

NOVIGADO

ACTIVE LEARNING AND INNOVATIVE TEACHING
IN FLEXIBLE LEARNING SPACES

Pedagogy and the learning space

Novigado project final report



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Executive summary

The design of the learning space has recently become more important for all stakeholders in school education, especially at local levels, as well as for architects and designers. Across Europe we can see more and more visually interesting school buildings that offer a variety of indoor and outdoor learning environments. However, even an outstanding modern school building, carefully designed to offer advanced and comfortable learning environments, may be used to deliver a traditional, instructional approach where students sit and listen to the teacher in front of them. This sort of pedagogical approach does not require much innovation or investment in the school infrastructure. But do we really believe students learn effectively and increase their competences in such a way? How do we empower students to become active learners? How do we initiate the transition of pedagogical everyday practice in every school?

Novigado was not a project about prominent, 'ultra-modern' school spaces designed by master architects. We focused on school spaces that are present in most European countries. The key to educational change is not the shape of a building, but rather the mindset of teachers and the whole school's approach to innovation. We believe a pedagogical change is possible in every school, and in most cases without serious investment in reorganisation or redesign of physical spaces. Of course, modernised school environments are comfortable for students and teachers, but here we are talking about something more, the next level. What we wanted to focus on was the link between pedagogy and the school space. Flexible learning spaces are in every school, and it is time to discover them, for the benefit of the pedagogy, and obviously the students.

Novigado aimed to support schools and related stakeholders in the transition from a conventional, teacher-centred classroom into teaching practices that promote active learning with the support of innovative learning environments and use of relevant ICT. Schools and teachers are in a critical transition phase where increasingly technology-rich learning environments and student-centric pedagogy are gaining ground in current practices. The focus of teaching is shifting from content to developing key competences. Schools and teachers are also directly impacted by developments in modernising or transforming physical learning environments.

In Novigado, we addressed the above-mentioned challenges. Within the outputs of the project, we promoted innovation in both teaching and learning by bringing an active learning model to the reach of more schools, teachers and other education stakeholders, and supporting them to benefit from the opportunities brought by ICT and new learning environments. The physical dimension of a school is very important to us, and we consider the role of learning spaces to be an enabler and impetus in the active learning process: the school environment is the 'third teacher' that offers added value to the learning and teaching process.

First of all, we focused on the meaning of active learning in the light of current practices and technology that can facilitate teaching/learning. How can active learning be implemented in schools and what benefits does it bring? Why is active learning so important for students nowadays and why is it becoming so crucial in the era of geopolitical or social disturbances we face around the globe, such as the COVID pandemic or wars.

The core of Novigado was the flexibility of the learning space. In the *Guidelines in Learning Space Innovations* we explained how to adapt the school space to any learning scenario that we wish to present to students. Every teacher has the power to use the classroom (or other) space to support the teaching process and this space can be pre-designed to help students

become more active learners and enhance key competences. We also recommended a number of learning zones that can be developed by schools to support everyday pedagogical practice.

The flexible learning space concepts were tested by 25 European schools within the Novigado *Capacity Building Programme*. Most of the teachers considered that changing their attitude to a classroom or school space and preparing active learning scenarios was helpful for their teaching practice efficiency, increasing their self-confidence to guide new activities. Many of them agreed that experiencing the pilot phase was useful to start reflecting on pedagogical changes and experimenting with new pedagogical practices, and Novigado ideas and concepts were useful for re-boosting the school's dynamics around active learning.

The Novigado project may be perceived as an important educational effort with pedagogical impact on schools across Europe. We hope we have provided policy-makers (as well as school community and teacher development institutions) with practical recommendations on how to support schools or local authorities to adapt or design the learning environments in schools and other educational institutions and use them in a more innovative way. The sets of recommendations are presented at the end of this report.

Chapter 1. Project background and outputs

The main objectives of the Novigado were:

- to provide evidence-based insight into active learning, helping to understand the principles of active learning in innovative learning-environment settings;
- to guide schools and teachers to audit their current learning spaces and guide them to adapting them in a resource-effective way;
- to develop a training programme that will help schools to apply the principles of active learning in different learning-space settings;
- to establish and animate a participative network (a community) of practitioners who engage in exchanges and professional development around teaching in innovative learning environments;
- to inquire into the effects, perceived benefits and challenges of an active-learning approach that involves both teacher innovations and effective use of the learning space in every school.

The project activities were divided into four main pillars.

We started with learning practice in schools and formulated the Active Learning Framework that can help schools to understand how active learning can be implemented in everyday pedagogical practice. Outcomes of this pillar were also important for subsequent Novigado phases, like the *Capacity Building Programme* for pilot schools (CBP), the *Guidelines for schools in Learning Space Innovations*, as well as designing the *Active Learning MOOC* (Massive Open Online Course) and the *Online Scenario Tool* for educators.

The second pillar was dedicated to educational learning spaces. Our work did not aim to present how to design and build modern, beautiful, physical school environments. Instead, it focused on the proper use of the space that schools already have or may have even without serious financial investments. We wanted to present how to use the existing school space in a more innovative way to help learners become more active in the teaching process. In other words, we aimed to inspire and present how the learning space could be pedagogically modern and purposeful.

The third pillar involved teachers and students. Aiming at more practical than theoretical outputs of the project, we have developed a series of activities to test the Novigado approach in a number of schools across Europe. Altogether 25 secondary-level schools in France, Poland, Portugal and Turkey were invited to participate in the *Capacity Building Programme*. They were offered pilot training, based on which they developed learning scenarios that were then tested during lessons with students. The programme resulted in the *Novigado Training Manual*, available in English, French, Polish, Portuguese and Turkish. It is aimed at anyone who wants to replicate a similar training programme in a school, a training institute or any other face-to-face course setting. It is accompanied by a comprehensive toolset of documents and instruments to carry out and monitor the programme (nearly 30 attachments).

Finally, as we aimed at increasing teachers' and students' teaching and learning skills, several tools and resources were developed within the project. They were mostly designed for

individual study or use by a teacher who wants to increase some pedagogical skills and better use the learning space during classroom or outdoor learning activities. In the fourth pillar, teachers were offered tools like *Online Learning Scenario* and were invited to participate in the MOOC course (the *Active Learning Scaleup Instrument*). In addition, during all phases of the project a broad variety of contents was produced and added to a repository where it may be easily found and used by teachers across Europe.

