically, institutions that regularly initiate more formalized projects, multiply the opportunities to integrate teachers interested in the topic and

introduce them to the collaborative way of working. The combination of these two modes of operation in project teams contributes to the development of a culture of peer exchange,inter-help and educational innovation. It thus creates a favourable context for the emergence of local initiatives but also for participation in more institutional projects, such as ANGE, which come to be linked to existing projects and allow to develop collective skills of project management and support for change.

Indeed, it appears that, without institutional support from management, the spontaneous initiatives of a few teachers to create spaces for the exchange of innovative teaching practices quickly find their limits. This support can be indirect, through the provision of resources and organizational arrangements that promote the emergence and development of such initiatives. These actions are not initiated or even formally validated by management, but management considers that they contribute usefully to the implementation of the settlement project. It therefore gives these initiatives the material and symbolic means to continue their development while ensuring that they do not go beyond the overall framework set by the institution.

This approach, described here as the "gardener's strategy" in reference toF. Julien's (2010)"island transformations"),is an essential step in the emergence of innovation projects within an organization but is generally insufficient to ensure more widespread dissemination within the institution. Indeed, the development and implementation of more formalized and structuring projects, such as ANGE, provide opportunities to accelerate and institutionalizelocal initiatives.

First of all,such projects are an opportunity to obtain the allocation,, by the decision-making bodies in budgetary matters, of dedicated resources that were not in the endowments of the establishment: improvement of the Internet network, acquisition of digital equipment and applications, layout of rooms, recruitment of specialized staff ... However, the weakness of these means is systematically pointed out as an important obstacle to the development of pedagogical pedagogical practicesaround digital.

Secondly, participation in multi-institutionalprojects, and integrating other actors (such as researchers), is an opportunity for theparticipants urto get out of their purely local problems and practices and to be confronted with other experiences. This shows that theeteachings issues are widely shared, but the ways of defining and dealing with them are plural: debates, exchanges, demonstrations, the construction of common analysis grids are all times of sharing, at joint events, which help to open the field of possibilities for the participants and allow them to return to their institution with new ideas that they can in turn share with their colleagues.

Finally, the, potentially illuminatinge and energizinge nature of such a projectis complementede by its structuring aspect, from a methodological point of view. The aim is to collectively build the project's expectations and formalize them in the form of deliverables at the end of the project. Reflections on the content of the project are a crucial step in defining its meaning and contours: what is the nature of the problem to be addressed and what direction should we take to develop elements of response? Added to this is the temporal dimension, with a known deadline in advance, which requires the project to be sequenced in intermediate stages, to identify the risks that will have to be anticipated and the means necessary to achieve it. On the one hand, those necessary for the smooth running of the ANGE project as a whole (project governance, travel and meeting costs, enhancement and dissemination of results), on the other hand those that its actors will have to obtain locally for its concrete variations that require specific financial support. Participation in such a project is a powerful legitimization lever for such support.

However, it is important to ensure that projects initiated by management reinforce, not replace, local dynamics that are considered positive. The structuring nature of projects carried out by management should not sterilize local initiatives but rather support them, consolidating them and promoting their dissemination. Indeed, once the project is formally completed, it is the dynamic created locally that will allow, or not, to continue the process of educational innovations, their dissemination within the school and their adoption by the teams, until they become a new normal. The results of the interviews with local stakeholders in the ANGE project show that,

although channelled by some of the project's expectations, their operation has remained largely based on volunteerism and informal exchanges, if not through more regular periodicity, more elaborate milestones via reports and more visible management support.

If the institutions studied show that their participation in the ANGE project has a real energizing and structuring effect during their participation, the maintenance of such a dynamic is never assured. Other even more structuring events, such as reforms or significant structural changes within institutions, potentially "parasitize" educational innovation projects by focusing the educational community on other particularly time-consuming topics. Thus, the project mode, inherently horizontal, often struggles to resist injunctions or events of a vertical and imperious nature that divert attentions and energies.

2) The place of accompanying change in the deployment of a digital educational project: a cohesiveand articulate process, from the construction of the project to the anchoring of new practices?

The development and deployment of projects aimed at changing pedagogical practicesis, as a mainmatter, the field of educational sciences but also, in a complementary way, management sciences and management. Indeed, they are interested in the conduct and organization of the finalized collective action. However, whether they are emerging or directed, such projects involve, directly or indirectly, the heads of schools whose management will have an influence on their progress. It is the nature of their levers of action, as initiators and/or facilitator of the changes induced by such projects, that we will analyze.

a. Directed, organized, continuous or proposed change: a starting point that determines the deployment process

The sociology of organizations, notably through the work of Philippe Bernoux (2011), offers us a general definition of organizational change that "consists in a

transformation of relations with others. It results in the creation of new rules (...) To change is to transform the ways of doing things, the relationships, the statutes.".

Thus, change within an organization can be seen as an informal and/or formal process materialized by :

- a set of evolutions, uncontrollable, edoused and progressive (even diffuse) representations, includesents, practices, even the values of the actors of the organization;

- youdo sequence of steps, to master, leading to the deployment or transformation of formal devices (structures, rules, tools ...) whose purpose is to channel the behaviour and actions of the members of the organization in the direction expected by its management.

The latter is part of a rather instrumental approach to management and change: it focuses on the methods that enable it to be developed and then deployed through rational methods (strategic plans, action plans, budget management, project management, procedures, tools, etc.). It is the prescribed organization.

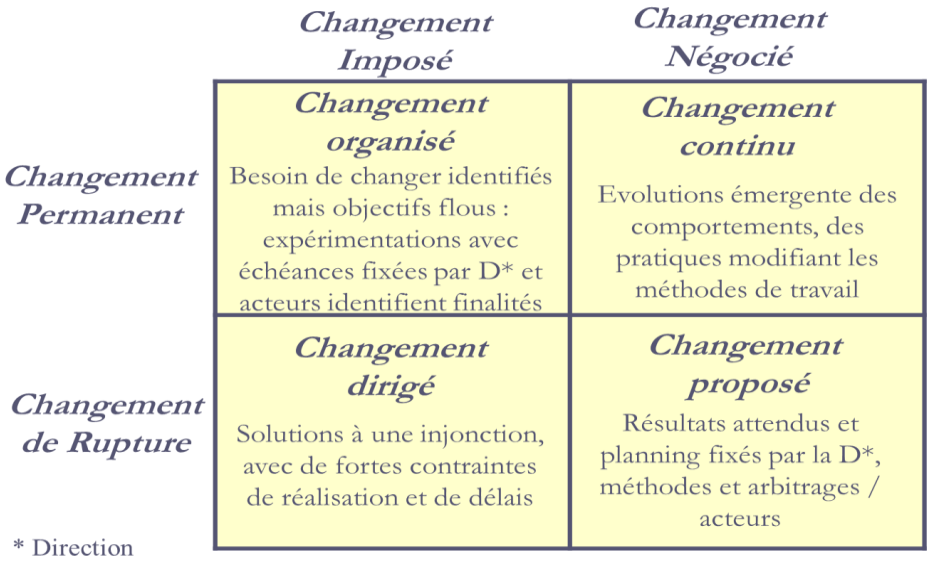
The first is a more constructivist approach that considers the organization to be the product of all the recurring behaviours of its members, according to the meaning they give to their work, their preferences, their individual and collective values. It is the real organization whose characteristics are influenced by the prescribed organization that sets a more or less restrictive framework.

If we accept the coexistence of these two sides of the same organization, the role of those who are responsible for it is to operate a "joint regulation" (Reynaud, 1997) between, on the one hand control regulation, on the other hand autonomous regulation in order to reach a necessarily dynamic and unstable point of equilibrium.

