DigiEU
digital garden for european schools

Teal Garden Classroom

A didactic experimentation for the self-construction of urban gardens for domestic use, with multidisciplinary objectives in theoretical/practical modality, using TEAL methodology.

Petit pas (Italy)

Danmar Computers SP ZOO (Poland)

Município de Lousada (Portugal)

Cross Cultures International Fundation (Cyprus)

Liceul Teoretic Marin Preda- Turnu Magurele (Romania)

Disclaimer

Digital Garden for European Schools

Cooperation for innovation and exchange of good practices
Strategic Partnerships for school education

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"DigiEU"

Intellectual output	IO1 – TEAL Garden Classroom
Activity	Methodologies, guidelines to conduct a lesson in TEAL mode with a focus on installing and managing a small vegetable gardens in domestic environments
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Abstract	The education context is changing progressively, education based on open technology is "necessary" and not only "desirable"in a short while, and this counts towards all age groups. Is important that especially young people are equipped with the essential digital skills for their future. "Opening up Education" aspire to open minds to new learning methodologies to ensure that people have a better chance of finding work and develop more business skills. Thanks to innovative teaching methods (TEAL) DigiEU project wants to experiment teaching that moves away from the traditional, transmissive and teacher-centric teaching model, in an active laboratory teaching, encouraging the attention of learners, stimulating and giving space to the need for active participation and expression of their opinions. This guide is a didactic experimentation on how to conduct a lesson in TEAL mode with a focus on the self-construction of urban gardens for domestic use, with multidisciplinary objectives in theoretical/practical modality, using TEAL methodology that will lead students to develop basic knowledge and skills thanks to they will be able to install and manage small vegetable gardens equipped in domestic environments such as balconies, terraces and gardens. A consortium formed by five organisations conducted primary research referring to the techniques and types of cultivations and the examples of the TEAL methodology application in each partners county. This guide contains 5 chapters with the aim of providing an overview on the condition of the education system and on the examples of application of TEAL

	methodology in Europe, in particular in the partner countries of the project, together with detailed information on the TEAL methodology applied to outdoor education and self-construction of an urban garden. It also contains practical sheets for creating a TEAL lesson applied to different teaching subjects and instructions for conducting a practical workshop for the creation of an urban garden module: • Chapter 1 Introduction • Chapter 2 Research case Studies • Chapter 3 Teal Theory • Chapter 4.1 Self-Construction of Urban Gardens • Chapter 4.2 Outdoor education • Chapter 5 conclusions • Info cards
Keywords	Digital education, TEAL methodology, urban garden, outdoor education

Partnership

THE ASSOCIATION OF SOCIAL PROMOTION PETIT PAS - IT

The association of social promotion based on collaboration and sharing of experiences, know-how and common values inspired by inclusion. It was founded in Trani (BT) – Puglia – Italy, in 2015.

DANMAR COMPUTERS SP - PL MARKETING SPECIALIST

Danmar Computers LLC, established in 2000, is a private company operating in the field of Information Technology and providing vocational training in this field.

MUNICIPIO DE LOUSADA IED - PT

The Municipality of Lousada is an institution of local public administration. It aims to pursuit the interests of the population in the territorial space of Lousada Municipality.

CROSS CULTURE INTERNATIONAL FOUNDATION CYPRUS - CCIF CYPRUS

CCIF Cyprus established in 2016, with the MISSION to support social inclusion of all citizens especially youth including those with fewer opportunities, through youth exchanges, networking, transnational initiatives and cultural dialogues.

LICEUL TEORETIC MARIN PREDA – TURNU - RO

"Marin Preda" Theoretical High School is located in Turnu Magurele, a small town in Teleorman County.

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Chapter 1

Introduction

Introduction
General considerations

When we think about **education** and its importance in our lives, the first thing that probably comes to our minds is **gaining knowledge**. And we are right: education is the main tool which provides us with **knowledge, skill, technique and information.** At the same time, though, education enables us to **know our rights and duties** towards our family, the community we belong to and towards society in general. Education **expands our vision** and outlook on the world, helping us gain the necessary **abilities to fight against negative elements** such as injustice, discrimination, violence or corruption. More than that, **education ensures** the **evolution of our society.** Without education, we would not be able to explore new ideas, to develop the world because without ideas there is no creativity and without creativity, there is no development of mankind.

Although we are aware that education is not restricted to a certain institution or a particular period in the development of the individual, **the role of schools in obtaining educated people is undoubtedly paramount**. In school, a person *is moulded into a valuable individual who can contribute to the progress and development of their community*. It is the place where one experiences learning, in a formal context, with the help of various methods and strategies which guarantee the fulfilment of clearly established objectives. **School informs and forms students** based on certain principles, it helps them *develop their identity and it also promotes diversity and common values.*

Bearing in mind the various functions school plays in people's lives, as well as the changes that both the individual and the society have undergone throughout history, it would have been impossible that the education process offered by schools should remain the same along the years. Therefore, in the introductory chapter of our book, TEAL Garden Classroom, we have decided **to offer a general presentation of the current context in which education is provided in school.**

In order to obtain a broader view, **we have created a questionnaire** which was shared with previous contacts we have from other projects and who come from European countries other than those involved in this partnership or from the same countries, but who belong to other regions. We have received a **total of 39 responses**, distributed as follows:

- › 7 responses from Portugal (Lousada, Porto, North)
- › 7 responses from Latvia (Latgale, Riga, Daugavpils)
- › 4 responses from Greece (Messinia, Crete, Central Macedonia, Thessaly)
- › 3 responses from Bulgaria (Sofia, Ruse)
- › 3 responses from Turkey (Sivas, Karaman)
- › 3 responses from Romania (North East, Arad, Bucharest)
- › 3 responses from Lithuania (Kaunas, Vilnius)
- › 2 responses from France (Corsica, Oise)
- › 2 responses from Slovenia (South East, Savinjska)
- › 1 response from Spain (Navarra)
- › 1 response from Germany (Bavaria)
- › 1 response from Cyprus (Pafos)
- › 1 response from Poland (Dolnośląskie)
- › 1 response from Finland (Pirkanmaa)

The topics included in the questionnaire were diverse, yet with relevance to the objectives and contents of our project: system of education (in terms of organization, distribution of classes, age, class size), priorities of education, curriculum, educational resources, educational needs, the relationship between the school and the other local / regional institutions, as well as the relationship between the teaching / learning process and the real world.

# The findings of the survey are presented below:

As it can be seen in the diagram below, in many European countries, **the number of students in a class** varies between 20-25, but there are also situations where class size reaches even 35 students.
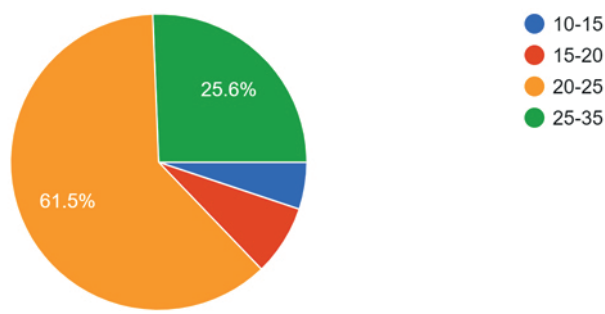
When we talk about **compulsory education,** we notice that nearly half of the countries / regions taking part in the survey start school at the age of 6, but there is also a high percentage of students who are obliged to go to school once they turn 7. Very few are those for who compulsory education starts at the age of 4.
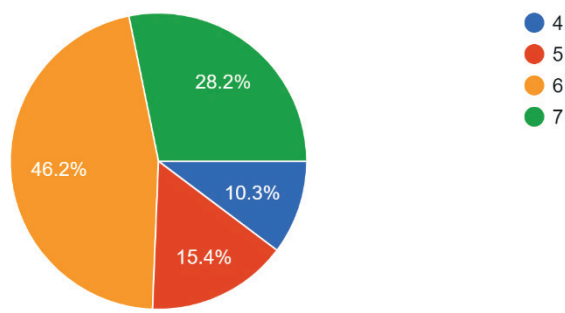

Regarding **the age when compulsory education finishes**, the situation is different, as it can be seen in the picture below.
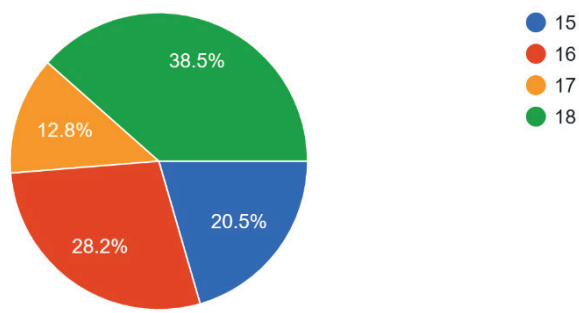
Concerning the **priorities of education** established by each country, 59% of the respondents considered that *ensuring equal chances to all students is the most important*. The priority that came second was *the promotion of social inclusion and equity* (43,6%), while the third one, which obtained 35,9% preference, was *the improvement of studying conditions in schools*. 30,8% of the people participating in the survey believed that education should focus on the *development of digital skills for both students and teachers*, and 25,6% considered that *offering teachers opportunities for future professional development* is another priority that schools should establish.

In terms of **curriculum**, more than half of the respondents admitted that they have few possibilities of creating their own curriculum, being obliged to follow the one established nationally by the Ministry of Education.
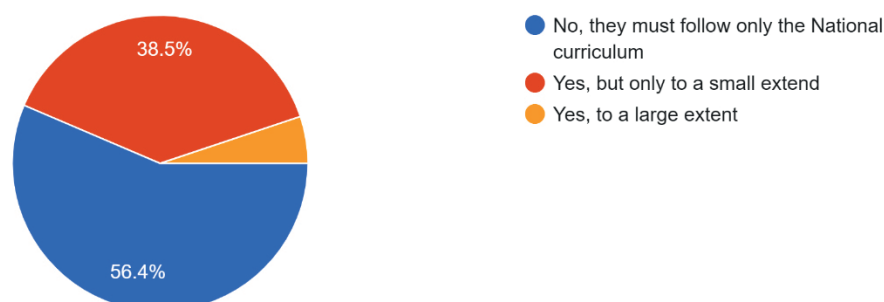
If we refer to the **educational technological aids** (such as computers, printers, projectors, interactive boards, etc) that schools are equipped with, the diagram below proves that most schools have a wide range of technological instruments which can support teachers in the educational process.
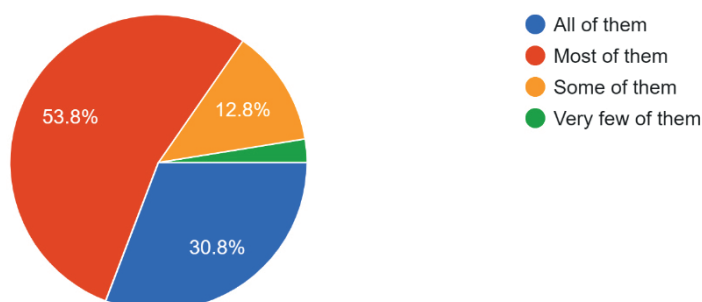

The following section of the survey we created referred to the **educational needs of both students and teachers.** The ones that occupied the **first four positions** when referring to **students** are:

›   The need to put into practice what they have learnt (64,1%)
›   The need to develop personally (615%)
›   The need to feel safe at school (59%)
›   The need to study in stimulating / motivating environments (48,7%)

If we refer to **teachers' needs**, the one that came as the most stringent was *the need to work with up-to-date equipment (educational resources)* – 53,8%, followed closely by *the need to adapt their teaching strategies to the specific needs of their students* (51,3%). The third most important one referred *the need to develop their digital skills* (41%).

Since we believe that the **relationship between the school and the other local / regional institutions** contributes greatly to a successful learning experience, we included two questions on this very aspect. As one can see in the diagram below, only 33,3% of the respondents could testify to a close collaboration between the school and other local / regional institutions (such as NGOs, training centres, museums, local authorities, the local police, medical surgeries, etc), while 23,1% had to admit that such partnerships are rather rare.
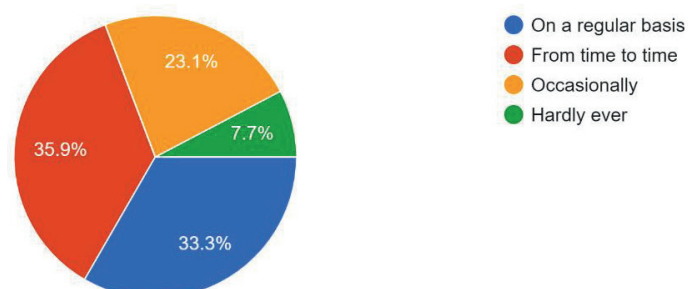
The main **domains of education in which schools collaborate** with other institutions are listed below:

- ✓ Career guidance (71,8%)
- ✓ Environmental education (61,5%)
- ✓ Health education (48,7%)
- ✓ Volunteering and civic education (43,6%)

The last section of our questionnaire was dedicated to **the relationship between the teaching / learning process and the real world**. We were pleased to find out that a large number of respondents consider that teachers use educational technological aids (computers, video projectors, interactive tables, etc), although, as the chart illustrates, some of them do it constantly, others only occasionally.
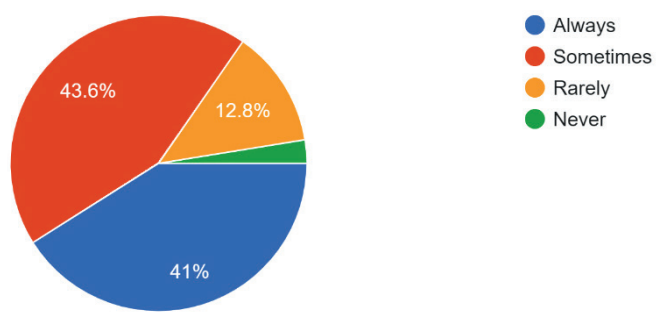
Unfortunately, we have also discovered that 59% of the participants in the survey agreed that, during classes, *students are mainly asked to memorise things, rather than understand them*.
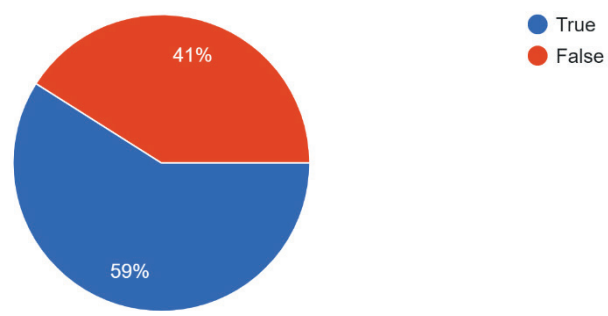
When it comes to the **type of homework teachers give**, the survey revealed that in many cases, the homework encourages creative thinking only form time to time, while a quarter of the respondents considered that students are rarely challenged to develop their creativity through their homework.
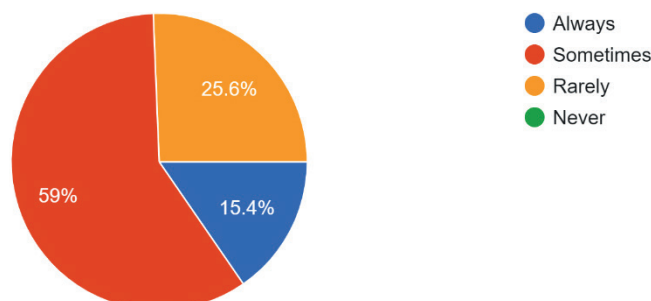
If we refer to the **techniques teachers use in order to motivate their students** and make their classes more attractive, the survey showed that indeed, teachers are concerned about the level on interest their students manifest towards what is happening during classes.
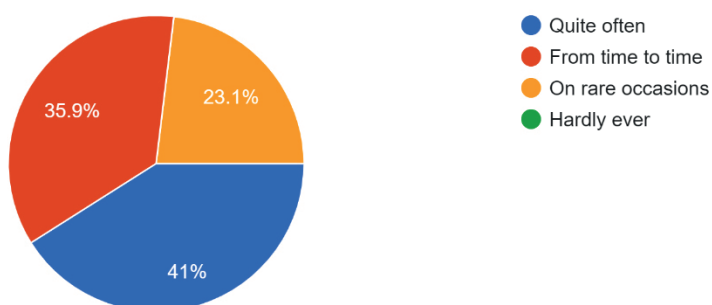
Finally, we wanted to know whether **the skills and competences acquired in school will allow students to successfully enter the labour market**. Perhaps not surprisingly, we have discovered that 38,5% of the respondents were of the opinion that this is quite unlikely, because the practical component is missing.
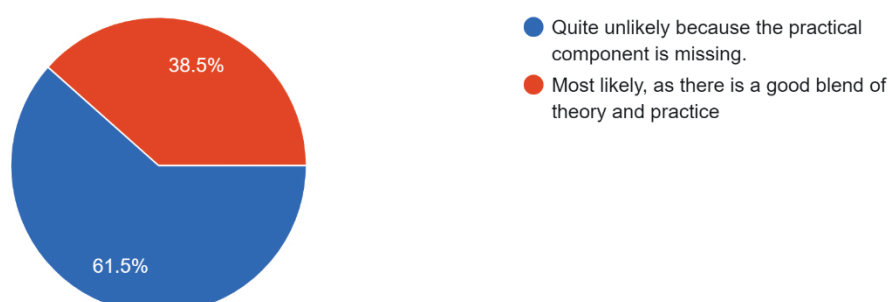
Detailed description of the situation in partner countries

Starting from this general overview of the current situation in European schools regarding the educational process, we **went closer and deeper to analyse the specific context in which the institutions involved in this strategic partnership carry out their daily work, but, most importantly, will implement the activities assumed in the application form**. The aspects we referred to are the same as the ones included in the questionnaire, the difference consisting in the quantity of the information offered and the examples provided by each partner.

A) THE FIRST ASPECT WE LOOKED AT IS THE ORGANISATION OF THE EDUCATIONAL SYSTEM IN OUR COUNTRIES.

In Italy, where the coordinator comes from, the education system is organized vertically, in 4 didactic cycles:

› **Kindergarten** for children from 3 to 6 years (not part of the compulsory cycle)
› **First cycle** of education, with a total duration of 8 years, divided into:
1. primary school (5 years) for children from 6 to 11 years
2. first grade secondary school (3 years) for pupils from 11 to 14 years
› **Second cycle** of education consisting of:
1. second grade secondary school (5 years) from 14 to 19 years
2. three-year and four-year vocational education and training courses (IEFP)
3. higher education offered by universities

The didactic activities take place, according to the **calendar established by each region**, in the period between 1st September and 30th June, for a total of 30-35 weeks. **Class sizes** depend on the educational level, are formed of a minimum of 15 students and a maximum of 26-27 students in primary school and a minimum of 27 and a maximum of 30 students in secondary school. Normally, **a class lasts 50 minutes,** there are 5 classes per day with one break only of maximum 20 minutes.

In **Portugal,** the educational structure consists of a vertical system of schooling. The Portuguese Educational System is divided into different levels of education, essentially sequential. It starts in **Pre-School Education**, with an optional cycle of attendance from 3 to 6 years of age.
It continues with **Basic Education**, comprising three sequential cycles:

› The 1st cycle: duration of 4 years (expected age of attendance between 6 and 10 years of age)
› The 2nd cycle: duration of two years (expected age of attendance between 10 and 12 years of age), corresponding to CITE 1
› The 3rd cycle lasting 3 years (expected age of frequency from 12 to 15 years old) corresponding to CITE 2

Secondary education follows, corresponding to a three-year cycle (expected age of attendance from 15 to 18 years old) corresponding to CITE 3, and which includes seven types of courses: Scientific - Humanistic Courses, Professional Courses, Specialized Artistic Courses, Courses with own Plans (Scientific - Technological Courses), Teaching and Training Courses for young people.

Higher Education is structured in accordance with the Bologna principles and is aimed at students who have successfully completed Secondary Education and have a legally equivalent qualification.

CITE 4 corresponds to post-secondary non-tertiary education and CITE 5 corresponds to the programme of short-term higher education.

CITE 6 comprises the degree programmes (or equivalent) and CITE 7 the masters programmes (or equivalent). Finally, CITE 8 comprises the PhD programmes (or equivalent).

School starts in the middle of September and ends in the middle of June the following year. It is divided into two semesters (September to December and January to June), but not all have this division implemented, there are schools that maintain three semesters (September to December; January to April; May to June). **Classes sizes** depend on the level of schooling: 15 to 20 students in pre-primary and primary, 20 to 25 students in secondary education and 25 to 30 students in secondary education. Normally, **a class lasts 50 minutes**, followed by a 10- minute break. There are 4-6 lessons per day, depending on the level of education, and students go to school in the morning or afternoon.

In recent years, education in **Poland** has been reformed. Compulsory schooling covers the period from 7 years of age to the completion of 18 years of age by the student.

The structure of the educational system consists of the following stages:

• **Pre-school education** - from the age of 6 years is compulsory (1 year)
• **8-year primary school** - obligation from the age of 7 years (possible from the age of 6 years if the parent wishes to do so)

  › 1-3 - early years learning - classes are not divided into subjects and are taught by a single teacher (unless they are additional classes, such as music lessons, foreign language),
  › 4-8 - Education takes place in various subjects and classes are conducted by specialist teachers.

• **Secondary schools**:

  › 4-year general secondary school,
  › 5-year technical secondary school,
  › 3-year first degree industrial school,
  › 2-year second degree industrial school,
  › 3-year special school for work preparation.

• **Post-secondary school**
• **Higher education**

The school year runs from 1 September usually almost to the end of June. It is divided into 2 semesters, which divide 2 breaks: winter holidays (2 weeks) and holidays (2 months – July and August). Children are also free during Christmas and Easter. **Classes sizes** vary from school to school, but usually the maximum number of students is 30. Depending on the grade of the class, students have different numbers of classes. The timetable is about 4 - 8 lessons per day. The lesson lasts 45 minutes. There are 5-minute breaks between different classes and one break of 15 minutes.

The **Romanian** educational structure consists of a vertical system of schooling. **Five main components** represent the fundamental pillars of this system:

› **Pre-school education** - not part of the compulsory cycle,
› **Compulsory education** - five years of primary, four years of middle school education, two years of high school,
› **Upper secondary education** - not compulsory (the last two years in high school),
› **Vocational education and training** - technological high schools and vocational schools,
› **Tertiary education** - post high school institutions.

School starts in the middle of September and ends in the middle of June the following year. It is divided into two semesters (September to December and January to June). **Class sizes** depend on the educational level: 15 to 20 students in pre-primary and primary, 20 to 25 students in middle school and 25 to 30 students in high school. Normally, **a class lasts 50 minutes**, followed by a 10-minute break. There are 4-6 classes per day, depending on the educational level, and students go to school either in the morning or in the afternoon.

Cyprus has a reputation for good public education in terms of the amount of GDP spent on education. The education system is divided into **pre-primary education** (ages 3– 6), **primary education** (ages 6–12), **secondary education (ages** 12–18) and **higher education** (ages 18+).

a. **Pre-Primary** education aims to satisfy the children's needs for the development of a wholesome personality in an experiential environment which enables them to recognize their capabilities and enhance their self-image.
b. **Primary Education** aims to create and secure the necessary learning opportunities for children regardless of age, sex, family and social background and mental abilities.
c. **Secondary Education** offers two three-year cycles of education – Gymnasio (lower secondary education) and Lykeio (upper secondary education). The curriculum includes core lessons, interdisciplinary subjects and a variety of extracurricular activities. Pupils may choose to attend Secondary Technical and Vocational Education that provides knowledge and skills which will prepare students to enter the workforce or pursue further studies in their area of interest.
d. **Higher Education** consists of public and private universities in Cyprus.

Full-time education is compulsory for all children aged between 5 and 15. State-provided schooling including higher education is paid for by taxes. In each classroom there are maximum 25 pupils. The school day in Cyprus begins at between 7.30 and usually ends between 13.15 and 13.30, depending on the school and grade. Every day, pupils attend seven 45-minute lessons or eight 40-minute depending on the grade, with three breaks totalling 40 minutes.

The school year is made up of 2 semesters, beginning in September and ending in early June. The first semester ends before Christmas and the second starts in January 6th. The most important holidays during the school year are Christmas and Easter and each has a two-week break. Summer break starts in June and finishes in September.

Within the same section, we analysed the current situation regarding **the curriculum** and we have noticed that there are a few differences between the countries involved in our partnership. For example, in **Italy** each school is responsible for the Plan of the Educational Offer (POF) which presents the fundamental constitutive document of the cultural and design identity of the school itself. The autonomy of the schools is exercised within a general frame of reference established by the MIUR (Ministry of University Education and Research), through the law 107 of 2015, so as to guarantee the unitary character of the education system.

In **Portugal**, the curriculum for the second cycle of primary education and lower secondary education was revised in 2012-2013. The new curriculum aims to set standards of basic skills to be reached by all students in Portuguese, mathematics, sciences and foreign languages, and to give schools more flexibility over curriculum management.

In **Poland**, subjects taught to children in primary school are Polish, modern foreign language, second modern language (VII-VIII), mathematics, nature (IV), biology (V-VIII), geography (V-VIII), physics (VII-VIII), chemistry (VII-VIII), history, music (IV-VII), fine arts (IV-VII), technology (IV-VI), information technology, physical education (general development classes in motor recreation adapted to the developmental age), vocational guidance (VII-VIII), knowledge of society (VIII) and education for safety (VIII). Optional subjects are religion or ethics (the choice is up to the parents) and upbringing for family life (from class V - the decision is up to the parents).

In **Romania**, all state schools follow the National Curriculum (75%), which is organised in seven curricular areas: Language and Communication, Mathematics and Natural Science, People and Society, Arts, Physical Education, Technologies, Counselling and Guidance. At the same time, each institutional unit has also School-based Curriculum (25%) which is established after consulting the students and their parents.

The formal education system of **Cyprus** is highly centralized and controlled by the state. School curricula and textbooks are determined by the inspectorate of different subjects, appointed by the Ministry of Education, culture, sport and youth, along with guidelines on how to implement the national curriculum.

The Ministry is responsible for both Public and Private Schools, with a wide range of responsibilities including monitoring and evaluation of public and private schools, monitoring of the implementation of the regulations for the schools, inspection of teaching staff, educational planning and teachers' placement in schools etc.

Steps have been taken for more school autonomy. From the 2017/2018 school year, all schools are asked to develop action plans based on their specific needs and the strategic goals laid down by the Ministry of Education. Overall, school autonomy remains limited, as school principals have no discretion over budgetary issues or appointment of teachers, both of which are organised centrally.

The last aspect we concentrated on in this first section deals with **priorities / objectives**. Thus, we have learnt that the training objectives, referred to in paragraph 7 of law 107 that **Italian schools** are called to identify, read as follows:

- › enhancement and improvement of language skills
- › strengthening, of mathematical-logical and scientific skills
- › strengthening, of skills in musical practice, culture, and art and in the history of art, in cinema, in techniques and media of production and diffusion of images and sounds
- › development of skills in the field of active, democratic citizenship and self entrepreneurship education
- › development of responsible behaviour inspired by knowledge and respect for legality, environmental sustainability, landscape heritage and cultural activities
- › literacy to art, techniques and media for the production and diffusion of images
- › strengthening of motor disciplines and development of behaviours inspired by a healthy lifestyle
- › development of students' digital skills
- › strengthening of laboratory methodologies and laboratory activities
- › prevention and contrast of early school leaving
- › enhancement of the school as an active community
- › afternoon opening of schools
- › increase in school-work programs in the second cycle of education
- › enhancement of individualized training courses and involvement of pupils and students
- › identification of pathways and functional systems for rewarding and enhancing the merit of pupils and students
- › literacy and improvement of Italian as a second language through courses and workshops for citizenship or non-Italian language students
- › definition of an orientation system.

