WITH THE SKILLS OF THE FUTURE FOR A SUCCESSFUL JOB AND LIFE

Guidebook of 21st century skills

Erasmus+

SKILLS

Introduction

The Guidebook was created as a final product of the project 21st century skills. It was co-funded by Erasmus+ programme of the European Union.

It might be useful for the teachers and educators who plan their work trying to use 21st century skills, the methods of blended learning, flipped classroom, learning by doing. Our schools have experienced the methodology through various learning and teaching activities during the Erasmus project.

The first part of the guidebook is theoretical and it was provided by professionals from Tartu University and Baltic Computers System during the seminar for teachers in Estonia.

The second part describes the Learning/Teaching/Training Activities for students held by partners in Erasmus+ project in Croatia, Turkey, Italy and Slovenia. They might be helpful for other projects to get some inspiration on the topic. The activities covered digital competences, career planning, STEM practices, "back to nature" skills.

Next parts of the guide were created by the teachers who implemented the use of 21st century skills in their schools. It presents lesson plans and event plans in the teaching technique "learning by doing". It could be useful for teachers or educators who would like to plan their activities based on the approach of 21st century skills.

WITH THE SKILLS OF THE FUTURE FOR A SUCCESSFUL JOB AND LIFE
Erasmus+ KA229 project partners 2019-2022

Kanepi Gümnaasium, Kanepi, Estonia
Süleyman Demirel Anadolu Lisesi, Istanbul, Turkey
Osnovna šola F. S. Finžgarja, Lesce, Slovenia
Tehnička škola, Požega, Croatia
I.I.S. Petrucci-Ferraris Maresca, Catanzaro, Italy

21st Century Skills Keywords

- Critical thinking
- Problem solving
- Creativity
- Collaboration
- Cooperation
- Communication
- Information literacy
- Media literacy
- Technology literacy
- Flexibility
- Leadership
- Initiative
- Productivity
- Social skills

ESTONIA 

Theoretical part

21st Century Skills

- **Learning Skills:** Also known as the "four Cs" of 21st century learning, these include critical thinking, communication, collaboration and creativity.
- **Life Skills:** Flexibility, initiative, social skills, productivity, leadership.
- **Literacy Skills:** Information literacy, media literacy, technology literacy.

Critical Thinking

Why is it important?

It is crucial to people ability to succeed in life after the classroom. Critical thinking is a significant part of what makes information fluency. To see data and information in many different dimensions, and from multiple angles. It empowers to make effective and level-headed decisions in people's lives and relationships. It is easy to see why critical and analytical thinking skills are important to success beyond school.

Communication

Why is it important?

Communication is a broad term that incorporates multi-faceted levels of interaction and sharing information. Students love to communicate using technology. But it is more than just being able to effectively use digital media. It is about personal interactions as well.

Attitude. Listening. Asking questions. Empathise. Giving Feedback. Safe and support. Empowerment. Teamwork. Proactive language. Avoid „should", „but", „however". Guiding questions. Check understanding. Defence mechanisms.

Collaboration

Why is it important?

People of the digital age are social by nature. They text, post, update, share, chat, and constantly co-create in technological environments with each other. When they are unable to do this in school, they become disengaged and unattached to their learning. Connection and collaboration with others are essential not only to their learning but their mental and emotional health. People must possess the ability to collaborate seamlessly in both physical and virtual spaces, with real and virtual partners globally.

Assertiveness. Different personality types. Time management. Cultural differences. Generational differences

Creativity

Why is it important?

People at constant state of stimulation and neural development with technology use, are natural producers and consumers, or prosumers, of information. Problem-solving is a skill that comes naturally to them. Doing rewarding projects and meaningful tasks give them challenges to overcome in imaginative ways. Ask any student about what they like to create and you'll get a myriad of different answers. They are constantly searching for ways to express themselves and their uniqueness. They need to be able to think and work creatively in both digital and non-digital environments to develop unique and useful solutions.

Blended Learning

Blended learning combines the best of two training environments—traditional face-to-face classroom training and high-tech eLearning. By covering all the bases, you can engage all types of learners—those who learn better in a structured environment that includes face-to-face interaction with an instructor, and independent types who learn better with semi-autonomous, computer-based training.

The classroom offers an opportunity for role-playing with immediate face-to-face feedback.

Online learning offers personalized, self-paced learning with eLearning components that lend themselves to interactive media such as games, videos, tutorials, quizzes and social media components, all accessible from the learner's home page in the Learning Management System (LMS)—and accessible from the learner's smartphone or tablet.

Blended learning (also known as hybrid learning) is a method of teaching that integrates technology and digital media with traditional instructor-led classroom activities, giving students more flexibility to customize their learning experiences.