The call for a typology of changes incorporating this duale vision of the organization, offers us a reading grid useful to the understanding of the cases studied in the ANGE project. The table below is constructed by crossing two factors:

- on the one hand, the way change emerges, imposed from the outside or by management versus co-constructed with stakeholders in an emerging or authority-driven manner;

- on the other hand, the pace of change, evolving according to an iterative logic or "small steps" versus brutal where a before and after are identifiable following the implementation of new devices. In both cases, the magnitude of the change may be limited to a simple adaptation or have a more structuring effect of the organizational system and profoundly transform some major aspects of its operation.



Adapted from D. Autissier et al. (2013, 2018)

Applying this typology to the four institutions studied, we find that all were, to varying degrees, in a dominant logic of continuous change whereai teachers, interested in teaching methods using digital tools, attemptedto experiment with them and disseminate them when they wereperforming well in the classroom. Their operation is very informal and based on voluntary commitment. In this context, management does not play a direct managerial role (planning, allocation of resources, animation, control) but, a minimum lets do, and at best facilitates and encourages initiatives. This situation is conducive to the development and participation of more institutionalized projects such as ANGE because a group of driving actors familiar

with the project logic can participate upstream in its preparation and form the core of the project team that will be responsible for it.

For example,participation in projects such as ANGE allows for the addition of a register of action on change actions without replacing emerging initiatives. Continuous and diffuse,change becomes proposed or organized,, depending on the more or less standardized nature of the expected results or the methods to be mobilized. In both cases, the deadlines become standard according to theprogrammed life of the project: its general aims are common to the participants but their local variations remain their responsibilities. These can be,, entirely or partially,, co-constructed by the participants of each institution, depending on the context and management of the head of the school. It is on how he will manage the project and the changes he seeks to produce that the head of the school has the most room for manoeuvre, taking into account the variables,, more or less restrictive,, of his environment. The GSR and ZAWM institutions have essentially remained on this register because of their respective management (between delegative and "leave to go" in the educational field but active in the external environment) and an evolving but relatively stable environment.

Indeed, the evolution of certain environmental variables or a decision of the head of the school can lead the change to be (or become) directed. The stalling of participation, the injunction of a guardianship to present results quickly, the implementation of a reform or structural changes interacting with the project can lead to a firm (re)takement of the project by management. The

challenge here becomes the mastery and realization, at a given time, of the project of change, at least in its visible dimensions (deployment of a tool, implementation of a new method of work ...) if not effective. When the injunction is linked to the proposed change but not the only dimension, it may tend to have to focus on that dimension by temporarily or permanently abandoning the others. Thus, the need at a given date to carry out evaluations in digital format at NL or the implementation of the reform of the high school and the baccalaureate, in a post-merger context,

at PCH have logically led to focus the actors on these priorities, probably at the expenseofother actions of change also induced by the ANGE project.

The COVID19 crisis was a major event that led all participants to focus on a management crisis. The injunctive nature of this crisis has sometimes been an opportunity to reap some of the gains of the ANGE experiment by facilitating the urgent adaptation of distance learning. However, it has also had a highly destabilizing effect on the functioning of the institutions and the dynamics of the projects in progress.

b. Decisions and deployment of new teaching tools and methods: volunteerism to encourage volunteerism?

The way in which the change project is initiated, the degree of impulse of management and a more or less restrictive context will thus contribute to influence its management. There is no determinism or universal recommendation as to a good way to drive and/or accompany this type of change but contingency factors that will be more or less perceived by the actors and will therefore influence their perceptions and actions, especially those of the head of school.

Thus, the table below shows the consequences of managing change depending on the type of change the organization is facing. The two columnsform the archetypal continuum extremums of a continuum form between a change that would be highly planned and the other essentially emerge. The first is conceived as a sequential process of rational deployment of a strategy developed by (or imposed on) the management of the institution. It is based on a direct and centralized management for which the faithful implementation of the change plan is the main objective. The second is conceived as the result of anonstruction of a common meaning, acceptable, even shared, of change among its stakeholders. It is based on collaborative management where management creates the socio-organizational conditions for stakeholders to interact, experiment and shape a change that is the product of this process. Above all, management plays a very general role in guiding the direction of change, methodological support, facilitator and resource provider.

It is at the service of the actors of change, while retaining a legitimate right of decision-making arbitration and, in the event of a stalemate of the process or events requiring acceleration, partial takeover (proposal or organisation), or even strong (direction) of change.

Directed Change/Organized Change/Proposed Change/Continuous Change	
A clear and framed vision of the desirable future and how to achieve it	Open and fuzzy vision of the desirable future and how to achieve it
Precise definition of the elements of the organization to be changed to achieve this vision	Defining a collaborative approach to co-building the changes to be made
Key players make decisions that they impose top-down	Willingness to bring out new behaviours through diagnosis and shared decisions
Relatively small manoeuvring margins left to players who need to implement and adapt	Great freedom of action left to actors to promote the creativity of each and autonomous behavior, experiments

Adapted from I. Vandangeon-Derumez (1998) and Autissier and all. (2018)

The management of the ANGE project in the four institutions studied is, to varying degrees, between these two terminals, but none corresponds to an extremum.

Thus, due to a constrained environment requiring the creation of a new project and a new establishment culture following a merger, in the context of major national reform of the secondary school and a rather directive management culture (while leaving spaces for participation and experimentation), PCH is in a process of change management that oscillates between the organized (in the service of the new school project and mobilizing the new equipment) and the proposed (choice of pedagogical experiments rather left to the actors) with a directed dimension due to a very proactive management and a very structuring institutional framework,, and requiring compliance with binding requirements and deadlines.

The NL case illustrates a management that is far removed from pedagogical issues that leaves a great deal of autonomy for volunteer teachers to carry out their

experiments. The executive is primarily focused on the management of his institution and the relationships with his external stakeholders. Nevertheless, the very strong constraint of curriculum reform and its component aimed at digitizing national assessments of pupils tends to focus the ANGE project on this dimension at the expense of other educational contributions. The opportunity offered by the institution's participation in the ANGE project is then diminished by the need to respond to this external injunction that transforms a proposed type project into a project led not by the interventionist will of the head of the school but by external constraints.

In the case of ZAWM, the ANGE project is clearly an opportunity to move from a change that is predominantly continuous (but sparse and very focused on a few volunteers) to a proposed type change where volunteers will become the facilitators of an establishment project with fairly clear objectives (adapting to the changing needs of the companies hosting apprentices and the behaviour of its latest in progress) with a certain abundance in the methods and tools experienced. These cover professional subjects, general but also remote interactions with apprentices who are physically little present in the training center. The material difficulties encountered are numerous and it is difficult to mobilize teachers, the vast majority of whom take vacations in the school, but the changes implemented seem to make sense to the stakeholders who perceive the interest and the first results. While being removed from pedagogical issues, the head of the school plays an important role here in creating the material and institutional conditions that promote the initiatives of the project's driving teachers but also to link these actions with the expectations of its external stakeholders. The ANGE project gives them the opportunity to interact with foreign colleagues and, even if this is pointed out as insufficiently developed, to identify practices and tools that they could adapt to their context. It is also an opportunity to better formalize the follow-up of educational change projects initiated even if most of the work remains fairly informal because teachers are autonomous in their pedagogy. The major obstacle to the development of these initiatives and their generalization is clearly identified: it is the lack of time and availability of the vast majority of teachers.

Finally, in the case of GSR, it is possible to note a real synergy between strategic management, operational management and change management. From a strategic point of view, one of the characteristics of the institution is that it has managed to position itself as particularly favourable to its external stakeholders,, through its long-standing and regular participationin national and European educational innovation projects. The development and continued participation in suchprojects, combined with a delegated operational management based on collaboration between teachers who form working groups to carry out collective productions and help each other,allows us to be in a process of continuous butoriented and channelled change. Thus, while building on teachers' initiatives, projects such as ANGE have helped to develop collaborative working methods that shape the school's daily life and feed the school's project portfolio into ideas and volunteers. Depending on their characteristics, projects are organized or proposed in an internal context of continuous change. Like all institutions, GSR must respond on an ad hoc basis to external injunctions that would imply a directing mode, but the ability of actors to mobilize and their habituation to the project mode and the autonomous conduct of change seems to make the need for managerial directionality minimal. Above all, it is a question of "technically" ensuring compliance with constraints without the question of the involvement of the actors appearing to be a major obstacle.

