NOVIGADO

ACTIVE LEARNING AND INNOVATIVE TEACHING IN FLEXIBLE LEARNING SPACES

JUNE 1, 2020

EXECUTIVE SUMMARY: O2 - ACTIVE LEARNING REFERENCE FRAMEWORK

FOR INNOVATIVE TEACHING IN FLEXIBLE LEARNING SPACES

Table of Contents

1 Introduction

The overall objective of the Novigado project is to **support schools and related stakeholders in the transition from a conventional and teacher-centred classroom**, where the transmission model is prevalent, into teaching practices that promote **active learning with the support of flexible, innovative learning environments and the use of relevant ICT**. Additionally, with the perspective of continued distance education due to the pandemic of COVID-19, active learning methods supported by ICT can be helpful in developing a sustainable model of education in which the physical space of brick-and-mortar classrooms is blended with or, should to such a need arise, completely replaced by online activities. The Novigado project's meta objective is to **stimulate the development of key competences and transversal skills** among students as crucial for their society's well-being and for their functioning in the pandemic-affected environment and the post-COVID-19 world. For that purpose, this **Active Learning Reference Framework** defines the key elements, techniques and criteria for active learning in flexible learning spaces, and it will form the conceptual framework of the Novigado project.

Within the scope of the project, this framework was constructed based on a rigorous **desk research and literature review** on various definitions of active learning, active learning techniques, flexible learning environments, and teachers' and students' roles, including critique of and obstacles to the implementation of active learning methods.

This document supports the subsequent phases of the Novigado project: creating the Capacity-Building Programme for pilot schools, defining Guidelines for schools in Learning-Space Innovation, organising the Pilot Evaluation Scheme for the school pilot implementation, and designing the Active Learning Scaleup Instrument and the Online Scenario Tool.

> **This is the executive summary of the Active Learning Reference Framework – the full version is available online (in English) here: https://fcl.eun.org/novigado-results**
> **The executive summary is also available in PT, PL, FR and TR.**

2 Active Learning

There are several theories that explain active learning. Nowadays, educational researchers generally define active learning as follows:

The roots of active learning can be traced back to Confucius (551-479 BC), who stated: "I hear and I forget. I see and I remember. I do and I understand" (Naithani, 2008). It is also commonly thought that people remember 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they hear and see, 70% of what they say, 90% of what they do, according to the so-called 'cone of experience' (based on the works of Edgar Dale). Therefore, students need to share their learning experiences, make links with their background knowledge and new information, and apply it to their daily lives. Active learning arises from social constructivism, a theory generally attributed to the Swiss psychologist Jean Piaget and the Russian psychologist Lev Vygotsky (Sparks, 2013).

Active learning is a process of creating meaning (Cherney, 2015). New knowledge is built when students combine new information with their existing concepts, knowledge or experience through the reflection process (Bell and Kahrhoff, 2006). Any new information that is not consistent with the past experiences is rejected as incorrect or incorporated into the new knowledge. To create meaning in active learning, students have to produce active effort. In other words, active learning requires students to do something (read, discuss, write) that needs higher-order thinking skills. Consequently, those students participate in the construction of the facts, ideas, and skills through the completion of tasks and activities directed by the instructor actively (Bell and Kahrhoff, 2006).

Active learning within an active pedagogy framework must be **student-centred**: students learn through emerging and persistent problems in an individual and interpersonal way that allows them to process information actively and deeply (Gilliot, 2017). The following five key changes to practice are needed in the student-centred learning approach (Weimer, 2002):

1. **The balance of power:** for the student-centred approach to work, power needs to be re-distributed from teachers to the students. As students should be in the centre of the learning process, they need to start being in charge of the learning process, able to influence what and how they are learning.

2. **The function of content:** following the constructivist approach where learners actively construct their knowledge by constructing the meaning and relating it to the previously acquired knowledge.

3. **The role of the teacher:** involving students in the process of acquiring knowledge and being active in the learning. Teachers are not the only source of expertise, and students should not wait for them in order to learn.