Last but not least, we monitored results and evaluated findings of the school pilot in order to see how teachers and students react to the Novigado approach and how they implement it. Chapter 2 presents what has been learned from schools within the evaluation activities.

1.1. Active learning

The Active Learning (AL) approach is at the centre of all Novigado activities. In a traditional form of the teaching process a teacher delivers a lesson to students explaining particular topics, and students listen to him/her. But such a learning process does not support the development of transversal skills. Therefore, we are in favour of restructuring everyday teaching practices and including more forms of active learning by students in this process. However, there is no call from the project to flip everything upside down and teach using only active learning methods in the classroom. The learning process must engage students in a wide set of mixed learning activities, make them discover issues and construct their knowledge and develop learning strategies, but still the teacher can be their guide, who helps with more complex issues during the lesson, when it is necessary for a proper understanding of the subject matter. To help teachers do so, within the project we proposed various teaching methods that are worth trying even for experienced teachers.

Active learning can derive from any form of activity that truly engages students in the learning process. The [Active Learning Reference Framework](#) created within the project provides a theoretical and conceptual background in the areas of active learning pedagogy, key competences and transversal skills, practical techniques of active learning, active learning environments, active roles of students and teachers, and advantages and barriers to and critiques of active learning.

As presented in the framework, active students learn by doing and reflecting on their actions. They participate actively in their own learning by forming connections between their previous knowledge and new information. The majority of descriptions of active learning bring us to the point that active learning is a process of making meaning. The basic elements of active learning are collaboration, discussion, investigation, practice, producing and reflection, all of which require students' active attention. Learning becomes meaningful when students make their best effort during the lessons. The role of a teacher is to create opportunities for such an effort in the classroom.

Active learning pedagogy aligns with the European Commission's and UNESCO's goals and priorities on key competences and transversal skills, which are crucial for preparing students for life in the present and future times. These skills benefit students in multiple ways. They are better at analysing and assessing things on their own, thinking independently, and coming up with creative solutions to challenges. They actively participate in their own learning by drawing connections between previous knowledge and new information. These abilities are especially valuable at a time when distant and hybrid learning environments are becoming more common, in the aftermath of the COVID-19 pandemic or due to other global challenges society is facing. Increased self-reliance allows students to stay focused and also carry on in distant

and hybrid learning environments, where lessons are delivered both synchronously and asynchronously.

Obviously, active learning comes to schools with both opportunities and challenges. The most significant opportunity is providing student agency for learning. In other words, active learning promotes students' autonomy, as well as lifelong learning abilities and the development of metacognitive thinking. However, there are also challenges for schools in applying active learning, such as strict class schedules, a crowded curriculum, the impracticality of active learning in crowded classrooms, a shortage of materials, equipment or resources, and some students who need additional support in the new way of learning. But we believe that such challenges can be addressed through a progressive transformation plan that is endorsed by the school management and teachers. Obviously, this will not happen in a short period of time. It requires discussion and planning at the school level and a plan for implementation of active learning activities during lessons. An openness to teaching experiments is crucial in a teacher's everyday practice and it stimulates both professional development and a school change.

1.2. Flexible learning spaces

The natural course of action after considering implementation of an active learning approach in a school is to create the conditions that would go hand in hand with this type of pedagogy. Some aspects of the learning environment that lend themselves naturally to such changes are space and seating arrangements. When the learning process becomes student-centred, and collaboration and communication are key elements of the class, the traditional classroom setting – in which the desks are arranged in rows facing the teacher's desk and the blackboard/whiteboard (or a large interactive smartboard) – becomes not only obsolete, but also counterproductive. Moreover, in many schools learning spaces tend to be limited to classrooms only, whereas innovative schools also offer to use common areas, indoors and outdoors, for learning individually or in groups. For instance, such 'extended' learning spaces can include corridors, lobbies, dining halls, courtyards, niches, or school gardens and lawns or any other open-access public area (even outside of the school territory).

Learning at school can happen everywhere as emphasised in Novigado. To approach the subject in an orderly and scientifically grounded manner, it's worth starting from David Thornburg's metaphorical learning situations. This futurist thinker developed an idea of the following learning zones: Campfire, Watering Hole, Cave, and Life.

- The Campfire is where students can learn from experts – it is a space for storytelling.
- The Watering Hole took its name from the place where community members gathered to exchange news, so it symbolises the space where students learn by talking to one another, giving and receiving peer feedback. This strongly corresponds with the idea that learning is a social phenomenon.
- The Cave is a personal space where students can build knowledge by working on their own, without being disturbed.
- Life symbolises a space where ideas are put into action and tested, it's a place for experimenting, exemplified by various maker labs which are more and more popular not only in schools but also across cities.

Thornburg's concept corresponds to the Future Classroom Lab learning zones concept developed by European Schoolnet.

- The Campfire is reflected by two zones: the Interact Zone, where the teacher may provide some direct instruction and do some lecturing, although his/her actions may be upgraded and made more interactive by employing ICT solutions, and the Present Zone, where the students are the ones who present the outcomes of their project work, etc., thus providing a source of information for their classmates.
- The Watering Hole corresponds to the Exchange Zone, which supports students' collaboration, and where social learning and peer feedback is the main mode of learning.
- The Cave is reflected in the Develop Zone which supports students working independently: alone or in small groups.
- Last but not least, Life, with its experimental approach, gave rise to the Investigate and Create Zones. The first is a space for inquiry, experiments and searching for information, and the latter a space for tinkering, building and making.



Figure 1. Metaphorical learning situations as presented by David Thornburg in the book *From the Campfire to the Holodeck* (2014).

Although transforming a traditional school into more open and flexible learning environments can pose a substantial challenge (e.g. architectural, organisational and/or financial), there are different levels of changes to choose from.

The first, totally cost-free way is to get rid of unused furniture and equipment which just clutter the space. Students' desks can be arranged to develop collaborative and social competences. Novigado's [Guidelines in Learning Space Innovations](#) provide some practical examples and suggestions as to how to do that. One example of a no-cost strategy is the mobile debate, which requires just a free floor area where students position themselves to answer the teacher's questions.