Among the priorities of the education in **Portugal,** one can mention:

› targets geographical areas with a socially disadvantaged population and early school leaving rates above the national average
› It aims to promote student success by improving the quality of learning; tackling disciplinary issues, early school leaving and absenteeism
› improving transitions to the labour market
› promoting co-ordination among schools, civil society and training institutions; and better adapting to student needs
› External competitiveness and internal cohesion will be the basis of Portugal's strategy for the 2020-2027 programming cycle, with a strong commitment to education as an important factor in the country's development
› combating school dropout and investing in professional training for young people and adults, as a factor for personal and professional development, enhancing employability,
› business competitiveness and citizenship.

As far as **Poland** is concerned, the following priorities have been identified:

› implementation of the new core curriculum in secondary schools with particular emphasis on science and mathematics education
› developing the independence, innovation and creativity of students
› implementing changes in vocational training, with particular emphasis on adult learning providing high quality education and psychological and pedagogical support to all students, taking into account the diversity of their development and educational needs
› use of digital tools and resources and distance learning methods in educational
› processes; safe and efficient use of digital technologies
› upbringing to values, shaping attitudes and respecting social norms
› organization of educational processes in a learning-friendly manner
› taking into account the different educational needs of students in the educational process
› students' education of key competences.

Education in **Romania,** envisages the following priorities:

› creating an open, innovative educational system which will correspond to the needs of nowadays' society
› improving the learning process by using, effectively and efficiently, the educational resources, especially the digital ones
› ensuring equal chances to education or all children, including those who belong to disadvantaged groups
› developing modern, digital instruments to increase the quality of education
› training teachers so that they have the necessary skills and abilities
› developing the relationship between schools and the economic sectors, thus adapting the learning process to the needs of the community.

In **Cyprus**, schools try to provide equal education opportunities to all students. The main objectives are to:

› offer comprehensive knowledge preparing the students for their academic or professional orientation
› promote and develop healthy, intellectual and ethical individuals
› create competent, democratic and law-abiding citizens
› consolidate national identity, cultural values, global ideals for freedom, justice, peace, love and respect for people
› promote mutual understanding and cooperation among people.

B) FURTHER ON, WE CONSIDERED THE MAIN NEEDS OF BOTH STUDENTS AND TEACHERS WHICH EDUCATION IN OUR COUNTRIES / INSTITUTIONS ATTEMPTS TO MEET.

The information presented below proves that there are quite a lot of similarities between partners.

The main **educational needs of Italian students** belonging to different orders and school levels can be summarized as follows:

› greater weekly school flexibility and the possibility of doing homework in the afternoon with classmates and teachers rather than at home (elementary school).
› the need to make the relationship between teachers and pupils less formal (middle school)
› having more practical and laboratory activities (high school)
› greater involvement of students, to not being just passive listeners (high school);
› the need to increase opportunities for meetings with organizations and bodies outside the school world (high school).

With reference to the **teachers' needs**, it is necessary to mention the following:

› the need to promote inclusive educational activities, also of a disciplinary nature and in its interdisciplinary connections, in collaboration with universities, research centres and associations
› the need to increase their students' motivation for learning
› the need to encourage the integration between curricular and extracurricular activities to promote initiatives with a strong socializing value.

The main **educational needs of Portugal students** can be summarised as follows:

› need to counteract the main predictors of failure by adopting solutions appropriate to
› the specific contexts and needs of students
› need to promote an inclusive school where each and every student, regardless of their personal and social situation, finds answers that enable them to acquire a level of education and training that allows their full social integration
› need to ensure equal access to public schools, promoting educational success and thus equal opportunities
› need to implement multilevel, universal, selective and additional measures that are appropriate for student learning and inclusion.

Referring to the **teachers' needs**, the following must be mentioned:

› need to perform functions that meet the needs of each student in a school that is intended "for all"
› need to be an "active implementer" as a curriculum agent and not a "consumer of the curriculum"
› need to be part of the process of educational innovation actively, as a decisive agent in the desired pedagogical renovations
› need to integrate and face globalisation, without, however, allowing the manipulation of education, building and strengthening one's own cultural identity, from the local reality, from the internal to the external, from the local to the global.

In **Poland**, schools are supposed to convey knowledge and information, but also to develop **students'** social skills, develop their emotions, but also critical thinking skills and entrepreneurship. Another goal of the school, which is in the core curriculum, is to interest students in learning about the world, which is a necessary way to motivate them to seek and increase their knowledge in the future. Schools in Poland also focus on conveying attitudes of openness to the world, or personal and social responsibility. It is worth noting that in the curriculum, schools in Poland declare that they will provide students with access to both information sources and modern technologies.

The main **needs of teachers**:

- › providing knowledge about the methodology of individualized teaching,
- › knowledge of how to motivate students,
- › developing communication skills and how to work with parents,
- › additional training on how to use ICT tools during lessons,
- › greater freedom to decide on the course of lessons.

Teachers are very often limited by the obligation to implement the core curriculum. Due to the fact that they have to complete a relatively large amount of material, they often do not have time to make their classes more attractive. The school therefore has a rapid reworking of material, which is mainly based on theory. Many teachers also do not have enough knowledge about individualisation or do not pay attention to it. Nowadays, students prefer a different style of teaching. They are more interested in lessons, where ICT tools and practical examples are used. In Poland, it is getting better and better in this respect, but there is still a lack of good equipment of many schools with modern technologies and appropriate, free training for teachers.

The main **educational needs of Romanian students** gravitate around the following:

- › the need to create and develop those abilities and skills that will allow them to successfully enter the labour market
- › the need to develop their creativity and entrepreneur spirit in order to contribute to the evolution of the society they belong to
- › the need to develop a civic and democratic attitude so that they become responsible citizens, guardians of democratic values and principles
- › the need to develop their flexibility and adaptability which will help them face the challenges of a globalised world in continuous change.

As far as **the teachers' needs** are concerned, the following must be mentioned:

- › the need to adapt their teaching techniques to both the needs of their students and the changes in our society (especially those in technology)
- › the need to increase their students' motivation for learning
- › the need to know their students very well so that they are able to offer career guidance and counselling
- › the need to develop their communicative and relational skills in order to have a good collaboration with the students' parents and other local organisations with a role in education.

In **Cyprus**, schools bear in mind the following **students' needs**:

- › need to respect safety and health rights, as well as the right to freely express religion or other beliefs
- › need to smoothly integrate students with different cultures and languages
- › need of advanced and differentiated programs for learning the Greek language for the children of repatriates and foreigners, to enhance more effective communication and smoother integration into the local society
- › need for strong citizenship, which is taught across several subjects; the separate 'civics' subject at upper secondary level was replaced in 2017/2018 by a cross-subject approach applied mainly in history and Greek lessons. Other subjects integrating citizenship education at both primary and secondary level include social sciences, ethics/religious education, health education, physical education and STEM (European Commission, 2018a)
- › need to increase their motivation for learning
- › need to ensure equal access to public schools and to promote educational success.
- › need to join in various programmes programs that promote lifelong civic participation
(e.g. UNESCO schools, Young Volunteers, MEDIMUN).

As far as **teachers** are concerned, in Cyprus attention is given to the following:

› professional development policies are in place to help public school teachers build their knowledge and skills on a continuing basis. Teachers, in Cyprus, are given substantial autonomy over their own teaching practice
› need for Educational conferences, training workshops and in-service trainings. The Cyprus Pedagogical Institute provides tailored training to teachers in citizenship education, covering areas such as racism prevention, stereotypes, empathy and practices for teaching controversial issues (European Commission, 2018b)
› need to implement different European programs
› need to strengthen one's own cultural identity within the realities in our society

C) THE NEXT ASPECT WE CHOSE TO APPROACH WAS THE RELATIONSHIP BETWEEN THE SCHOOL AND THE OTHER LOCAL / REGIONAL INSTITUTIONS WITH AN INTEREST / ROLE IN EDUCATION.

Since our project stresses the **importance of collaboration**, we wanted to find out the areas of common interest for those organizations that could get involved in supporting the activities carried out by schools.

In **Italy**, relations with local authorities and with the territory are the **responsibility of the head of the educational institution**, in fact paragraph 14 of Law 107, states: "*For the purposes of preparing the plan, the head of school promotes the necessary relationships with local authorities and with the different institutional, cultural, social and economic realities operating in the territory; it also takes into account the proposals and opinions formulated by parents' bodies and associations and, for secondary schools, students.*" This basically means that within the context of the educational objectives deemed essential by the educational institution and in the project activities, schools will be able to bring out within the PTOF the link with the territory or with the cultural, social and economic context to which they belong.

In particular, **parents** of all school levels and grades elect their own representatives in the collegiate bodies (class councils or interclass or intersection and in the school/institute councils), and have the right to meet at the school premises, to carry out their right to democratic participation in school life.

The introduction of work-school programmes between **school and business** or other types of activity, due to the characteristics of strong integration between the activities developed in the various areas, implies the management of information flows between the different contexts and subjects involved, each of which it is not limited only to the implementation of the actions within its competence, but must also manage the connection with the operations carried out by other subjects. In this context, the sharing of the formative value of work-school programmes by families and the attention to the needs of students, whose motivations must be respected and valued, is fundamental.

In **Portugal,** school culture influences the operationalization of educational change and the teacher's own role is contaminated by it, as workplace culture has a direct impact on how teachers see their performance and their students. In this sense, in Lousada just like it happens in the entire country, there is a **strong involvement among groupings, schools and the active participation of the students' parents and local authorities**. The strong involvement with local institutions in the implementation of educational and social projects, as well as the participation in national projects, have contributed to the **valorisation and promotion of the image of quality**.

The Ministry of Education and the NGOs converge their efforts to **promote environmental education, civic development, development and capacity building in the most diverse scientific areas**. The education system also has the support of various sponsors and foundations with the aim of improving people's quality of life.

As far as **Poland** is concerned, schools <u>implement various local programmes or EU projects,</u> <u>through which they cooperate with various organisations</u>. **Local authorities** that finance public schools or the programmes they implement **contribute to equipping schools with appropriate equipment or to support students in need of assistance**. <u>Schools also often cooperate with</u> <u>Social Assistance Centres</u> (in order to best help students and their families), with Psychological Counselling Centres, with Medical Centres where they provide health care. <u>Police officers</u> are organised to talk to pupils and their parents to ensure **maximum safety by raising awareness of the risks and consequences of committing illegal acts**. There are also institutions and organizations that support **environmental education**. Various environmental actions are organised, e.g. *Cleaning up the World*, *We're segregating garbage*. In addition, schools undertake cooperation with other educational institutions, schools, universities in order to develop students. <u>Pupils take part in various competitions</u>. They can participate in *Open School Days*, where they can learn more about the place of their future education. Universities often organize interesting lectures, classes for primary school students. Thanks to the **cooperation with parents and local authorities**, schools often organize events for the school and students. In addition, the **schools cooperate with local entrepreneurs, non-profit institutions**, giving students the opportunity to get to know the work in different sectors and the development of their interests.

Cooperation with various institutions / organizations covers areas such as: health, financial aid, psychological assistance, safety, education development, entrepreneurship, security, tolerance, technologies, participation in various events.

In **Romania**, the educational process, being a complex one, involves a large number of partners whose roles must be harmonised so that they all contribute, in a positive way, to the development of our society. **The local authorities represent** one such important partner, since in Romania, they are **members of the boarding committee, they take part in the decision making process**; they also **support schools financially** and are **initiators or collaborators in many educational projects** (either at local, regional, national or even European level).
NGOs are becoming more and more visible and active in the life of the school; they **initiate or support programs and projects** in the following educational domains: **protection of the environment, health education, promotion of children's rights, personal and professional development of both students and teachers**.

Economic agents are another category of partners whose contribution is of vital importance, especially if we refer to the development of certain competences and skills for the students who study in **technical and vocational high schools**. These agents can **provide the practice** our students need to be properly prepared for the working place.

In **Cyprus**, the situation is similar to the other ones, in the sense that **schools cooperate with various bodies, services and organizations, private and public, in and outside Cyprus, for organizing sports and cultural activities.**

The cooperation results in <u>programs related to the promotion of health and development of the</u> <u>vulnerable groups of students</u>, such as the ***DRASE*** and ***EAYP*** programs, as well as the program called *Greek for children with immigrant biography*.

Developing and implementing European programs in school units in various subjects are enhancing the **cooperation among EU teachers**. <u>Schools cooperate with NGOs</u> to support **environmental education** and also with artists to **promote creativity and inclusiveness**.

However, there is a strong need to create flexible and equivalent learning methods, connecting the school and the local entrepreneurs.

D) FINALLY, WE DECIDED TO ADDRESS A VERY IMPORTANT, YET SENSITIVE ASPECT: THE RELATIONSHIP BETWEEN THE TEACHING / LEARNING PROCESS AND THE REAL WORLD.

We consider it a little bit delicate because many times, people, teachers included, believe that the role of the school is to transmit information and help students acquire knowledge. Thus, we forget that the skills and competences developed in school should be in direct correlation with the labour market and interests of our students. Here is the reality in each of the partner countries.

In **Italy**, the work-school programme, introduced in the school system as a teaching methodology for the second cycle courses by art. 4 of the law 28/3/2003 n. 53 and disciplined by the following legislative decree 15/4/2005 n. 77, aims to ensure that <u>young people, between 15 and 18 years old, in addition to basic knowledge, acquire skills that can be spent on the job market</u>.

Work-school programs are designed upon different types of agreements with public and private subjects and stipulated by educational institutions to encourage the school integration with other subjects in the area, in order to **bring young people closer to the world of work and jobs closer to young people**. The specific legislation emphasizes the purposes to be pursued in the design of these paths:

› create flexible and equivalent learning methods from a cultural and educational point of view, as appropriate to the results of the second cycle of education, which link classroom training with practical experience;
› enrich the training acquired in school and training courses with the acquisition of skills that can be spent on the job market;
› encourage the orientation of young people to enhance their personal vocations, interests, individual learning anchor;
› create an organic link between the educational and training institutions with the world of work and civil society that allows active participation in the training processes of the various subjects involved;
› correlate the training offer to the cultural, social and economic development of the territory.

Essential conditions, therefore, for the planning of work-school programs are the analysis of training needs in the territory and their correlation with the Training Offer Plan and the specificity of the curricula of the educational institutions. Concretely, <u>the training courses are carried out through the alternation of study moments and experiences in working contexts, with a sharing of objectives between school and business, as well as a common orientation to the training needs of students</u>. The work-school programs are designed and implemented by the school or training institution, on the basis of special agreements with companies, their respective associations, the chambers of commerce, industry, crafts and agriculture or with public and private bodies, including those of the third sector.

Organisations increasingly require individuals to have certain **technical** and generic skills, including **academic qualifications**, **language knowledge**, **computer skills**, **teamwork**, **availability, organisation, dynamism, leadership**, etc. In this sense, the Portuguese education system, followed locally, has focused essentially on the **promotion of scientific** but also **technical knowledge**, enabling transversal competences, thus assuming a determining role for the professional performance of excellence. We have also developed principles of action and guidelines for the development of areas of **autonomy outside the curriculum**, the educational organization with the main focus on future **employability** and **interest of students**.

In **Poland**, the education system is still limping. The level of teaching depends on the school and the involvement of teachers and technical aspects, such as appropriate materials and technological equipment. <u>The traditional teaching system is still used in Poland</u>. <u>Classes are still very theoretical and students often lack a practical approach to the topic from the teachers</u>. Although many schools try to make changes in this regard by carrying out various projects

themselves and looking for a way to increase teaching efficiency, <u>in some schools, classes are often boring for students</u>. **Teachers lack training on how to use ICT tools** in class to make students more active and interested. <u>The curriculum is very intensive</u>, which makes individual work during lessons difficult. Despite various shortcomings, **through the implementation of various projects and cooperation with different institutions and organisations, many schools manage to respond to pupils' needs.** They organize interesting classes and events to develop students' interests. However, many changes and efforts are still needed on the part of teachers to make education more effective and interesting at primary school level.

In **Romania**, the material resources offered by schools are supposed to be in correlation with the profile of that schools, especially in high school. For example, in those educational institutions which **focus on humanistic subjects**, there are special labs for developing the students competences in communication (both in their mother tongue and in foreign languages), whereas in schools whose **main focus is on science**, there are more IT / chemistry / physics labs.

Unfortunately, though, in Romanian education system, **the accent falls mainly on the theoretical part**. Students are expected to know a lot of information, to memorise data, yet they lack practical abilities. The situation is created by the **limited financial resources** which do not ensure the instruments / gadgets / software / appliances that are necessary to develop other essential, practical skills and competences, without which our students cannot get the desired job. **In order to compensate for the insufficient** investment in this practical side, schools have tried to develop the above-mentioned competences **through extracurricular projects**.

In **Cyprus**, education attainment has risen further but **underutilisation of skills remains a challenge given the specific features of the Cypriot labour market**. Measures have been taken to **upgrade vocational education and training and adult learning**, but attractiveness of both sectors and participation in them remain low.

Advisory and Vocational Education Service comes under the Administration of Secondary Education. Its main purpose is a personal, social, educational and professional development of students, having as primary principle the peculiarity of each individual. <u>Students develop among others the necessary skills and capabilities that will enable them to take rational decisions concerning educational / professional or personal matters</u>. They learn about the nature and demands of various professions, as well as about modern socio-economic and cultural evolutions and their impact on the local and international employment market, so that they make the right educational choices.

FINAL CONSIDERATIONS

After a close analysis of the main elements that characterise the educational context in Europe, we have noticed a few **challenges that most schools, regardless of the country they belong to, face nowadays**. The majority of these challenges are different from the ones previous generations of teachers had to deal with, that is why, it is necessary to mention some of **the changes that have occurred in recent years** and that have led to the appearance of those challenges.

First, the world we live in embraces technological futures, therefore how and what we teach in our education system needed to be reshaped to keep up to date with the growing demands of the 21st century. Therefore, **incorporating technology into our teaching became a great way to actively engage students in the learning process**, especially since digital media is an ever-present element in the lives of today's young people. Interactive whiteboards or mobile devices started to be used to display images and videos, because they helped students visualize new academic concepts. <u>Learning has become more interactive since technology came to be an indispensable part of it</u>, and students can now physically engage during lessons, as well as instantly research their ideas, which develops autonomy. The use of mobile devices, such as iPads and/or tablets, for students to record results, take photos/videos or share their work has proven to be a great ally of the teacher in the fight against monotony and boredom.

Secondly, the concept of a teacher standing in front of a room full of students who listen and respond to direction is increasingly a thing of the past. While not an entirely new approach, **student learning spaces have grown wider than the typical classroom we once knew**. This has allowed students to become partners or co-creators of their own learning. Experiences which favour <u>collaboration, communication and teamwork</u> for all students usually take place beyond classroom walls. That is why, more and more often, teachers seem to encourage the development of such <u>learning projects between individuals, small groups or larger groups, in which students can learn both at school and at home, collaborating and applying their knowledge to real-life issues.</u>

Third, in this digital era, a world of information is at our fingertips with the click of a button or a simple voice command, and, as technology continues to advance, students need to grow their learning with it. Consequently, **technology is no longer a motivating factor when it comes to learning – it is a must**. It has been proven that consistent use of mobile technology provides more skills for pupils' futures, particularly around digital citizenship.

Another change that has occurred in recent years is the use of games in learning. Gamification used to be a hot topic until a few years ago. Nowadays, many educators agree that **using digital games in the learning process can actually help improve pupil's engagement** and give teachers useful tools to help analyse their pupils' engagement.

Significant change has taken place not only with reference to what constitutes a classroom (since technology has eliminated the boundary of classroom walls), but also regarding the way teaching is delivered. If we look around, we notice that most professions treat everyone's case differently. For example, a doctor has individualised treatment plans for each patient. Teachers have realized that education should not be any different and that the old model of teaching and learning which fits all students is outdated and can no longer fulfil the objectives of the 21st century education. Thus, in the last 10 years, **teachers' role has become that of a facilitator of learning, while students have gained more control of their own learning journey**. In the past, all children did the same work, no matter their level of ability or skill, which led to nothing but disengagement and poor outcomes. Consequently, in today's education systems, <u>teachers have individualised learning plans for students, which allows every student to learn at a pace that best suits their abilities and to engage with content that is most beneficial to them.</u>

The goal of education itself has changed. In the past, education was viewed as the transmission of knowledge by the teachers to the students. Today, most teachers consider that **education is about facilitating students' autonomous learning and self-expression**. The former approach which converges toward the teaching of specified subject matter, may be termed "convergent" teaching and the latter approach which emphasizes open ended, self- directed learning could be called "divergent" teaching. Previously, education was quite structured and teacher-centered; the students were passive recipients of knowledge transmitted to them.
<u>The divergent approach is flexible, student-centered, with students becoming active participants in the learning process.</u>

One last important change worth mentioning, especially from the perspective of the methodology proposed by our project – that is TEAL Methodology, refers to inter-disciplinary collaborations. In the past, the tendency in our schools was to teach bits and pieces of information related to a particular subject, without any correlation with similar concepts or phenomena. In time, educators have realized that **cooperative sharing of information from different fields and the efforts to find pragmatic solutions to global problems can contribute greatly to the preparation of students to function and be productive in a world with diverse populations, different economic conditions, multitudes of cultural, religious and ethnic groups, and many other different factors**.

To conclude, **the main challenges of education**, in the midst of which our project came to life, can be summarised as follows:

> › technology needs to be integrated more and more in educational activities, in order to keep

up with the learning demands of the 21st century

›   teaching needs to be adapted to different student characteristics, by using diverse methods of teaching; adaptation refers to: ability levels, patterns of different abilities, learning styles, personality characteristics and cultural backgrounds

›   active learning methodologies, that directly involve students in the teaching process, are **essential** for a significant impact on their knowledge acquisition, on their creativity, as well as on their ability to work in diverse groups

›   **cooperative learning**, in which students of mixed abilities are encouraged to work together, **needs to be promoted**; thus, education will develop students' self-confidence, it will enhance their communication and critical thinking skills, which are vital throughout life

›   **increasing students' motivation for learning remains a constant preoccupation of teachers,** especially since society has evolved so much that it is becoming more and more difficult to find topics of interest for our digitized students, whose world and existence are many times reduced to the virtual reality.

Without doubt, **education does form the foundation of any society**. It is responsible for the economic, social, and political growth and development of society in general. <u>Therefore, the direction our society is going depends upon the quality of education that is being imparted</u>. Schools' responsibility is thus to mould a nation's future by facilitating all round development of its future citizens.

ONLINE RESOURCES

file:///C:/Users/Utente/Desktop/RILEVAZIONE+BISOGNI+FORMATIVI+AMBITO+2_alle gato_1.pdf

http://www.indire.it/lucabas/lkmw_file/eurydice/QUADERNO_per_WEB.pdf

http://www.moec.gov.cy/dme/en/index.html

http://www.moec.gov.cy/odigos-ekpaidefsis/documents/english.pdf

http://www.questfield.ro/en/challenges-in-education/

http://www.sistemagenerale.com/2017/05/11/sistema-scuola-cosa-ne-pensano-gli-studenti/

https://blog.interactiveschools.com/blog/6-ways-teaching-has-changed-in-the-last-10-years

https://ec.europa.eu/education/sites/education/files/document-library-docs/et-monitor-report- 2018-cyprus_en.pdf

https://www.gov.pl/web/edukacja/podstawowe-kierunki-realizacji-polityki-oswiatowej-panstwa-w-roku-szkolnym-20202021

https://www.istruzione.it/alternanza/allegati/Raccordo%20tra%20Scuola%20e%20Mondo%2 0del%20Lavoro.pdf

https://www.miur.gov.it/sistema-educativo-di-istruzione-e-formazione

https://www.publicschoolreview.com/blog/10-major-challenges-facing-public-schools

https://www.quizalize.com/blog/2018/02/23/teaching-strategies/

https://www.tandfonline.com/toc/cete20/current

https://www.univa.va.it/web_v4/site.nsf/dx/dossier_ASL_USR.pdf/$file/dossier_ASL_USR.pdf

http://www.moec.gov.cy/en/index.html

Chapter 2

Research
case Studies

European approach to TEAL teaching

Collection and analysis of case studies in Europe that apply the TEAL method in different didactic areas

A t this stage of our work, after analyzing the situation of teaching on the European territory and examined and synthesized the reference points of the TEAL theory, we considered appropriate to search for good practices and case studies linked to realities already operating at European level, to be able to take from these examples useful operational references for our project. Specifically, we were able to identify different realities of both public and private nature, which implement educational projects through the use of TEAL elements, applying them to very different areas, not necessarily linked to the school context, as traditionally conceived.

Below is the list of summary sheets that describe and analyze these selected projects divided by the educational area in which they operate.

EXAMPLE OF TEAL TEACHING METHODS APPLIED TO THE TECHNOLOGICAL FIELD.

- PHYSICS on VIDEO (www.fisicainvideo.it)
- CO-LABORY (www.co-labory.com)

GAMIFICATION: METHODOLOGY OF TEACHING-LEARNING ENOUGH ABOUT THE GAME

- Score Hunter for BIK (https://scorehunter.edu.pl/)
- Khan Academy Kids Free educational (http://www.edukacjaprzyszlosci.pl/)

TEAL METHODOLOGY APPLIED TO CIVIC EDUCATION

- Programming and robotics for students
- BIOESCOLA 360° Lousada

TEAL METHODOLOGY APPLIED TO THE TEACHING OF SCIENTIFIC SUBJECTS (EG BIOLOGY, NATURAL SCIENCES)

- Liceo "MARIN PREDA" THEORETICAL HIGH-SCHOOL (www.liceulmarinpreda.ro)
- Scuola Infanzia "MARIN PREDA" THEORETICAL HIGH-SCHOOL

TEAL METHODOLOGY APPLIED TO THE TEACHING OF HUMANITIES (EG GEOGRAPHY, FOREIGN LANGUAGE

- FUN & SMART CLASS@
- FUN & SMART CLASS@ COWORKING

EXAMPLE OF TEAL TEACHING METHODS APPLIED TO THE TECHNOLOGICAL FIELD.

FISICA IN VIDEO

The "PHYSICS on VIDEO" educational project is a project born within the scientific laboratories (physics; chemistry; museum of natural sciences; etc.) of the Liceo Classico of Venegono Inferiore (MI), of the Archbishop's Seminary of Milan. In particular, the project was born in 2002 when the school started a series of events and guided visits to the laboratories for the students of primary and junior high schools in the area, organizing for them small Physics and Chemistry experiments, as fun and instructive activities to do together. The "Try To Believe" project was born from these activities, thanks to the physics teacher Natale Castelli, the chemistry teacher Adriano Sandri, the videomaker experts of Guglielmo Daino and Cesare Gandini, the web designer Luca Colombo and the craftsman Piero Fanchin. All together they created the Open Source "PHYSICS in VIDEO" educational portal where videos of many scientific experiments with different levels of difficulty are collected for students of different age groups.