4. **The responsibility for learning:** students should be responsible for their own learning; they should be taught how to learn and become autonomous, self-regulating learners.

5. **Evaluation purpose and processes:** teachers need to implement assessment for learning and assessment as learning – both being formative assessment strategies to support students as learners.

Furthermore, active learning builds on the following theories and/or concepts (UCLES, 2019):

- **Scaffolding,** described by Jerome Bruner (1915-2016) as supporting students in their learning of new language or skills.

- **The revised Bloom's Taxonomy,** which offers a classification of affective and cognitive skills. Active learning approaches will help students develop at every stage of Bloom's Taxonomy (creating, evaluating, analysing, applying, understanding, remembering).

- **The child-centred approach** advocated by Maria Montessori (1870-1952), where students play an active role in their learning while teachers are activators of learning in student-centred or learner-centred learning.

- **Inquiry-based, problem-based or discovery learning,** including methods such as the Genius Hour, where learners learn by addressing and posing questions, analysing evidence, connecting such evidence to pre-existing knowledge, drawing conclusions and reflecting upon their findings.

- **Experiential learning** describes someone learning from direct experience.

Benefits of active learning include building knowledge and understanding which students can then apply to new contexts and problems; fostering students' learning and their autonomy, giving them skills of lifelong learning, and allowing them to develop their metacognitive thinking; and helping learners to develop higher-order thinking skills to achieve high grades in high-quality examinations (UCLES, 2019).

3 Key Competences and Transversal Skills

Active learning elements may directly support the development of key competences and transversal skills.

The key competences determined by the European Commission (2018)	The UNESCO Framework for transversal competences (2013)
- Communication - Mathematical Competence and Basic Competences in Science and Technology - Digital Competence - Learning to Learn - Social and Civic Competences - Cultural Awareness and Expression - Entrepreneurship	- Critical and Innovative Thinking - Interpersonal Skills - Intrapersonal Skills - Global Citizenship - Media and Information Literacy

4 Practical Techniques of Active Learning

Active Learning Activities are those that **involve students in the learning process** (Bell and Kahrhoff, 2006) or instructional activity that involves students in doing things and thinking about what they are doing (Brame, 2018). Active Learning Activities must make sense to students because they involve their efforts **to build their knowledge actively** (Gilliot, 2017). Such activities can vary from very simple (for example, to pause a conference to allow students to clarify and organise their ideas by discussing with neighbours) to complex ones (for example, to use case studies as a focal point for taking decisions). They can be exemplified as working with other students on projects during class, making a presentation, asking questions or contributing to discussions, participating in a project as part of a course, working with other students out of class on homework, discussing ideas of a course with others outside of class, and peer tutoring (Brame, 2018).

Techniques or activities help active learners **create meaning and learn actively**. Active learning techniques that are mostly used in classrooms include: the pause procedure, demonstrations, think-pair-share, concept maps, team-based learning (TBL), problem-based learning (PBL) (Brame, 2018). Some other techniques include project-based learning with its modification known as the Genius Hour, which is based on the practices of huge companies known as Passion Projects or 20% projects.

Class discussion is among the common activities that promote active learning (Cherney, 2015). Up to 17 different class discussion strategies (e.g. gallery walk, philosophical chairs, pinwheel discussion, etc.) can be used to engage all students in the lesson. They oppose a technique called Fisheye Teaching where only a couple of the most courageous students take part in the discussion. The strategies can be divided into three groups: 'high-preparation,' which require more teacher preparation, 'low-preparation,' which can be used any time without the special preparation, and 'ongoing strategies,' which can be integrated into the instruction (Gonzalez, 2015).

5 Active Learning Environments

The idea of **flexible learning spaces** (FLS) has two sides: one is the choice of furniture and equipment, the other is giving students choice and ownership and self-direction in finding spaces and places that work best for them to help them learn and get the most out of their learning (Snape and Johnston, 2019).