The other end of the spectrum includes comprehensive, expensive and professionally designed makeovers of the existing infrastructure or even building completely new learning spaces in new buildings. Plans demanding substantial funding require involvement of and decision-making by local or national authorities or school boards. It goes without saying that any planned changes should result from the school's pedagogical needs, not from an external trend. And, to underline, it is strongly recommended to include all stakeholders in the process of designing such a new learning environment: not only officials and architects but also teachers, students and even parents as they represent the local community which could benefit from new, multifunctional premises. This is a process where all voices and opinions should be taken into account.



It is also recommended that the change of the learning space in school should be understood as an ongoing process rather than a one-time revolution. Any school debate and action taken may be a good opportunity for more pedagogical experiments and in the end gathering valuable experience on how to teach/learn in flexible learning spaces.

All of the above considerations were published in the *Guidelines in Learning Space Innovations* where we considered the reasons why flexible learning spaces are ideal to accompany active learning pedagogy and the development of skills in the classroom as well as identified practical classroom set-ups for different activities. Finally, we identified challenges related to mindsets, skillsets and toolsets of both students and teachers that might be obstacles to implementing active pedagogy and flexible spaces.

The Guidelines are accompanied by 13 case studies from schools in France, Portugal, Poland and Turkey that have implemented flexible and innovative learning environments. The schools described their road to becoming more innovative in adopting the spaces and active pedagogy (understood as student-centred learning). They shared their successes and identified benefits for the whole school community, but also addressed the challenges encountered while implementing changes. The stories can serve as an inspiration for other schools across Europe who are at the beginning of their journey towards becoming more active and more flexible schools. Obviously we are aware that we can find many more such interesting stories across European schools as flexible learning space is a fascinating pedagogical issue. It is certainly worth further study and testing by head teachers, teachers and students and we strongly believe that the project outputs can inspire many innovations in schools.

1.3. Capacity Building Programme for schools

Novigado's *Capacity Building Programme* (CBP) was designed to facilitate implementation and support sustainable change processes in schools. The CBP aims to mainstream Active Learning and pedagogical innovation at the whole-school level, going beyond individuals or a small group of front-runners.

To put the programme into practice, the project partners organised a CBP pilot in four countries – France, Poland, Portugal and Turkey – between June and December 2021. Each

of the four national pilot programmes involved five to six schools. The pilot started off with a training workshop for teacher teams of the participating schools on Active Learning pedagogy, which was followed by creation of innovative scenarios and their implementation with students in the classroom.

The pilot was launched in each country with an online kick-off event for the participating school teams, in June/July 2021, about two months before the actual training workshop and the classroom phase. In this event the main objectives of the CBP, the timeline and the commitments were shared and discussed with teachers. This allowed the schools to get prepared for the programme by involving and informing relevant colleagues and school management, and selecting class groups.

The main part of the actual Novigado school pilot commenced with a training workshop for teachers who later rolled out the activities with their students. For this purpose, the programme was shaped into a two-day workshop. It consisted of different modules, dealing with different aspects of Active Learning and testing proposed methods in practice.

The two-day training workshop served as a preparation for the core activity of the pilot programme, which was the activities taking place in classrooms.

This phase took place over a period of about three months and consisted of two parts. During each part the teacher teams developed a scenario in their school. The scenario was then delivered in at least two different class groups. During these deliveries, peer review was conducted by one or more colleagues from the school team.

In between the two parts the school teams attended an online follow-up meeting with the national Novigado team.

During the pilot phase the school teams co-created scenarios making use of the *Online Scenario Tool*. The scenarios were delivered in at least two different class groups. To this end, the scenarios were adapted to the specific context in each classroom.

One or more peer observers attended when the lesson was delivered, for which purpose the project had prepared peer observation instruments. Also the students took part in the evaluation by filling in a survey.

The teachers who actively took part in the project (by creating a scenario and leading the classroom activities) were invited to fill in a Teacher's Journal. In this document they reported about the main pedagogical and organisational elements of the learning activity. It also made teachers reflect on the level of engagement of the students.

The national project teams also organised face-to-face or online interviews with teachers, either individually or in focus groups. All information and opinions received from CBP pilot participants helped to shape the final version of the *Novigado Training Manual*. This Manual was designed for all educational institutions interested in replicating a similar training programme in a school or other educational organisation.

1.4. Increasing teachers' competence

Active methods and strategies call for a change in the students' role at school. No longer should they be passive participants of the lesson process, but rather become social learners

and actively construct their knowledge, at least if we want them to be better prepared for living in the complex and dynamic societies of the 21st century. However, for many teachers this change would mean a considerable challenge in their everyday teaching practice. Being aware of this, we also developed in the project a set of tools and content materials that can help teachers to increase or develop some competences when they decide to try out Active Learning pedagogy in practice in their classrooms.

1.4.1. Online Scenario Tool

As one of the project's key outputs, the Partners developed a [Scenario Tool](#), which is an online tool for teachers that guides them in building learning scenarios and practical lesson plans that support Active Learning pedagogy. It can facilitate the initial steps of a teacher who wants to start with AL activities in the classroom. The Scenario Tool can also generate some reflection on how the lesson is being designed, being therefore a tool that helps teachers to develop their pedagogical competencies. It strongly promotes 21st-century skills, and specifically the so-called 4 Cs of Education, too.

The Scenario Tool is inspired by the concept of the Future Classroom Lab Learning Zones. To avoid stereotyped classroom activities, the tool makes the users reflect on the different types or categories of activities. When designing a new activity as part of the scenario, the users select one of these six categories:

- **Interact & Instruct:** teachers guide the learners through the different steps of the learning process.
- **Exchange & Discuss:** learners communicate and exchange with peers, either in small groups or in plenary.
- **Investigate & Research:** learners collect and reflect on data, find answers to driving questions, etc.
- **Create:** learners plan and prepare a product or a way to showcase their learning.
- **Present:** learners share what they have created with an audience.
- **Assessment & Feedback:** any activities concerning assessment *for, as and of* learning.

There is a certain overlap among the categories, but the advantage of this initial reflection is that it encourages users to bring variation into their classroom activities. And for each category the Scenario Tool provides ready-made activities the user can select and adapt. Moreover, there are suggestions about the tools and technologies to be used.