Although there are 4 basic models of blended learning, the possibilities are endless when it comes to the ways in which instructional technologies can be blended into a teacher's pedagogical approach. In general, blended learning refers to the following:

- some learning happens online in a format where the student has control over the path and pace at which they engage with content;
- some learning happens in an instructor-led classroom;
- online and in-person learning is complementary, creating a truly integrated learning environment.

Blended learning combines the best aspects of face-to-face teaching and online instruction in ways that enable students to learn at their own pace. It is proving to be a scalable learning model that simply works for diverse populations of students.

Flipped Classroom

A flipped classroom is a type of blended learning where students are introduced to content at home and practice working through it at school. This is the reverse of the more common practice of introducing new content at school, then assigning homework and projects to be completed by the students independently at home.

For some the flipped classroom has become synonymous with active learning. There are many ways to incorporate active learning into your courses, and the flipped classroom is but one of those methods. There are also strategies you can use to make lectures interactive.

Some of the benefits of a flipped classroom are:

- it is flexible;
- students can learn at their own pace;
- students take responsibility for their learning;
- students learn rather than encounter material in class;
- there are more opportunities for higher level learning;
- it does not waste time transferring information to students when that information is available to them in books or online;
- instructors and TFs work more closely with students, getting to know students better and providing better assistance;
- increased collaboration between students.

Learning by doing

Learning by doing is the simple idea that we are capable of learning more about something when we perform the action. The argument is that active engagement provides deeper learning and that it's okay if you make mistakes as you learn from those as well. This mentality brought forth a new name for this technique: experiential learning.

The first benefit is that it is more engaging and memorable.

Every action provides personalized learning experiences, and it is where motivation is built. That motivation connects to what is learned and felt. It teaches that learning is relevant and meaningful.

Beyond that, this experience allows the opportunity for learners to go through the learning cycle that involves extended effort, mistakes, and reflection, followed by refinement of strategies.

Learning by doing offers a personal experience. Referring back to the cycle of effort, mistakes, reflection, and refinement, this cycle is only possible through personal emotions—the motivation and realization of knowledge of a particular topic tying into your values and ideals.

Learning by doing involves the world at large rather than sitting alone in your room or a library stuck in a book. Since the whole city is your classroom technically, you're able to leverage all kinds of things. You're able to gather local assets and partners and connect local issues to larger global themes.

The final benefit of learning by doing is that it builds up your skills for success. Learning by doing encourages you to step out of your comfort zone, discover something new, and try things out for the first time. You're bound to make a mistake or two, but this technique doesn't shame you for it.

As a result, learning by doing can build your initiative for new things as well as persistence towards growth and development in a field. This could also lead to team management and collaboration skill growth. These are all vital things in personal growth as we move towards the future.

Life skills

Life skills is a term used to describe a set of basic skills acquired through learning and/or direct life experience that enable individuals and groups to effectively handle issues and problems commonly encountered in daily life.

They include creativity, critical thinking, problem-solving, decision-making, the ability to communicate and collaborate, along with personal and social responsibility that contribute to good citizenship – all essential skills for success in the 21st century, both for healthy societies and for successful and employable individuals.

Life skills touch upon issues that are:

- real, they actually affect people's lives;
- topical;
- sometimes sensitive: they can affect people on a personal level, especially when family or friends are involved;
- often controversial: people disagree and hold strong opinions about them;
- ultimately moral: they relate to what people think is right or wrong, good or bad, important or unimportant in society.

Why do we need to teach life skills?

Democracies need active, informed and responsible citizens, who are willing and able to take responsibility for themselves and their communities and contribute to the political process.

How does training in life skills benefit young people?

It helps them to develop self-confidence and successfully deal with significant life changes and challenges, such as bullying and discrimination. It gives them a voice at school, in their community and in society at large, while preparing them for the challenges and opportunities of adult and working life.

Literacy skills

Literacy skills help students gain knowledge through reading as well as using media and technology. These skills also help students create knowledge through writing as well as developing media and technology.

Information Literacy

Students need to be able to work effectively with information, using it at all levels of Bloom's Taxonomy (remembering, understanding, applying, analyzing, evaluating, and creating). Information literacy involves traditional skills such as reading, researching, and writing; but new ways to read and write have also introduced new skills:

Consuming information: The current excess of information requires students to gain new skills in handling it.

Producing information: Now writing is one of the main ways students communicate. It has real-world applications and consequences. Students need to understand that what they write can do great good or great harm in the real world, and that how they write determines how powerful their words are. Students need to take on the role of professional writers, learning to be effective and ethical producers of information.

Media Literacy

Media literacy involves understanding the many ways that information is produced and distributed. The forms of media have exploded in the last decade and new media arrive every day: podcast, forum, blog, list, eBook, Facebook, tweet, social etc.

Students must learn to recognize the strengths and weaknesses of each medium and to analyze each message they receive and send.