Image 1: project logo

Link:
www.fisicainvideo.it (solo italiano)
www.youtube.com/channel/UCTotKzDnjkiNZ4YIfxl0Tsg (solo italiano)

- PHYSICS on VIDEO

The teaching subject of this project is Physics in its main branches (movement; forces; energy; waves and acoustics; fluids; thermology; optics; electromagnetism; etc.).
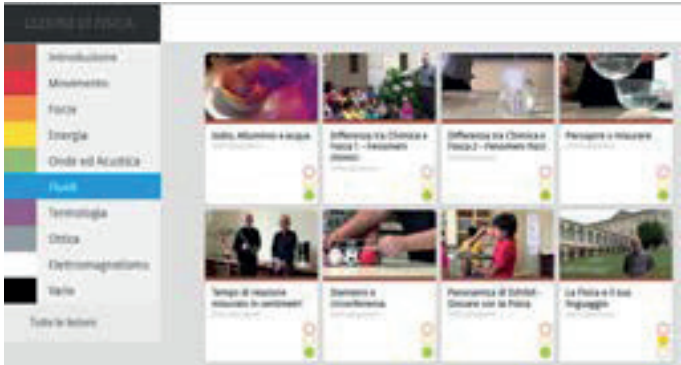

Image 2: home page of the platform "PHYSICS on VIDEO"

The students who take part in the filming of these videos as protagonists are mainly junior high school students that participated in the visits and educational activities organized by the high school.

What type of classroom (size, space organization, table arrangement etc.) have they used?

PHYSICS on VIDEO takes place within two types of spaces, one more traditional which is made up of the laboratories of Physics, Chemistry, and the Museum of Natural Sciences, where we find workbenches with specialized technical equipment of various types or classic display win- dows. Within these laboratories, more structured exercises and experiments are carried out during which the subject is told by concepts and not by formulas. A rigorous approach that when studying a physical quantity or a law does so through the search for the essence of the phenomenon rather than its mathematical formulation, an attitude in line with the style of the scientist Michael Faraday (1791-1867), the first to use curious experiments to catch the atten- tion of the students in his "Christmas lectures".

www.youtube.com/watch?v=AcwW_gG_-QQ
www.youtube.com/watch?v=PxrW0P0AUTI
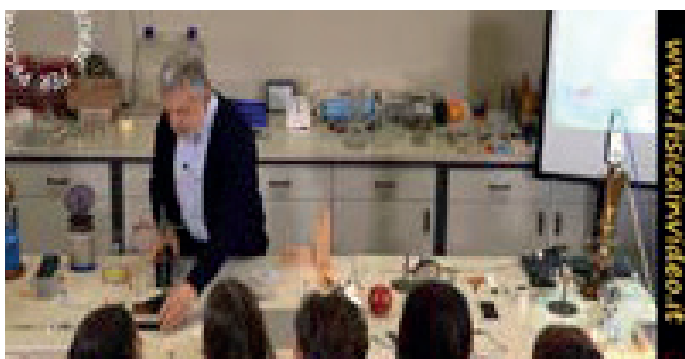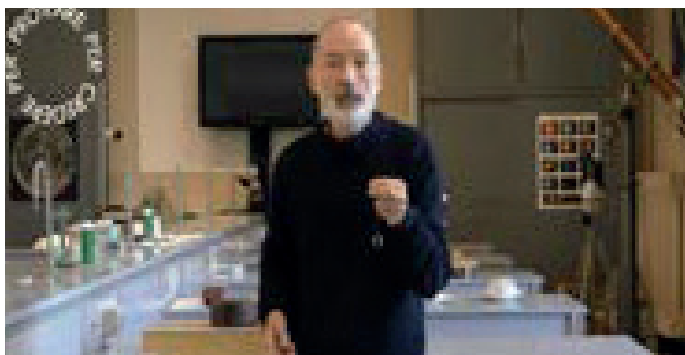
Next to these traditional laboratories, we find the Exhibit laboratory, an informal space inspired by the famous Exploratorium museum in San Francisco, started in 1969 by the physicist Frank Oppe- nheimer (1912-1985), which represents the most important example of an exhibition-educational space dedicated to physics and chemistry. The Exhibit laboratory of the Physics on VIDEO project has a collection of about sixty artifacts that explain scientific concepts of all levels in a fun way, from the simplest to the complex ones such as magnetism, in this way the people who visit the laboratory can engage in different experiments and "games".

Space is organized in an informal way with workstations for single work and group work, artifacts and exhibits of different sizes freely accessible by the children to conduct autonomously the "ex- periments" and easy-to-use technological equipment that are functional to the introduction of the different experiments that take place inside the laboratory.

It is a real TEAL laboratory where the technological equipment made available to traditional stu- dents (tablets; smartphones; etc.) and unconventional ones designed and built specifically to tell a specific scientific topic.

What kind of training material was employed (PowerPoint presentation, videos etc.)?

Inside the Exhibit laboratory the main tools used are the exhibits, a series of "toys" that allow, through an immediate and user-friendly approach, to discover and understand natural and scien- tific phenomena, even complex ones. Through the exhibits, a privileged entrance is created in the students' minds, thanks to the curiosity that this informal approach to Physics and Chemistry creates.
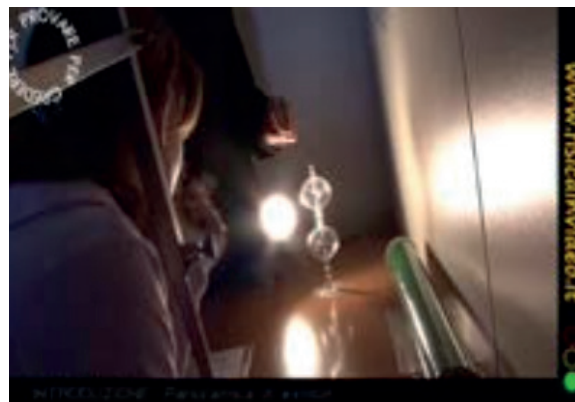

Image 5: images of some "exhibits"

How technological tools (ICT) were involved?

Technological tools (ICT) such as tablets and smartphones are used in the introductory phases for the explanation of a natural phenomenon, for viewing videos and images of what students are preparing to experiment with the exhibits.

What type of results were achieved using this teaching methodology compared to the conventional one?

Taking into consideration the most widespread teaching theories which highlight the power of tools such as Devices and the Internet, we immediately realize that a laboratory in which scientific and natural phenomena are tested in a practical way, through playing and using strange artifacts, represents an upstream but also an extremely effective choice because it brings learning back to a direct and unfiltered dimension. A teaching method oriented to passions, curiosity and previous knowledge is applied, promoting learning based on doing (learning by doing) where playing repre- sents the privileged means of learning. The attention that these toys arouse and their ability to affect students are indisputable. What may surprise us is that this approach, in the long run, could create new and better conditions for scientific teaching in adults, going increasingly towards the Edutainment, that is a form of entertainment aimed at both educating and entertaining. In addi- tion, another very important educational result achieved by PHYSICS on VIDEO is to be underlined, namely the very high degree of replicability of their project, thanks to the open-source video con- tent that is uploaded to their portal.

CO-LABORY

Young co-working space born in Puglia (IT), more precisely in Trani, with the desire to create an ecosystem that facilitates and supports innovation in all areas, including teaching those girls and boys of school age. Co-labory aims to be a space that supports continuous learning and growth through sharing and Cooperative Learning.

Thanks to its professionals, this reality is initiating a series of fruitful collaborations with the schools in its territory, realizing projects that have INNOVATION as their central theme. Social and cultu- ral innovation with projects involving the European community and the Erasmus + program or technological innovation with projects about cultural heritage, storytelling, and coding education through the use of open-source applications or equipment related to the world of makers.

Image 1: co-working space interiors

Link:
www.co-labory.com (solo italiano)
www.facebook.com/colaborycoworking

What is the teaching subject?

Co-labory professionals do not have a defined subject area of action, but rather provide advice on the realization of personalized learning paths with a high innovation content. In fact, as per the TEAL literal definition, active learning paths enabled through technology are designed and crea- ted, combining frontal didactic moments with laboratory activities and teaching, thus giving life to training courses based on Cooperative Learning.
Co-labory has carried out projects in various areas such as the storytelling of cultural heritage (mtvrs.io/EducatedVerifiableConch), coding education (scratch.mit.edu), the Erasmus + program and labor policies in Europe (www.co-labory.com/alternanza-scuola-lavoro-5ac) or digital manu- facturing and design for all (www.archilovers.com/projects/257635/tavole-tattili.html). All themes have allowed students to try unusual topics and resources, giving them the opportunity to learn new skills and not only new concepts.

Age of the students

Youngsters who have been involved in these training courses are both students from Junior High and High School, who with their enthusiasm have made possible moments of real Edutainment, that is, fun moments of educational-training entertainment.

Image 2: some didactic activities carried out

What type of classroom (size, space organization, table arrangement etc.) have they used?

One of the strengths that Co-labory puts into play in collaborations with schools is the ability to in- tervene on traditional teaching spaces. With temporary interventions and the use of technological equipment, teaching spaces are transformed into "classrooms 3.0", hence, into flexible spaces that follow the TEAL teaching guidelines within which it is possible to overcome the logic of the study intended as "mnemonic learning".

Image 3: traditional teaching spaces reconfigured for a TEAL teaching

In these renewed spaces it is possible to involve students in active and collaborative learning (problem-solving) encouranging the shared planning of the teaching process. Depending on the topic that the teaching process aims to address, an optimal space configuration is adopted for the enhancement of laboratory teaching and peer teaching, without ever neglecting the integration between technological and traditional tools.
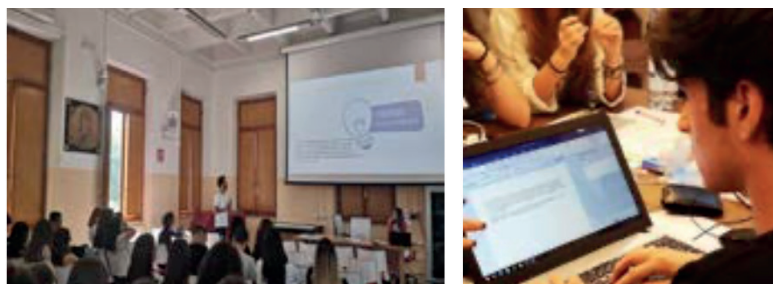

Image 4: didactic activities in spaces reconfigured for a TEAL teaching

What kind of training material was employed (PowerPoint presentation, videos etc.)?

In designing its educational paths, Co-labory always tries to combine standard digital contents (videos; photos; Powerpoint presentations; etc.), applications and open source programs (Meta- verse; Scratch; Driftsight; etc.), traditional techniques and materials (models; concept maps; etc.) and tools typical of the maker world (3D printer; CNC pantograph; etc.).

This hybrid and complex planning prove to be successful regardless of the subject that students have to face because it allows learning by skills and not by concepts. Moreover, it also manages to free itself from the excessive use of technology and devices.

Image 5: activities and workshops carried out during didactic activities

How technological tools (ICT) were involved?

Technological tools and applications or open-source programs are always used as the supporting structure of each project, without ever making them the goal of the educational path. Tools such as IWB or Metaverse are and must remain as means to facilitate the achievement of the didactic goal that each project has.
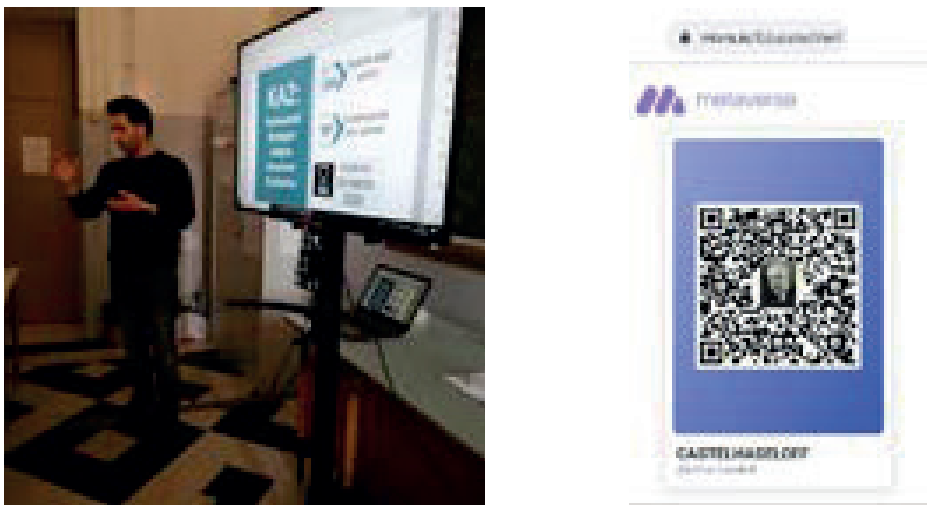

Image 6: some ICT tools used

What type of results were achieved using this teaching methodology compared to the conventional one?

The main goal that this hybrid methodology achieves is a greater awareness from the students' side of their abilities and attitudes. Furthermore, the youngsters working in informal environments with collaborative dynamics develop great empathy with the tutors who guide them.

Image 7: a group of students who participated in didactic projects co-designed with schools

The great merit recognized at Co-labory is the ability to intervene as facilitators of teaching pro- cesses in school structures that do not yet have permanently configured TEAL spaces. The friendly approach that Co-labory applies in the design and implementation of innovative and personalized educational paths allows it to respond adequately to the needs that schools can manifest from time to time, needs that can be both educational and logistical.

Score Hunter for BIK

Score Hunter for BIK Links to external pages:

- YT: https://www.youtube.com/watch?v=egHISSr51T8
- FB: https://www.facebook.com/budujdobrahistorie/
- Official website: https://scorehunter.edu.pl/auth/login
- https://www.bik.pl/poradnik-bik/score-hunter-czyli-wiedza-w-punktach

Image 1. The official Score Hunter Logo.

What is the teaching subject?

Biuro Informacji Kredytowej (BIK) uses gameplay to build credit awareness of students entering the stage of financial independence. Score Hunter is a game that takes you into a world of difficult but important topics. The whole game is divided into several thematic sections: creditworthiness, identity theft, alerts, BIK in general and a video section. Points are awarded for simple tasks, qui- zzes and correct answers. The points can be exchanged for prizes. At any time, you can check the number of points scored and your position against other players.

Score Hunter is a proposition for those who want to prove themselves in a difficult financial field. In a simple, accessible and modern way, the game conveys knowledge about the benefits of having a good credit history, reminds you of the need to protect your personal data and shows you how financial credibility is shaped. Less-oriented players are made aware of what is BIK, what scoring is and what credit guarantees are associated with it.

Age of the students

Pupils and students (16-25)

What type of classroom (size, space organization, table arrangement etc.) have they used?

As we see in the picture below, the classroom has a typical size. All of the students have their own computers.

Image 2. Some of the didactic activities taken at Wyższa Szkoła Bankowa in Gdańsk (Poland)

The teacher introduced the topics with questions, exercises, videos and graphic presentations. The students have done several numbers of educational tasks on the platform. They were related to the credit information exchange system, principles of the credit bureau, secure lending, cre- ditworthiness, credibility building, identity protection, consequences of personal data theft and protection against credit extortion. All educational materials are available in the knowledge base.

Image 3. Didactic activities in Uniwerystet Rzeszowski – Rzeszów, Poland

Numerous ICT tools were involved to enhance the teaching subject. They were implemented in a classroom to make it more interesting and engaging. Classrooms included a series of technological tools. They were equipped with a data projector, which allows students to see the presentations on the wall. Students used computers, laptops, tablets and mobile phones so that all of them could follow the teacher and play this educational game on their own. Students used the educational platform that includes game mechanisms, including elements of the competition.

By using this teaching methodology, the classes were more attractive to the students. The students worked actively with the help of the devices, collected information and data presented during the classes. Thanks to these activities more pupils and students have credit knowledge. Using ICT tools increased student's motivation, connected students to various information sources and helped the instructors with presenting the teaching subject in a more interesting way.

TEAL technology is very important in today's world. It is important in teaching. It helps in the learning experience by using simulations and laboratory activities. Exchanging the traditional board for interactive tools, such as presentations and videos, makes lessons very interesting and keeps the students focused.

Khan Academy Kids Free educational

Khan Academy – Edukacja dla Przyszłości

Website: http://www.edukacjaprzyszlosci.pl/
FB: https://www.facebook.com/edukacja.przyszlosci/

Image 1: Official logo

What is the teaching subject?

The aim of the Edukacja Przyszłości Foundation is to support the Polish educational system by pro- viding students and teachers with a modern and free educational platform. They want to achieve this through: Translation of Khan Academy materials, Creating own materials according to the Khan Academy formula, Promoting Khan Academy to teachers and students, Training teachers to use the Khan Academy platform. All Khan Academy materials and features are available for free!

Age of the students

Children and Pupils 6-14

What type of classroom (size, space organization, table arrangement etc.) have they used?

Teachers used a normal classroom for their activities. All of the students had their own tablet or laptop. They used a Khan Academy app to increase their knowledge. Teachers helped them and gave them tips when needed. Students were allowed to use an extensive video library, interac- tive challenges and assessments from any computer with internet access. This complete learning tool adapts to the learning pace of the students.

More information and good practices are below:
https://www.youtube.com/watch?time_continue=520&v=gIm6174WDYQ&feature=emb_title

What kind of training material was employed (PowerPoint presentation, videos etc.)?

Teachers, thanks to access to the application, used a collection of interactive activities and books. Teachers used the data projector to show students educational videos and PowerPoint presenta- tions which made the lessons more attractive. Link to the youtube channel: https://www.youtube. com/user/KhanAcademyPolski. Some of the exercises were used in good practices.

How technological tools (ICT) were involved?

Numerous ICT tools were involved to enhance the user experience. They were implemented in the system to make them more interesting and engaging. Students on their lesson used devices such as PC, laptop, tablet or mobile phone. The teacher used the data projector to show children the presentation.

Image 3. Example of ICT tools

Example of using ICT tools in classes:
https://www.youtube.com/watch?v=wZxZZ3RgWhI

What type of results were achieved using this teaching methodology compared to the conventional one?

Thanks to diverse learning methods, creative lessons, educational videos and tasks, young learners engaged with topics through open-ended and original content. The learning path is personalized so the kids and students can learn independently. It is more interesting for them than traditional methods because they belong to generation Z, who use ICT tools in normal activities. Khan Aca- demy makes education easy and fun for young kids and pupils. Students after the classes can see their statistics and compare them to others in a classroom. Teachers also have access to all neces- sary data of their students.

They can download a summary of the results of the class and find out which topics are problematic for students. The class profile allows the teacher to look at the progress of the whole class and quickly identify which student requires more attention and in which area. Thanks to using the ICT tools, children not only develop their digital skills but also by watching the educational videos and doing the exercises they develop soft skills. We know that in today's world it is really important to develop soft skills such as creativity, problem-solving, critical thinking, etc.

All of the exercises encourage students to think and learn, that's why we think that is a good option for teachers and students to learn.

Programming and robotics for students

The Municipality of Lousada promoted, for the second year, a complementary offer of Initiation to Programming and Robotics for the classes of the 4th year of the first cycle, in the scope of the curricular enrichment, foreseen in the Annual Plan of Municipal Activities for the Schools.

This action is part of the Integrated and Innovative Plan to Combat School Failure of the Municipality in partnership with CIM Tâmega e Sousa, co-financed by North 2020.

What is the teaching subject?

This activity promotes creativity and scientific, logical, and mathematical reasoning by providing simplified computer programming tools. Thus, it is intended that the youngest develop cross-curricular skills associated with computer thinking, learning basic programming principles in order to increase students' levels of digital literacy. According to the Coordinator, Dr. Paulo Monteiro, "prac- tical exercises on computational thinking are carried out, where robots are used to accomplish a path through instructions provided. The students perform worksheets on algorithms and practical exercises and also create different programs, using programming tools. "During the Initiation to Programming and Robotics portable computers, educational robots equipped with sensors and modules are used, as well as equipment that serves to observe the operation of some automatic mechanisms.

Age of the students

All students in the 4th year of the municipality's schools enjoy the activity.

What type of classroom (size, space organization, table arrangement etc.) have they used?

During the current school year, 483 students from the 4th year (26 classes) participated in the activity, of which 364 enjoyed the two components (sessions and equipment).

What kind of training material was employed (PowerPoint presentation, videos etc.)?

Computers; PowerPoint; Scratch

How technological tools (ICT) were involved?

In Lousada Schools Grouping, the activity is energized by the teachers of the grouping itself, using only the equipment that was acquired under the Integrated and Innovative Plan to Combat School Failure.
Students used MIT's Scratch project, which works as a gateway for kids to learn coding and "help young people learn to think creatively, reason systematically, and work collaboratively".

What type of results were achieved using this teaching methodology compared to the conventional one?

Students

- understood the dimensions involved in computational thinking;
- solved problems by their decomposition into smaller parts, by similarity or reduction of com- plexity;
- understood what algorithms are, how they work and their practical application;
- understood and applied the fundamental principles and concepts of programming (logic, data types, variables, conditional and repetitive structures, among others);
- created programs to solve problems, animate stories or games using a textual programming language or block programming environment;
- understood what OTs are supposed to do;
- programed OT to solve simple and complex challenges.

The Programming and Robotics for Students program is a well thought and crafted program that ensures that young students have early access to ICTs and technological problem solving that can spark an early interest in ICTs which, in turn, can lead to a very increasing literate society around technologies.

BIOESCOLA 360° Lousada

The BioEscola 360° Challenge is an initiative of the Municipality of Lousada that aims to promote good environmental practices and conscious citizenship, through a better active participation of schools and school centers in the municipality in promoting environmental responsibility, aware- ness and sustainability.

What is the teaching subject?

In this first session, the monitor should introduce the theme "Water" to the students and make a 360o visit that shows different forms of life in water. It should also create a discussion environment in which the students make their contribution to the importance of water for earthly life.

In the second half of the session, an exploratory activity should be initiated to the school facilities and evaluate and note the problems with water waste detected and discuss possible solutions, framing everything in the BioEscola 360o project.

Age of the students

5-12 years old.

What type of classroom (size, space organization, table arrangement etc.) have they used?

A regular-sized classroom (~30 students)

What kind of training material was employed (PowerPoint presentation, videos etc.)?

VR Equipment; PowerPoint; Whiteboard; Journal.

How technological tools (ICT) were involved?

For this program, VR was used as a tool for teaching the different forms of life in water. The use of Virtual Reality provides a new tool and approach to the way students can gather information and visualize learning. Through the use of a tool that allows students to see things that the naked eye wouldn't be able to, such as these water lifeforms, the use of VR has facilitated teaching but, also, has created a more engaged classroom.

With this program, a much more effective apprehension of content, increased interest in the sub- ject, and interactivity with the "real world" without leaving the room was achieved.

Image 1. Didactic activities

This is a very useful tool to avoid the dissemination of information using only the theoretical com- ponent, to bring students closer to local reality and to be able to provide experiences that would otherwise be difficult to explain and that most would probably not be able to use. Learning throu- gh new technologies (VR equipment) proved to be very captivating in all classes, and BIOESCOLA 3600 achieved a reach of 20 classes totaling 750 students through this new learning.

"MARIN PREDA" THEORETICAL HIGH-SCHOOL

"MARIN PREDA" THEORETICAL HIGH SCHOOL - TURNU MAGURELE, ROMANIA

"Marin Preda" High School in Turnu Magurele is situated in Muntenia, a southern region in Roma- nia, at 130 km from the capital city, Bucharest. The school has a rich history and a good image in the community, which has been gained through the students' and teachers' good results. In time, it has become better in several domains.

Image 1. "Marin Preda" High School – Teachers' Entrance

The institution includes all three levels of education, primary, secondary, high school and it cur- rently has around 800 students and 64 teachers. There are 10 classes in primary school, 8 classes in secondary school and 15 classes in high school. The teachers are characterized by professiona- lism, their most cherished values being: teamwork, mutual respect, a great relationship with the students, openness towards new methods and strategies, enthusiasm and a desire to improve.

Link:
http://www.liceulmarinpreda.ro/ (RO only) https://www.facebook.com/liceulmarinpreda/

What is the teaching subject?

Since it is a public state school, the national curriculum is taught. In Romania, however, there is the possibility to offer optional classes, which are established based on students' and their paren- ts' preferences. Therefore, in order to increase the attractiveness of this school, as well as to help students deepen their knowledge, a rich and diverse educational offer has been created, allowing students to choose from those courses which correspond to their needs and interests. In the hi- ghest level of education, most classes have a humanistic profile, but there is also a class in each grade that is mainly focused on sciences. Apart from that, in secondary level, there is a special class that studies piano.

For this specific activity, which was a cross-curricular one, combining physics and biology elemen- ts, the students learnt about photoreception and Human Sensorial Deficiencies. Students disco- vered the anatomical structure of the eyeball, they identified the components of the organ, they were explained the process of image formation and they identified the causes and manifestations of the main sight deficiencies. While working in groups, students observed and described the ob- jects' projection in lenses and they also rightfully associated the types of lenses required to correct sight deficiencies.

Age of the students

The girls and boys who were involved in this activity are in the 7th grade, which means they are 12-13 years old. The students were extremely enthusiastic to take part in the proposed tasks, es- pecially since it was the first time they had had the chance to experiment a new working metho- dology. It was also their first involvement in a European project.
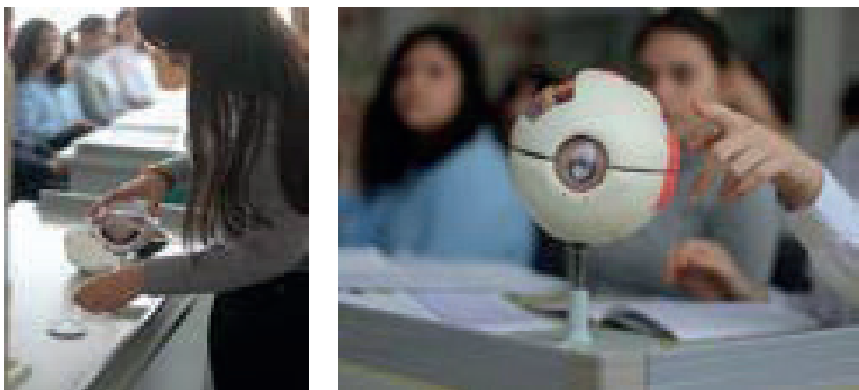

Image 2. Activities carried out

What type of classroom (size, space organization, table arrangement etc.) have they used?

There were around 24 students in the class. Because the desks in the laboratory are specially de- signed for experiments, they cannot be moved; therefore, when the students were asked to work in groups, they were not able to face each other. However, all of them were able to see what was projected on the whiteboard. During this activity, students learnt about photoreception and Hu- man Sensorial Deficiencies. They discovered the anatomical structure of the eyeball, identified the components of the organ, they were explained the process of image formation, they identified the causes and manifestations of the main sight deficiencies. While working in groups, students obser- ved and described the objects' projection in lenses and they also rightfully associated the types of lenses required to correct sight deficiencies.
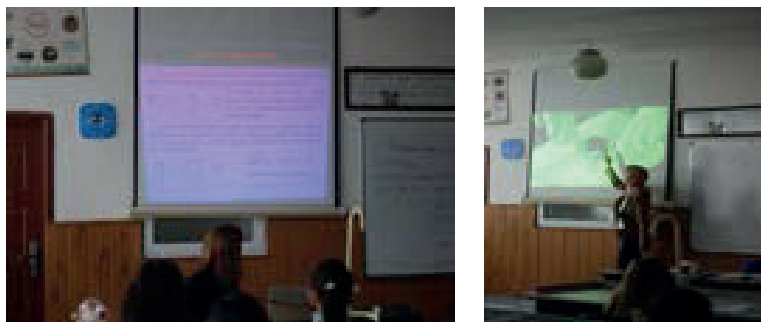
Image 3. Didactic activities

What kind of training material was employed (PowerPoint presentation, videos etc.)?