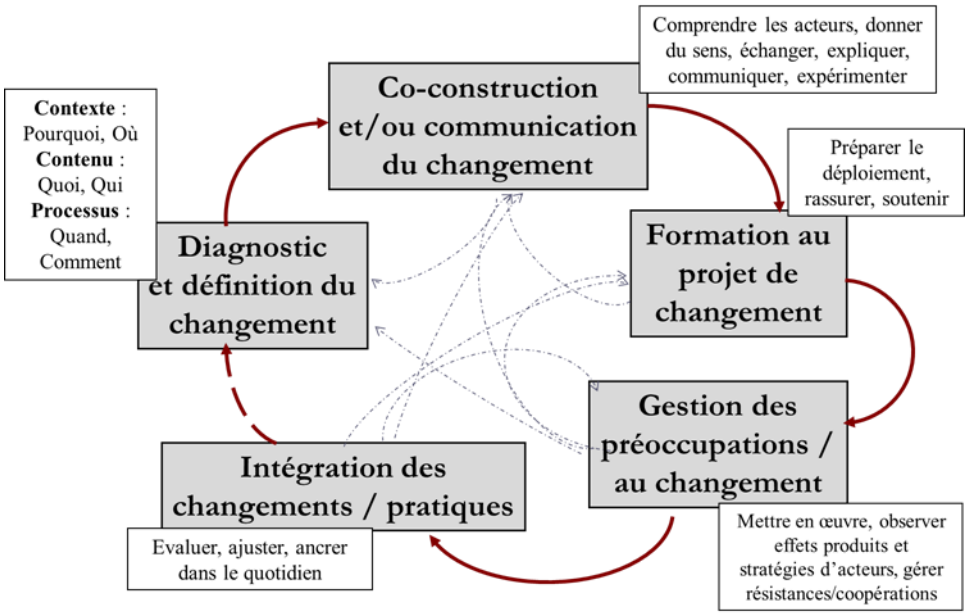
Thus, the volunteerism of the head of the school always seems important to create a context conducive to collaborative work, itself a factor in the emergence of a culture of mutual aid and educational innovation among teachers. However, when it comes to fostering and facilitating the emergence and development of projects aimed at changing teaching practices, the autonomy of teachers should be preserved. The head of the school then places himself further back and essentially plays a role of facilitator who is at the service of the teams but also the guarantor of the coherence of the actions carried out in the context of the settlement project. This positioning, sometimes on the front line, sometimes more backwards, requires a capacity for

discernment as to the requirements of the context but also as to the expectations of the stakeholders in the face of the change in progress.

c. Identify and address the concerns raised by the deployment of the digital project among key stakeholders: necessary vigilance throughout the process

Unsurprisingly, the main stakeholder in the ANGE project mentioned in the four cases studied is the faculty. Of course, students, their families, other staff and external actors (tutels, local authorities, neighbouring institutions, etc.) are important stakeholders who have a role to play at different stages of the process, but teachers are the omnipresent actors.

The diagram below attempts to represent the successive and articulated steps of a process of deliberate change that would be the subject of impetus and managerial accompaniment. Its linear scheduling, ranging from decision-making to its sustainable integration into practices, is nevertheless nuanced by a set of non-linear interactions between its main phases, distinguished for the need for analysis but, in fact, highly intertwined. Thus, the reality of a process of change consists of contingencies, unforeseen events, interactions, negotiations and adaptations that can lead the project to evolve significantly from what was originally envisaged by its initiators. The latter are not necessarily hierarchical leaders but can be actors on the ground taking initiatives and acting very informally.



Adapted from D. Autisser and Moutot (2016)

The ANGE project was an opportunity for all institutions to participate in the project steering committee, to successive events marking its various stages and to decline this driving logic at the local level. Thus, they have all set up their steering committee, usually composed of the head of school, assistants and possibly administrative actors, volunteer teachers being involved in similar projects (formal or informal) including the trainer dedicated to digital,where it exists.. This steering committee is metby a teacher identified as the project's bearer and meets on varying periodicities: from once a month to two-three times a year. Between these meetings, interactions between project participants vary in frequency and are essentially informal. The members of the steering committee are sometimes tasked with communicating to their other colleagues the progress of the project and the decisions that have been made. Indeed, if such a committee is a place of exchange and coordination, it is also a place where the head of the school is reported to the head of the project and where the head of the project can be called upon to validate proposals and make decisions.

The existence of a steering committee is therefore by no means exclusive and is systematically supplemented by working groups, more or less formalized, where the essentials of the interactions that allow the project to move forward take place. Theseprovisions are the preferred places for the actors involved in the project to construct a shared diagnosis on what is wrong (why) and which needs to be changed (what and where), at what pace (when), according to which methods (how) and on the main stakeholders involved in the change (who). This preparatory work, when it is collegial, can go beyond the steering committee and be supported by working groups and informal exchanges with stakeholder representatives. The more widely shared it is, the more the project of change can consider, as far as possible, the plurality of the actors' views. It is in itself the beginning of implementation because it offers the opportunity to actively listen to the actors, to confront their points of view and to try to co-build a project that faces common sense, or even, at best, that elicits a certain amount of support. These structured exchanges also prepare for the future deployment of change by appreciating the resources, time and support efforts that will be required. The lackof understanding, fear, opposition or adherence that can be detected during exchanges, or even during experiments, will help to better understand the concerns raised by the project among its stakeholders.

In this regard, Bareil's work offers an interesting typology to identify the concerns of the actors and the actions that could respond to them, as summarized in the table below:

PHASES DE PRÉOCCUPATIONS	EXPRESSIONS COURANTES ET THÉMATIQUES	PRIORITÉS DE GESTION	ACTIONS ADAPTATIVES POUR L'EMPLOYÉ
1. Aucune préoccupation	« Je doute que ce changement me concerne » · Continuité des projets habituels et des habitudes de travail · Peu d'importance accordée au changement	Communiquer de façon précise et donner de l'importance au changement	· Poser des questions · Rechercher des faits et des données vérifiables · Confronter sa position à celle des autres · Reconnaître ses réactions
2. Préoccupations centrées sur le destinataire	« Que va-t-il m'arriver ? » Inquiétudes égocentriques quant aux impacts sur soi et sur son travail : perte d'emploi, insécurité, pertes du patron et de collègues, perte de pouvoir, d'autonomie, de compétences, incidences sur les outils de travail et sur l'organisation du travail, etc.	Écouter et soutenir	· Exprimer ses inquiétudes aux bonnes personnes · Chercher des réponses · Accepter que l'information ne soit pas disponible · Apprendre à gérer sa petite voix intérieure