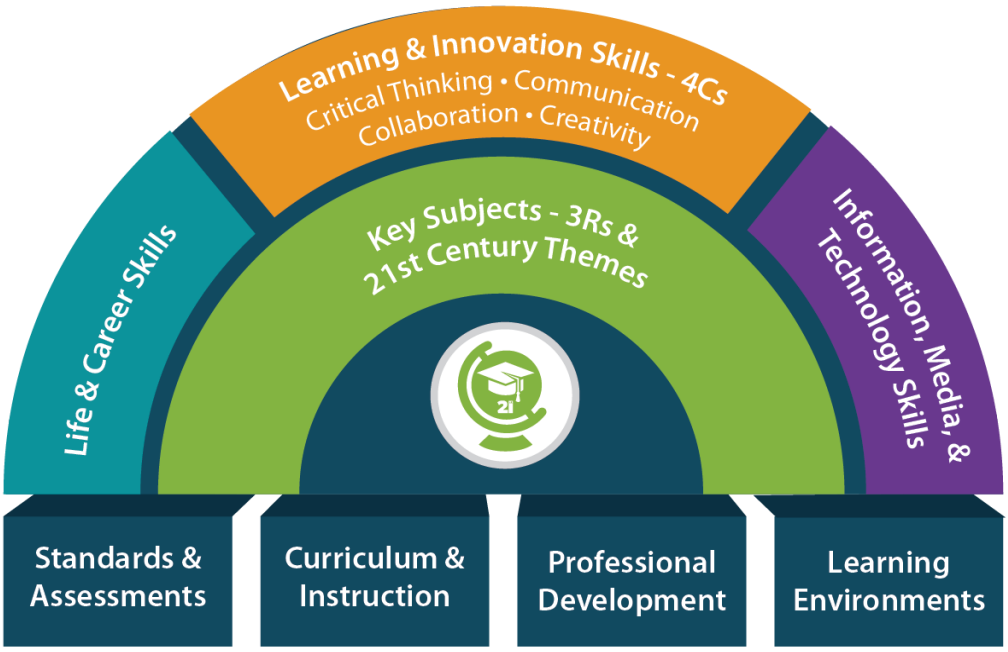
Technology Literacy

In “How the Net Generation Is Changing Your World” (2008), Don Tapscott outlines the following eight expectations that students have of technology.

- Freedom to express their views, personalities, and identities.
- Ability to customize and personalize technology to their own tastes.
- Ability to dig deeper, finding whatever information they want.
- Honesty in interactions with others and with organizations.
- Fun to be part of learning, work, and socialization as well as entertainment.
- Connecting to others and collaborating in everything.
- Speed and responsiveness in communication and searching for answers.
- Innovation and change, not settling for familiar technologies but seeking and using what is new and better.

As you can see, students expect a great deal out of their technologies. You can help them use technology wisely:

- reading Web sites;
- using search engines;
- using map searches;
- accessing videos, podcasts, and feeds;
- evaluating Web resources;
- researching on the Internet;
- e-mailing, chatting, texting, microblogging;
- using social sites;
- visiting virtual worlds;
- blogging and using wikis; and
- using message boards, newsgroups, and VOIP (Skype).



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Learning and Teaching Activities of Erasmus+ Project for Students

CROATIA 

We are ready for the digital world

Escape room - Let's meet Croatia, enabled the students to get to know the Republic of Croatia. It was prepared by the students of the Technical School under the guidance of a student. Participants visited the Business Incubator in Požega, managed by the Public Institution Local Development Agency Požega. They met with their owners, among them former students of the Technical School.

In the "Digital Competences" workshop held at the school, students in school teams with the help of host students, explored the specifics of their region in terms of culture and traffic to discover the original tourist route that could make their region an interesting place for visitors. The students created a timeline of traditional and cultural festivals, described a trip from their city to the nearest airport, and made a comic about that trip with them as participants. The workshop was prepared by professors.

The National Center for a Safer Internet operates within the Center for Missing and Abused Children in Osijek. It is a leading organization that has been operating for more than ten years in the field of protecting children from abuse and sexual exploitation via the Internet. A lecture on the topic "Safer Internet Center" was held for the participants in the conference hall of the Educational and Informational Youth Tourist Center in Osijek. The risks we are surrounded by in the online world every day are presented, what research shows, and what young people think about cyberbullying. The participants of the lecture learned a short message that means a lot: "Stop. Block. Tell." - report inappropriate behaviour and content on the Internet and turn to trusted people for help in case of need.

During a trip to Slavonski Brod the participants visited the Faculty of Mechanical Engineering. The students presented the presentations of the search for the hidden treasure of Požega, which was prepared for the students by professor. A presentation and workshop with drones was held at the school. The students were thrilled with the drone management in the school playground area.