1.4.2. MOOC: Active Learning and Innovative Teaching in Flexible Learning Spaces

As a professional development activity to reach out to a wider group of teachers and educators, the Novigado consortium organised a massive open online course (MOOC), called [Active Learning and Innovative Teaching in Flexible Learning Spaces](#). The course was organised on the European Schoolnet Academy platform and it took place from 17 January to 23 February 2022. This MOOC included four modules, one module opening each week, and in the last module a peer-assessment task. This task was about creating a learning scenario and reviewing three scenarios from other participants.

A total of 3 158 people signed up for the course and 1 914 of them started following at least one course module. Finally, 687 participants obtained the course certificate (they went through

all the materials and completed all activities). Although the course is now closed, the [content is available](#) for self-learning purposes at any time (login required).

The participants were invited to submit the lesson plan they had created – this resulted in 113 lesson plans received. We have curated a collection of the lesson scenarios that best present active pedagogy in a flexible classroom. They were checked against the criteria by the Novigado consortium experts and in the end the 24 best lesson plans were published in the Future Classroom Lab [resource directory](#). Being already shared with a wider audience, these lesson plans can be used by other teachers and inspire them to create their own Active Learning activities in classrooms.

Chapter 2. Evaluation findings: What have we learned from teachers and students?

As described in the previous chapter, pilot school teachers from France, Poland, Portugal and Turkey had the opportunity not only to study and apply Novigado outputs during lessons in their schools, but also to share their thoughts and respond with remarks or feedback on the content and tools dedicated to them. They took part in a broad evaluation activities carried out under the lead of Réseau Canopé.

The evaluation of the Novigado pilot phase aimed:

- to identify the conditions, enablers and obstacles to the transition to an active learning model and the use of flexible learning spaces in schools;
- to identify the best practices (school, teaching practices, student engagement) and recommendations on the implementation of active learning scenarios;
- to provide indications on the scalability of the model and the proposed tools.

2.1. Methodology

The evaluation of the school activities consisted of multiple case studies including both pre- and post-tests with students and teachers, teacher journals, teacher peer observations, and interviews with teachers.

The evaluation protocol was designed to gather qualitative and quantitative data from each partner following specific requirements for data collection:

- getting feedback from as many participants as possible;
- avoiding as much as possible the translation from one language to another; and
- collecting data during a set period for each tool.

The evaluation results may present some bias. In some cases, the people involved in the data collection were associated with an institution that represented a hierarchy for the interviewees. The discovery of new activities and the consciousness of taking part in a pilot phase might also induce a (positive) bias in how students and teachers evaluate their active learning (AL) experience. Also, some difficulties were reported in one case study for younger students in understanding a few of the test items. Moreover, the pandemic conditions may have added other biases due to the organisational difficulties that sick students and teachers might have caused in the implementation of the learning scenarios.

2.2. Results

From September to December 2021, altogether 25 schools (77 teachers and 1 050 students) participated in the Novigado pilot phase in France, Portugal, Poland and Turkey (Figure 2). Two different levels of schools in terms of active learning practices and flexible learning spaces acculturation were identified.

- The ‘advanced’ – schools that already had a functional flexible learning space and at least some teachers with experience in active learning activities.
- The ‘starters’ – schools without much experience in teaching in a flexible learning space and teachers with rather little experience in applying active learning methods.

	Schools	AL school level: Starter	AL school level: Advanced	Total number of teachers	Teaching students from 11 to 14	Teaching students from 15 to 18
France	7	5	2	22	9	13
Portugal	6	4	2	17	13	4
Poland	6	3	3	12	0	12
Turkey	6	3	3	26	26	0
TOTAL	25	15	10	77	48	29

Figure 2. Distribution of teachers and students by country, age group and active learning school level.

Most of the teachers in the four case studies considered themselves autonomous in the use of digital (ICT) tools for personal purposes and for preparing classes and teaching.

The evaluation report analyses the pre- and post-tests of 522 students and 60 teachers, and the ideas, opinions and beliefs of 55 teachers collected during eight group interviews in four countries (Figure 3).

	Schools	Total number of teachers	Students completing pre-test and post-test	Teachers completing pre-test and post-test	Teachers interviewed
France	7	22	154	15	12
Portugal	6	17	106	13	9
Poland	6	12	53	10	10
Turkey	6	26	209	22	24
TOTAL	25	77	522	60	55

Figure 3. Teacher and student data collected in the Novigado evaluation process.

2.2.1. Perceived changes in students’ attitudes

Compared with what they were used to, the teachers in France, Poland, Portugal and Turkey observed greater motivation and engagement in students during the AL activities. This was mostly observed in starter schools. Students who are not usually willing to work in class (students with different abilities, students with special needs, weak results or shyness) got to engage in activities. According to some Turkish teachers, they even increased their self-

confidence and thus their participation in lessons. Teachers from Turkey also observed greater student attention during lessons.

Despite the general positive attitude of most students, some were reluctant to participate in the active learning activities. Teachers identified the main difficulty for students in adapting to AL pedagogical models as that of becoming active students during a lesson. For many, this change was unusual, as they were asked to take an active part in various activities, e.g. to search for information, work in pairs or groups, and propose ideas or solutions instead of only listening and taking notes.

Some teachers in Turkey observed the development of 4 Cs skills in their students as well as enhanced searching and practical skills. Teachers in France also reported an improvement in the cooperation and collaboration skills of their students. Teachers from AL 'starter' schools identified more students helping one another while in AL 'advanced' schools teachers observed more peer-to-peer work. Despite this, some French teachers in AL advanced schools warned that routinising peer work and group work with students could create some unwanted results. Making students work all the time in peer-to-peer settings encouraged students to create dynamics and strategies that were counter-productive in terms of learning. For instance, instead of working together with their peers to develop a solution, students divided their work into two and later gathered both parts in a document. Instead of collaborating, which was the main objective of the teacher, they cooperated. To remedy that, learning strategies must change all the time, otherwise they can get "worn out" in the eyes of students (they lose their novelty status), which may result in students looking for ways to do the activity fast instead of following the teacher instructions.

Some teachers in Turkey, Portugal and France also observed students improving their self-autonomy after implementation of AL scenarios: they had greater initiative and enhanced problem-solving attitudes.