PHASES DE PRÉOCCUPATIONS	EXPRESSIONS COURANTES ET THÉMATIQUES	PRIORITÉS DE GESTION	ACTIONS ADAPTATIVES POUR L'EMPLOYÉ
3. Préoccupations centrées sur l'organisation	« Est-ce que le changement est là pour durer ? » · Inquiétudes quant aux conséquences organisationnelles du changement à moyen et à long terme · Questionnements sur la légitimité du changement, sur la capacité organisationnelle à mener le changement à terme et sur l'engagement de la direction	Démontrer le sérieux et les raisons du changement et illustrer les moyens engagés par l'organisation pour la réussite du changement	· Comprendre les raisons qui motivent le changement · Se positionner par rapport au changement : rester passif ou s'investir ?
4. Préoccupations centrées sur le changement	« Qu'est-ce au juste que ce changement ? » « Comment fait-on ? » Inquiétudes quant au scénario de changement, à la qualité de la mise en œuvre du changement, aux ressources allouées	Communiquer le plan d'action, les ressources et faire participer	· Répondre aux questions : qui, quand, comment, avec qui · Échanger avec d'autres personnes ayant vécu le même type de changement
5. Préoccupations centrées sur l'expérimentation	« Est-ce que je vais être capable de… ? » Inquiétudes quant à sa capacité à faire face au changement, au soutien disponible et à la compréhension de son supérieur	Faciliter le transfert des nouveaux acquis : formation, accompagnement, temps d'adaptation	· Réduire ses zones d'inconfort avec la technique des petits pas · Clarifier les attentes du gestionnaire · Exprimer ses besoins de soutien sur les plans technique et professionnel
6. Préoccupations centrées sur la collaboration avec autrui	« Qui pourrait-on réunir pour qu'on collabore à trouver des solutions et auprès de qui transférer notre récent savoir ? » Inquiétudes quant aux occasions d'échanges et de collaborations avec d'autres équipes, services, unités, etc.	Faciliter les échanges entre destinataires et devenir une organisation apprenante en changement	· S'impliquer dans un comité · Partager son savoir et son savoir-faire · Mettre à profit ses expériences de changement
7. Préoccupations centrées sur l'amélioration continue du changement	« Comment pourrait-on faire mieux ce qu'on fait bien avec le changement ? » Inquiétudes quant aux améliorations à apporter pour que le changement fonctionne encore mieux	Laisser émerger des pistes d'amélioration du changement	· Oser agir autrement, innover · Envisager des façons originales de faire les choses

C. Bareil (2008)

As proposed by C. Bareil, each of these phases of concern must be the focus of attention on the part of the project team and may be the subject of action to address them. Even if we must be aware that there is no automatism in this progression and that actors can anchor themselves in passive or hostile behavior towards the project if they perceive it negatively in relation to what matters to them. Nevertheless, identifying them helps to limit misunderstandings and misunderstandings but also to anticipate the foreseeable difficulties of implementation. Of psychological origin,

this reading grid can be usefully supplemented by the strategic reading grid of the sociology of organizations (Crozier and Friedberg, 1977; Bernoux, 2011; Dupuy, 2020), based on the analysis of the organizational games of actors seeking to achieve their goals, in a context they perceive in terms of resources and constraints, factors of contingency to the adoption of behavioral strategies in the face of change.

The interviews we conducted do not allow us to apply these analyse grids to the cases studied because it would imply that we could design a data collection device, in the form of in-depth interviews and observations, which we were not able to carry out. We therefore adopt here a prescriptive position, as to the relevance of the use of such analytical grids to illuminate the action of the actors of change, rather than descriptive and analytical,, for lack of material to mobilize them. Nevertheless, they allow us to measure the importance of considering the sociological and psychological factors that influence the behaviour of actors in the face of changes whose magnitude may seem limited in comparison to major institutional reforms but which impact the core of their profession, their pedagogy and their interactions with their students.

d. Moving from experimenting with new practices to effective anchoring them: a major post-project challenge that is difficult to master

The final phase of a change project, as presented in the previous scheme, does not consist of the end of the project itself, when the project is formally completed, following the deployment of its deliverables. Great is the (legitimate) temptation to celebrate the end of the project, if it has succeeded, and to move on,, considering the change that one wanted to implement acquired. However, the effective implementation of a new structure, a new system or new working methods does not imply that it will be generalized, sustainable and effective.

The change can be ephemeral, on the surface, have negative induced effects and/or give disappointing results, in view of what the initial results suggested. This

post-project phase of change, which K. Lewin describes as a "refreeze" or "recristallization" that follows the "transition" phase (or "displacement")," is all the more critical because the attention of change actors has generally shifted to other projects or subjects. The steering committee is less mobilized or even dissolved, and at this stage it is essentially the more informal dynamics that have developed throughout the project that can continue and continue the work of integrating and accompanying change in practices. However, it remains the responsibility of project initiators to maintain an appropriate level of support and to focus on assessing the effects it produces to help consolidate or adjust them.

With regard to the ANGE project that is coming to an end, only a return to the land where its variations have been deployed will allow us, in hindsight, to assess the nature and sustainability of its effects. In view of the interviews, it seems certain that it has helped to consolidate (GSR, ZAWM) or to develop (PCH, GL) the operation in project mode within the participating institutions, through in particular structuring methodological inputs and the dynamics created on this occasion. But daily life, reforms or crises naturally tend to focus actors on issues that can distract them from this dynamic, unless it proves synergistic with these same issues and with the strategic and operational management of the head of the school. Thus, it is essentially an alignment between the contributions of the projects initiated, the methods of collaborative work they have developed, the concerns of the stakeholders concerned, the way the head of the school manager manages and the challenges facing them that allows a change project to be truly appropriate by its actors.

From an opportunity to a few and a source of concern for many, it can become a resource for the greatest number when the elements that constituted the content of the change and the management method it helped to develop provide solutions to the problems faced by its players in the exercise of their profession. It is on this condition that we can hope to see an anchor of change in daily practices and a systemic transformation of the functioning of theinstitution, according to a collaborative or even learning logic.

Conclusion

At the origin of this study, two main families of questions were asked to us and it is in the hope of answering them that we mobilized the framework of contextual analysis of change.

The first focused on the interaction between the design and deployment of a digital educational project and the management of the institution. How does such a project affect and be affected by existing management? We have shown that this link is clearly visible in the case of the ANGE project because of its content, but above all because of the process of operating in project mode and accompanying the change it brought about. Nevertheless, the nature of the interaction is in no way deterministic and will depend on many parameters. The contextualist approach offers us three main ones that we mobilized during this study.

The content of the projects: here is the main commonality between the cases studied because, if they are not identical, they all fall under the same logic. The aim is to develop the use of digital tools in order to significantly evolve certain aspects of teachers' pedagogy towards more interactivity with pupils. The latter need to be more involved in their learning and this can include the use of digital tools before (preparation of reverse classes), during (toolsfor exchanges and interactions) or after (self-assessments, deepenings, distance tutoring, final evaluations) the class.

Context is an important differentiating factor and we have tried to show the impact on the project. External pressures from the school's environment can provide a strong lever for the project: incentives for guardianship, digitization of national assessments, high expectations of key partners, changes in classroom behaviour of students. But other characteristics of the same environment can significantly hinder the progress of the project, or even call into question the sustainability of what has been implemented:

regular reforms of programs and structures, regulation of the work of teachers not taking into account their investment outside the pedagogical face-to-face, instability of technologies and applications used, brutal crises... Faced with these factors, the heads of schools have no lever of action except that by identifying them and analyzing theurs positive or negativeeffects, they can try to adapt the management of their institution and the current change project.

That is precisely what the process is all about. It consists on the onehand, of the strategic and operational management of the establishment and the management of the change project itself. The latter involves the establishment of modes of interaction,, *a minimum* participatorys,even collaborative between theactors of the project team but also with all the actors involved in the project. When this is also the usual way of managing the establishment, there is no tension between the operation of the establishment and that of the project since both are on the same register.

However, when this is not the case, tensions are inevitable. These can be constructive and sources of learning and lead a rather hierarchical and direct management to gradually become more participatory, or even tend towards more delegation ofresponsibility to actors who are considered ready to assume more autonomy (Chomienne and Pupion, 2009). They can also be sources of contradictions between the uns formal and horizontal interactions involved in the operation of the change project and the more formal and vertical mode of operation on a daily basis. At the risk that the management of the project will shift to the day-to-day management of the establishment and is partly sterilized. It does not seem to us that this happened in the context of the ANGE project, but it is a very real risk. On the other hand, we were able to note, to varying degrees, that the dynamics created by the ANGE project naturally melted into the existing management when it was on the same register or, in the majority of cases, offered the opportunity to the head of the school to evolve his managerial posture, without necessarily being aware of it. For example, using the project to improve the strategic positioning of its institution in its environment and to

make this issue a driving force behind the dissemination of new teaching practices is an interesting contribution to the case of ZAWM.