For the development of the activity, online resources were used (a short video, different images connected to the topic under discussion), as well as PowerPoint Presentations. During the activity, the students were asked to watch a video regarding a biological experiment, namely the dissec- tion of an eyeball. It had the same purpose of studying the specific phenomenon like a traditional experiment, but because of the online/digital element, it was much more attractive to the stu- dents. Moreover, the time needed to assimilate the information was reduced up to 30-40%, by comparison to the traditional learning style. This modern method of teaching and learning, where technology is involved, is characterized by individualization and differentiation. At the same time, it comes handy and useful when the physical didactic resources are limited; it is also a safe method if we were to think about the challenges or even dangers a real experiment, carried out in class, brings.

How technological tools (ICT) were involved?

Technological tools and applications were used during different stages of the activity; the computer, the video projector and the whiteboard were means to help achieve the goals of the activity, but they also increased the motivation for studying of the students.
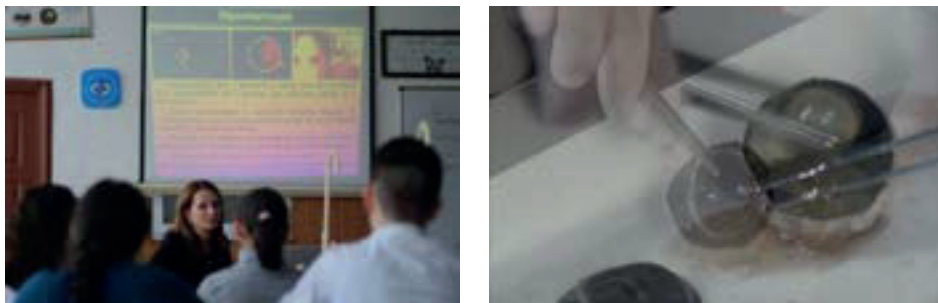

Image 4. Didactic activities

What type of results were achieved using this teaching methodology compared to the conventional one?

Using TEAL methodology during this activity, in which the teacher was no longer in the center of attention, nor was he/she the supreme possessor of knowledge, proved to be effective not only in changing the classroom routine but also in improving students' learning achievements. The students were no longer passive listeners; they were encouraged to solve problems together, to find appropriate solutions, to learn from each other. Thus, they became the real protagonists of the learning pathway. During the different stages of the learning process, they assumed various roles: "producers", "authors" and "consumers". And, at the end of the class, the feeling of self- -satisfaction was amazing. Another great advantage of TEAL methodology which was experienced was the fact that it promoted inclusion. The weaker students, who on a regular basis are left out and develop a feeling of uselessness, this time felt as valuable members of the group, they found their own role in the proposed tasks, they were stimulated to bring their specific contribution to the final outcome.

Image 5. Didactic activities

During this activity, inductive methods were used: from the observation and the practice to the conceptual framework. The success of the activity was guaranteed also by concept questions with individual reflection, peer discussion and corrective feedback from the teacher. Thus, the students were able to develop their cognitive skills (better retention, reflective learning, problem-posing/ solving), their social and interpersonal skills (by collaboration and group work), their communi- cative skills, as well as their emotional and motivational skills. The last mentioned category, is of utmost importance in today's society. Teachers aim to increase students' motivation for studying so that they will develop a positive attitude towards school. TEAL methodology is one important way to achieve this goal.

"MARIN PREDA" THEORETICAL HIGH-SCHOOL

"MARIN PREDA" THEORETICAL HIGH SCHOOL - TURNU MAGURELE, ROMANIA

"Marin Preda" High School in Turnu Magurele - Romania, although not farther than 130 km from the capital city, Bucharest, belongs to quite a poor area, with a high rate of unemployment and with a lot of families struggling to offer their children the necessary conditions to study (they buy the books recommended by the teacher or similar student workbooks, they try to buy their kids computers / smartphones with internet access so that their children have access to online resour- ces)..

Image 1. "Marin Preda" High School – Teachers' Entrance

The climate of the organisation is an open and stimulating one, characterized by dynamism and satisfaction of its beneficiaries. The relationships between colleagues are based on respect, su- pport and honesty. The teachers in the school are interested in raising the students' motivation for learning, for becoming active citizens in their communities. Attention is also to the level of the education provided to students.

Link:
http://www.liceulmarinpreda.ro/ (RO only)
https://www.facebook.com/liceulmarinpreda/

What is the teaching subject?

Despite the limited digital resources the school has to offer, teachers are aware of the important role technology plays in our lives, whether we are adults, teenagers or small kids. Therefore, most of the teachers in the school have participated in training courses aimed at developing their digi- tal competence, at improving their teaching, evaluation and assessment methods. The interest in using technology in the didactic process was one of the reasons why there was a common will to try a new methodology in which IT tools are used.

The activity described below was carried out during a Natural Science class and it was aimed at developing the pupils' knowledge regarding parts of the plants, the role of each part, as well as at recognizing risk factors on one's health, starting from the presentation of short texts, watching movies and case studies.

Image 2. Didactic activities

Age of the students

The girls and boys who were involved in this activity are in the 3rd grade. They are aged 8-9 years old. The students were extremely enthusiastic to take part in the proposed tasks, especially since it was the first time they had had the chance to experiment a new working methodology. It was also their first involvement in a European project.

Image 3. Didactic activities

What type of classroom (size, space organization, table arrangement etc.) have they used?

The class is formed of 28 pupils who were organized in groups. This allowed them to express them-selves better, it also taught them to take responsibility for their decisions (for example, when they played a group game); they learnt to share information, to look for solutions together, to identify different factors that can affect our lives in a negative way. The fact that the teacher had a diffe- rent role made the pupils change their perception towards learning; the teacher was there only to guide them; she/he made them feel confident in their own abilities, she/he encouraged them to learn from each other; thus, there was a significant change from the lecture-based classroom where students are passive listeners, to a problem-solving, peer-learning classroom that combined different active-learning methods which fostered the pupils' active participation and contribution to the learning process.
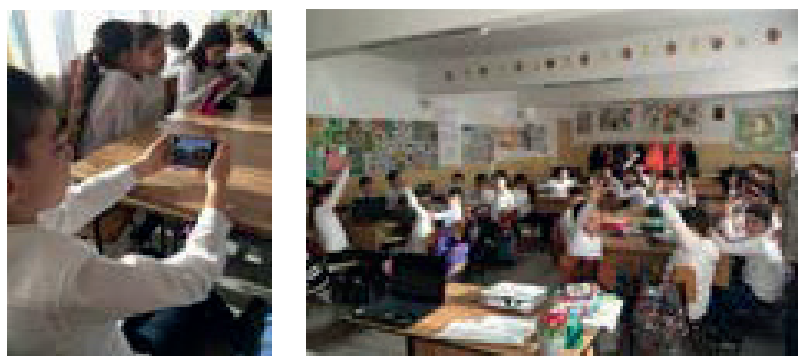
Image 4. Didactic activities

What kind of training material was employed (PowerPoint presentation, videos etc.)?

During the activity, different training material was employed: PowerPoint Presentations about plants (what they need to develop) or about vegetables and their importance for our health, edu- cational games (such as puzzles or Kahoot games) or videos on Youtube. Connection to the inter- net enlarged the resources to which both the teacher and the pupils had access; they were able to find answers to their questions almost instantly, they managed to make comparisons and select the most appropriate data.

Image 5. Didactic activities

The following IT tools were used: a laptop, a video projector, tablets and smartphones. Unfortunately, there is no interactive board in this classroom, only one regular whiteboard and a blackboard.

What type of results were achieved using this teaching methodology compared to the conventional one?

The use of technology transformed the class from a monotonous one into a very interactive activity; the students had the chance to use something they are really familiar with in their everyday life, but this time it was with a different motivation; serving a different purpose; it has even given them the chance to show their teacher other abilities they have and which they are so proud of. Apart from the improvement of the digital skills of the participants (teacher and students alike), this type of activity contributed to the development of social and interpersonal skills, as well as the communicative skills of all people involved.
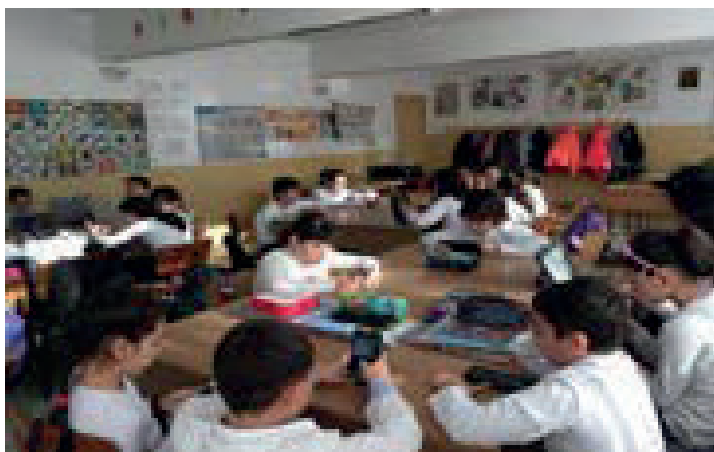
Image 6. Didactic activities

There is one more aspect regarding the use of TEAL methodology that should be point out, namely that it requires an update of the teacher's profile, in the sense that he/she needs to acquire specific competencies, to rethink the way their lessons are planned and implemented. There are certain factors that must be taken into consideration when using this type of technology: autonomy in personal and professional development, confidence in the new settings, mastery of disciplinary contents and adaptability to constantly changing situations. It is true that planning activities simi- lar to the one described above may take a longer time at the beginning (especially due to the invol- vement of digital/technological tools); however, once the teacher gains familiarity and confidence in using such tools, he/she can fully concentrate on the learning process and enjoy the benefits it brings.

FUN & SMART CLASS

The CYPRUS paradigm case study "FUN @ SMART CLASS" uses TEAL methodology applied to the teaching of humanities (foreign languages and digital skills within an innovative frame of fast, fun and smart learning)

• What can be considered a TEAL methodology for your country?

In Cyprus, at the Gymnasium level, a 3-year program of general education enriched with elements of te- chnical knowledge is offered. There are syllabuses for each subject, consisting of goals, subject matter and indicative teaching methods and materials. ICT and foreign language learning are a priority in the educational system of Cyprus. A national syllabus for ICT as a subject in its own right was for the first time implemented in 2002 at all levels of the public education system, while ICT as a tool has been integrated within other subject areas, such as foreign language learning.

In relation to the learning of foreign language learning, two foreign languages - English and French – are compulsory across the three grades of the gymnasium. Their broader aims are parallel to those of modern language teaching and learning, focusing on 'know-what' (content syllabus), 'know-how' (skills) and 'know- -why' (cultural awareness and critical evaluation). Language Rooms are gradually being established at the gymnasium level. Modern Language Rooms are multi-functional classrooms that can be used either as a conventional classroom, as a Self-Access Centre (SAC) or as a Language Resource Centre (LRC).

• What is the perception of the TEAL methodology in your country?

In a recent study (Empirica, 2006) about the use of computers and the Internet in schools in Europe, it was found that almost all schools in Cyprus now use computers for teaching and have Internet access, with the highest percentage being achieved in primary schools (95%). Only 31% use the Internet via a broadband connection, ranking Cyprus 25th among the 27 countries participating in the survey. However, the survey did not make clear how many computers are used per class and the study was based on limited observations. While schools in Cyprus appear to be well-equipped with technology and an ICT in education plan exists for formal education, what has generally been lacking is a holistic e-learning strategy encompassing education, business, and industry. (Vrasidas, C., & Glass, C. V. (2002). (Eds.) Distance Education and Distributed Learning. Greenwich, CT: Information Age Publishing, Inc.).

FUN @ SMART CLASS

Cyprus and the European Union have signed several protocols on financial and technical coo- peration. In addition, Cypriot public and private organizations are increasingly participating in various EU funded educational initiatives. CCIF Cyprus provides an active inclusive learning en- vironment, applying cooperative and active learning to support and engage learners including refugee students. The volunteers of CCIF Cyprus work with technology-enriched and interactive learning media. The DIGEU study case by CCIF Cyprus focus on engaging experiences for students and teachers. The teachers design their courses according to TEAL strategies for active learning. In "FUN @ SMART CLASS" the students learn foreign languages in an innovative frame of fast, fun and smart learning.

"FUN & SMART CLASS" by CCIF Cyprus

Park and Choi [22] defined the classroom as the physical space that has been connected to the educational approaches through time. The ancient Greeks used the rhetorical/dialogical system in a non-specific space for the classes and in a non-setting for the teacher and the students. Stu- dents were sitting around the teacher in a non-particular order. In "FUN & SMART CLASS" non formal education and technology-enhanced methods are used in new teaching scenarios. Since its inception in 2016, CCIF Cyprus provides space for volunteer professionals, highly passionate about providing Education. It is based in the believe in the transformative power of non-formal education and its ability to simplify the way of learning and support the inclusion of all students through Education.

What is the teaching subject?

Language Learning

- GREEK for immigrant and refugee students
- Foreign languages, english and french

Challenges and Possibilities:
There are several challenges in promoting new learning initiatives including the lack of solid strategic plans and the issue of accreditation of online programs.

Age of the students

- Refugee or immigrant students learning the Greek language, of 7-16 years old
- Local students learning English and French, of 12-16 years old

What type of classroom (size, space organization, table arrangement etc.) have they used?

FUN & SMART CLASS@ is both :

The tables are set for groups of students.
The virtual afternoon classroom, is an online classroom.

What kind of training material was employed (PowerPoint presentation, videos etc.)?

PHYSICAL CLASSROOM

The lessons start with video and ppt presentations. The students create then their own scenario using their mobile phones. Lessons have different purposes to serve students' everyday life.

Some exemples are the following:

How to communicate in a supermarket
In a hospital
Communication with their teachers and peers at school
Non-formal evaluation in a fun and productive setting.

In the teaching of English and French we use also the "Learning by doing" sessions. The artistic expressions become a tool for learning, promoting cultural and digital skills.

Art professionals are invited to the art workshops
Students learn how to make different art crafts speaking the foreign language
Students participate in storytelling workshops
Students learn during the kitchen and culture days

VIRTUAL CLASS

The afternoon virtual classroom is an online classroom. The students learn and practice English and French using their Mobile phones for personalized learning. The path uses also the free app DUOLINGO for revision, practice and learning. The modules are grouped to form language skills. Each lesson is made of a range of activities such as translation, tapping the pairs etc.

https:// schools.duolingo.com/

The learning scenarios include:

listening
flashcards
multiple choice exercises
games
competitions
quizzes

How technological tools (ICT) were involved?

FUN @ SMART CLASS uses different ICT tools to enchance learning and motivate students. We use the interactive board, online comics for homework, quizes and online brainstorming.

Students create original mini stories for challenging reading and listening comprehension
Teachers use original activities for teaching students how to research and filter information
Fun little competitions
Interactive educational activities with images, grammar points, listen and type, speaking and hearing it

Self-directed learning with
- https://apps.apple.com/us/app/showme-interactive-whiteboard/id445066279
- https://www.pixton.com/
- https://quizizz.com/admin/quiz/new?source=admin&trigger=header
- https://kahoot.com/

What type of results were achieved using this teaching methodology compared to the conventional one?

Fluency in foreign languages through different learning methods
Fun evaluation tests at the end of each semester
Learn from home with independent and flexible learning time

Teaching foreign languages is supported by Technology-Enabled Active Learning (TEAL), a pedago- gical innovation established in a technology-enhanced multimedia classroom, emphasizing cons- tructivist-oriented teaching and learning. We hope that more educational institutions will adopt the TEAL methodology to deliver courses.

FUN @ SMART CLASS provides free education to students with less opportunities, in an attractive, interactive and motivational setting of non-formal education.

Image 1. Didactic activities

FUN & SMART CLASS@COWORKING

CCIF Cyprus with its "FUN & SMART CLASS@coworking" introduces the teaching of Engilsh as a foreign language paired with the development of employability and digital skills. Students learn and practice English and at the same time they learn about digital communication, branding, vi- deo editing and technology use.
The VISION of CCIF CYPRUS is to empower students irrespective of gender, social, cultural, or educational background for active citizenship, volunteering, tolerance, respect, mutual unders- tanding, sustainable growth and life development.

What is the teaching subject?

ENGLISH as a foreign LANGUAGE (EFL) classes paired with EMPLOYABILITY AND DIGITAL SKILLS

The FUN & SMART CLASS@coworking curriculum includes the following:

Branding
Digital communication
Video and photo editing
Technology use

Age of the students

Youth 18 – 25 years old including those with fewer opportunities
Students of 13-18 years old

What type of classroom (size, space organization, table arrangement etc.) have they used?

FUN & SMART CLASS@coworking is both

LABORATORY classroom where students work with tablets, pc or mobile phones
MOBILE classroom (we deliver the workshops targeting different groups of learners in other cultural organizations' premises)

What kind of training material was employed (PowerPoint presentation, videos etc.)?

• PP presentations
• Learning with Mobile phones
• Learning with digital tools
• Games
• Learning with Social Media, Facebook, Twitter, Instagram

How technological tools (ICT) were involved?

FUN & SMART CLASS@coworking uses different FREE tools to enhance learning motivation and ICT competences. The students watch the presentations, work with peers in groups and produce the expected home work.

Branding
Personal branding
Visual identity, think visual
Learners types, emotion guide
Create a logo, website and mobile app
Video Marketing, video animation
Digital Marketing (Online presence and publication strategy)
Business plan
Create Digital Content, Text, Image, Sound, Video, Animation
Online security
E-commerce

FREE TOOLS:

https://www.canva.com/es_es/
https://biteable.com/
https://spark.adobe.com/es-ES/
https://www.powtoon.com/
https://www.pixton.com/

What type of results were achieved using this teaching methodology compared to the conventional one?

- Fluency in English
- Knowledge on cultural heritage and traditions
- Knowledge how to build communication channels
- Values of cooperation
- Create a strategy plan

FUN & SMART CLASS@coworking created by CCIF CYPRUS provides free educational opportunities for students, youth and seniors using informal learning methods.

The students also gain a combination of soft skills including social skills, communication skills, personality traits and career attributes. They also learn how to develop entrepreneurial mindset.
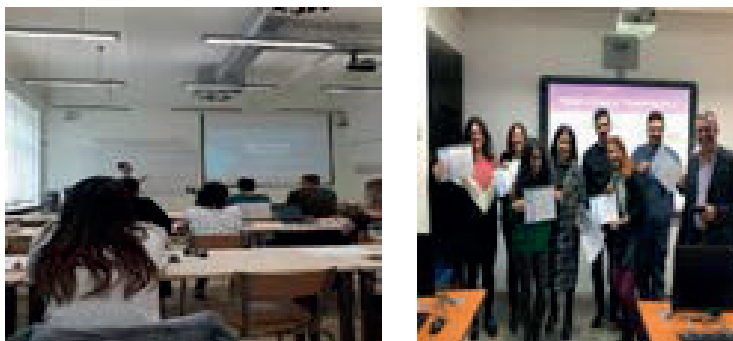
Image 1. Didactic activities

Conclusions

Final thoughts on the case studies analyzed in this chapter

The ability to successfully use innovative training products is a long process and requires the adoption of a new way of thinking and learning. In this regard, it was considered appropriate to carry out a profound analy- sis to identify the field of action of TEAL methodology, its effects, and good training practices transfer. One of the purposes of this collection of case studies was, therefore, to highlight the advantages of these projects and the transfer of good practices in the training field. Following this in-depth study, we can conclude with certainty that there is no lack of good practices and ex- periments on the European territory in the field of TEAL teaching. Projects are carried out by public (schools; cities) but also private subjects (associations; NGOs; etc.) and this is a very important aspect because it allows the research to continue without necessarily following pre-established governmental agencies' instructions but instead, by exploring methodologies and unconventional techniques.

Starting from this consideration and from the material collected during our research of good practices, in the second part of this chapter, we will try to summarize everything in data sheets that will provide teachers with guidelines for TEAL teaching in the different areas (Technological field; Gaming Education; Civic Education; Scientific subjects; Human sciences). These summary sheets will guide teachers step by step in the design and implementation of an active and collaborative learning path for the students through the use of techno- logies and the setting of the learning space.

Chapter 3.1

TEAL Theory

Introduction

The scenario on innovative teaching

One of the needs that arose during the research work that the partners of this project have carried out is to bring order among the methodologies that European teachers and schools adopt within their classrooms. Methodologies that use digital tools in the most varied ways to make one's lesson increasingly active and engaging in the context of teaching skills.

For this reason, in this technical introduction to digital teaching and in particular on TEAL (Technology Enhanced Active Learning) methodology, which is the protagonist of this Erasmus + project, it was decided to list through a synthetic abacus the main teaching methods used in the different school age groups. The purpose of this abacus is once again to provide a broad and organized context on teaching to those who want to deepen these issues by consulting all the intellectual products provided by the DigiEU project.

- **COOPERATIVE LEARNING:**

Description: "The group must be responsible for achieving its goals and each member must be responsible for contributing their share of the work." (Johnson & J.)
A first planning model was proposed by Johnson and Holubec as early as 1993 (Nevin, 1993). These models suggest teachers to focus their attention on some specific areas in relation to which making educational and organizational decisions. The condition of positive interdependence determines in each one the finding of being indispensable for the group, with positive repercussions, not only on motivation and commitment but also on the quality of interpersonal relationships.

Pedagogical References: Its references are recognizable in four pedagogical macro-areas
(1. Active pedagogy; 2. Constructivism; 3. Humanistic Psychology; 4. Social psychology).

- **PEER EDUCATION**

Description: PEER EDUCATION methodology involves a radical change of perspective in the learning process, placing students at the center of the education system. The focus is on the peer group, which constitutes a sort of social laboratory, in which to develop dynamics, experiment activities, design, share, improving self-esteem and relational and communicative skills. PEER EDUCATION allows to convey more effectively the teaching of life skills essential for achieving educational success by each student. This is an educational strategy based on a process of transmission of experiences and knowledge among members of a peer group, within a plan that includes objectives, times, ways, roles and structured materials.

Pedagogical references: Constructivist teaching that has ancient references in the method of "mutual teaching".

- **DEBATE**

Description: DEBATE is an active teaching methodology that allows to stimulate transversal skills in the didactic and educational matrix, which has as main objective the development in students of the ability to think creatively and communicate effectively and adequately. It is a methodology that involves the activation of Cooperative Learning and Peer Education in a phase that precedes the debate. In summary, the DEBATE is a formal and non-free discussion, in which two teams of three or more students support and counteract a given statement (extracurricular), placing themselves in one field (PROS) or in the other (CONS).

Pedagogical References: The reference of this didactics is Vygotsky's constructivist pedagogy, as it is based on student's social interaction during research and debate.

- **FLIPPED CLASSROOM:**

Description: Teachers prepare all the didactic material on a website where they collect didactic videos and plan couple or group activities to propose in class. The activities are creative and competitive, self-assessable through simple checklists by the students themselves. After studying at home videos from the classroom lessons, students carry out the activities they find on the website in small cooperative groups. The teacher has an empathic relationship with the pupils. He/She continuously evaluates them, avoiding the isolation of unmotivated pupils.

Pedagogical references: Constructivism.

- **IBSE (Inquiry Based Science Education)**

Description: "Science is a way of thinking much more than it is a body of knowledge". Carl Sagan (1986) Investigation-based science education (IBSE) is an inductive approach to science teaching that places direct experience at the center of learning. The activities actively involve students in the identification of relevant evidence, in critical and logical reasoning on the evidence collected and in reflection on their interpretation. Students learn to conduct investigations but also understand the processes that scientists use to develop knowledge. Effective at all school levels, it increases students' interest and performance levels and develops the fundamental skills to prepare to face the world beyond school.

Pedagogical references: Teaching with a constructivist matrix that starts from Dewey and Piaget work.

- **MONTESSORI Methhod**

Description: A method based on teaching techniques that respect everyone's individuality. This didactics used mainly with children, leaves them free to work according to their own rhythms and interests on materials that allow the whole body to exercise intelligence and creativity thus developing a democratic personality open to the world.

Pedagogical references /

- **MICROLEARNING**

Description: MICROLEARNING means creating Bite-Sized and Snackable training contents. Very short and shareable contents like a snack (Iearning nuggets). Focused content on a specific skill or theme and Multiplatform that allow fruition in presence or in other contexts. Each MICROLEARNING has a brief or none introduction, showing and not saying, is immersive and highly experiential with simulation of real cases, teaches "just in time" and offers different solicitations (video, images, audio, website, etc.).

Pedagogical references: Microteaching by Dwight W. Allen (Stanford University, 1960s), in turn developed in the context of constructivism and constructionism.

- **PROBLEM SOLVING**

Description: "WE solve the problem so I learn."
This is the logic of the active methodology "COLLABORATIVE PROBLEM SOLVING" which draws its origins from Vygotsky's constructivist pedagogy. As reaffirmed by the PISA-OECD (Program for International Student Assessment) 2015 report, Problem Solving is a complex skill that develops with a properly organized collaborative methodology (in terms of roles, organization and strategic vision) which contains some key passages identifiable in putting pupils in a problematic situation, making the necessary information accessible and accompanying them towards the identification of hypotheses and their transformation into actions, verifying at last, the effectiveness of the solution and possibly, through the error diagnosis, starting again cyclically from the analysis of the initial problem.

Pedagogical references: Vygotsky constructivist pedagogy.

- **DIGITAL STORYTELLING**

Description: Telling stories is an ancient practice, with the introduction of new technologies, means of involvement and communication has changed as a result, which however have left the emotional emphasis of this teaching unchanged. Digital Storytelling can be defined as a tool through which teachers can transmit or exemplify content using narratives, metaphors and anchors to the individual experience by synergistically exploiting a web based technology by combining images (fixed or in motion), a narrative voice (recorded or written) and a soundtrack (sounds and/or music) with narratological elements designed for public use.

Pedagogical references: Constructivism

- **TEAL**

Description: Technology-Enhanced Active Learning (TEAL) is a methodology designed in 2003 by MIT of Boston. A frontal lesson is often passively accepted by students while TEAL teaching aims to combine frontal lessons with simulations and laboratory activities through the use of technologies. This methodology is supported by the design of spaces with specific characteristics and modular furnishings, reconfigurable according to needs. Create interconnection between different technologies and tools, stimulate peer comparison, web research, debating issues, and their reworking through a shared synthesis online. All with the aim of combining lectures and laboratory activities through pedagogical activism, to create enriched learning based on peer collaboration.