 European Schoolnet's Future Classroom Lab classifies active learning zones as: interact, exchange and develop (where the division is based on the level of students' engagement in constructing their knowledge), and investigate, create and present (where the division is based on the three steps related to project-based learning) (European Schoolnet, 2020).

The layout of the classroom is just as important as planning the programme and units of work because if the classroom is not set up in a way that is conducive to learning, it is going to be a hindrance. Moreover, it is important to explain to students the purpose of each zone, the routines and procedures that help the space function in an efficient way, and to set clear expectations in order to increase the chances of success during the implementation of FLS (Snape and Johnston, 2019). Students should be told about the invisible boundaries which exist between different zones in the classroom, as well as about being considerate to other people as there is more than one class in one room at a time.

6 Redesigning Classrooms for Active Learning

Redesigning classrooms for active learning has aroused great interest among different educational researchers. Many educational researchers are interested in redesigning classrooms to accelerate active learning. Theoretical and empirical studies on redesigning classrooms for active learning constitute meaningful evidence for us.

Classroom redesign can be seen as the transformation of learning spaces from factory model schemes to modern educational ecosystems, motivated by that fact that the world outside of the school walls "continues to innovate and advance at an increasing pace." From a practical point of view, the three qualities conducive to creating the optimal classroom experience are "learner-centred, engaged, and dynamic." A learning space should be warm and welcoming, offering flexibility, but not be overloaded with stimulating decorations. Moreover, the question how technological devices are integrated by the teacher is more important than what types of technology are used. The three basic technical elements, however, are having strong wireless access, charging stations for devices, and enough power outlets to maintain classroom flexibility. (Dillon et al. 2016).

Many institutions are making conscious efforts to **incorporate technology into classrooms** by transforming traditional classrooms into active learning classrooms rich in technology, hoping to have a positive impact on student learning. Research studies have shown that interactive learning environments improve students' problem-solving skills, attitude development and class attendance rates, and reduce failure rates. Active learning spaces have a significant and positive impact on student learning (Gordy et al. 2018).

7 Teachers' Role in Active Learning

The traditional view sees teaching as transmission of information. A traditional teacher is like a radio transmitter transmitting data to be received by any student whose receiver is tuned to the correct frequency. In active learning, on the other hand, teaching requires a change both in philosophy and in practice. An active teacher stops asking the question, "How can I explain this to my students?" and starts asking, "How can I get my students to discover this?" Only students can learn, and only when they get involved with the material can they learn. Only students can change their own knowledge as a means to integrate new knowledge. Teachers can only support students while they are exploring the new educational content actively. Teachers' pedagogical mission is to design and implement activities that motivate students' discovery, provide support and evaluate achievements (Sparks, 2013).

Redesigning learning spaces to maximise learning is primarily a **shift in culture and mindset**. Teachers who want to change their learning spaces should understand that this decision is "a commitment to student-centred learning including a shift in the locus of control." It is also noted that, for the change to be successful, teachers need to "see their roles in a multi-faceted way": as "facilitators of deeper, quality learning, learners and positive risk-takers for kids, and as empowered change agents in the area of learning-space design" (Dillon et al. 2016).

Teachers' role in active pedagogy is to focus on students' learning, guide and facilitate their learning by giving them feedback. It is also important to show that teachers are still learners (Gilliot, 2017).

On the one hand, an ideal teacher must have knowledge and gain expertise. He should create "enigma" among students and guide them during the learning process. On the other hand, students should develop their own knowledge instead of reproducing others' (Lebrun, 2007).

8 Students' Role in Active Learning

There is a growing trend to stimulate students to take a more active role in their own learning. In traditional learning, students expect to be taught and drift through a lecture passively. However, students should have the right to control their own learning. The more active students are in the classroom, the more engaged they are in the learning process, and the more they remember (Goldberg, 2012). It is closely associated with learning how to learn.

Learners take part in their own learning process actively by making links with existing knowledge and new information. Active learning requires students to think hard, creatively, and to practise using new knowledge and skills in order to develop long-term recall and a deeper understanding (UCLES, 2019).