This naturally leads us to the second family of questions that guided our study: what are the effects of school participation in the ANGE project on their governance, i.e. on their relations with their external and internal stakeholders?

We have shown that, for external stakeholders, participation in such a project is, by itself, an important lever to legitimise the demand for specific support, particularly in terms of resources. This additional contribution of resources is not automatic and is only achieved by demonstrating the potential added value for the establishment of participation in this project and the conditions for success that require the allocation of additional resources. Indeed, the project itself funds the operation and enhancement of the actions carried out between the participants of *the EE ANGE classlabs,* but each institution must mobilize its resources to design and deploy its change project locally. Once initiated, it is the effects produced that will also be able to position the institution favourably vis-à-vis the stakeholders who get new answers to their expectations. The more satisfied these stakeholders are, the more the head of the school and his teams can hope to obtain support and benefit from favourable arbitrations: the external environment is then a variable that is not fully experienced but which can be contributed, even modestly, to influence favorably.

As far as internal stakeholders are concerned, participation in a project such as ANGE is a great opportunity for its participants to be open, especially when participation in this type of project is not usual.le Meetings, exchanges, debates, visits, demonstrations and the development of common methodologies are key moments to learn each other's experiences and, in turn, to import these dynamics and learnings within one's institution. Nevertheless, the cases studied show that this is not done without a minimum of organisational efforts: steering committees, project leaders, thematic working groups, referents, relay teachers of their discipline or department... are all

devices and roles to be formalized to relay the dynamics and teachings of the ANGE project to the greatest number of people in the institution.

Thus, this cannot be decreed and essentially passed through the hierarchical process. This necessarily means delegating, therefore sharing, no part of the power of action (and certain decisions) with the main players of the project. They must have the legitimacy and the means to play their role of animation with their peers. This implies that teachers are receptive to these actions and agree to devote time and energy to them. However, this is not obvious, it is even pointed out by our interlocutors as the main difficulty in moving from a phase of experimentation provided by the actors of the project to a phase of adaptation and dissemination on a larger scale. As formal incentives, particularly financial incentives, are very limited or non-existent, they do not constitute significant leverage.

It is then the ability of the head of the school and the actors of the project to create a favorable context (in terms of envy and interest) to the commitment of the greatest number in the evolution of their pedagogical practices that appears decisive. But this implies that they see its meaning, interest and strong support throughout the process,, which implies the additional mobilization of material and human resources in support of the project. Or that the way the head of school is managed embodies, through his daily practices, what is required of his teams and that this constant exemplarity helps convince them of the interest and the merits of developing new modes of interaction between peers and with students, with or without the support of digital tools. This seems both heroic and a necessary condition for achieving a systemic transformation of the governance and management of an institution, with the deployment of digital devices being a trigger and possibly facilitator.

Thus, the question of the head of the school's appropriation of the pedagogical issues of the digital project, beyond the question of the integration of new tools, offers him the opportunity to play a real role of facilitator vis-à-vis the stakeholders (Attarça and Chomienne, 2012, 2013; Desmarais and Abord de Chatillon, 2010). Especially with regard to teachers, he can accompany all the more because he has knowledge and legitimacy on pedagogical issues (pedagogical differentiation, collaborative work among

students, increased autonomy of students, identification, evaluation and enhancement of cross-cutting skills...) without going into the didactic details. While the head of the school's ability to actively contribute to the evolution of pedagogical practices is facilitated by previous teaching experience and a common culture, it relies mainly on the development of relationships of trust and mutual respect in his daily management.

Bibliography

ATTARCA M., CHOMIENNE H., "Headteachers: New Managers in Changing Organizations," Management and Future, 2012/5, No. 55, 2012, p. 215-232.

ATTARCA M., CHOMIENNE H., "The heads of French public schools facing the challenges of the new management of the education system," Revue @GRH, 2013/4, No. 9, 2013, p. 35-66.

AUTISSIER and all., Driving Change: Key Concepts, Dunod, 2018.

AUTISSIER D., MOUTOT J.-M, Method of Driving Change, Dunod, 2016.

AUTISSIER D., MOUTOT J.-M, Agile Change, Dunod, 2015.

AUTISSIER D., JOHNSON K., MOUTOT J.-M., "From the Conduct of Instrumentalized Change to Agile Change,"Magement Questions, 2015/2 (No. 10), 37-44.44.

BAREIL C., Demystifying Resistance to Change, Telescope, ENAP, Vol. 14 No. 3 Fall 2008.

BAREIL C., Managing the Human Side of Change, Transcontinental Editions, 2012.

BAREIL C., Accompanying for Change: The Success of a Transformation, Management Review, HEC Montreal, Vol. 44 (4), 2019, 54-59.

BERNOUX P., Sociology of Change in Business and Organizations, Point Seuil, 2011.

BROUWERS I. et al., Human Management and Change Context, De Boeck University, 1997.

CROZIER M., FRIEDBERG E. , The Actor and the System, Paris, Seuil, 1977.

DESMARAIS C., CHATILLON ABORD E., "The role of the manager's translation: between allegiance and resistance," French Journal of Management, No. 205, 2010/6, p.71-88.

DUPUY F., We do not change companies by decree, Threshold, 2020.

JULIEN F., Silent Transformations, The Book of Pocket, 2010,

PETTIGREW A.M., "Longitudinal Field Research on Change: Theory and Practice," Organization Science, Vol. 1, No. 3, 1990, 267-292.

PICHAULT F., Change Management., De Boeck, 2013.

SOPARNOT R., "The Evaluation of Organizational Change Management Models: From Change Management Capacity to Change Capacity Management," Management, 2004/4 (Vol. 29), 31-42.

VANDANGEON-DERUMEZ I., "The Dynamics of Change Processes," French Management Review, September-October 1998.

VAS A., "The speed of change in large organizations," French Management Review, 155, 2005/2, 135-151.

ANNEX 4. TABLE OF 11 SCENARIES PRODUCED BY THE 4 CLASSLABS

PARTNERS	SUBJECT OF STUDY CANDIDATURE ANGEL	SUBJECT OF STUDY	PEDAGOGICAL OR GOVERNANCE SCENARIES OFFERED BY THE 4 SCHOOLS	TRACES SHORT-TERM TRAINING
PCH FRANCE	Creation of a "digital pedagogy" workshop; study of the impact of digital environments on the overall configuration of an establishment and recommendations for educational management	**How to transform a multimedia room into a place of research ?**	1 / Creation of a Learning Lab ; innovative learning space for students and teachers 2 / Creation of an educational innovation laboratory as a training space for education stakeholders : the innovative bubble 3 / Commitment to participatory governance of digital deployment in the establishment	1 / Creation of the layout of an educational space by codesign (modeling tool in the Sketchup space) 2a / Teacher training in a new digital tool "Learning Apps" 2b / Preparation of students for the oral examination of the French bac using ICTs (Google Doc) 3 / Interview conducted by the Action Research coordinator
GRE « GS Rakovski BULGARIE	Study of the digital learning environment for better social inclusion	**How to allow dropout students who do not show up in class to sit for exams using the Moodle platform created for this purpose ?**	1 / use of the Moodle platform to respond to an institutional order to allow the care of disabled students 2 / Extension of the uses of the Moodle platform to other audiences of the Lycée de Bourgas, based on the model of inverted classes 3 / Establishment of a skills development process between peers (formal and informal)	1 / Training in the basic functions of the Moodle platform and familiarization with its digital uses 2 / Learning sequence on the notion of French / Italian comparison using the inverted class