Pedagogical references: Constructivist pedagogy

- **TINKERING**

Description: TINKERING is an English term that literally means "tinkering, striving, getting busy". TINKERING is now considered to be an innovative approach to STEM education (Science; Technology; Engineering; Math) in educational environments at international level and an important tool for the development of students' skills. TINKERING is spoken of as an informal form of learning in which one learns by doing. The pupil is encouraged to experiment, stimulating a problem-solving attitude. All activities are always launched in game or challenge form and have to be carried out in a group. The main activities that can be proposed consist in building or decomposing objects, designing machines, which move, fly, draw, float, exploring materials or mechanical elements, creating original artifacts or chain reactions. The purpose of tinkering is to create objects of various kind using recycled materials, which are also easily available at home. Boxes, glasses, sheets of paper, pieces of wood, metal wires, plastic wraps are just some of the "ingredients" needed to get to work. Things that can be built are many: electrical circuits, small robots, mechanical toys, marbles tracks, chain reaction mechanisms, sculptures.

Pedagogical references: Dewey and Piaget constructivism

These didactic and pedagogical methodologies are only a part of the avant-gardes that face the issue of immersive and involving teaching all over the world towards girls and boys of all ages. These didactic experiments concern all areas of teaching such as scientific, technological, humanistic, civic, environmental, historical, anthropological and even social areas when it comes, for example, to teach a new language as a vehicle of integration for migrants. For this reason, a synthetic abacus of the most widespread school's teaching methodologies was considered fundamental in this introduction, so that anyone who wants to approach these issues through these guidelines, can have an overview and understand why the Erasmus + project "DIGIEU" (Digital Garden For European Schools) has put TEAL (Technology-Enhanced Active Learning) teaching methodology at the center of all this work.

TEAL... what is this?!

Definitions and basic concepts of active learning defined as TEAL

As already mentioned, the TEAL (Technology-Enhanced Active Learning) teaching method was born from the work of Professor Peter Dourmashkin of MIT in Boston in 2003, a didactic that immediately brings excellent results and already since 2005 is used in all introductory courses to the Physics of MIT.

http://web.mit.edu/edtech/casestudies/teal.html

In summary, TEAL teaching is active learning mediated through the use of technologies, designed to overcome the problem of dropout, that is, the student who leaves school before completing the course of study and also to bring girls closer to the subjects of STEM (Science; Technology; Engineering; Mathematics). This methodology aims to combine lectures, laboratory activities and pedagogical activism to give life to enriched and collaboration-based learning.

TEAL CLASSES FEATURE:

- Collaborative learning-students working during class in small groups with shared laptop computers;
- Desktop experiments with data acquisition links to laptops;
- Media-rich visualizations and simulations delivered via laptops and the Internet;
- Personal response systems that stimulate interaction between students and lecturers.

The main benefits of TEAL teaching are overcoming the logic of the study intended as mnemonic learning, in fact learning becomes active (problem-solving) and collaborative.

TEAL encourages a design approach in training courses and enhances laboratory practice and peer teaching, promoting the integration between digital and traditional tools. In this approach, spaces and technologies are closely interconnected, in fact a TEAL classroom is generally equipped with a central position for the teacher with round "islands" around him/her, which host groups of students in odd numbers (3 or multiples), each "island" is equipped with a shared PC station with access to the web and other equipment that vary according to the lesson topic. In this classroom setting, communication is essential, in fact, technology and layout of the classroom allow the teacher to have in real-time the overall picture of the lesson progress and the response of their students with immediate feedback.

Recently, Professor Dourmashkin creator of TEAL teaching, illustrating the developments of this teaching at MIT spoke about a new way of designing activities, based on three different "learning sequences" (1. pre-learning sequence; 2. video-lecture; 3.post-learning sequence). In particular, he placed the emphasis on the "video-lecture" that through the "lightboard video" allow the teacher to illustrate the concepts and contents of the lesson with drawings, graphs or maps on an overhead projector that helps to make the educational episode captivating and engaging, increasing its effectiveness.

Most schools have adopted TEAL as an integral part of the STEMs teaching curriculum, but recently this teaching has also been extended to the humanities, especially history and philosophy. Some schools also use it as an interactive way to implement the CLIL (Content and Language Integrated Learning) methodology, using English as their working language and this contributes to making the learning environment interactive and dynamic, involving students in a very effective way making them protagonists of their learning path. Oral interaction, simulations, experiments and group discussions in a foreign language within a TEAL environment can contribute to the realization of a CLIL path of great impact and quality.

From TEAL to TINKERING

didactic evolution of the "Technology Enhanced Active Learning"

TINKERING is a didactic method developed by the EXPLORATORIUM of San Francisco starting from the experiences and research of MIT in Boston. A methodology initially developed for teaching STEMs (Science; Technology; Engineering; Mathematics) but subsequently applied to different areas such as art or coding.

Before describing TINKERING in more detail, it is useful to say that EXPLORATORIUM is one of the first museums in the world designed to be entirely dedicated to science. Founded in 1969 by the physicist Frank Oppenheimer, younger brother of the best known Robert Oppenheimer, it collects numerous workstations in its rooms that allow visitors to directly experience the principles of physics and science. This premise is important because it provides us with the fundamental elements to understand why TINKERING was born right here.

https://www.exploratorium.edu/

https://www.exploratorium.edu/explore
https://www.exploratorium.edu/tinkering
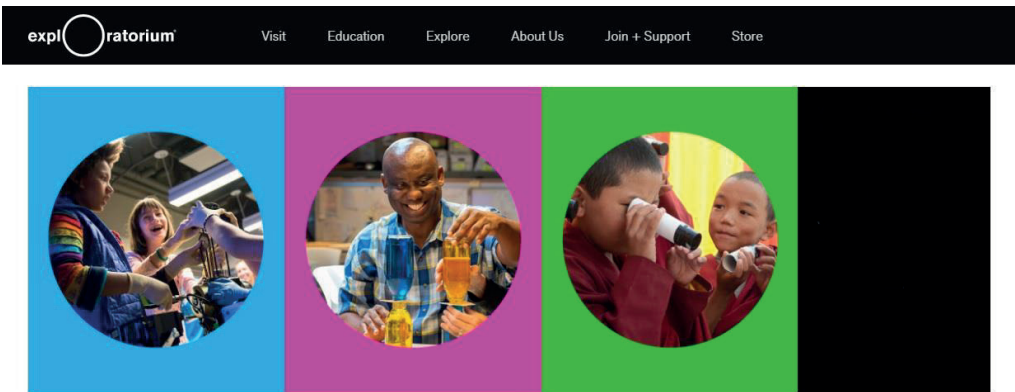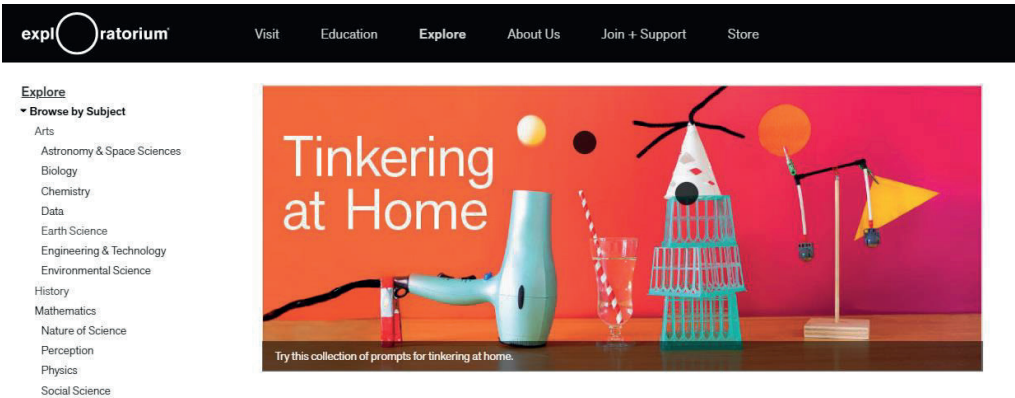
What is TINKERING? Literally TINKERING means to tinker with, trying to repair or improve something in a random or disordered way, often without any useful effect and it seems that this term was used for the first time in the 14th century to describe welders who traveled to repair the most disparate household tools. Today, TINKERING corresponds to a very precise didactic methodology, in which knowledge is not transmitted by a teacher in a pre-packaged way but discovered and built through personal interaction with materials, tools and new technologies.

What are its pedagogical references? TINKERING is a teaching based on Piaget's Constructivism and Papert's Constructionism, therefore on the idea that construction of knowledge is always a result of a mediation between those who learn and the object of knowledge. In particular, in constructionism the learning process takes place precisely by building an object, it is not important that it is real (Tinkering) or virtual (Coding), what matters is the process. In fact, this method encourages experimentation, stimulates problem-solving abilities and teaches to work in a team, to cooperate to achieve a goal. Thanks to TINKERING, children, adolescents and even adults can approach disciplines such as art, science and technology without being forced to memorize theoretical concepts because what matters is only the practice.

How does TINKERING work? TINKERING laboratories are designed taking into account children's point of view not only about contents but also about materials, in the furnishings arrangement and time management. The activity is presented in an inviting and creative way so as to trigger the desire of young people to get to work. The material made available for the activities is usable, simple and does not require particular explanations. At this point the role of the facilitator is only to support and increase the experience by making sure that the error becomes a fundamental part of the experience, losing any negative value.

What are its future developments? All over the world research and experiments on TINKERING are taking place and there are many directions that this methodology can take. In particular, what is done in the Boston MIT laboratories on computational thinking and coding has produced an open-source tool called SCRATCH, which immediately spread worldwide in the school environment.

https://www.media.mit.edu/posts/engaging-all-learners-in-physical-tinkering/
https://www.media.mit.edu/projects/computational-tinkering/overview/

TEAL element for new didactic approach

Methodological and operational indications for setting up an optimal TEAL learning path

After this detour on TINKERING teaching methodology, very useful in our opinion, we would like to go back to the main subject of this Chapter, that is TEAL (Technology-Enhanced Active Learning) teaching, providing operational elements for the didactic and classroom setting, the two cornerstones of this teaching. Let's start immediately with the didactic settings and the activities evaluation methods. Most schools have adopted TEAL as an integral part of the STEMs teaching curriculum, but recently this teaching has also been extended to the humanities, especially history and philosophy. Some schools also use it as an interactive way to implement the CLIL (Content and Language Integrated Learning) methodology, using English as their working language and this contributes to making the learning environment interactive and dynamic, involving students in a very effective way making them protagonists of their learning path. Oral interaction, simulations, experiments and group discussions in a foreign language within a TEAL environment can contribute to the realization of a CLIL path of great impact and quality.

PRELIMINARY ANALYSIS:
- Comments on limits of frontal teaching:
- Frontal lessons are often passively accepted by students;
- Attention drops after a short time;
- The percentage of misunderstandings and consequent failures is high; • Some concepts are abstract and difficult to visualize;
- There is no stimulus for intuition and reworking.

POSSIBLE SOLUTIONS:

- Combine lectures, simulations and laboratory activities using new technologies;
- Setting up learning spaces with reconfigurable equipment as needed;
- Create interconnections between new technologies and traditional tools of different types; Stimulate research, peer comparison, discussion on issues and their reworking.

TEACHERS' ACTIVITIES:

The teacher ENCOURAGES and SUPPORTS:

- Work and experimentation (hands on) in small groups (3 or 5 students);
- Discussion and comparison between peers;
- Problem solving, active research and collaborative learning (workflow).

THE TEACHER PROPOSES:

- Exercises aimed at developing one or more products (Poster; PPT; Video; Podcast; etc. to be shared with the class group.

THE TEACHER EVALUATES:

- Different aspects of each individual student work with a table that is explained and clarified at the beginning of the activity.

STUDENTS' ACTIVITIES:

The student is ENCOURAGED to:

- Emancipate from the passive reception of the contents;
- Develop communication skills in a collaborative context;
- Enhance new research models;
- Co-contruct peer learning;
- Deepen expressive and critical skills.

THE STUDENT IS SUPPORTED:

- From the intervention and evaluation of the teacher.

SPATIAL SETTING:

The learning space is set up on the basis of:

- How is meant to make students interact with each other and with the teacher;
- Which pedagogical model is intended to be pursued by rethinking the role of the teacher and students;
- The type of workstation is wanted for students to work on after being divided into groups of three or five. The odd number favors the development of an agreement because there will never be a tie in decisions;
- Regardless of the topic of activities, the teacher is provided with a central (real or virtual) workstation from which to check and evaluate student activities.
- The type of visual contributions that is wanted to provide to students through the use of projectors, giant screens, overhead projectors or IWBs;
- Wide spaces and passages around the workstations in such a way as to allow movement both for the students, who can thus free themselves from the rigid frontal teaching schemes and for the teachers who can thus move between the workstations to encourage and support dynamics and work of the different groups.

(Given the importance of this point, we will analyze the Setting in detail in the next point)

ASSESSMENT METHOD:

The teacher will evaluate the SKILLS concerning:

- Representing concepts;
- Combining different ideas;
- Carrying out logical reasoning;
- Evaluating and using news;
- Communicating ideas;
- Interacting with peers and with the teacher.

Basically, it will be taken into account students' observation and annotation skills, their individual and group qualities, the quality of their final papers and eventually their ability to self evaluation and peer evaluation.

METHOD STEPS:

ACTIVATION

- The teacher provides a topic that motivates to start an activity;

PRODUCTION

• In the classroom, the teacher proposes strategies of active teaching using interactive presentations, online visualizations, structured tests uploaded on the desktop, tests and problem solving. The student instead researches online, discusses with the group and elaborates the product;

RE-ELABORATION
- the teacher clarifies and consolidates the learning;

REPORT
- The student reports to the class from their desk;

DISCUSSION
- students ask for clarification and examine in depth the news;

SYNTHESIS
- The teacher summarizes the research results;

VERIFICATION
- The teacher can propose a summative test or evaluate the work produced with criteria that must be explained at the beginning of the activities to the students.
(Attached at the end of the paragraph a model for the evaluation of TEAL activities)

NECESSARY RESOURCES:

TECHNOLOGICAL resources

- LIM or screens (minimum number of 3); Projectors; Ultra-wideband wireless connection; Internal wiring of all spaces (LAN / W-Lan); Fixed and/or mobile devices; Dedicated peripherals.

INFRASTRUCTURAL resources
- Sufficiently spacious environment with adequate furniture and tools for a correct layout of the space (modular tables; swivel chairs; central position; adequate lighting; mobile partitions; etc.).

FINAL ANALYSIS:

PROS of TEAL teaching:

- Develops an understanding of abstract concepts;
- Develops problem-solving skills and habit to teamwork;
- Includes students, through practical activities and experiments in all disciplines;
- Enhances project research skills;
- Enhances research-based learning methodology;
- Enhances expressive skills, among peers and with the teacher

CONS OF TEAL TEACHING:

- The teacher must be trained to become a learning facilitator, not a notions provider;
- The group must be constantly supervised by the teacher, to avoid an imbalance of tasks between busy and unmotivated students; Teacher flexibility is required to adapt the project

structure to the students with whom he/she interacts; Many institutes do not have classrooms or laboratories with adequate spaces and tools for this type of teaching;

• The evaluation criteria, if not clearly spelled out from the beginning, can generate frustration and misunderstanding.

COOPERATIVE GROUP VALUTATION

date ___-___-___   title of work ___   name ___

ARGUMENTS	VALUTATION				POINT
	beginning 0 / 4 pt	developing 5 / 9 pt	accomplished 10 / 14 pt	exeplary 15 / 20 pt	
research information	does not collect information	contributes little inforamtion	contributes information that relates to the topic	contributes a great deal of important information	
cooperates with group members	never cooperates	seldom cooperates	usually cooperates	always cooperates	
shares information	keeps information to self and does not share with group	share some information with the group	shares important information with the group	comunicates and share all information with the group	
listens to group members	always talking and never allows others to speak	talks much of the time rarely allows other to speak	talks too much at times but usually is a good listener	balances listening and speaking well	
shares responsibiliy	always relies on others to complete assignments	rarely does work needs costant reminders to stay on task	usually does the work seldom needs reminders to stay on task	always does assigned work whithout being reminded	
				TOTAL	

COMMENTS

TEAL element for setting space

spatial configurations for organizing an optimal TEAL space

Let's now analyze in detail the most important element of TEAL teaching, that is, setting the learning space. To do this we introduce a matrix that will help us identify priorities in the use of space. This matrix identifies in its cornerstones four distinct priorities which translate into well-defined spatial priorities. The indications that are obviously obtained are recommendations to be adapted to one's context in order to obtain an optimal setting up of the educational space.
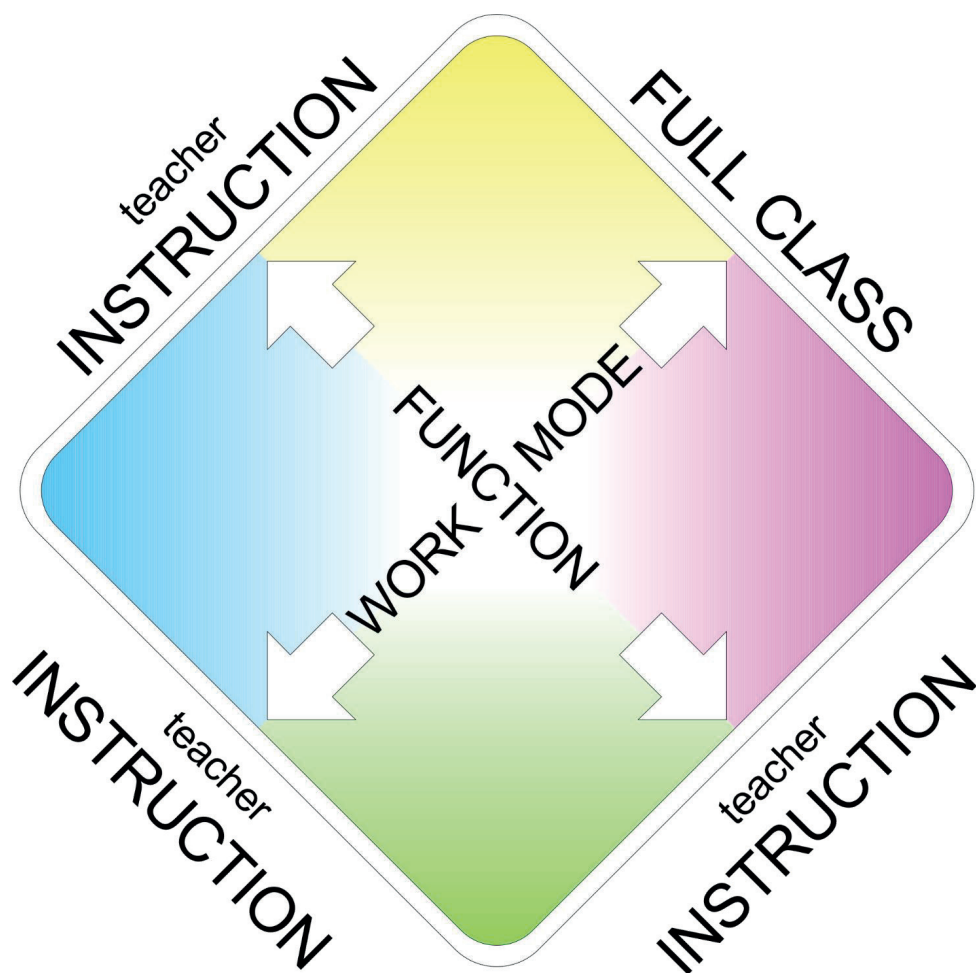
SPATIAL SETTING matrix

large group

DIRECTED INSTRUCTION SPACE

The first key of the matrix identifies a spatial setting that maximizes the space efficiency for DIRECT EDUCATION, with a teacher and a large group of students (20/25 students). Within this configuration, furnishings and equipment are fixed in space therefore the lesson does not need additional time to set up space customizing it according to the type of students. In this type of space, the setting is focused exclusively on direct communication of educational content.
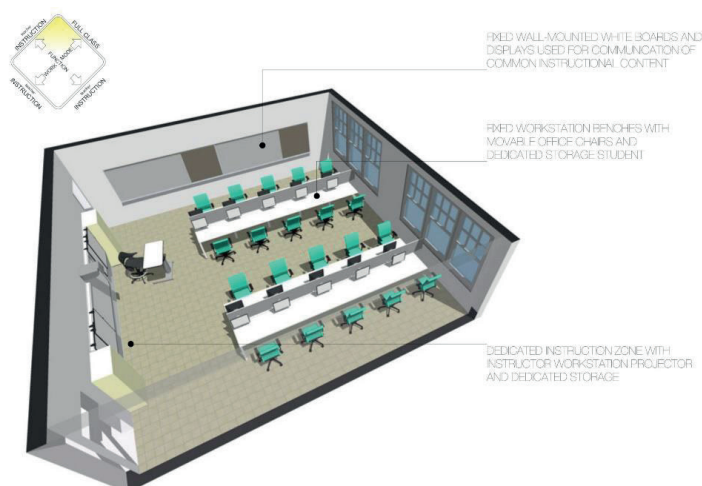
setting DIRECTED INSTRUCTION SPACE
space simulation by ©Archeworks
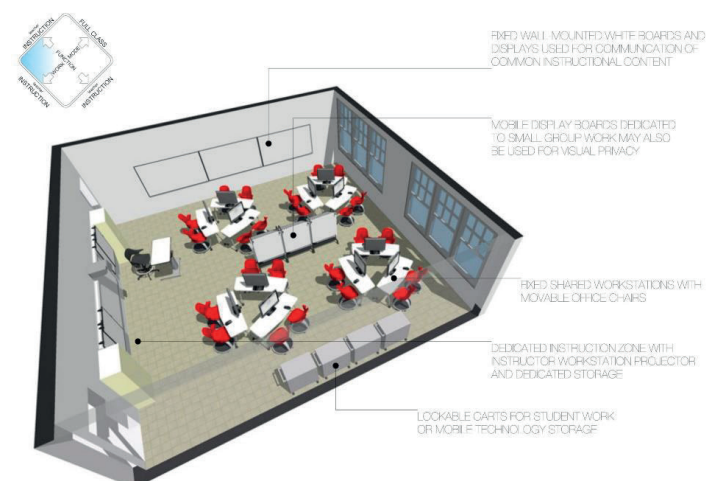
setting DIRECTED INSTRUCTION SPACE
space simulation by ©Archeworks

small group

DIRECTED INSTRUCTION SPACE

The second key of the matrix is a space configuration maximized for the efficiency of DIRECT EDUCATION FOR SMALL GROUPS. In theory, this configuration provides 2/3 students per workstation, but if space or equipment is not sufficient, larger groups of students can be made for a maximum of 6 students. In this configuration, displays and mobile trolleys can make the space flexible even though the workstations are fixed.

large group

CREATIVE SPACE

The third key of the matrix is organized as CREATIVE SPACE with the aim of providing each student with adequate space for work and personal research. The idea behind this setting is that each student has available a personal workstation (max 2). In addition, this layout provides the teacher with the possibility of simultaneously displaying the same didactic content to all students. Low shelving and trolleys with additional equipment to the workstations complete this spatial setting.
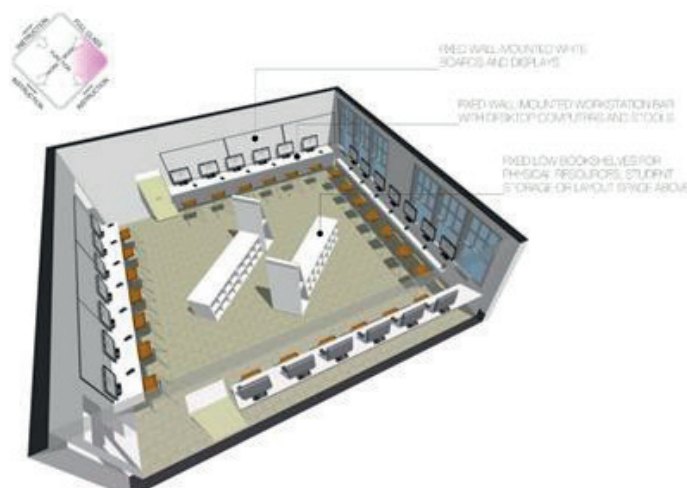
setting DIRECTED INSTRUCTION SPACE
space simulation by ©Archeworks

individual/small group

CREATIVE SPACE

The fourth cornerstone of the matrix is a spatial configuration set as CREATIVE SPACE FOR INDIVIDUAL WORK OR IN SMALL GROUPS. This configuration allows multiple working modes to occur simultaneously, from brainstorming and group designing to focused individual production. Without a dedicated education area, the space is more open and available to students who can use it as they wish. Pushing this setting to the limit, it could be assumed that the different groups of students work on different topics with totally free and autonomous exchange and comparison.
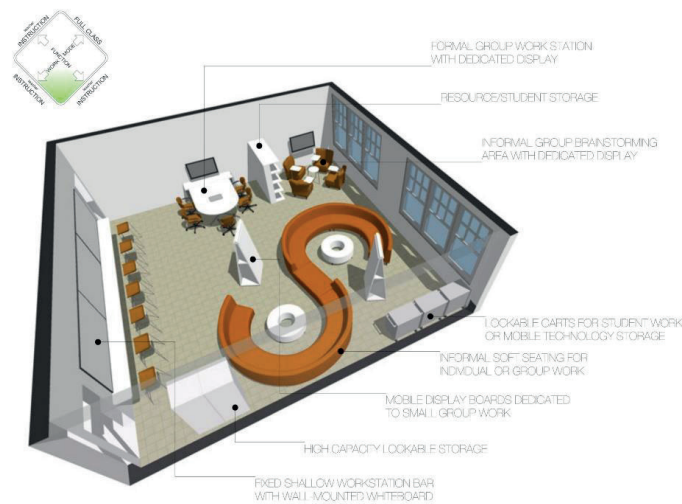
setting DIRECTED INSTRUCTION SPACE
space simulation by ©Archeworks
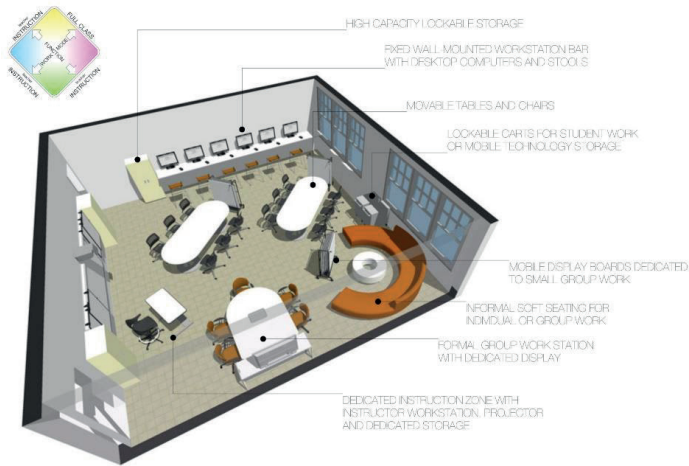
setting HYBRID SPACE
space simulation by ©Archeworks

small/large group

HYBRID SPACE

By combining the four cornerstones of our matrix we obtain a "HYBRID" setting. A configuration that allows the use of different educational scenarios thanks, above all, to workstations, furnishings and modular equipment, which adapt flexibly to these different educational settings. Obviously this type of set up presents some critical issues but it is the one that best of all adapts to projects of different nature, such as teamwork, storage of resources and projects of different nature.

flexibility elements for optimal spatial configurations

SPACE ELEMENTS

At this point, it is very useful to analyze the basic elements of the spatial layout in a timely manner so that we can better understand how to "COMPOSE" the most appropriate teaching space for our lesson.