Active learning not only fosters students' learning and their autonomy, but it is also successful in engaging students and improving **students' skills like lifelong learning** (Banavara, 2017). Active learning makes the students capable of analysing and evaluating on their own, thinking independently and solving their problems more creatively. This will guide them toward becoming thinkers and lifetime self-instructors.

Active students experience **a deeper and lasting understanding** because they are cognitively involved with what they are studying: they learn by doing and thinking about what they are doing. Active students try to apply, analyse, evaluate and create by moving to the highest levels of Bloom's taxonomy (Sparks, 2013).

9 Obstacles to the Practical Implementation of Active Learning

The **attitude and lack of skills** among the educators who have tried to employ active learning has been reported as the main challenge related to the implementation of active learning methods (Aksit and Niemi, 2016). Teachers may be resentful about losing control over the class as they fear that having less control is synonymous with ineffective class management. Another obstacle is **overcrowded classrooms**, as it is much harder to manage discussions and to put students into groups if one teaches a class of over 30 students. **Insufficient time and time pressure** related to covering subsequent items of the curriculum were also found to be major barriers which could discourage teachers from employing active learning methods, as "the use of active learning increased the required amount of time." Students also pointed to the **lack of the necessary equipment** required for laboratory exercises or computer-based classes. Lack of resources for active learning resulted in an increased workload for teachers who needed to prepare them on their own. **Inflexibility of the existing classrooms** was also cited as one of the obstacles, as students realised that in order to effectively engage in autonomous learning, they need a comfortable working environment. Another problem was students' own passivity, lack of motivation, as well as lack of self-confidence. Listening to a lecture seemed easier than active participation, i.e. continuing with the tradition of the behavioural training model students were

raised with. Presenting their own material in front of their peers requires more self-confidence than just passive participation in the back seat. The final barrier mentioned by the students was the system of standardised examinations, as "getting a high score in these tests generally requires memorised information." Moreover, teachers reported that they had not thought as beginning teachers that they would use such innovative methods in their class because of the examination system and students' and parents' expectations (Aksit and Niemi, 2016).

10 Critique of Active Learning

A critical study of constructivist, discovery, problem-based, experiential and inquiry-based teaching, and especially their aspects related to the amount of guidance that students receive, compared the effectiveness of these pedagogical approaches with direct instructional guidance (Kirschner et al. 2006). Those methods, which are associated with unguided or minimally guided learning environments, in the light of recent advances in human cognitive architecture, might be less effective in comparison with methods offering direct instructional guidance. This effect seems to be most easily visible in cases of novice to intermediate learners and where learners were not offered any scaffolding, as novice learners have no experience in integrating new information with their prior knowledge. Considering those findings, methods which are learner-centred should be chosen less frequently when dealing with students who are only starting to learn a given subject area, and direct explanations of what to do and how to do it should be given instead (Kirschner et al. 2006). The students in question are learning science – as opposed to doing science – and should be aided in their learning through the application of an effective pedagogy and good instructional design (Kirschner, 2009).

Special importance should also be placed on providing additional scaffolding and more guidance in order to avoid situations where students become lost or frustrated and could "acquire misconceptions or incomplete or disorganised knowledge" (Kirschner et al. 2006). This scaffolding proved effective when used by teachers whose students had problems with making progress with minimal guidance. The four stages of the scaffolding process include: (a) demonstrating to students how to identify and self-check important information; (b) showing students how to reduce and paraphrase the information they receive; (c) asking students to make notes which would be useful in developing collaborations and routines; and (d) recommending that students collaborate with one another and have discussions when solving problems.