			4 / Development of participatory governance to assess teaching practices using digital technology	3 / formal and informal exchanges within the framework of activities (short-term training courses, other European projects, etc.) 4 / Interview conducted by the Action Research coordinator
Novida Lukio Loimaa FINLANDE	Learning situation to develop didactic proposals for skills development	How to develop assessment as a teaching practice ?	1 / Development of new online assessment practices by seizing the opportunity of the official digital Bac process ?	1 / Participation in the digital evaluation process for the bac exams
ZAWM St Vith BELGIQUE	Learning situations for a study of the conditions of education and learning in a digital environment - the use of ICT	How to offer a digital certification training (additional module) online for participants with different backgrounds ? How to manage (technical, educational choice) ?	1 / Familiarization of learners and teachers with a digital environment through the use of various digital terminals (BYOD, IPAD) 2 / Familiarization of learners and teachers with a digital environment through the use of various digital professional applications (BIM (Building Information Modeling) ; virtual welding station 3 / Implementation of distributed leadership within the framework of participatory governance	1 / French learning sequence via BYOD (mobile phone) 2 / Learning sequence on the use of a welding simulator 3 / Interview conducted by the Action Research coordinator

ANNEX 5. COMPARATIVE TABLE OF LEVERS/OPPORTUNITIES AND BRAKES/THREATS OF THE SWOT ANALYSES OF THE 4 CASE STUDIES

LEVERS/OPPORTUNITIES

1. From the Director and the management team

BURGAS	LOIMAA	PCH	ST VITH
The presence at the centre of a "digital culture", through the regular use of an ENT, internal messaging and shared virtual spaces.	The Ministry of Education's proactive policy on digital skills development and assessment.	A very buoyant ministerial context for the deployment of digital technology for the benefit of teaching and learning.	Management support
A well-established school culture of participation in Erasmus projects over the last 20 years: openness, exchanges, observation of other management	A certain culture of shared governance and leadership: the management is willing to consult teachers on many issues related to pedagogical organisation and	Structuring and formalisation of a managerial practice in question, which tends towards a form of shared governance, of which the steering committee is the symbol.	Support/relationship with companies

and learning situations: informal professional development already in place among several teachers, mainly language teachers. Each year, around 20% of pupils and teachers take part in transnational mobility, but more than 60% of pupils and teachers benefit from the returns.	school life. The implementation of the ministerial obligation to digitise secondary school exams is one example.		
The strong investment of the management to achieve the initial intention, to find solutions to difficulties (technical, financial, organisational), to support the project on a daily basis abroad and to find the necessary financial means, for example, to equip the pupils when the families are not able to do so.	The headmaster gave the teachers the space to be themselves and to try out the different technological tools. The headmaster supported the teachers' ideas and creativity.	Establishment of shared governance that encourages teachers to become involved in the life of the school (based on the identification of "innovative" leaders, their support, and the identification and strengthening of their skills).	Centre for training at the forefront of the digital issue
The parents' agreement to carry out the experience proposed by the centre and affecting their children (through an acceptance			Involvement in the European project ANGE

form made compulsory by the Ministry of Education).			
			Adequate premises
			Always listening to companies

2. From the teachers

BURGAS	LOIMAA	PCH	ST VITH
The training of the teachers taking part in the experiment is provided by an in-house trainer, partially relieved of his or her teaching duties, who has both a pedagogical and technical profile as well as reverse classroom experience: short face-to-face training + online exchanges in the form of start-up support + tutoring.	The Ministry of Education's proactive policy on digital skills development and assessment.	The majority of teachers are committed to their schools, even if their projects do not focus on the digital environment.	Teacher motivation

The previous experience of several teachers in using the platform in their classrooms: existence of a first basis of "digital pedagogical culture".	The good will of the work team in terms of developing the use of digital resources in the courses.	Pioneering" teachers are already committed to using digital technology in their lessons, some of them finding themselves in the "innovation bubble" that is taking its first steps.	Culture of collaboration and exchange
Team work to choose the learning contents that will be the subject of the reverse class, the approach to be applied and regulated, on the basis of an already existing culture of exchange and joint work.	Carrying out internal training courses on digital tools and their proper use in teaching practices (Abitti, which is the digital assessment platform, and Microsoft Office 365). The training focused on technical and pedagogical aspects, with exchanges of ideas and practices between teachers. The "pioneers" were able to take advantage of these moments to share their experimentation, better understand the support needs of other teachers and convince them to join the project.	Presentations during educational days on the digital field, which helped to nourish the first exchanges.	Teacher training

Information and support to students to help them become familiar with the platform and the learning methodology (in the initial scenario and then in the reverse class scenario).	The presence among teachers of Riitta Salmenoja (who is also a national mathematics trainer), which involves local training.	Development of individual and collective skills.	Hours of free lessons
Desire to participate in new innovation projects	Quality digital resources, in terms of infrastructure, networks and personal technological devices, as well as the willingness to find appropriate solutions to ensure that all students have access to digital devices.		Innovation - willingness to innovate
	The ANGE project, as a vector for opening up to other contexts, discovering other practices, other uses of digital tools and which can enable the management and other teachers to take an interest in the transformations desired by the "pioneers". The meetings held in the framework of the ANGE project and in the specific		Acceptance of teaching staff

	development of the classlab allow to go out of the comfort zone. Teachers have been enriched by the experience of others and the diversity of others (in terms of tools, situations and teaching practices), and have learned to have the right to make mistakes and even fail.		
	A certain culture of shared governance and leadership: the management is willing to consult teachers on many issues related to pedagogical organisation and school life. The implementation of the ministerial obligation to digitise secondary school exams is one example.		Attachment of teaching staff to the training centre
	The choice of "pioneers" to implement this experimental strategy, step by step, and the openness and exchange with other teachers on the basis of		Experimental approach and accepted as such: trials/errors, exchanges, advances, etc.

	"evidence". In this way, institutional opportunities (external and internal) can be used to try to convince and train new teachers with regard to the classroom laboratory.		
	Digitisation makes evaluation more diverse and different types can be applied, such as self-evaluation, peer review or multiple choice with immediate feedback.		
	The work of the teachers is very independent, and they can use the digital tools they want.		

3. From the students

BURGAS	LOIMAA	PCH	ST VITH

The existence, for the first two years, of compulsory training for computer science students, which they can take as an option in the continuation of their studies. A very gradual decrease in the drop-out rate as indicated by the teachers themselves, although this strength needs to be assessed over time to see whether it is maintained.	Quality digital resources in terms of infrastructure, networks and personal technological devices, as well as the willingness to find appropriate solutions to ensure that all students have access to digital devices.	Development of the investment of all pupils, by valuing pupils with educational difficulties in order to get them back into learning, thanks to their taste for digital tools.	Motivation of students
More interest in the studies of some students, due to an increase in their motivation.	All students benefit from a specific digital culture course.	Development of transversal competences, which will usefully complement the more "academic" competences and help them to better integrate into higher education and more generally into the professional world and society of tomorrow (see expected competences).	

Full participation in the process since students are involved in their learning, are active and actors and this generates the possibility of improving their academic results by realising how far they have come and how far they still have to go.	Students are highly motivated in the use of digital resources.	Put the pupil at the centre of his learning by stimulating his activity and getting him to pass it on to his peers.	
Practical application of the knowledge and skills acquired. As a result, more learning is perceived. Development of autonomy and teamwork: students become masters of their own learning.			