1. BOARDS and DISPLAYS are opportunities to bring identity to space and show students' work. Displays can be fixed or mobile and the content can be static or dynamic.

• Displays could be of the traditional type (Panel with markers) or digital (LIM; overhead projector).
• Displays must be able to transmit digital content by connecting to the web or other peripherals (PC; Tablet; Smartphone).
• It is very useful to report the digital atelier outside with specific signs.
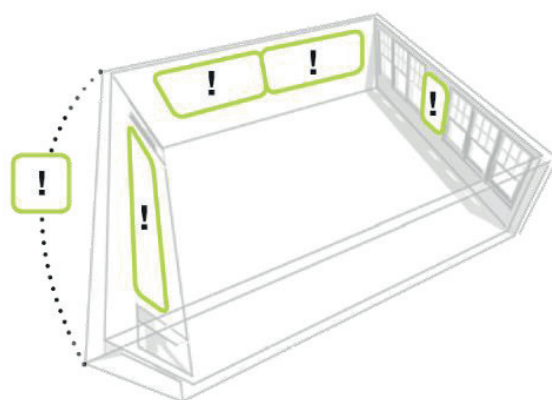
DISPLAY/SIGNAGE
space simulation by ©Archeworks
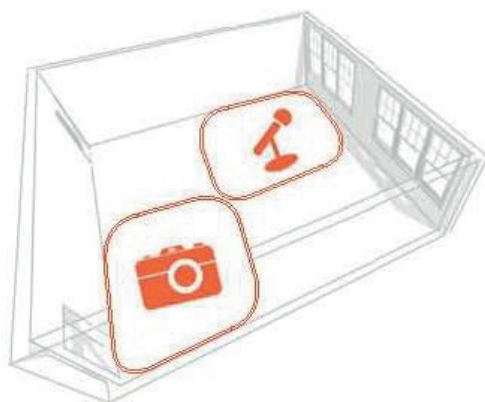
SPECIALIZED ZONES space
simulation by ©Archeworks

2. SPECIALIZED AREAS: Depending on the educational requests of students or teachers, specialized areas can be identified with dedicated equipment (Audio/Music; Videomaking; Fab Lab; etc.).

• Before proceeding with the preparation of the specialized areas, it is very useful to check the know-how of the teachers / tutors.
• Check the equipment, space, acoustic and electrical requirements in order to maximize the effectiveness of these equipment.
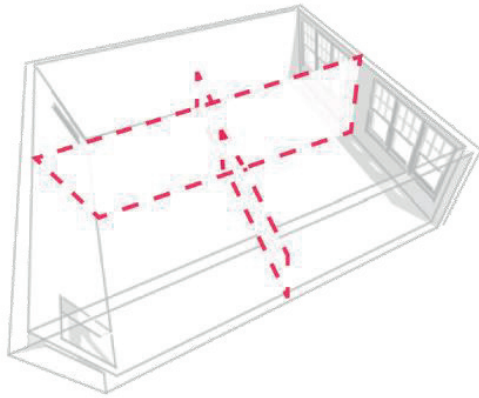
ROOM SEPARATIONS space
simulation by ©Archeworks

3. MOVABLE ROOM DIVIDERS inside the laboratory are very useful tools for optimally dividing and setting up space, simultaneously managing to create different ways of working. The important thing is that these equipment guarantee visual and acoustic privacy between groups. They can be ceiling curtains, folding partitions or mobile backboards.

Some questions to ask:

- Movable dividers are only suitable for certain types of activities.
- Verify that safety management is not hindered by this equipment

4. COLOR is a simple and effective tool to bring energy and identity into space. Bright colors can be used on walls, on the floor or as part of the furniture

- Soft colors and lighter floors make rooms bigger, while darker colors mask dirt and damage.
- It is preferable using bright colors on only one part of the space while on the other it is necessary to attenuate with neutral colors.
- Avoid bright colors on the walls near workstations and overhead projectors because they could create eye strain.
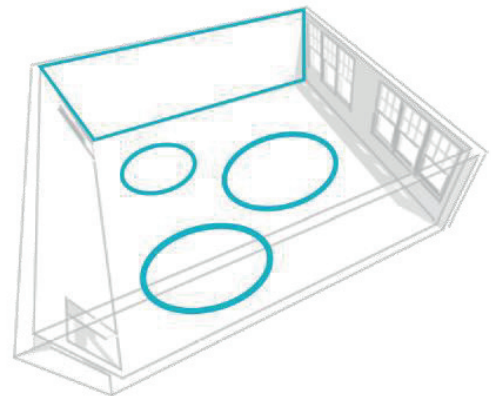
COLOR
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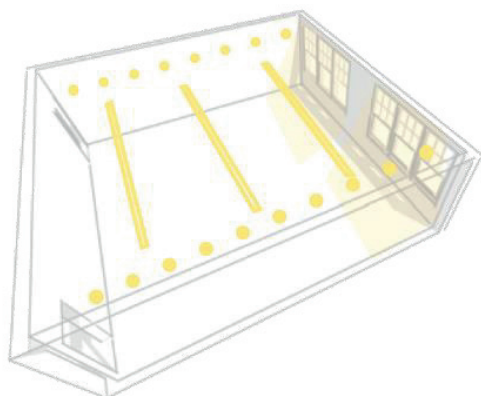
LIGHTING
space simulation by ©Archeworks

5. A combination of natural and artificial LIGHTING is necessary to ensure maximum visual comfort within the teaching space. To obtain the maximum possible result, it is necessary to carry out a detailed spatial analysis before deciding with which types of appliance (table lamps; rear lighting for the panels; indirect light suspensions; dimmable lamps; etc.) and / or lighting systems shading (blackout curtains; blinds; etc.).

• For greater and optimized visual comfort, the home automation control units for lighting scenarios are useful.

6.POWER SUPPLY and DATA LINE are a fundamental technical requirement to consider. Without these technological systems, the laboratory would be inadequate for most educational activities.

• To optimize the preparation of an educational space, it would be useful to provide multi- socket slippers for the power supply and a broadband Wi-Fi connection.
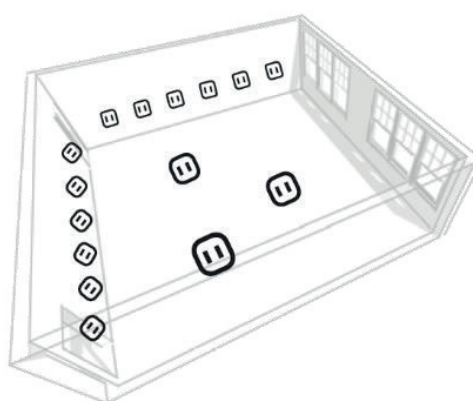
POWER/DATA
space simulation by ©Archeworks

AS IT IS EASY TO UNDERSTAND WITH A CORRECT COMBINATION OF THESE ELEMENTS, IT IS POSSIBLE TO SET UP OPTIMAL TEACHING SPACES FOR DIFFERENT TYPES OF ACTIVITIES AND SUBJECT AREAS.

Chapter 3.2

TEAL
Space Settings

TEAL setting space

Elements of configuring the space and environment for TEAL learning

After analyzing some European good practices on the application of TEAL teaching in the various disciplinary areas, it is our intention to try to develop a summary scheme that can provide methodological and organiza- tional information to anyone who wants to try applying the TEAL in their disciplinary field. Before elaborating these synthetic schemes, it is very useful to summarize in detail the elements that characterize the spatial setting of an efficient TEAL classroom.
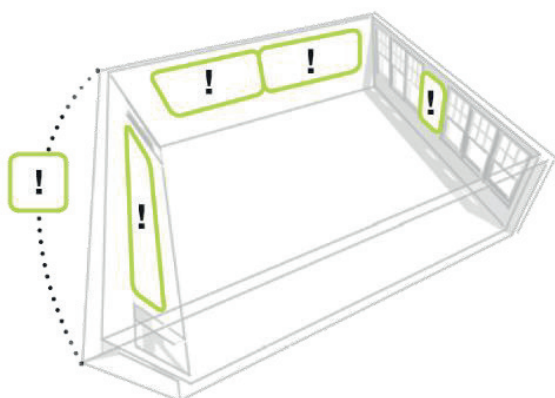
DISPLAY/SIGNAGE
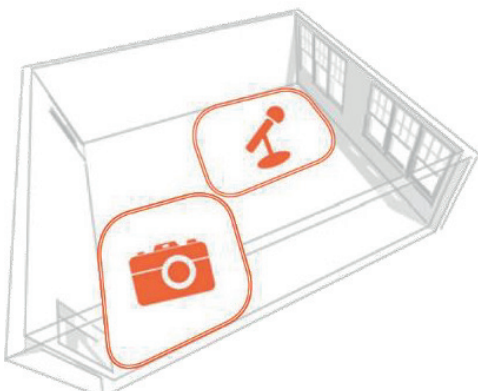
SPECIALIZED ZONES
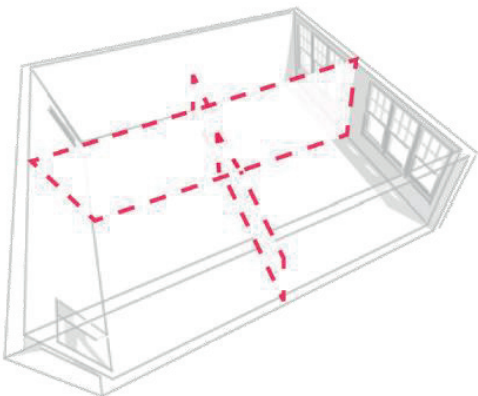
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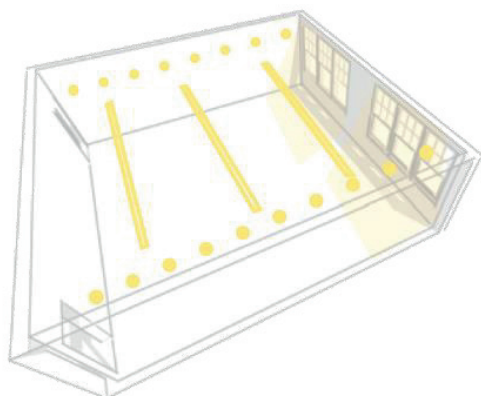
LIGHTING
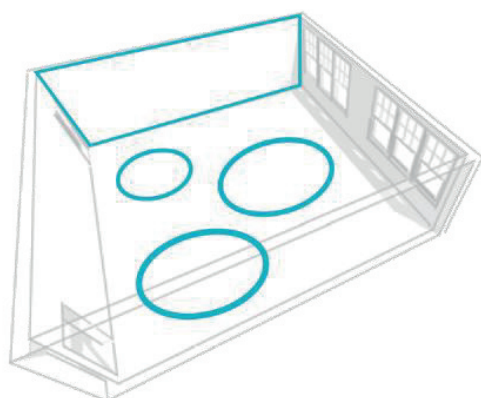
COLOR
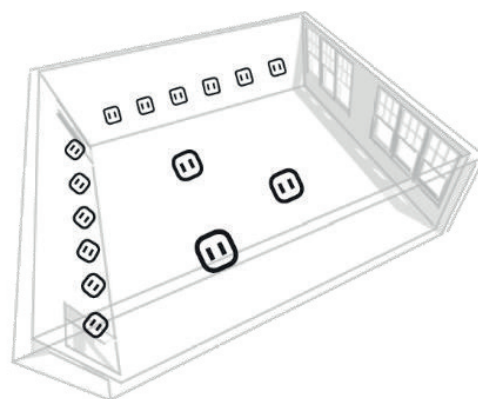
POWER/DATA

Together with these elements we recall the two main types of organization of the workspace.

VARIANTE A   **VARIANTE B**   **VARIANTE C**
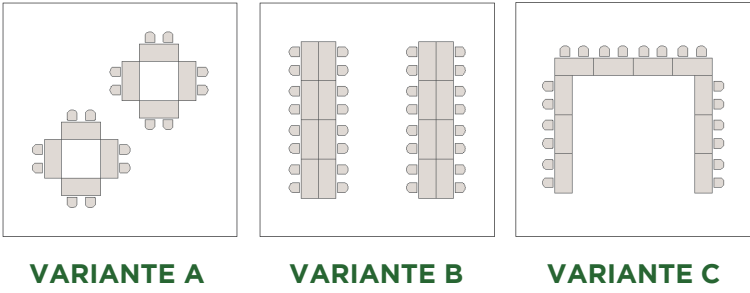
Within an educational space like this we find a structured and rational organization of the space that favors teamwork and guarantees a wide vis- ibility to the teacher. This educational space is equipped with numerous technological tools, a high-speed internet connection, large work sur- faces on the walls (white panels, blackboards, etc.), and a space dedicated to the storage of educational material.

TEACHER - LED LEARNING ZONE
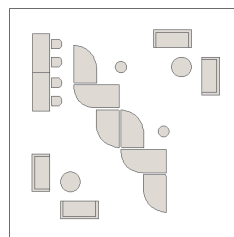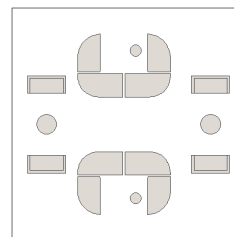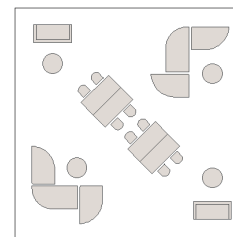
VARIANTE A   **VARIANTE B**   **VARIANTE C**

In this type of space we have a flexible, comfortable and hierarchical-free organization, capable of providing those who use it with numerous and varied easy situations where they can work and experiment in maximum safety and with total privacy. A space like this favors creative work in small groups and develops the concepts of co-creation and sharing in students. For this space to be effec- tive, it must have smart tools and technologies of different nature and with easy-to-access interfaces for students.

CREATIVE ENVIRONMENT ZONE

With these elements we could set up an HYBRID space that is effective in the different ways of working and that provides the right support in the various didactic areas.
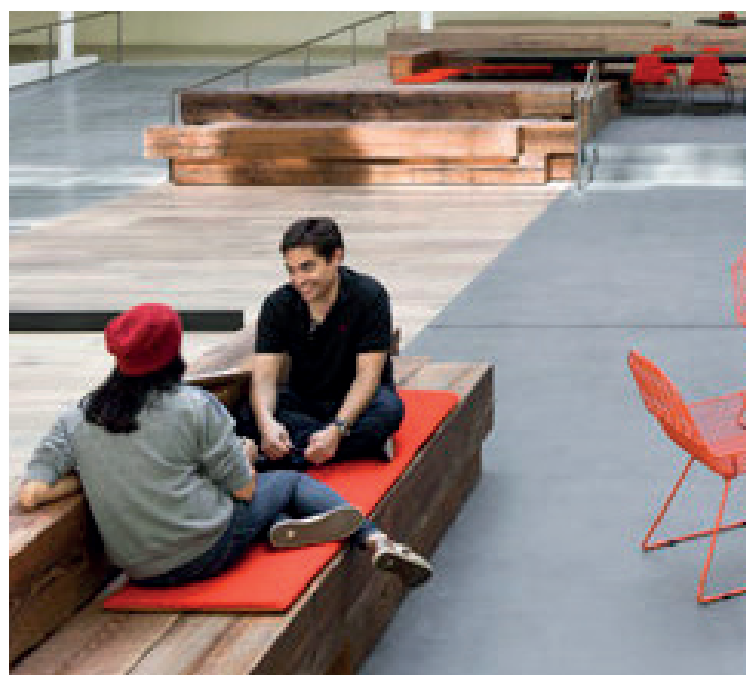
Upon a closer inspection, it is clear that by maintaining the TEAL classroom functional to any type of teaching environment, it fails to fully express its potential because it lacks appropriate specialization. For this reason, in the following section we have elaborated some guide cards for a spatial setting calibrated on the specifics of the different didactic areas.

SETTING HYBRID SPACE

LARGE PRINTER
PANTRY SPACE
MOVABLE WHITE BOARD
DISPLAY / PIN-UP BOARD
TEACHER ZONE
AUTONOMOUS PLAY
COLLABORATION ZONE
STORAGE CUBBLES
PRESENTATION WALL

STORAGE ZONE
HANG-OUT ZONE
AUTONOMOUS WORK
CREATIVE ENVIRONMEMENT ZONE
TEACHER - LED LEARNING ZONE
HANG-OUT ZONE
PRESENTATION ZONE

space simulation by ©Archeworks

TEAL application

guidelines on the most suitable spatial setting for the main teaching areas

DIDACTICS OF SCIENCE AND TECHNOLOGY

For the teaching of science and new technologies, it is useful to point out the importance of instrumentation and equip- ment specific to the educational field under consideration. The teaching of physics requires specific equipment. In spite of this, we can say that for an effective spatial setting of a TEAL classroom for science and technology teaching, the SPE- CIALIZED ZONES and LIGHTING are more important than any other element.

It will be essential to create and equip functional Specialised Zones within the classroom with the best possible equipment, which can be purchased or alternatively self-built so that it can be tailored to the needs of your students.

Consequently, it is clear that the lighting of these Specialised Zones is of great importance in order to provide the best pos- sible light-comfort, enabling everyone to work efficiently and comfortably.

For this teaching area, a TEACHING type of spatial organisa- tion is considered most suitable, with mobile and modular equipment that makes it easy to switch from working individ- ually or in small groups to frontal teaching, which is useful for the demonstration phases of the lesson.

EXAMPLE

91
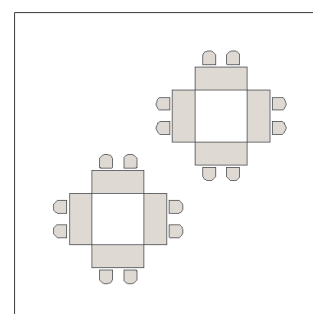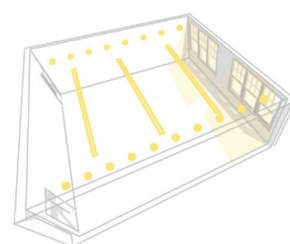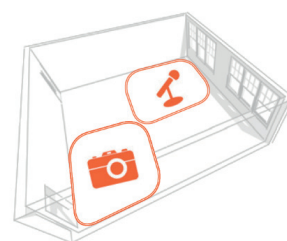
GAMIFICATION

For didactics linked to gamification and app games, the POW- ER/DATA element is of fundamental importance, meaning all the technological substructures (power supply; wi-fi; fast in- ternet; etc.) that underpin the efficiency of all the technolog- ical equipment.

A further element that can stimulate creativity and optimise work processes within an educational space linked to gam- ification is the COLOR which, combined with the LIGHTING element, will contribute to making the space stimulating and therefore more efficient.

A CREATIVE type of spatial organisation equipped with flexi- ble and modular furniture is considered more suitable for this teaching area, so that the work space can be quickly adapted to the needs of the moment.
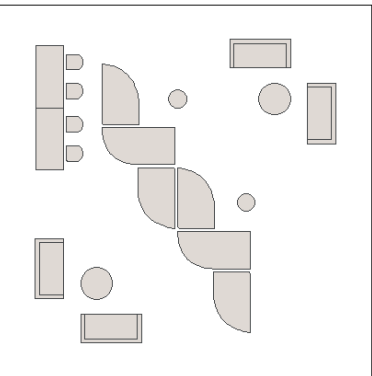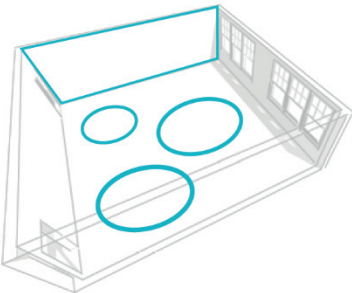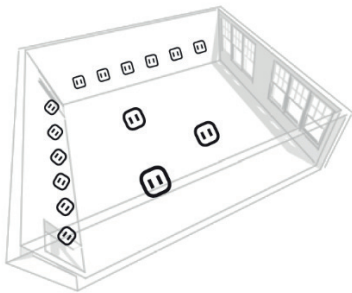
CIVIC EDUCATION

Civic Education teaching covers a wide range of topics (social, political, environmental, food, etc.) so it is difficult to develop a model that works well for everyone. Despite this, however, it is felt that the ROOM SEPARATION element could provide the space with the necessary flexibility to achieve the most appropriate spatial setting. Furthermore, the COLOR element could make the areas recognisable and stimulating, creating the best conditions for work and learning.

Considering the particular nature of this educational field and the possibility that some activities can be carried out in an outdoor environment, the CREATIVE spatial organisation is considered the most suitable.
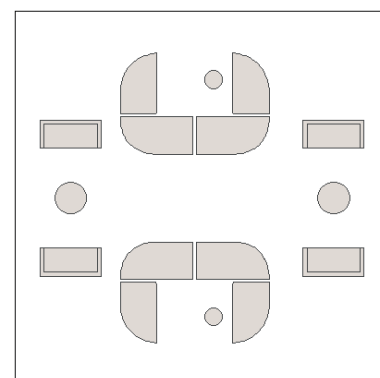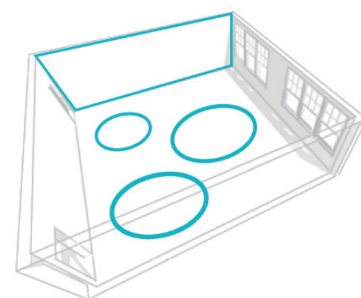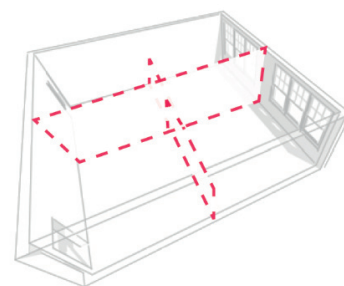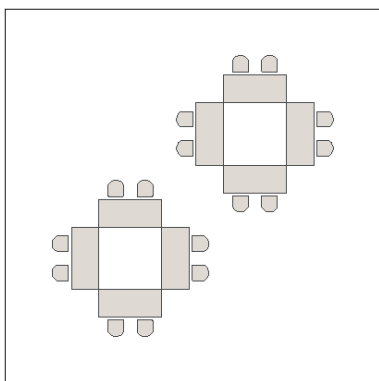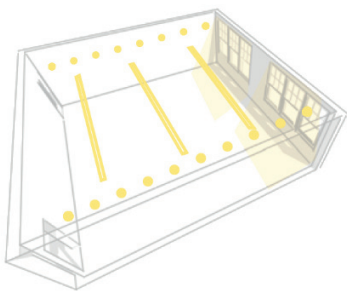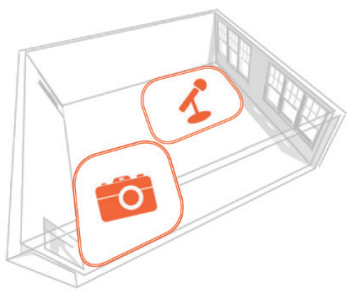
BIOLOGY AND NATURAL SCIENCES

For the teaching of natural sciences and biology as well as for science teaching, it is important that specific instruments and equipment are available in addition to the basic equipment. An effective spatial setting for biology teaching within TEAL methodology is mainly influenced by two elements, namely the SPECIALIZED ZONE and LIGHTING.

It will be essential to create and equip functional Specialised Zones within the classroom with the best possible equipment, so that the students can operate at their best.

Consequently, it is clear that the lighting of these Specialised Zones must be optimal in order to provide the best possible light comfort for the students.

A TEACHING type of spatial organisation is also considered to be more effective in this teaching area. By equipping the space with movable and modular elements, it will be possi- ble to easily change the setting, passing from frontal teaching to personal research/action work with simple moving operations.

LANGUAGE, HISTORY AND GEOGRAPHY

In the teaching of language, history and geography, it is useful to combine the TEAL mode with the CLIL methodology (Content and Language Integrated Learning) in order to make the use of the contents wider because it will be possible to draw on international databases where the contents are all in English.

The two elements that contribute to an effective spatial setting are DISPLAY/SIGNAGE and POWER/DATA.

The former as a material support (panels and wall boards) for the analysis work through the elaboration of concept maps in brainstorming mode.

The latter is used as a support for the research/action phase (fast internet and wi-fi), which characterises the students' autonomous work after they have learned the necessary didactic and cognitive tools.

A CREATIVE spatial organisation with zones that can be configured quickly in the teaching mode is considered more suitable for this teaching area.
This is important because in this teaching environment, numerous audio-visual contents are used which require specific configurations.
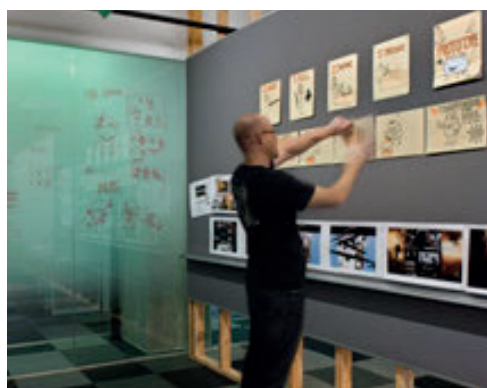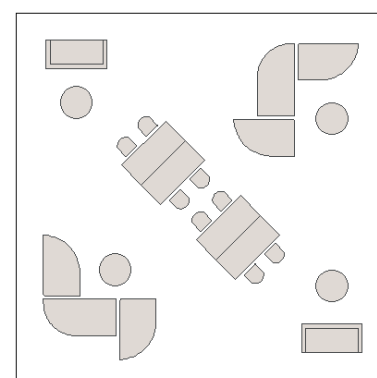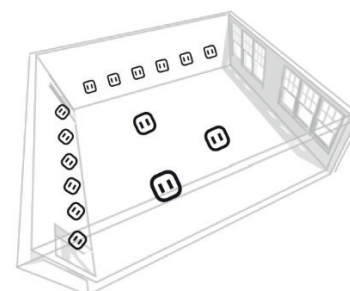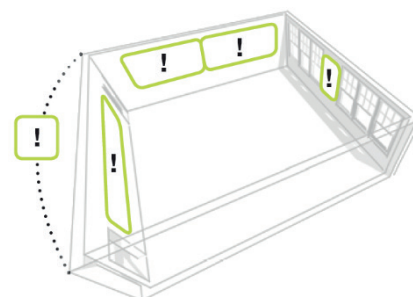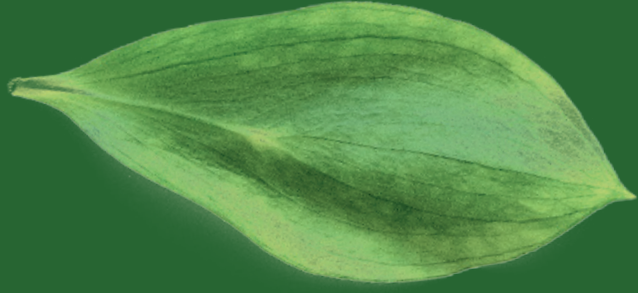
Chapter 4.1

Self-Construction
of urban Gardens

where do I start to have a vegetable garden at home?

Introduction and first steps to build our vegetable garden

Unlike what you may think, installing a vegetable garden on your balcony is very simple, just consider 360 ° view of the space available by designing and creating a structure that exploits both width and height availa- ble. Clearly the quantities of vegetables that can be produced will be limited to personal use but if you pay attention to seasonality, planning what to plant and when, we are sure that your garden will give you a lot of satisfaction. A home vegetable garden cannot do without an element, that is, a seedbed. There are many things that can be sown in a seedbed (Cucumbers; Beans; Green Beans; Chicory; Chard; Lettuce; Leek; Pars- ley; Zucchini; Sage; Spinach; Peas; Rocket; Beetroot; Asparagus; Endive; Carrots).