11 Conclusion

Having thoroughly analysed various studies and research sources related to active learning and flexible learning environments, we can state that these topics are widely covered and have been thoroughly examined by researchers. The main findings of this Active Learning Reference Framework in the field of active learning pedagogy, key competences and transversal skills, practical techniques of active learning, active learning environments, active roles of the students and teachers, obstacles to and critique of active learning, can be summarised as follows:

Active learning is a **process of creating meaning** during which students participate actively in the construction of the understanding of concepts and skills by discovering, processing and applying information through the completion of Active Learning Activities. The active learning pedagogy stems from the **constructivist theory** generally attributed to Jean Piaget and Lev Vygotsky. Active learners learn by doing and thinking about what they are doing. They take an active part in their own learning process by making links with their existing knowledge and new information. Any type of learning activity that involves students in the learning process is called an Active Learning Activity. Active Learning Activities should include development of communication competences, teamwork and creativity. They involve the efforts of students to build their knowledge actively.

When the information about active learning is compared with the data related to **key competences and transversal skills**, one can observe that active learning pedagogy goes hand in hand with the goals set by the European Commission and UNESCO. The European Commission (2018) lists the following key competences: communication, mathematical competence and basic competences in science and technology, digital competence, learning to learn, social and civic competences, cultural awareness and expression, and entrepreneurship. According to UNESCO (2013), transversal competences like innovative thinking, interpersonal skills, intrapersonal skills, global citizenship, media and information literacy are critical for students in preparation for their life in the 21st century world.

One of the institutions which aims at promoting active learning pedagogy is the Future Classroom Lab of European Schoolnet (2020), which features the following active learning zones: Interact, Exchange, Develop, Investigate, Create and Present. Each of those spaces represents both a physical type of space and a stage of learning within the active learning pedagogy, where students can engage in such activities as reading, watching, writing, talking, listening, collaborating, discussing, investigating, practising and producing.

According to the OECD (2017), **active learning environments** should be designed to strengthen the learners' active engagement in learning and to encourage well-organised cooperative and collaborative learning. Active learning spaces should give students choice and self-direction in finding spaces that work best for them to help them during learning. Research studies show that interactive learning environments improve students' problem-solving skills, attitude development and class attendance rates, and reduce failure rates. Active learning spaces have a **significant and positive impact** on student learning.

Teachers who want to change their learning spaces should understand that this decision is a commitment to **student-centred learning**. In order to increase the chances of success during implementation of flexible learning spaces, it is important to explain to students the purpose of each active learning space and the procedures that provide the learning-space function for active learning. **Classroom redesign** for active learning should be learner-centred, engaged and dynamic. A flexible classroom should be warm and welcoming. Students should feel comfortable with moving tables and chairs to suit an active learning activity in the classroom. Flexibility of classroom correlates with increased student engagement, more collaborative learning, and great variety of use of enhanced active learning.

When a teacher in an active learning classroom uses technology, in tandem with effective pedagogy, he or she can have a positive impact on student learning. Interactive learning spaces with technology support can also have a significant and positive impact on student learning. Active learning classrooms can be designed by transitioning to a more student-centred approach, easy-to-adjust physical design, and decentralised use of information technologies in classrooms.

Active teachers are able to design and implement activities which **motivate their students to discover**, which provide support and scaffolding for the students to achieve the adequate level of both expertise and skills, and which serve to evaluate students' achievements. Teachers become **facilitators of learning** by transferring learning responsibility to their students. In practical terms, teachers should be able to select the types of active learning strategies that match their learning styles and the course objectives, and their students' characteristics.

Active students are capable of analysing and evaluating on their own, thinking independently, and solving their problems more creatively. They **take part in their own learning process** actively by making links with existing knowledge and new information. These skills are particularly useful in a time when distance learning is becoming more and more common, especially due to the COVID-19 pandemic. The more independent the students are and the less control and teacher assistance they require, the easier it is for them to function in the world of remote schooling, with some lessons taught in a synchronous, and some in an asynchronous manner.

Some **obstacles to active learning** which have been identified during the desk research process and which need to be addressed in subsequent stages of the Novigado project, include lack of skills related to the practical implementation of active learning and teaching methods, limited class time, heavy curriculum, impracticability of active learning in large classes, the lack of materials, equipment or resources, and the negative attitude of students who were not accustomed to active learning methods.

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13 About Novigado

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