2.2.1.1. STUDENTS' DIGITAL TOOL USE

The test results show that students' digital tool use is very heterogeneous in each case study and even within the same school. In general, the most used ICT tools were: group chat, information research tools, assessment tools, exercise tools, virtual learning spaces (VLE) and editing tools.

In Turkey, the comparison of students' pre- and post-tests revealed an increase in the use of presentation and information research tools. Students from Poland and Turkey also declared increased use of video conferencing, assessment, file-sharing and interactive quiz tools. Turkish and Polish students declared having used more forums and blogs, as well as creation tools. By contrast, the use of group chat decreased in French schools.

2.2.2. Perceived changes in teaching practice

2.2.2.1. TEACHING MINDSET

Teachers reported a variety of changes in their teaching attitude during and after the Novigado pilot phase. Teachers taking part in the four case studies claimed they spent more time on guiding their students: giving advice, supervising, explaining or repeating instructions. Some teachers pointed out the difficulty of not being able to guide and follow all the students at the same time. Other teachers felt withdrawn, frustrated or sometimes even disrupted by not having enough control over their students' work in the classroom.

The importance of considering students' opinions/feedback on how to improve their learning was also presented in teachers' test results. All the teachers except the Polish ones agreed

strongly with the statement regarding AL methods: 'Students have an influence on what they learn and how they learn'.

2.2.2.2. LEARNING SCENARIOS AND CLASS PREPARATION

Teachers in all case studies pointed out some challenges encountered during the design and preparation of active learning scenarios for their students:

- The **amount of pedagogical work** when designing the active learning scenario. Besides planning the scenario, it required: thinking ahead about forms of assessment and possible answers to students' questions; handling students' difficulties during the AL lessons; preparing instructions and didactic materials for planned activities.
- Designing a set of activities to get students **engaged** while enabling them to discover information and knowledge by themselves, avoiding traditional top-down settings.
- The complexity of working in **transdisciplinary settings** with teachers of other disciplines: creating a scenario that could be adapted to any discipline, class or school level.
- Conceiving activities that allow each student to become active **regarding their learning process** while making them cooperate with one another.
- Creating **well-balanced student groups** in terms of levels and profiles.
- The difficulty of keeping a **positive work tension** in all students' activities.

However, most teachers considered that preparing active learning scenarios was finally helpful for their teaching practice efficiency, and increased their self-confidence to guide new activities or restructure/recycle previous ones. On the other hand, some teachers were not used to creating learning scenarios and did not appreciate teaching in line with prepared scenarios.

2.2.2.3. STUDENTS' METACOGNITION

In the pilot phase teachers encouraged students to self-reflect on their own learning and got a lot of feedback on the applied learning scenario. Some teachers in all four case studies were surprised by the quality of students' feedback they received. However, some students encountered difficulties when trying to assess what they had actually been learning during lessons with active learning elements.

Peer assessment, self-assessment and becoming an 'expert' were some of the strategies implemented by teachers to help develop students' metacognition. Teachers also chose to include the creation of objects or documents to help students realise what they were actually learning.

2.2.2.4. TEACHERS' DIGITAL TOOL USE

Teachers in France, Poland and Turkey increased VLE, group chat, assessment and file-sharing tool use. In France and in Poland they were also using more ICT creation tools.

2.2.2.5. TEACHER-STUDENT RELATIONSHIPS

Some interviewed teachers from France, Portugal and Turkey reported changes in the relationship between teachers and students. This relation became more horizontal with a greater closeness, and also calmer and more trust-based. Spontaneously, some students started to be involved in the learning scenario design and recommended some changes to teachers. Some teachers reported the existence of student-tutors and the co-intervention of student-teachers in class.

2.2.2.6. ACTIVE LEARNING SCENARIO IMPLEMENTATION CHALLENGES

Teachers indicated that their major challenges in scenario implementation were (in order of importance): outdated furniture or digital equipment; working with too large groups in too short

sessions; students' lack of experience in active learning lessons (e.g. their etiquette during discussions; reticence; confusion between relaxation and work time); the official curriculum; improvising to deal with emerging problems and absent students; finding the time slot in a calendar to work in transdisciplinary mode; and students' use of digital devices for personal rather than learning purposes.

2.2.3. Perceived changes in learning spaces

In general, teachers taking part in the pilot activities reported four types of changes in learning spaces:

- Change in the attitude towards the learning spaces in school. Greater awareness of how space is being used, and what the students' needs are in terms of learning space.
- Change in teaching practice in the classroom. Teachers implemented more activities to make students move around the classroom (e.g. stand up, change positions) and more often changed the seating arrangement and/or the furniture.
- Change in the school workspaces. Use of new spaces other than classrooms (e.g. corridors, outside space, etc.) for teaching purposes as well as creating more resting spaces for students within the school.
- Change in students' engagement. Some students were involved in the design of spaces for learning purposes and/or the use of spaces outside of the school in the learning scenarios.

Despite these changes, some teachers from Turkey and France, most of them from 'advanced' schools, reported no changes in the learning environment. They declared they already have such a school space and use it for teaching purposes.

In some cases in Poland and Portugal teachers reported the creation of new learning spaces or spaces designed for community activities and resting. Students' involvement in space design was also observed in these cases.

2.2.3.1. TEACHERS' USER EXPERIENCE IN FLEXIBLE LEARNING SPACES

While some teachers felt pleased, motivated and relaxed observing students working on their own and satisfied with having implemented some active learning activities, others felt more tired and anxious about placing more responsibility on students, and in some ways losing control over the teaching process. Some teachers felt divided: they felt pleased but challenged by the 'new' formats where teachers were 'not needed' for learning and there was no immediate feedback from students.

A majority of teachers from Turkey, and half of the French and Portuguese teachers, identified the noise produced by students as a characteristic 'feature' of active learning and sometimes it was a real concern for them. Some teachers were worried about disturbing other classes, but most teachers agreed that some noise is needed in AL activities as it is natural when students move around the classroom, work in groups/pairs and communicate as well as debate and defend their own opinions, etc. Teachers stated that there should be a period of time dedicated to an adaptation to AL activities and that this was needed in order to clarify roles and tasks of students. Some reported that, after a period, students self-regulated and calmed down. Some recommended the use of applications or signals to help the group to regulate the noise in the classroom.