Image taken from a botanical manual with different varieties of vegetables

But what does it take to make our seedbed? There are of course different ways to make our seedbed starting from recycled material. You could use old boxes (wood or plastic) that will first be drilled on the bottom (4-5 holes diameter 2 cm) and then lined inside with cellophane, after which they are filled first with a layer of pebbles on the bottom (height of layer 2- 3 cm) and then with soil (layer height 20 cm), and your seedbed is ready and you can arrange it wherever you want in order to always ensure the right amount of light.

Seedbed model installed on the balcony useful for obtaining the "seedlin- gs" starting from the seeds, seedlings which are then replanted in larger pots

Basic elements for the construction of a seedbed starting from a box

Do you have a small balcony and don't want to use all the space available for the seedbed? No problem, the seedbed can be created by taking up very little space starting from egg cartons, which once filled with soil and your seeds is immediately ready for use. The great convenience of this system is above all in the very little space it occupies in addition to the possibility of being able to position it wherever you want (windowsill; wall shelves etc.) in order to guarantee it the right amount of light and water.

Basic elements for the construction of a seedbed starting from an egg carton

Seedling model made with egg cartons. System that offers significant organizational advantages by taking up very little space

DIY balcony vegetable garden

practical examples and ideas to easily create your garden on the balcony

At this point, we can start with the project of our vegetable garden on the balcony. The first thing to do is to observe the space available and decide if the vegetable garden will grow and develop vertically or horizon- tally. Each one of the two ways has advantages and disadvantages (Occupied space; Sun exposure; Water consumption; etc.) that we must take into consideration before installing our vegetable garden. A useful suggestion for the first installation is to create a temporary structure that can be easily be modified as our vegetables grow.

In this module, we will briefly present three types of structures that lend themselves well to the creation of a vegetable garden on our balconies, structures that have as a common characteristic being made with recycled materials.

1. HORIZONTAL VEGETABLE GARDEN

The first structure has as its basic element the old milk or water boxes, a modular element that allows you to easily adapt the structure to the space available, as if they were giant LEGO bricks that we assemble at our convenience.

Basic element model for the creation of a vegetable garden in domestic spaces such as a balcony

As you can understand from the photos above it is a very simple structure that easily adapts to different types of spaces and to many types of vegetables by adding simple accessories, such as vertical supports to support the growing plant.

The elements needed to create this type of structure are the following:

**1. PLASTIC PALLET;   2. PLASTIC BOX / CONTAINER;   3. MEDIUM-SIZED SEA PEBBLES;
4. VEGETABLE SOIL;   5. TREE BRANCHES;   6. BAMBOO CANES FOR GARDENING..**

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• STEP 1

We position the pallets in a spot of the balcony that we consider the most suitable. To understand which is the most suitable point, we must consider not only the space but also the sun exposure and the proximity to the water tap.

• STEP 2

After positioning the pallets and preparing the base for our vegetable garden, we create between 6-8 holes with a diameter of about 1 cm on the bottom of each box that we have. The holes have the function of re- leasing the unnecessary water present inside. At this point, we position the boxes following the shape of the base trying to make the most out of the space by fitting the boxes together, just as we did with LEGO bricks as children.

• STEP 3

We fill each box with a layer of pebbles about 5 cm high. This layer will have the function of draining the extra water and promoting its leakage from the holes previously made on the bottom of the boxes.

• STEP 4

We fill each box with a layer of branches and lumber about 5 cm high trying to compact the branches as much as possible. This layer will support the soil ensuring proper ventilation of the layer that will host our vegetables.

• STEP 5

Complete the filling of the boxes with a layer of potting soil about 20-25 cm high. At this stage, we just have to plant our seedlings with any bamboo cane aids that support the plants in their height growth.

The end result will be a more or less regular chessboard full of vegetables and plants of different types each with its own living space.

Horizontal vegetable garden model composed out of boxes placed side by side

2. VERTICAL VEGETABLE GARDEN

The second structure is designed for small balconies trying to exploit the space in height instead of in wid- th. The basic elements are bags to be made out of fabric (micro-perforated fabric, geotextile or old woolen blankets) of what we consider the most comfortable size. These bags will first be lined inside with peat or al- ternatively thick jute fabric and then filled with vegetable potting soil. At this point, we just have to hang our bags on the supports we have available (hooks for shelves; old stairs; etc.) or even simply hang them trying to distance them from the wall to allow ventilation around the bag.

Vertical vegetable garden model made with bags hanging on the wall

Vertical vegetable garden model made with bags on wooden support

The elements needed to create this type of structure are the following:

1. ROLL OF GARDENING GEOTEXTILE FABRIC (ALTERNATIVELY OLD WOOLEN BLANKETS) OR READY-MADE GEOTEXTILE BAGS;   2. VEGETABLE SOIL;   3. WOODEN LADDER OR STRUCTURE IN WOODEN SLATS;   4. METAL SUPPORT TO BE FIXED INTO THE WALL.

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• STEP 1
Let's take the Geotextile fabric roll for gardening and create the bags in the shape we want with the help of a pair of scissors and a stapler. As an alternative to Geotextile we can use old thick woolen blankets or rea- dy-made Geotextile bags that we find on the market. It is recommended equipping the bags with handles in order to make easier the fixing to the support structures.

• STEP 2
After analyzing the space we have available, we should position our ladder in the place we have chosen, placing it on a free wall and paying attention to the sun exposure. We fix the ladder into the wall in order to make it stable. As an alternative to the staircase, it is possible to design and create a custom-made wooden structure for our space, using fir wood listels and ropes. The advantage of building a customized structure is to make the most out of the space available.

• STEP 3
As an alternative to the wooden structure lean on the wall, we can use metal ring supports to permanently attach it to our wall. The advantage of this solution compared to the wooden structure is having fixed points to move our bags according to the season and the amount of sunlight.

• STEP 4
At this point, all that remains is to prepare the bags by lining them with peat or jute fabric, then filling them with plant potting soil (a layer of about 10 cm) and finally placing our seedlings (1-2 seedlings for each bag). Once prepared, we just have to fix them to our support structure, helping us with the fabric handles made previously or alternatively with ropes. We suggest during the initial stage of our vertical garden to make seve- ral tests by positioning the plants

in different points of our balcony in order to correct propptly any problems of sun overexposure or excessive wind.

The final result will be a more or less complex support structure with many hanging bags, which will be moved accordinglt to the sun exposure
and ventilation of the plants they host.
If your DIY skills allow it, we can indulge ourselves with containers of different shapes and materials, such as the example in the photos on the side, where our structure has been hung with recycled and cut plastic tannins or metal vintage style buckets.

We remind you, however, that if you use a container that does not allow the passage of water such as the vintage buckets for example, you have to drill holes on the bottom of the container and create a layer of pebbles under the soil, in the same way in which you prepared the boxes for the horizontal garden, illustra- ted in the previous section.

3. HYBRID

If you believe that your DIY skills are good enough then you can test yourself and create this latest type of structure for your balcony vegetable garden. It is a structure that we call hybrid because it develops simul- taneously in height and width assuming the appearance of a flight of steps. The complexity and at the same time the great advantage of this structure is that it is designed and tailored for your balcony so it makes the most out of the available space but requires good carpenter's skills.

Model of vegetable garden with steps in a wooden structure

The elements needed to create this type of structure are the following:

1. WOODEN OR PLASTIC PALLETS;   2. BOARDS AND STRIPS OF WOOD;   3. NAILS AND SCREWS IN GALVANIZED IRON;   4. MEDIUM-SIZED SEA PEBBLES;   5. VEGETABLE SOIL; 6. TREE BRANCHES;   7. BAMBOO CANES.

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7

- **STEP 1**

Let's take the pallet and place it on the balcony area that you consider most suitable. To identify the most suitable spot, we should consider besides space also the sun exposure, the wind and the proximity to the water tap. The pallet will be the basis for our stepped structure and will define the space that will be occupied by our vegetable garden.

- **STEP 2**

After positioning the pallet, we must measure the space available to us and cut the fir wood boards of the most suitable dimensions with a saw. Once all the elements for our structure are ready we can begin to build our step structure by fixing the boards together with galvanized iron nails and screws.

- **STEP 3**

Once our step structure is ready we must fill it on the bottom with a layer of pebbles about 5 cm high. This layer will have the function of draining the extra water and promoting the evacuation of this from the free spaces that remain between the wooden boards.

- **STEP 4**

On the cobblestone layer we create a layer of branches and lumber about 5 cm high trying to compact the branches as much as possible. This layer will support the soil ensuring proper ventilation of the layer that will house our vegetables.

- **STEP 5**

Complete the filling with a layer of potting soil about 20-25 cm high. At this point we just have to plant our seedlings with any bamboo cane support that helps plants in their height growth.

The end result will be a more or less complex stepped structure that will have a different basic shape and can be placed in the center of the space or leaning against a wall. The limit of this type of vegetable garden is our ability to work with wood, in fact as we can see from the photos below you can create very versatile structures, which allow you to simultaneously grow different types of vegetables.

Complex models of stepped vegetable garden

The vegetable garden grows and arrives in courtyards and even in the streets of our cities

Practical models for creating educational vegetable gardens in semi-public spaces such as shared courtyards and terraces, or public spaces such as streets and squares

1. It should be clear so far that there are many possible types of bases to create your vegetable garden, structures that can be purchased or built from basic or recycled materials. For this reason, we would like to show you some models of structures that can be built in semi-public or public spaces starting from a fundamental element, that is, the establishment of a multidisciplinary group of volunteers that allows enrichment and collective learning.

2. SEMI-PUBLIC SPACES

By semi-public spaces we mean those private spaces that abound in our cities and represent a great unex- pressed potential if we think of urban green system or zero-kilometer food production.

Let's think first to the terraces on buildings in those suburban neighborhoods where there are no public squares or parks, or the courtyards of those condominium complexes where we find only small planters and paved avenues.
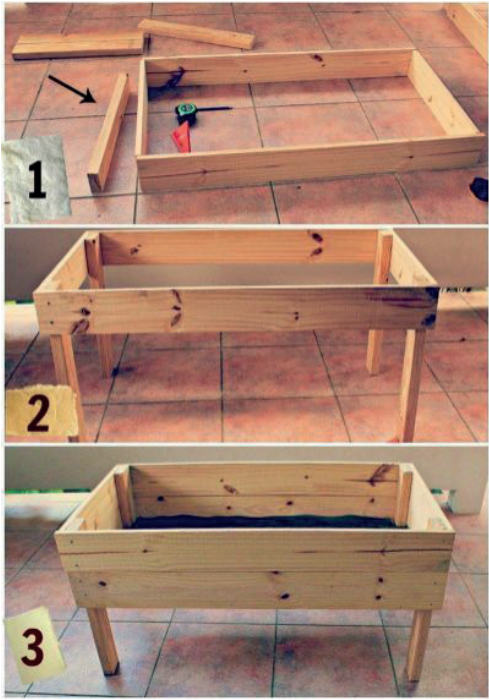
Vegetable garden model on terrace

To set up a garden on a building the terrace, for example, the ideal would be to use raised woo- den crates in order to prevent water and dirt from accumulating under the structure of our garden.

Raised structure model to be used in a vegetable garden on the terrace

If, on the other hand, we have a condo's courtyard available, the installation is simpler because the structures for our garden do not create drainage problems with dirt accumulation. The simplest thing is to make low wooden crates to be placed at the right distance between them so as to guarantee the right maneuvering space between one crate and another.

Vegetable garden model for a private courtyard

Obviously, as we have already explained above for balcony vegetable gardens, if your DIY capacities are suf- ficiently developed you can try more complex structures that can develop both in width and height, starting also from more complex designs of the rectangle.
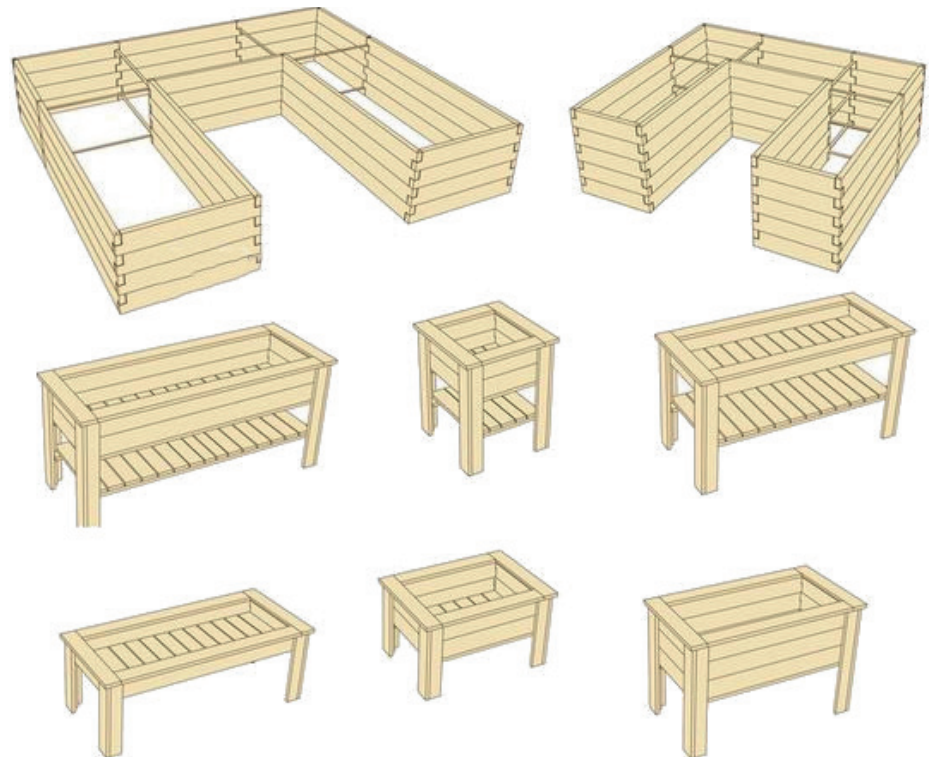
Shaped crate models and complex structure to create a garden in a private courtyard
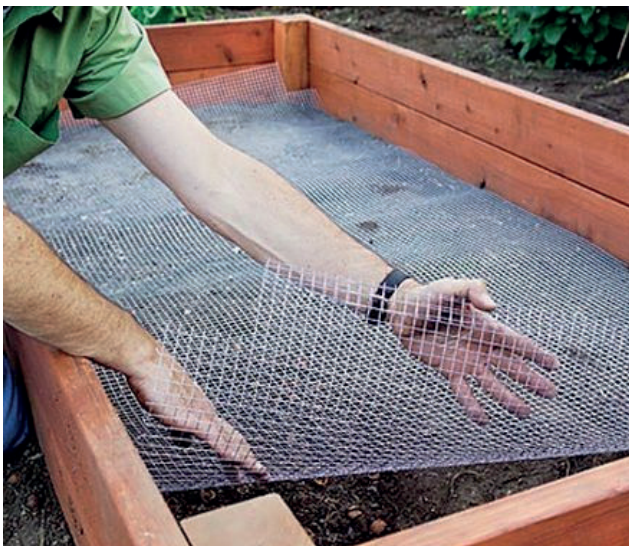
3. PUBLIC SPACES

By public spaces, we mean streets and squares as well as obviously parks and gardens, all places that with different percentages contribute to the urban green system of a city. The examples of educational vegetable gardens created in parks, squares and in general in large spaces are many both in Europe and in the rest of the world, for this reason, we believe it useful to point out an urban garden created in Spain where a wall becomes the support of a colorful vertical vegetable garden.
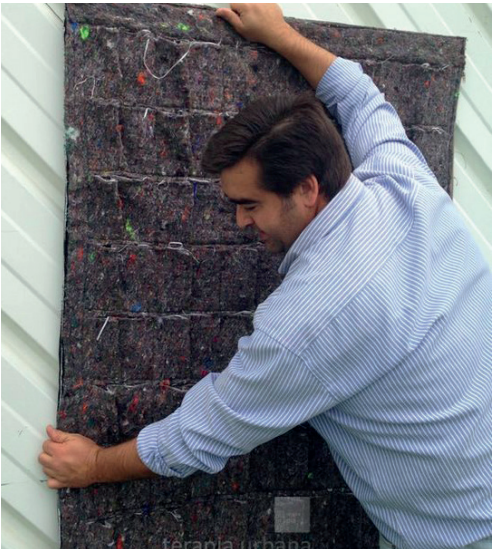
Vertical vegetable garden model on the street

The basic element with which the architects of Peinado Arquitectos studio have carried out this intervention is the insulating felt made from recycled fabrics. These rolls that are usually used for houses soundproofing were sewn into modules of pockets which were then hung on the fence wall of the USP Sagrado Corazón cli- nic in Seville. At this point, the designers with the help of some volunteers of the Urban Therapy association have planted many varieties of plants creating a splendid vertical garden full of colors.

Assembly of pocket modules in recycled felt where the vegetable garden plants will be placed

Basic elements to create a vertical garden on a fence wall

www.plataformaarquitectura.cl/cl/02-207267/ en-detalle-jardin-vertical-en-clinica-usp-sagrado-corazon-se-villa-terapia-urbana?ad_medium=gallery

Accessories for our vegetable garden

Models for accessories useful to make our vegetable garden even more performing

Lastly, there are systems that we can add to our garden to make it more functional by optimizing our do- mestic production cycle.

For example, a composter to transform organic waste into an excellent fertilizer for our vegetables is a fun- damental component of a vegetable garden. The images below refer to a video tutorial that explains step by step how to make and operate a composter for domestic use.
Composter model for domestic use

Composter model for domestic use

Or a system to collect and store rainwater in order to drastically reduce the water consumption of our garden.

The simplest system is to collect water from the downpipes in a container and then use it when necessary, but there are other systems such as burying containers like vases or plastic bottles near our vegetables, making small holes in them so the water is absorbed by the soil as this dries. Below are some images that outline systems for the recovery and use of rainwater in growing vegetables in home gardens.
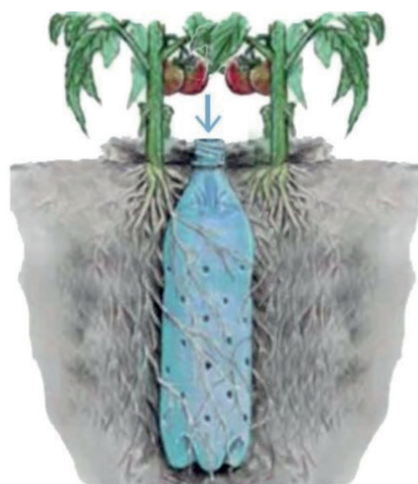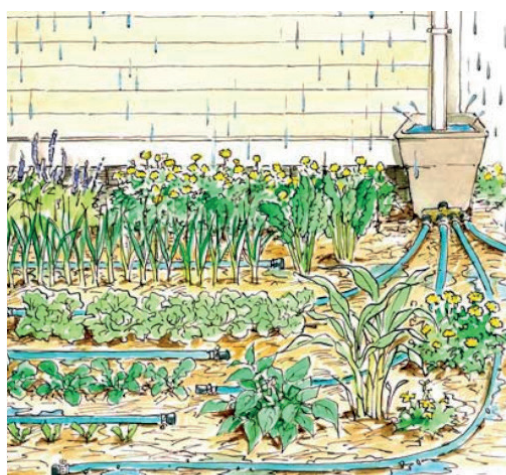
Rainwater recovery tanks models

2019-1-IT02-KA201-062276

Chapter 4.2

Outdoor education

Urban garden & outdoor education

can an urban garden become a next-generation didactic tool to counteract the negative effects of distance learning and the technological tools of TEAL methodology?

Having reached this point of the research on TEAL methodology, educational gardens and technological tools applied to newly conceived teaching, we cannot help but wonder about the negative effects that these tools could have on students and their possible contraindications. During a historical moment like the one we are experiencing, the global COVID-19 pandemic is highlighting the great importance of physical contact in the learning process, especially for younger students, and the limits that technological tools have, if not appropriately supported by a project balanced didactic. In this context, we cannot help but ask ourselves whether it is appropriate to maintain a consolidated approach in teaching or taking advantage of this crisis to develop new methodologies.

Even before the pandemic, many research bodies and associations that deal with children and young peo- ple such as **SAVE THE CHILDREN** had begun to question education in public and private outdoor spaces, developing new projects related to the so-called OUTDOOR EDUCATION which means those curricular and extracurricular activities carried out by schools, local authorities and associations in open spaces such as courtyards, squares and public gardens.

"You'll find more in the woods than in books. The trees and the stones will teach you things that no man can tell you."

Bernard di Clairvaux

DigiEU
digital garden for european schools

At an international level, there are many pedagogical types of research and educational practi- ces that support the validity of Outdoor Education both in natural and urban environments, as an educational practice that simultaneously concerns learning, socialization and health. This par- ticular philosophical-pedagogical trend was born in Germany in the second half of the twen- tieth century, initially spread mainly in Northern Europe (Sweden, Norway) and subsequently
in the rest of Europe, USA and Canada, influencing more and more pedagogues on the im- portance of the Outdoor Education in all stages of learning, including the one for the elderly.

In summary, the Outdoor environment assumes the value of an educational context with a broad sense, a place where one learns, strengthens a sense of respect for the natural environment and expresses emotio- nal-affective, social, descriptive, creative, and sensory-motor skills. It also stimulates cooperation and colla- boration between peers with excellent results in intra-generational relations. From the pedagogical point of view, woods, public gardens, squares and courtyards represent a great potential still unexpressed.

Project FOREST SCHOOL CANADA
(https://childnature.ca)

Examples of Urban Gardens and intergenerational activity

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TEAL DIGITAL GARDEN application

guidelines on methodological approaches on the most suitable spatial setting for the creation of an educational garden with TEAL supports

INTRODUCTION

It may seem a contradiction apparently, to relate OUTDOOR EDUCATION and TEAL but we believe that our research has provided numerous elements to demonstrate how a DIGITAL GARDEN is a perfect synthesis between transversal teaching and new technologies, with a high degree of replicability and adaptability to territories and different contexts.

METHODOLOGY AND SETTING SPACE

As well as for science education, new technologies are also very important for the DIGITAL GARDEN with a CREATIVE-type spatial setting equipped with flexible, modular and user-frien- dly furnishings. In particular, it should be noted that in addi- tion to specific equipment in the biological, agronomic and meteorological fields (PH ground tester, rain gauge, etc.), in- struments and equipment related to connectivity in the out- door area (wifi, cloud, etc.) would be very useful. Connectivity becomes essential to allow students to access specific con- tent previously prepared by the teacher (game-app, keynote, etc.) or to carry out free research on new topics, all thanks to a simple device (smartphone, tablet).

In the outdoor environment, the element that most of all in- fluences the spatial setting is the COLOR. A balanced combi- nation of natural colors linked to the environment (sky, sun, plants, etc.) and artificial ones linked to equipment (furnishin- gs, greenhouses, etc.) will be able to create recognizable and stimulating areas, to create the best working and learning conditions for outdoor learning. A further element to highli- ght is the SPECIALIZED ZONE linked to food education and the short supply chain, where children can see and explore all the steps related to food production. Cultivation with see- dbeds and tubs for vegetables, recycling with composters or rainwater collection systems, as well as obviously preparing food with tables or barbecues where the circle closes and is possible to enjoy conviviality.

Below are some examples of installation and case studies with different levels of difficulty and integrated technology that allow us to understand how the interactions between urban gardens and new technologies are not only possible but very effective.
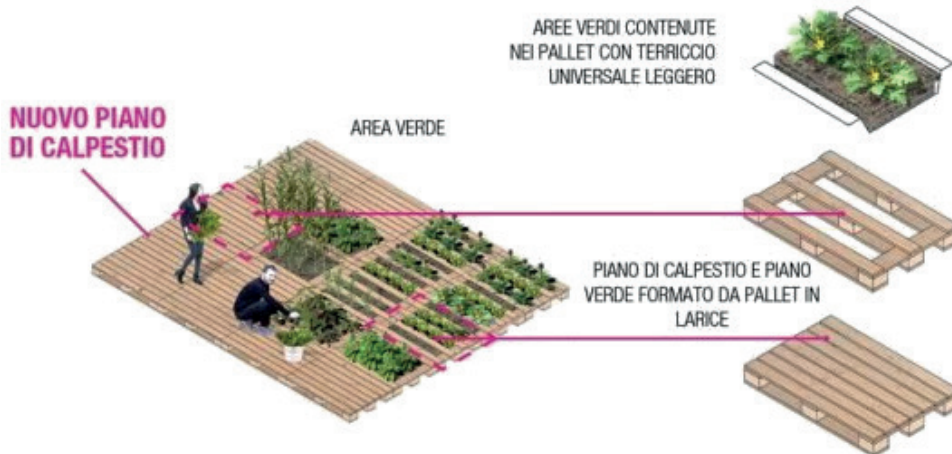
example of a spatial setting applied in a condominium courtyard
www.piuarch.it/en/projects/orto-fra-i-cortili

example of a spatial setting applied in a condominium courtyard www.piuarch.it/en/projects/orto-fra-i-cortili

example of spatial setting applied in a public space with hydroponic system

www.humanhabitat.dk/projects?lang=en
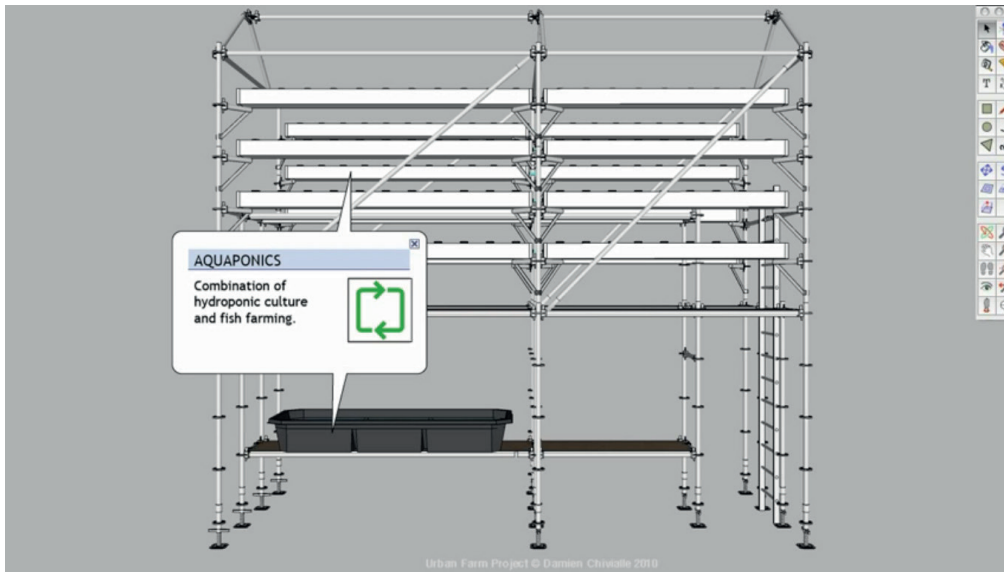
example of spatial setting applied in a public
space with hydroponic system

www.youtube.com/watch?v=yKEIkc98qtE-

www.designboom.com/architecture/
shipping-container-greenhouse-urban-farm-
unit-by-damien-chivialle/

Conclusion

the TEAL Digital Garden not only as an area of educational research and design but also a new direction in response to social and intergenerational isolation

At the end of the two sections of the manual in which information and operational supports were provided to learn, plan and implement educational activities in TEAL mode and educational gardens in urban contexts at different scales (balconies; condominium courtyards; squares and urban parks) we feel the need to share a small reflection that goes beyond the research scope of the DigiEU project.