BRAKES – THREATS

1. From the Director and the management team

BURGAS	LOIMAA	PCH	ST VITH
Computer equipment is sometimes insufficient: wifi network, teachers' equipment, room equipment (e.g. video projectors), operation of the network infrastructure, etc.	The management is primarily concerned with the proper application by all teachers of the ministerial directives, but it does not make the initiative of the "pioneers" of this classlab a priority for the centre.	The common school culture has yet to be built: differences in professional interests and pedagogical priorities.	Budgetary resources, as margins are narrow and large-scale projects require seeking external funding
The weakness, or even absence, of an institutional system of continuing training encouraged by the Ministry. It is therefore necessary to commit to a policy of regular and long-term internal continuing training.	Educational practices are unlikely to change without management pressure. Therefore, a strong commitment from the management is needed to encourage teachers to participate in the project.	Ongoing training is done on personal time and is not financed.	Size of premises too small

The need to be able to formalise the actions carried out and evaluate them in order to make them evolve.		The activities of the "innovative bubble" have gradually become more structured, but exchanges on feedback are lacking.	Lack of a technician
At the beginning of the project, the relative absence of an evaluation process based on clear and shared criteria			Too little time to pass on the basics
The need for management to master both intentions and strategy, and to have a good understanding of the tools used, their potential for experimentation, a good knowledge of teachers, their reactions to digital technology, and their needs in the face of the difficulties and fears that may arise when entering into these pedagogical transformations.			Cost of equipment that quickly becomes obsolete

2. From the teachers

BURGAS	LOIMAA	PCH	ST VITH
Teachers have a very heterogeneous digital and pedagogical culture, which can generate resistance to the proposed transformations.	The new secondary school curricula begin to operate in 2020 for implementation in 2021, an issue that will attract the attention and efforts of teachers.	Teachers with little or no training in the use of digital tools (fear of technology, little desire to be insecure, fear of the time it takes to train and think about new situations). The first few months of operation of the "innovation bubble" have not borne the expected fruit in this respect, as the uptake remains very marginal.	Recurrent technical problems that make teachers insecure
The commitment of "pioneer" teachers to pedagogical transformation is difficult to recognise financially because there is no system for paying overtime.	The culture in upper secondary education is still very individualistic when it comes to teachers, and everyone does what they think is right in their classrooms in terms of the use of	The presence of the technician is considered insufficient in a start-up period during which technical insecurity is a powerful brake on transformation.	Lack of time for teachers to invest in discovering the tools, their functionalities and their integration into new pedagogical situations.

	tools and methods.		
Lack of time for teachers to train at home: the investment is personal and can only be made on a voluntary basis.	Little time for exchanges, except within the same disciplinary group. More strategies and better conditions for teacher exchanges are needed to consolidate innovative practices around continuous assessment of formative and summative learning.	The heterogeneity of middle and high school teachers.	Reluctance on the part of several (older) teachers
	The time that needs to be invested and spent from personal time by teachers to create new educational situations and new activities, and to exchange with other teachers participating in the classroom laboratory.	The "learning lab" used is on the premises of the high school, which does not make it easy for secondary school teachers to come.	Remaining up to date, at the level (technology is evolving fast)
	Digitisation of final evaluations is accepted (due to an institutional obligation), but there is no particular motivation to reflect collectively on new teaching practices (e.g. the development of		The fear among a majority of teachers that they do not feel they are "living up" to expectations (their own and those of their students).

	student self-evaluation), as the results are good and parents, like students, are for the most part satisfied.		
	The non-existence of a class group per se, since students, due to their choice of subjects over a period of time, form random and punctual groups.		No continuous training prior to experimentation, very heterogeneous personal digital culture
	The organisation of school time into periods of 6/7 weeks for a group of pupils, which makes it difficult to continue educational activities and to evaluate their effects.		
	There are few guides and teaching materials specifically for numerical assessment. There are no specific resources available for the transition to digital assessment, which means that teachers need to carry it out		

	autonomously in order to improve their teaching and meet this need.		
	It would be important for more teachers from the centre to participate in the classroom laboratory.		
	In the framework of the ANGE project, the exchange times during the transnational meetings were short and did not allow to enter into discussions that would be necessary, also considering the language barrier.		

3. From the students

BURGAS	LOIMAA	PCH	ST VITH
The students have a rather heterogeneous educational level,	Lack of belonging to a proper class, since students, because of	Infrastructure and terminal facilities are too limited. The use	The management of new classroom situations due to the

although they all entered high school through a selection system and with a certain cut-off grade.	their choice of subjects over a period of time, form random and ad hoc groups.	of pupils' personal terminals leads to inequalities and the fear of many teachers of disruptive recreational uses.	use of digital tools, in particular smartphones (potential distraction of pupils: messages, photos...)
The team of students in question is random.	Sometimes having the technological resources available can mean a few moments of distraction.	Pupils with heterogeneous profiles.	Lack of easy-to-use applications and little previous "modeling" practice
	There is no need to change things because the climate at the school is pleasant and the results are rather good.	Problems linked to adolescence or the lack of attention from pupils when they use their smartphone in class, for example, which can be a hindrance to pedagogical innovation.	

ANNEX 6. GLOSSARY KEY CONCEPTS ANGE PROJECT

STRATEGIC PARTNERSHIP ANGE

2017-1-FR01-KA201-037369 – duration of the agreement from 01/09/2017 to 31/12/2020

GLOSSARY KEY CONCEPTS ANGE PROJECT

Support	It is a modality of professional action or activity-based training which, alongside the practitioners concerned, involves people of different status: peers, experts, trainers or researchers. Support is considered a necessary condition to facilitate professional development, especially when it is collective and "supportive". It can take very varied forms, involving research to varying degrees, but it is there to help people to take a step back, to help them analyse their professional activity and/or carry out a project, to compare points of view, to provide expert input, it is there to grow and nurture an individual and/or collective path, but not to say what needs to be done or what the path is. (Sources: interview and webinar with François Müller, interview with Olivier Perrenoud, interview with Monica Gather Thurler, interview with Jean-Marie de Ketele, interview with Ricard Wittorski)
Learning, apprenticeships	In ANGE, we conceive learning as a mechanism, a process, a dynamic that allows the acquisition of knowledge, know-how, interpersonal skills, which facilitates the implementation of a competence in action, in situation. The actor of learning is the "learner", whoever he is and whatever the context of learning, whether at school or at work, and whatever the form, formal or non-formal, or even informal. The ANGE classlab thus promotes the creation of a community of practice and learning between and by peers that brings together both the leaders and teachers of the experimental establishments and also the trainers and researchers who accompany them. This type of approach is often associated with a context of innovation, pedagogical and/or managerial; as shown by Axis 2 of the Quebec PAN (digital action plan) and particularly the deployment of the CAPTIC (centre for learning in pedagogical applications of ICT), which have largely inspired several partners in the ANGE project.
Classlab	The Class Lab designates "a laboratory for supporting change in education and links with digital technologies and governance of action. The concept of Classlab is based on a conception of the development of 21st century skills for education stakeholders and learners in the training establishment. The Classlab is also a place for transforming the institution". Source: ANGE ERASMUS+ project; Definition enriched and finalised by the Bulgaria workshop of the ANGE project (2018): "The ANGE classlab is a laboratory for supporting change in education in relation to digital

	technologies and governance in education. Its objective is to be a lever for the transformation of the institution. It is organised as a learning community made up of stakeholders: researchers, trainers, school heads, teachers, parents, students, professionals, local partners, etc... These learning communities enable experiments to be supported as close to the field as possible, thus becoming a form of in-service training for teams, teachers and headteachers. The classlab concept is based on a conception of the development of 21st century competences of education stakeholders and learners in the training establishment. The approach of the ANGE Classlabs communities is that of action research. It is based on methodological protocols: identification of the object of study, analysis and theoretical contributions from research and experimentation, formulation of future scenarios enriched by the progress of the research. The ANGE classlabs are organised in pan-European and international networks and work both face-to-face and remotely. »
Learning community	It is a group of individuals, who share common interests, in their professional activity, in their intentions. It becomes a "learner" when it wishes, in conscience, to develop collective knowledge that contributes to the professional development of its members, when its members formalise their own knowledge (or know-how, or resources...), in order to capitalise on it and be able to share it, within the community or with others. The learning community, like the learning organisation, is built on the transition from "solitary" professional development to "solidarity" professional development. (Sources: interview with François Müller, webinar by Richard Wittorski, webinar by Jean-marie de Ketele)
Skills	**Definition by Tardif (2006)** : "A competence is an ability to act based on the effective mobilisation and combination of a variety of internal and external resources within a family of situations". **Definition enriched by the AEFA ERAMUS+ Guide (2017)** : "A competence is a knowledge to act based on the effective mobilisation and combination of a variety of internal resources (knowledge, cognitive capacity, metacognitive capacity, procedural know-how, physiological resources, emotional resources, etc.) and external resources (networks, software, database, documentary resources, members of the collective, resources of the professional environment, etc.) within a situation in a given context". **Enhanced and finalised definition of the ANGE project's PCH workshop (2019)** : "A competence is a know-how to act based on the effective mobilisation and combination of a variety of internal resources (knowledge, cognitive capacity, metacognitive capacity, procedural know-how, physiological resources, emotional resources, etc.) and external resources (networks, software, data bank, documentary resources, members of the collective, resources of the professional environment, etc.) within a family of situations in a given context, with