2.2.4. Teachers' opinions on active learning and the Novigado outputs

Almost all teachers from Turkey and half of the French teachers claimed that the greatest benefit of active learning is giving students the opportunity to increase their creativity and output in the classroom. They observe that active learning allows students to feel more productive, improves students' self-confidence, self-discovery and motivation for learning. This kind of motivation is identified by teachers as particularly important for permanent learning acquisitions for all students, and especially for isolated students. Teachers associate a positive attitude towards learning to learn with the development of students' self-regulation in the learning process. However, teachers also identified a challenge in getting students to change their mindset from a traditional model to the active learning one, if students had not had much experience before.

Most of the Portuguese teachers interviewed, more than half of the French ones, almost half of the Turkish ones, and a third of the Polish teachers shared their opinions on the proposed methodology during the Novigado pilot phase. More than half of the teachers in the four countries (in particular the Turkish) agreed that experiencing the pilot phase was useful to start their reflection on pedagogical practice and experimenting with new pedagogical methods. Almost the same number of teachers (especially French and Polish) agreed that Novigado was useful for re-boosting the school's dynamics around active learning by sharing ideas with other schools and initiating workgroups. For some teachers, the contribution from the Novigado project was mostly the reinforcement of interdisciplinary work between teachers, and the opportunity for teachers to have dedicated time to work on active learning and exchanging with colleagues. Some others felt that they were able to improve their AL knowledge and felt 'validated' to implement more activities in that context.

Teachers also reported an improvement in the relationships among teachers involved in Novigado activities. Consequently, it opened new pedagogical opportunities within their schools, e.g. participation in other teachers' classes.

Interviewees also give their opinion about the follow-up tools. Most teachers considered that peer observation was the most interesting practice to adopt after the project. The *Guidelines in Learning Spaces Innovations* were considered a valuable and helpful tool for changing teaching practice in their schools. The same opinion was expressed for the *Scenario Tool*; however, many teachers found it difficult to use.

2.3. Implementing active learning methods in schools

The experience of the pilot *Capacity Building Programme* allows us to claim that active learning methods combined with some changes in teaching practices, and run in flexible learning spaces in schools, can drive towards a positive change in teaching practice and increase students' self-motivation for learning. However, this is not an easy and automatic process. It requires some preparation from teachers, and also better planning of future pedagogical activities.

For those teachers and schools that would like to try to implement some ideas promoted by Novigado, we present a short list of issues to consider, based on what we have learned from teachers participating in the evaluation process:

- **Adaptation period.** Not all changes can happen immediately in the classroom. An adaptation period for students and teachers to become familiar with active learning elements is needed to facilitate the mindset change and the right attitude towards it.

- **Infrastructure.** Offer minimum infrastructure conditions to implement AL activities: spaces and furniture recommended to be easy to reorganise and move, digital devices in good condition for student use, and access to the Internet.
- **Digital skills.** Students must have some basic information-searching skills and basic skills to use digital devices. Teachers must have basic digital skills for teaching and be able to use and guide students through the AL scenarios.
- **Longer learning slots.** A single lesson (in most countries more or less one hour long), may not be enough to discover the benefits of active learning pedagogy. Teachers involved in the school pilot recommended having longer learning sessions (e.g. with two or more lessons in a block), so students are able to implement designed activities.
- **Group size.** The variety of AL methods gives the opportunity to apply this pedagogy in every classroom. The ideal group size is linked to the classroom size and the teaching level. It should enable smooth group work. Middle school teachers (teaching students from 11 to 14 years old) recommended between 22 and 28 students in the classroom; high school teachers between 20 and 25 students.
- **Teaching subject and curriculum.** Ideal curricular conditions for AL implementation would consider interdisciplinary connections and a lighter curriculum prioritising skills and permanent learning rather than content and notes.
- **Dosage of active learning.** Worth stressing: active learning methods are not meant to eliminate other teaching methods. It is important to have a variety of activities in the classroom. AL elements should be a visible part of the instruction process, but it is up to the teacher what set of methods he/she will apply. These methods need to be applied according to the content and it is important to balance AL activities with other methods. Not too often, but not too exceptionally as well.
- **Understanding the learning space.** It is not so obvious to many teachers how to use the school learning spaces, even in their classroom. Teachers should try to learn what they can do with the space and how to arrange the classroom for various types of student activities (see: *Guidelines in Learning Space Innovations*).
- Also, to increase their competences, it is good to initiate a **workgroup** of teachers that will both apply AL elements and learn from their experience together.

As the Novigado team, in the light of evaluation findings, we believe that active learning and flexible learning spaces can be the motor to advances in teaching and learning, under some conditions on many levels. In Chapter 3 we present a set of recommendations for schools, teacher training institutions and education policy-makers on how this change may begin.

Chapter 3. Recommendations

The following set of recommendations is based on Novigado project desk research and feedback received from schools during the CBP pilot, after the practical application of active learning scenarios in flexible learning spaces. As we believe the active learning approach should become a significant part of everyday teaching practice in every school, we have presented specific recommendations for school authorities and teacher teams, and also for teacher development institutions. However, we also believe that education policy-makers will have an important role in that change and can contribute to more effective implementation of AL in schools across Europe. They are responsible for education systems and create conditions where pedagogical innovations and good practice can flourish and be disseminated more easily across teacher communities.

3.1. For policy-makers

Systemic change in schools needs a clear strategy and communication as well as genuine support for innovative teaching from national and local education authorities. Many schools have among their teachers one or more early adopters of innovative methods of teaching in their classroom. Unfortunately, sometimes they can be perceived by colleagues or even the school management as too revolutionary, since conventional teaching routines are still deeply rooted in many schools. When the new approaches are backed up and encouraged by official policy, other teachers can be more open to following them. Below is the set of the Novigado project's recommendations for policy-makers:

- Explicitly include the 4 Cs of Education (Creativity, Collaboration, Communication and Critical Thinking) as well as project work in the common-core curricula. Teachers will be expected to address those competences and will include this particular method as one of the methods used while teaching their subject content. Also, adapt the official examinations so that they assess the development of skills (at least the 4 Cs) and not only factual knowledge.
- Reduce the contents of the common-core curricula in some subjects so that teachers can focus on the quality, not quantity, of their students' learning. Reducing the common-core curricula will give students time for deeper learning and building their knowledge at their own pace. It will create more opportunities for practising Active Learning methods in the classroom.
- Increase the number of hours dedicated to doing project work. This will allow students to use competences and develop new ones in contextualised activities that engage them to go further.
- While preparing national curriculum content to educate students about 'learning how to learn' strategies, also include information on growth mindset. Research indicates that informing students that intelligence is not a fixed trait but can be developed can boost the effectiveness of 'learning how to learn' strategies.
- Introduce measures that will reduce teachers' stress and overwork. Studies indicate that teachers who are stressed or suffering fatigue tend to revert to the traditional/conventional methods of teaching and classroom management.
- Communicate and promote the need to differentiate the learning environment in schools. If possible, plan appropriate school renovation budgets to create or modify

spaces within the school into flexible learning spaces to address the diverse needs of the students and support active pedagogy.