After a whole year of world pandemic during which most of the social and interaction patterns between individuals have lost their validity showing gaps we were not aware of, we believe that our research on an innovative teaching modality like TEAL applied in outdoor environments such as URBAN GARDENS, must and can go beyond the limits of didactic research.

The emotions of students, intergenerational relationships, the conscious use of new technologies, or the social repercussions that any intervention in the urban environment can generate are just some of the issues that the global COVID-19 pandemic has placed at the center of the cultural debate and we believe that our project can contribute to face it in a positive and proactive way.

Chapter 5

Conclusion

Conclusion

We started to build this educational material by looking, first of all, at what education is, the role it plays in our lives in general, then narrowing down the perspective to what happens in our schools and finally in our classrooms. We thus acknowledged once again that education gives us a knowledge of the world around us and changes it into something better. It develops in us a perspective of looking at life. It helps us build opinions and have points of view on things.

At the same time, we asked ourselves the question: is education the only thing that gives knowledge? We do agree that education is the process of gaining information about the world that surrounds us; nevertheless, information cannot be converted into knowledge without education. Education makes us capable of understanding the processes that happen all around us, it helps us interpret and give meaning to things; therefore, we have concluded that education is more than just a few lessons in a textbook. It is about the lessons life offers to those whose eyes are open, to those who take the time not only to marvel at the beauty of nature, but also to learn from it.

Our manual was based on the research carried out in the countries involved in the partnership, with regards to the educational process and the learning activities that take place in our institutions or in the communities we belong to. However, this book was not intended as a precise, exhaustive presentation of different realities existent in several European educational environments, but it is meant to offer ideas and suggestions towards the improvement of methodological practices, with a view to increasing the quality of the education provided in schools, first in the ones involved in the current project, then in as many as possible.

After a close analysis and systematic comparison of common issues, such as the national curriculum, priorities in education, needs of the students and those of teachers, educational, technological aids, the relationship between the school and the other local / regional institutions or the relevance of our studies for the labour market, we came to the conclusion that there are a few areas in which the challenges that all partner countries face are very similar. These domains translate as follows: the introduction of technology in the learning process is a must in today's world; students' creativity has to be developed in order to ensure the progress of our society; teachers should consider active learning methodologies which allow students to work together and cooperate while experimenting; digital tools can be used as a motivational instrument while teaching any subject. Through this manual, we have come with a possible solution to the above-mentioned challenges, namely the use of TEAL Methodology in class. Technology-Enhanced Active Learning (TEAL), designed in 2003 by MIT in Boston, pays a lot of attention to all students' participation in the learning process. However, teachers agree that the goal of increasing participation is not to have every student participate in the same way or at the same rate. Instead, it is to create an environment in which all participants have the opportunity to learn and in which the class explores issues and ideas in-depth, from a variety of viewpoints. TEAL methodology makes that possible, by organising the students in groups that are made up of components with different levels of skills and knowledge. Moreover, in a TEAL Classroom, the teacher introduces the topic with questions, exercises and graphic representations. Then each group works collaboratively and actively with the help of a device to collect information and data and perform experiments or checks. It is very likely that some students will raise their voices more than others; this is a result of differences in learning preferences as well as differences in personalities. What matters more, though, is that TEAL methodology creates conditions that enable students of various learning preferences and personalities to contribute.

It has been proven that some students who do not speak often in class are reflective learners,

who typically develop ideas and questions in their minds before speaking; others are shy students who feel uncomfortable speaking in front of groups Many students who frequently volunteer to contribute are active learners, who typically think while they speak. Using TEAL methodology, the teacher can encourage quiet students to speak up and, if necessary, ask the more verbose students to hold back from commenting in order to give others a chance. At the same time, the teacher can reduce students' anxieties by creating an atmosphere in which they feel comfortable "thinking out-loud," taking intellectual risks, asking questions, and admitting when they do not know something. One thing needs to be added at this point, though: active student participation will not happen naturally or overnight; it must be carefully planned and encouraged. Organising a TEAL classroom does take time, it also involves assessing student participation during the lesson and thinking about what aspects could be changed for improvement.

The reason why TEAL methodology is very much concerned with students' participation in the learning process is related to the multiple benefits it brings. Participation adds interest. We are all aware that it is hard to maintain students' focus and attention when all they hear is the professor talking. In a TEAL class, all voices are heard, every answer is important, different points of view are encouraged and appreciated.

Participation engages students. A good question can pique their interest, make them wonder why, get them to think and motivate them to make connections with the content. At the same time, when students answer or try to explain, teachers can see the extent of their understanding. Participation does not only provide the teacher feedback, it also provides the students feedback. For example, when teachers ask questions or otherwise seek student input over a topic, they are letting students know something about the importance of certain ideas and information.

Participation encourages dialogue among and between students. When TEAL methodology is used, one group of students is offered the chance to comment on what another group has presented, on the data they have collected (with the help of one or several digital tools). Students are invited to discuss possible answers, to add information, sometimes even to analyse critically. Consequently, participation develops important speaking skills. In many professional contexts, people need to be able to speak up in a group. They may need to offer information or argue for a different solution. These skills cannot be acquired or improved by reading about them – they need to be practised.

Another aspect that is paramount in a TEAL classroom and which we have underlined in this manual (especially in the chapter dedicated to the case studies) is the teacher's role and his/her position in the classroom. Moving away from the front of the classroom defines TEAL methodology because it promotes better participation. If students perceive that all comments must be channelled through the teacher, he/she becomes a gatekeeper for participation and it gets harder to develop a sense of collective responsibility.

The role of the teacher who uses the TEAL methodology is very different from that of a traditional teacher. The latter type of educator spends quite a lot of time using the board and explaining things, transmitting knowledge to the class, with occasional questions to or from the learners. Throughout the lesson, the teacher keeps control of the subject matter, makes decisions about what work is needed and orchestrates what the students do. In this type of classroom, the teacher probably does most of the talking and is by far the most active person. The students' role is primarily to listen and concentrate and, perhaps, take notes with a view to take in the information. This kind of teaching is based on the assumption that the teacher is the 'knower' and has the task of passing over knowledge to the students.

When using TEAL methodology, teachers act as a facilitator in learning; their role as educators has evolved and they are no longer the source of all knowledge in the classroom; they are the educators that inspire the students to take ownership in their own learning. In a TEAL classroom, teachers provide opportunities for students to learn key concepts and discover the various tools that they need for learning so that they can become lifelong learners. The role of the teacher is to provide resources, to monitor progress and to encourage students to find solutions for various problems. This type of teacher assists his/her students in grasping at their common targets and in achieving them without any intervention on his/her behalf, thus granting the learners some space to let the spirits of creativity and innovation manifest. Such pedagogical strategy will create a student-centred and conducive learning environment. When teaching is student-centred, it encourages student's enthusiasm and willingness to learn, it increasing motivation for self-development, it sets the momentum and makes both the lecturer and student feel satisfied. Participative environment means not only a lot of questions and talking from the students, but it also means an environment where every student learned in a manner which best suits him or her. In any formal education, most of learning activities take place in a classroom. Classroom is a built-in environment where formal learning process takes place. It is an important context where both students and instructor come into contact to share information in their quest for knowledge. For the instructor, classroom time is a golden opportunity to meet face to face with the students, delivering the teaching material effectively with the aim to ensure that students are learning what they need and will later use. On the other hand, the students are expected to participate actively in order to absorb, seek and apply the skill and knowledge shared in the classroom or other learning activities. These complementing engagements between lecturers and students do generate conducive classroom environment.

Classroom setup also plays a crucial role in TEAL methodology; therefore, one section of this manual was dedicated to a detailed presentation of important aspects that need to be taken into consideration by any teacher who wants to benefit at the maximum from a TEAL classroom. Studies have shown that there are several factors which influence the student's participation in the process of learning. Previously, we have referred to the personality of the students and have pointed out that students with high self-efficacy show better academic achievement and more participation in the classroom, whereas those with low levels of self- confidence are afraid of failing to show their intelligence, fear that their answers will be criticized by the teachers, thus becoming less engaged in classroom discussions.

We have also referred to another important factor that affects the students to participate actively in the classroom, that is the traits and skills of the instructor. When a teacher proves supportive, understanding, approachable and demonstrates friendliness through positive nonverbal behaviour, giving smiles and nodding for admitting the answers that are given, students feel comfortable and engage in the learning process.

However, the way the classroom furniture is organised, as well as the quantity and quality of the equipment used are not less important. Student participation in class is high when students are divided into groups. That is why, in a TEAL classroom, desks are arranged in such a way that students can face each other, talk to each other and hear their peers' ideas, arguments or questions. Such organisation develops the concepts of co-creation and sharing in students. At the same time, it guarantees a wide visibility to the teacher.

Special attention must be paid to the equipment of the educational space; it is essential to include various technological tools, a high-speed internet connection, large work surfaces on

the walls (white panels, blackboards, etc.), and a space dedicated to the storage of educational materials. A classroom equipped with proper lights, fan or air conditioning, and other facilities will make students feel comfortable and encourage them to participate in the learning activities. Nevertheless, it must be pointed out that one of the most useful characteristics of TEAL methodology is its adaptability to many teaching environments. Sometimes, schools may not have access to the latest technological devices or classrooms are not always very generous in terms of space. Consequently, it depends on the creativity and ingenuity of the teacher to make the necessary changes and adaptations to his/her particular educational environment, without moving away from the core concept of TEAL methodology, yet benefitting from its usage.

Today's world is fast-paced, and heavily reliant on technology. Whether we want to admit it or not, despite the fact that digital progress has brought amazing changes in the way we communicate, work or spend our free time, if we are not careful, technology can end up putting us in a box, a very bright, shiny, and fun box to be sure, but a box nonetheless. We may think that those dropdown menus give us options, but what they really do is limit choices that limit our thinking, imaginations, and actions. At the same time, because of technology, so very often we have replaced the real world with the virtual one and we fail to experience the beauty and the essence that the real world provides through sight, sound, smell, touch, taste, balance, movement, temperature, pain and emotions.

Therefore, another section of our book offers an alternative to those of us who still believe in the importance of connecting to nature, in the power of the natural world to develop students personally and professionally, by arising their curiosity, teaching them flexibility, increasing their open-mindedness, improving their creativity and critical thinking. This alternative is the creation of urban or personal gardens. Regardless of their size, shape, content or place of growth, such gardens represent connective spaces that allow our students to see a bigger picture. They can experience the beauty as a whole and then find interesting, simple, yet many times forgotten things like: how plants smell or look, the taste of fruits and vegetables, the power of a tiny seed. Creating and looking after a small garden, as part of the school learning experience, serves as a wonderful and exciting way to make classroom curriculum come alive and show "real-life" meaning to students as they learn. A garden can provide an opportunity for students to participate in hands-on learning that teaches not only the intended subject but also responsibility, teamwork, and respect for nature, others and themselves. Whether growing vegetables, fruits, or a variety of herbs, these gardens represent a valuable tool that schools can use to promote healthier eating habits, appreciate locally grown food sources, teach environmental stewardship, encourage community and social development.

In the chapter that focuses on the design and self-construction of an educational garden, we have attempted to demonstrate not only the process that lies behind or the materials that teachers and students need when creating and growing urban gardens, but, more importantly, we have stressed the positive effects it has on the participants. For example, students who actively interact with nature end up having greater positive attitudes towards the environment well into adulthood. Through gardening, students become responsible caretakers. They have an opportunity to engage in agricultural practices, even if it is on a very small scale, but they learn about the responsibilities and impacts of land cultivation.

When children's sense of connection with nature is deepened through the construction of a small garden (whether at school, at home or in a public place), it can lead to environmental protection. Children learn about water and energy cycles, the food chain and the individual

needs of different plants, and thus they will develop a desire to explore the outside world. At the same time, students will become more aware of the long-term human impact on the natural environment. From the water shortage to the over-use of pesticides, children who engage in looking after their own garden have the opportunity to observe the importance of conservation and intelligent allocation of resources.

By getting children involved in the creation of their personal garden, teachers offer students the chance to sharpen their communication skills. This is achieved when they start looking for what fruit, vegetables or herbs to plant, how to care for them, what the benefits are of consuming these species of plants. Teamwork is another lesson they can learn throughout the time spent taking care of their small garden.

We have chosen to allocate, in our manual, a considerable amount of space to designing, building and looking after a personal garden because, if it happens as part of the educational process, it can provide students an opportunity to investigate and compare the basic physical characteristics of plants, what helps or hinders their growth, and their response to stimuli and environmental growing conditions throughout the season. Students also have a chance to observe similarities and differences in the needs of various living things, they can all be involved in experiments conducted in the garden.

What we have intended to point out throughout the whole book is the numerous benefits of using TEAL methodology in class and we have also offered examples of how teachers can include it in their didactic strategies. One aspect which still needs to be emphasized is that with the help of TEAL methodology, we can develop students' creativity and cultivate innovation. When designing learning experiences, teachers must plan and frame curriculum, but at the same time they should provide tools that give students options, voice and choice in order to enable them to be creative.

Creativity requires flexibility and divergence in thinking – new ways of thinking or expressing oneself; pursuing questions for which there is no single, correct answer. It implies a stretching and expansion of the students' thoughts and ideas and the development of original insights. This is exactly what happens in a TEAL classroom. Students are encouraged and challenged to overcome the fear of expressing themselves freely, they are integrated in every part of the learning process. The teacher allows the development of activities and experiences that require students to assemble, disassemble, transform prior learning, and to combine it with new knowledge and skills so as to form unique conceptions or products. The educators who are willing to experience TEAL methodology are those who have understood that teaching students how to think is more important than teaching students what to think.

In the 21st century, skills such as critical thinking, problem-solving and innovation – having ideas and finding new approaches that can improve the way we and others do things - are more important than ever. With TEAL methodology, learners can develop these vital skills, while teachers can foster creativity and imagination in the classroom by:

- providing meaningful and complex tasks;
- getting students to work in groups;
- encouraging lots of ideas – learners may later select and reject those that do not work;
- building on each other's ideas – many of the best ideas are ones that have been developed collaboratively; working together and suggesting extensions or variations of an idea can

often lead to creative solutions;
- evaluating the ideas or solutions suggested; students will need to think about criteria such as cost, the time needed to implement, whether they have the necessary tools or resources.

We could not finish the last chapter of our book without referring to another defining element of TEAL methodology, that is the technological component. Whether we talk about computers, tablets, smart phones, interactive boards or video projectors, they all come to assist the teacher in his/her activity in order to increase the interaction between the participants in the learning experience. Without doubt, there are many ways in which these technological tools can be integrated in a TEAL classroom, but since the second intellectual output created within the partnership is a Digital App, we consider it appropriate to make several remarks concerning the use of games in the teaching process.

Students learn through the process of playing an educational game; they are able to understand a new concept or idea better, take on a different perspective or experiment with different options or variables. Moreover, through games, students can learn a variety of important skills, such as critical thinking, creativity, teamwork or even strategy-building. While playing games, students develop a range of connections with the content and can form positive memories of learning. There is no doubt that a positive emotional connection can facilitate learning. Furthermore, many games feature a variety of different stimuli; for example, when studying languages, some students might remember the vocabulary words from acting them out, others remember reading the clues, and other students remember hearing classmates call out answers. Games can provide a wide range of sensory experiences for students. Finally, games catch students' attention and actively engage them. With the help of a game, teachers can drive away boredom, relax a tensed atmosphere, increase the competitive spirit, cultivate perseverance.

To conclude, it is extremely important that a tecaher knows the subject matter and that the information he/she trasnmits to the students is correct, updated, useful and complete. However, no educator should grant less importance to the strategies they choose to use in class, to the educational environment in which the learning process takes place or to the resources and tools provided during teaching. Only in this way, will he/she be able to develop in their students the skills required by a continually changing society and will ensure not only a useful learning experience, but also an enjoyable, interactive, memorable one.

Pratical Info Cards

DigiEU-Teal

Practical implementation of the TEAL methodology in Turnu Magurele, Romania.

In November 2021 for 3 days from November 17th ultil November 19th the partners of DigiEU project took part in the short-term joint staff training events addressed to teachers and staff of the participants organizations hosted by the Romanian partner Liceul teoreticu "Marin Preda" in Turnu Magurele, Romania.

During this formative moment the participants and teachers were able to test on themselves and on students the applications of the TEAL methodology applied to different teaching subjects such as English, biology, financial education, chemistry, but also applied to practical workshops that allowed students and teachers to experience first-hand the self-construction of a small urban garden.

As a final contribution to this manual we would like to provide you with practice sheets containing practical answers and instructions for implementing a lesson using the TEAL methodology.

• ACTIVITY SHEET 1

Name of the teacher(s): ESTERA LIGIA STANCU (English class)

Name of the activity: International Piloting of IO2 – using the GARDEN APP as a teaching tool in an English class

Level of the students: Secondary (5th graders – 11 years old)
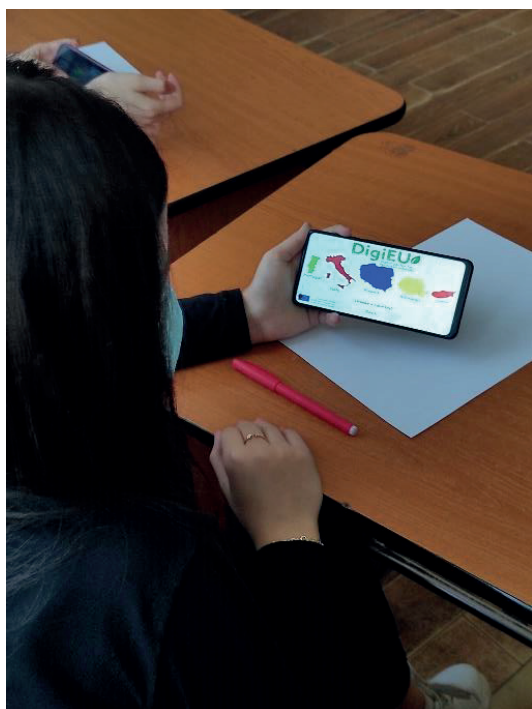
Objectives of the activity:

  › To find some interesting facts about the countries involved in the project
  › To develop students' vocabulary on the topic of the project
  › To illustrate how the game app can be used as a teaching tool during an English class
  › To practise working in groups
  › To develop the students' digital competence

Digital Resources used:

https://www.youtube.com/watch?v=DH-wwkkJdqM
https://en.wikipedia.org https://www.authenticfoodquest.com/popular-portuguese-dishes/
https://www.chefspencil.com/top-25-polish-foods/

• ACTIVITY SHEET 2

Name of the teacher(s): CĂTĂLINA-SIMONA BĂLAȘA, CĂTĂLINA MAZILU (Romanian class)

Name of the activity: The Fantastic in Literature

Level of the students: high school (10th graders, 16 years old)

Objectives of the activity:

› Deepening knowledge regarding the aesthetic category of the fantastic
› Analysing the structural components of certain studied literary works
› Developing research strategies and investigation of a topic
› Developing teamwork

Digital Resources used:

PPTs created by the students
https://wordwall.net/ro/resource/3080426
https://dexonline.ro/

• ACTIVITY SHEET 3

Name of the teacher(s): CATALINA CIUPITU (English class)

Name of the activity: English Language: my Door to the World! - Heritage tourism

Level of the students: Secondary (8th graders – 14/15 years old)

Objectives of the activity:

- › To learn more about Britain's history
- › To make PPT projects on some beautiful places in Romania
- › To present interesting facts about Romania
- › To practise working in groups

Digital Resources used:

www.britishcouncil.org/learnenglishteens
www.kahoot.com
https://youtu.be/8aukCBIX3_U

• ACTIVITY SHEET 4

Name of the teacher(s): DANIELA CARNUTA, ALINA ALEXE (biology and physics class)

Name of the activity: The Physiology of Respiration

Level of the students: high school (10th graders, 16/17 years old)

Objectives of the activity:

› Using digital technology in order to identify and recognize the components of the respiratory system and the way in which their structure allows the breathing function to take place
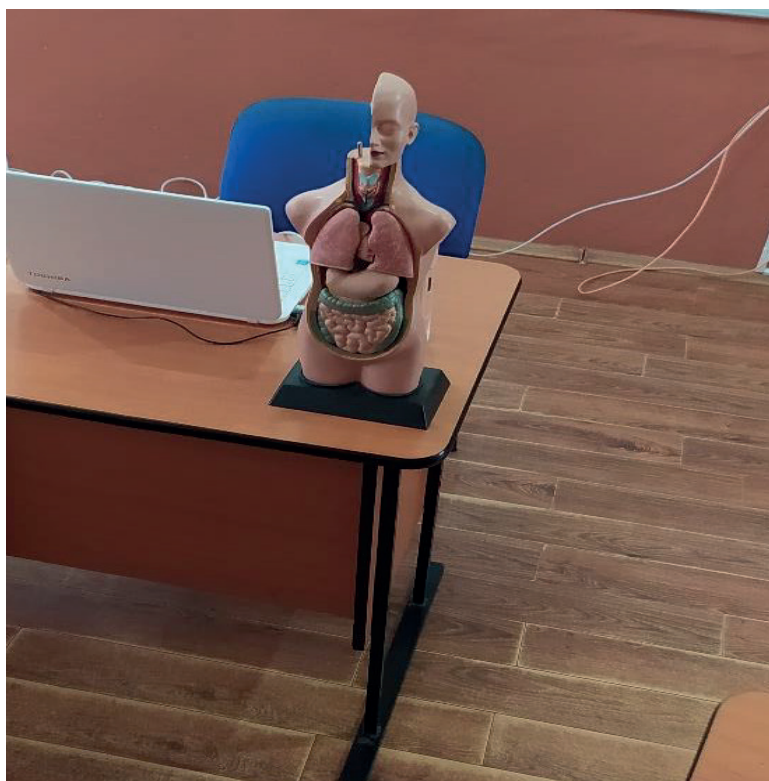
Digital Resources used:

https://www.youtube.com/watch?v=NlPx3XaxI-s
https://view.livresq.com/view/5ef440874099f4fb1a5e6b19/
https://www.youtube.com/watch?v=Ec52IDDWkYo
https://www.youtube.com/watch?v=12clD5IsPeA

• ACTIVITY SHEET 5

Name of the teacher(s): ESTERA LIGIA STANCU (English class on Nutrition)

Name of the activity: International Piloting of IO2 – using the GARDEN APP as a teaching tool in a class on Nutrition

Level of the students: Secondary (6th graders – 12 years old)

Objectives of the activity:

› To develop students' vocabulary on plants (fruit, vegetables and spices)
› To illustrate how the game app can be used as a teaching tool to teach students about a healthy life
› To practise working in groups
› To develop the students' digital competence

Digital Resources used:

https://www.youtube.com/watch?v=DH-wwkkJdqM
https://create.kahoot.it/details/6ba406c9-1516-45e8-8e95-655d2d5a1665
https://www.mentimeter.com/s/1694472954ca13be5206ddfd58c1fb75/5baf2160873c/e dit
https://quizizz.com/admin/quiz/5922ada805079f1100fade53/fruit-and-vegetables

• ACTIVITY SHEET 6

Name of the teacher(s): CORNELIA LIXANDRU (chemistry class)

Name of the activity: Acids and bases in everyday life

Level of the students: high school (10th graders, 15-17 years old)

Objectives of the activity:

› Describing the behaviour of chemical species in a given context
› Explaining the observations made in order to identify some practical applications of
› certain chemical species and processes which had been studied
› Making some investigations in order to underline some characteristics, features and relations
› Anticipating the effects of some specific actions upon the environment

Digital Resources used:

https://wordwall.net/ro/resource/2280471/formule-chimice
https://phet.colorado.edu/sims/html/acid-base-solutions/latest/acid-base- solutions_ro.html
https://catalog.manualedigitaleart.ro/art-chimie7/v1/index.html#book/u3-92-93
https://phet.colorado.edu/sims/html/ph-scale/latest/ph-scale_en.html
https://catalog.manualedigitaleart.ro/art-chimie7/v1/index.html#book/u3-94-95

• ACTIVITY SHEET 7

Name of the teacher(s): FLORINELA MIHĂILESCU PÎRVAN (financial education class)

Name of the activity: Prepare for success: Learn about money! – The setting-up of a reading club with a limited budget (5000 RON)

Level of the students: secondary (8th graders, 14/15 years old)

Objectives of the activity:

› To become familiar with the composing parts of a budget
› To make rational and sensible online shopping
› To draw-up a plan, by working in groups, to create a reading club

Digital Resources used:

https://youtu.be/Kt99FdkoLR4
https://manuale.edu.ro/manuale/Clasa%20a%20VIII-a/Educatie%20sociala Uy5DLiBDRCBQUkVTUyBT/book.html?book#0
www.libris.ro
https://www.mobman.ro/?gclid=CjwKCAiAv_KMBhAzEiwAs-rX1NewovtyUFohP_G-bYO4vxpWf_Y6xzEq9P2T9jSS2jBm69GrIdyYNxoCIAwQAvD_BwE

• ACTIVITY SHEET 8

Name of the teacher(s): RODICA MONICA DRAGHICI (science class)

Name of the activity: The Life Cycle of Living Things

Level of the students: primary school (4th graders, 10 years old)

Objectives of the activity:

› To know the main stages in the life cycle of living things
› To identify the relation between different phenomena and processes
› To make simple deductions based on listening to a literary text
› To create short texts using digital resources
› To identify different groups of plants and animals that live in the surrounding world

Digital Resources used:

https://youtu.be/Y_F63lAqr0g
https://wordwall.net/ro/resource/1075190/stiinte-recapitulare

Workshop How To Create A Small Urban Garden

What You Need For Your Vertical Vegetable Garden

1. A PIECE OF FABRIC (OLD WOOLEN BLANKETS, RUGS..) 2. PLASTIC WRAP OR PLASTIC BAGS; 3. VEGETALBE SOIL; 4. VEGETABLE SEEDLINGS; 5. SUPPORT STRUCTURE (LADDER, WALL BRACKET)

1

2

3

4

5

- **STEP 1**

Take the piece of fabric and cut out a rectangle of fabric with the help of a pair of scissors.
Cut out a cellophane rectangle of the same size or alternatively get a plastic bag large enough to accommodate the plants and that is smaller than the rectangle of fabric.

- **STEP 2**

Fold the rectangle of fabric to form a bag and with the help of a stapler close the bag along the edges. After closing the two edges, turn the bag over and make sure it is tightly closed.

- **STEP 3**

Prepare the plastic wrap or the plastic bag lining the fabric bag, then filling them with vegetable soil (a layer of about 10 cm) and finally placing the seedlings inside (1-2 plants for each bag).

- **STEP 4**

After creating our fabric bag containing the vegetable seedling, observe the space available around, to find a spot where to position it; it could be a ladder or leaning it against a free wall and paying attention to sun exposure. As an alternative to the ladder, it is possible to design and build a wooden structure tailored to the space, using wood strips and ropes.

- **STEP 5**

Last but not least.....take a picture of your vegatable garden masterpiece!