	reference to an educational vision co-constructed by the actors of the ANGE project within ERASMUS+".
21st century competences - transversal competences	These are skills that can be mobilised in a wide variety of situations and/or contexts. "This does not mean, however, that they can all be mobilised simultaneously in all situations. They can be divided into five dimensions : - organisation - adaptability and autonomy - sociability - communication - initiative-taking and participation. » (Source : AEFA ERASMUS+ Guide).
Professional development (continuous)	Professional development is concerned with vocational learning. It describes the way in which people build themselves and change over time. It can be intentional or unintentional, formal or informal. It is essentially developed in a collective framework, over time, in contact with other professionals and/or expert resources. It differs from continuing education, which is only a limited aspect of professional development. It is nourished by opportunities to meet other professionals, other work situations, and elements of reflection on professional activity. It is all the more effective when it is lived in support contexts that help to raise awareness of professional developments at work. (Sources : interview with François Müller, interview with Richard Wittorski, webinar by Jean-Marie de Ketele)
Learning establishment	It is an establishment in which the staff who make it up have decided to move from "solitary professional development" to "solidarity-based professional development", in which the teams decide to develop collective knowledge, beyond the addition of individual knowledge, to share experiences, resources, reflections, to formalise them in order to better capitalise on them and share them better internally, but also with others outside. It is an institution in which one learns from one's professional practice, from the practices of others, from the analysis of these practices, from the contributions of experts. You learn all the better the more you are supported to do so, the more you are part of this collective dynamic over time, the more you do not hesitate to open up to others, to be inspired by them and to draw inspiration from them. It is the responsibility of the management of this establishment to create the climate, the conditions favourable to the emergence and life of such a dynamic and it is the responsibility of everyone to commit to sharing. (Sources : interview with Jean-marie de Ketele, interview with François Müller, interview with monica Gather Thurler, webinar with Richard Wittorski)
	In the ANGE project, it is evoked in the framework of the classlab approach that accompanies the innovations brought by the teams of 4

Evaluation (forms of evaluation)	establishments: the evaluation must be built in the iteration of the experiments, feed the regulation and the life of the project. To do this, it must be built on the basis of the objectives and expected effects for each scenario, as a series of stages in the evolution of the original scenario. It concerns each level of action of the project, its governance, the role of the actors but also the pupils in particular. It is not an external judgement, it is a moment of the innovation process, it participates in the formalisation of the project and therefore of the capitalisation in this respect. It also enables better sharing with the support team and with the other teams in experimentation. (Sources : action research workshops of ZAWM St Vith and ICP, interview with Françoise Cros)
Experimentation	It is an iterative approach often linked to innovation. It is based on questioning, observations, analysis of action, trial and error and regulation. It takes place over time. (Sources: interview with François Müller, interview with Hervé Chomienne). The ANGE project proposes to implement 4 experiments in 4 different schools to bring pedagogical and/or organisational innovations linked to the deployment of digital technology.
Governance	Governance refers to a complex system of decision-making entities that direct one or more areas of activity. The notion of governance implies the notion of multiple systems and entities. No single entity has the power of decision alone; this is the case of the ANGE ERASMUS+ project which is part of a European space with several partner entities. Quality governance therefore implies a systemic approach and a form of steering* that allows it. Comments by Alain Bouvier : "I am talking about governance in relation to complex systems (in the sense of Morin); in general, with few exceptions, a school is not a complex system even if there is complexity within it. A complex system has many stakeholders (who want to take part in decisions and demand accountability), there is no single 'leader', at most a 'facilitator' appointed by the stakeholders for a very limited period of time, with many relatively autonomous internal networks and sub-structures (such as a nuclear physics laboratory...), many partners (agreements, contracts, joint projects...), where collective decision-making mechanisms are constantly being built around multiple projects, where the main focus is on regulatory mechanisms and the evaluations carried out. We can speak of governance for very large multidisciplinary universities, for large hospitals, for a regional park, etc. We are at the crossroads of management sciences and political sciences. For example, the history of the Notre-Dame des Landes airport raised multiple governance problems, and nobody was in a position to decide alone; there were no pilots. Another example: the director of the CIEP pilots his establishment, which he runs with his board of directors; but for all the big responsibilities he inherits, which concern multiple French, European and international institutions, he is there on a register of governance and there is no pilot... or there are too many ! »

Innovation	It is a contextualised change that can take many different forms and produce many different effects. Above all, it aims at an improvement, in consciousness, on the part of those who wear it. It can be punctual, "on the surface" and quickly fade away, but it can also be structural and become a real transformation. It has complex relations with the institution ("I love you, neither do I"): the school institution needs innovations to evolve for the little that they do not call into question its fundamentals; innovations need the institution to obtain the means to function, a certain recognition, but not too much so as not to "recuperate" and "institutionalise", which does not often appeal to innovators. (Source: webinar and interview with Françoise Cros)
Leadership	Leadership refers to the process by which a person influences or unites other people or organisations in order to achieve certain goals. Leadership can take different forms: authoritarian (top down, in reference to hierarchical status), charismatic (in reference to the moral authority of the person), transformational (focused on the transformation of practices in an institution), instructional (focused on educational outcomes), pedagogical (focused on pedagogical practices), distributed (focused on the sharing of responsibilities between different actors). In the ANGE ERASMUS+ project, leadership is a distributed leadership where responsibilities are shared with a view to transforming pedagogical practices (notably through the use of digital technology) to improve educational outcomes, to train a European citizen committed to the society in the making and to develop the professionalism of the actors involved in the organisation (emerging professionalism*).
Partnership	The partnership is "an association of personal or institutional actors (institutions or organisations or bodies or authorities) who have an interest in carrying out joint operations to exchange resources (information, skills, various means) in order to carry out a common project (development, education, training) in the service of the people for whom they are responsible". Partnership implies a collaborative approach*. Source: Result of a content analysis of partnership definitions (Mahavoriaina & De Ketele, 2019, ICP).
Research Action	There are several forms of action research, all of which bring together researchers and practitioners around a common question. The differences are built on the level of involvement of the researchers in the choice of the common question, their involvement in the design of solution paths and in their implementation (source: interviews with Monica Gather Thurler, Olivier Perrenoud). The ANGE project has opted for collaborative action research that involves researchers in the construction of solutions, in a classlab type support approach (see above).
	It is the fact of validating knowledge, know-how, skills, on the basis of evidence, or more generally of validating a skill in a situation. This

Recognition	recognition often remains the work of institutions. The approach of open badges (open badges) makes it possible to open up this recognition to individuals among themselves through a request for endorsement, which can be made on the basis of evidence that the person concerned stores, for example in a digital portfolio. (Source: Serge Ravet's intervention during a workshop at ICP - September 2019)
Common skills repository	A reference system must enable everyone to find their place, particularly when each skill is broken down into levels of complexity. It must also allow each individual to better identify his or her distinctive abilities in order to put them to better use for the collective of his or her institution, or even for European projects, as in the case of ANGE. The co-construction of the reference system creates a collective dynamic favourable to this identification, as well as to the identification of concrete professional situations which, in the context of each individual, allows to work and master the competence concerned. This can only be done because the group co-constructing the reference system shares the same vision, the same purpose. It is not a disembodied ideal to be achieved, but rather a lever, among others, for professional development based on solidarity. (Source: interview and webinar by Jean-Marie de Ketele)

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