- Give schools more freedom to create flexible timetables and to define lesson duration as they require. Lessons 45-50-minutes long may be too short to allow teachers to engage their students in project work, giving peer feedback and activities based on metacognitive strategies. Another option is to introduce a weekly 'project day' (as already successfully practised in many schools).
- Promote knowledge about how the environment influences the learning process and the importance of redesigning spaces, especially to head teachers and their staff.
- Provide teachers with the necessary support and professional development empowering them to implement active pedagogy. Make active pedagogy one of the recommended conditions for teachers' professional advancement.

3.2. For schools

It is the teacher who can start a true pedagogical (r)evolution in a school. It is equally crucial that the school management understands the benefits of smart, meaningful changes in everyday teaching practice and supports them. Apart from the recommendations for policy-makers, we have also devised a set of recommendations for schools that aim to implement active learning pedagogy in their flexible learning spaces. We believe the following recommendations could help teachers in the transition from a more traditional approach to active, student-centred methods that include effective use of the learning space:

- Make the development of skills the centre of your school's educational philosophy. Schools should create an atmosphere of innovativeness and openness that promotes a trial-and-error approach and planning-implementation-reflection cycles. Consequently, foster the mindset of innovation, experimentation and growth among teachers and students, where no one is afraid to learn from mistakes, or be loud or messy. Teachers should have confidence in their head teachers who know that, as studies indicate, active learning may require, for example, higher noise levels in the classroom. The head teacher should be the leader of changes towards active pedagogy and what it implies. He/she should understand and support the need for space redesign.
- Plan the introduction of active learning methods in at least a middle-term perspective. One school year would be good to introduce some new elements, practise different approaches, experiment with different methods of teaching/learning, or manage and check different learning environments. This experience is crucial for building a better understanding of active learning methods and discovering what works well and what needs more adaptation.
- Balance active learning and traditional learning. Avoid revolutionising the teaching methods but rather try to implement a step-by-step approach, in which teachers start with changing their awareness and mindset, implementing some basic active learning strategies and only later increasing the ratio of active learning to traditional teaching.
- Give teachers time to work together on designing the learning process for their students. Provide teachers with scheduled reflection time about their practice and collaborative planning in the grade or subject groups.

- Organise professional development sessions linked to active pedagogy and flexible learning spaces. Provide teachers with the necessary support and professional development, empowering them to implement active pedagogy. Foster and guide interdisciplinary work among teachers.
- During classroom observations (coaching sessions), focus on active pedagogy (and not on various modes of activation of students, as this is not enough to be named active learning), and on the way the teacher and students use both the physical and digital space.
- Make sure both students and teachers have enough time to get accustomed to active learning methods.
- If possible, reduce class or group sizes to best use the time and space to support the students.
- If you are considering modernising or rearranging the learning environment at your school, make decisions involving all the stakeholders. Invite students, teachers and parents into the process of designing or redesigning learning spaces in school to give them the feeling of empowerment so that they can be 'owners' of the new space and be more willing to use it. Let teachers and students rethink the learning spaces and make the school their second home, the home of growing, learning and creativity. Consult all those groups about how they imagine their learning spaces and include them in the creation of new ones. If commissioning professional space designers to develop plans for learning-space redesign, make sure that they include teachers and students in interactive workshops during which they will have a chance to share their feedback related to their needs and expectations.
- On the practical level, start from thinking about common and open spaces at your school that could be used for learning. Design-thinking methods can help stakeholders find creative uses and transformations of existing spaces in the school.
- If you decide to purchase new equipment and furniture, make sure that they are sturdy and of good quality. Investing in cheap, low-quality equipment and furniture is likely to result in their malfunctioning or being broken in two or three years' time.
- To keep the cost low and manage the budget wisely, start small and adopt an experimental approach, equipping one classroom with the new device or furniture to collect users' feedback before extending the investment (or abandoning it).
- Support both the students and teachers to develop their digital competence, allowing incorporation of technology in their work in a seamless and meaningful way. Then technology becomes 'transparent', i.e. it stops being the main focus of the learning process and is used to achieve previously designed learning goals.
- Create connections between the school and externals to reinforce the link between the school and the complexity of the real world. A school space redesigned as a 'Third Place' can be a concrete and physical place in which all can meet and interact. The space's timetable can be a powerful lever to promote shared activities during school time and beyond.
- While designing the school timetable, include blocks of lessons rather than single periods for the teachers to foster project-based learning.

3.3. For teacher development institutions

Both early-career teachers and teachers with several years of teaching experience should become familiar with active learning methods in flexible learning spaces. This is an important task and also a challenge for both teacher education institutions (like faculties of pedagogy at universities) and teacher training and development institutions responsible for increasing the knowledge and competences of the teacher community. In order to guarantee sustainable implementation of active learning strategies in the long term, it is not enough to address only educational authorities, teachers and head teachers with new ideas and recommendations. It is advisable that teacher education or teacher development institutions include AL and flexible-learning-space issues in their core education/training activity. Student teachers need to acquire the principles of active learning (and have a chance to test them in practice) and, if possible, also to be trained to exploit the pedagogical benefits of flexible learning spaces. Some recommendations as to what those institutions should focus on include the following:

- Include issues of active learning and flexible learning spaces in the programme of pedagogical studies at university level and in the teacher training plans of the teacher development institutions.
- Train teacher educators on active learning and on a peer-learning basis (community of practices, seminars, workshops) in teacher training institutions. They will be more inclined to implement active learning modules with their teacher students.
- Teach as you preach. Organise training modules and workshops so the active learning process is visible in the activities which are run. Implement active learning settings using flexible learning spaces for teacher training so future teachers can experience the active learning model first-hand and experiment with it.
- Focus on good and practical pedagogical content. Provide (also future) teachers with active learning strategies and methods that they could implement while teaching particular items included in the national core curriculum.
- Teach (also future) teachers how to carry on an adaptation process with students who have never had active activities.
- Encourage self-reflection activities on the effects of learning-space arrangements. Include in the training for future teachers a reflection on how the pedagogical contract between teacher and student changes between a teacher-centred model and a student-centred model.
- Address active teachers already working in schools with training or development programmes dedicated to active learning in flexible learning spaces.
- Identify teachers who are already implementing active learning in their classroom and invite them to open their classroom to less experienced colleagues. Think of incentives to motivate them to do so (tutor's role, trainers' community of practice, financial recognition, etc.)
- Encourage peer learning among teachers. Promote study visits to colleagues while they conduct their class and peer observations and exchange afterwards. Let them focus on possible learning scenario modifications and how to overcome its challenges.

Chapter 4. What's next – towards active learning education in every school

For education to effectively address complex issues of modern society, such as future pandemics, climate crisis, challenges related to technology including Artificial Intelligence (AI), or even armed conflicts, the priority should be a transition from the traditional to a learner-centred approach. Therefore we need to equip students with the skills and competences required to solve simple algorithmic problems, towards an active, student-centred approach which promotes the four Cs of Education, i.e. Creativity, Critical Thinking, Collaboration and Communication. A student-centred pedagogy calls for physical learning spaces in which the teacher is no longer 'the sage on the stage', and the blackboard/whiteboard is no longer the only teaching equipment.

Transitioning towards the student-centred classroom does not mean abandoning direct instruction completely, but learning to deploy active learning modes of teaching when it is justified and, when there are lecture-type explanations, trying to make them more interactive, with sufficient time for note-taking and reflection. Active methods should not be overused, for example in situations where the students' knowledge of the subject is very limited and they require lots of support and careful scaffolding to master the basic content. Instead, they should allow students to explore the topic further through the inquiry and discovery process.

Active methods and strategies call for a change in the role of students, who become social learners and actively construct their knowledge on the basis of the information received, research, personal inquiry and both teacher and peer feedback. The teacher, on the other hand, needs to become a 'guide on the side', but also a learning experience designer and facilitator of the learning process.

The transition from a traditional teacher towards an educator with a developed sense of agency whose toolbox includes a wide range of active strategies suited for flexible learning environments takes time and usually involves three stages: Awareness, Experimentation and Coherence. First, there is an understanding that traditional methods and traditional classroom arrangement can no longer bring satisfactory results in students' learning and that new problems and challenges call for new methods. After a teacher has extended his/her knowledge related to the existing active learning strategies and creative use of flexible learning spaces that support those strategies, the trial-and-error phase begins. The teacher builds his/her skills by experimenting with what works for him/her and his/her students. The last stage involves arriving at a point where the combination of active methods, ICT and flexible learning space is used meaningfully and purposefully at any time during the teaching and learning process. The teacher at this stage should be able to think 'out of the box' about the classroom space, time devoted to the learning process, and his/her students and their abilities, which often involves leaving the classroom space and using common school space or even open urban spaces for lessons.

To support this transition, school authorities should, on the one hand, set the correct course, encouraging teacher collaboration and a cross-curricular approach as well as a trial-and-error-friendly environment, and, on the other hand, provide adequate support in terms of logistics, i.e. obtain feedback from both teachers and students on which equipment and furniture is

needed and build on this feedback to enact the change in the school and classroom environment. When consulted about their needs, teachers and students have a sense of agency and empowerment, which in turn leads them to accept and 'own' the changes. Research suggests that in order to avoid teachers reverting to traditional teaching and direct instruction, schools should make sure their staff are not overworked or stressed, as a friendly and supportive atmosphere plays a major role in encouraging teachers to experiment with active learning and flexible learning spaces.

Appropriate changes are also needed within the teacher training and development institutions. One of the prerequisites of a successful workshop devoted to active learning methods in flexible spaces is the actual use of such methods and spaces during the workshop. Consequently, the mode of delivering such workshops should be consistent with their contents. The practices in which teachers are encouraged to use active methods during a lecture-type presentation should be avoided whenever possible. If we believe that knowledge is constructed socially on the part of the lesson participants, teachers should be given the opportunity of experiencing active methods on a first-hand basis. The chances are that they will enjoy this experience enough to be encouraged to try similar strategies with their own students.

Apart from various types of innovative space equipped with mobile furniture, greater emphasis should be put on the purposeful use of ICT in the classroom. Virtual space afforded by digital tools can become useful in situations where schools have too few resources to redesign their buildings into innovative and flexible learning environments. Not only can ICT solutions expand the classroom space, providing the type of environment where students can share resources, communicate and present their learning outcomes, but they can also expand the time dimension, making all those resources available regardless of the school working hours. Consequently, learning can take place not only anywhere, but also anytime students choose to access those resources. Also, when used in the classroom, ICT tools should be employed less frequently just to present information, and more often both to promote collaboration and communication between students and to 'lower the classroom walls' so that the learning outcomes such as project results can be shared with the outside world and external experts can be invited to have conversations with student teams working on their projects.

We strongly believe that teachers and institutions who want to make their work more innovative through the use of active methods in flexible learning spaces will find the outcomes of the Novigado project, namely the *Guidelines in Learning Space Innovations* and *School Case Studies*, the *Active Learning Blog*, the *Capacity Building Programme*, the *Training Manual* and the *Online Scenario Tool*, useful in their quest to help today's learners become tomorrow's problem-solvers. We also believe that such a change in everyday pedagogical practice is possible in every school. And this change could be started even today. Furthermore, for more active learning strategies in classrooms we don't in fact need instruction and consent from above, from persons responsible for the education system at local, regional or national level. A teacher has all the powers to start this change. And the school head teacher should be the main supporter of the transition. On the other hand, it is the interest of the education system, as well as a social interest, that students leave school and enter the job market with a broader range of personal and professional transversal skills. Therefore, it is recommended that ministries and other education institutions promote and support this change in teaching.

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