The technology teacher gave a lecture on time-lapse video, it is a photography where a certain scene was taken several times at certain time intervals. It applies to scenes that change slowly. It was explained making or taking photos with examples.


SKILLS
Welcome, dear friends!

TURKEY

We are greater than the sum of our parts

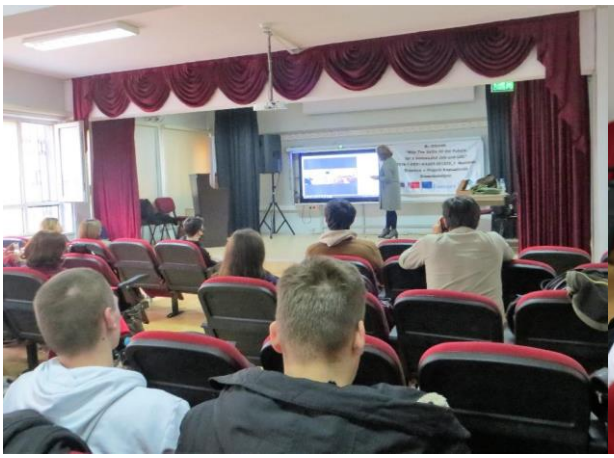
The 5-day activity was designed to improve the communication and collaboration skills of the students in order to prepare them for career world after their graduation. There was a 3-day seminar and workshops about effective communication skills, what is and what is not communication, how to behave at a job interview, what are the essential elements of a public speech, some clues about writing a perfect CV, how to set up a pattern to establish collaboration and how to cooperate with others.

In order to integrate these activities and what was learnt during the activities into the school curriculum, participant students prepared a presentation to present to the students at their schools. This was to make the project sustainable, and to get a wider impact on the other stakeholders while improving the participants' presentation skills.

In this mobility, the students talked about future jobs which they previously searched. The idea was to see which jobs were in demand and which were not popular anymore in Europe to decide on their career to choose.

Encouraging them to develop and hone every aspect of their communication skills would serve them well in both their personal and professional lives. Students had to possess the ability to collaborate seamlessly in both physical and virtual spaces, with real and virtual partners globally.

This specific LTT activity was not only to encourage the development of speaking and listening skills, but it also was to teach students how to effectively achieve goals together.



ITALY 

Educate to Innovate Smart Trendy European Methods

Starting from the concept that performing STEM in the school is not easy but requires a lot of motivation and inspiration both from students and teachers, a workshop was planned based on how to build an App, using LEARNINGAPPS platform, where students practiced and performed interactive exercises. So they created their own educational resources.

During the first cultural visit they practiced interaction in a national park, the biggest science park in the South of Italy, students experimented the four elements – FIRE, WATER, EARTH, AIR. Inspired by the four natural elements and by the dissemination of scientific content through a multimedia system that uses classic exhibits and innovative multimedia, three-dimensional and immersive installations in a unique, engaging context with a strong emotional impact, students lived an extraordinary experience in a natural context, exploring and discovering. They also saw the symbol of the Sila, that is the wolf, and the most ancient trees in Europe the White Maple.

Another activity was past and future telecommunications. Guided by a teacher of the school, students created a radio connection as it was done during the II World War simulating an encrypted conversation. Applying knowledge and skills to the real world situations was a challenge that students really appreciated.

In the lecture done by a professor from University of Calabria he covered the topic “From the Internet of Humans to the Internet of Things: will the machine govern the future?” The seminar started from a brief history of the Internet and moved towards the Arpanet to WWW where we can connect sensing devices to smart objects.

The cultural visit was to the National Museum in Reggio Calabria, where the Bronzes of Riace stand. Students were invited to take pictures and later they had to create a holograph using Active presenter program, easy to be used by students during the workshop. Another lab activity done was creating a holograph projector. Students were due to create and build the holograph using pictures taken from the visits.

EDUCATE to INNOVATE as our task, is the way to motivate and inspire students to continue practicing STEM in their professional life.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SKILLS

SLOVENIA 

Back to nature for 21st century skills

The main theme of workshops in Slovenia was getting back to nature for 21st century skills. Initially students discussed the map and other things they needed for spending time at a mountain cabin in the following days using ICT. Students stayed there supervised by mountain guides and teachers for three days. Mountain rescue team Radovljica held workshops: showing and demonstrating mountain rescue, how to use GPS for search rescues, using dogs to look for injured or missing persons. Discussions were held about first aid and using GPS. Students learned about clothes and equipment needed for the mountains. They also experienced a sensory path where they had to orient oneself using their senses.

Students worked in groups. They needed to be able to think and work creatively in both digital and nondigital environments to develop unique and useful solutions. Students also learned and used new apps such as Locus using GPS and mobile phones in nature. Students developed programme contents of directed free time and evening animation. A bonfire was created, they prepared snacks over fire. Each country sang a traditional song in their language.

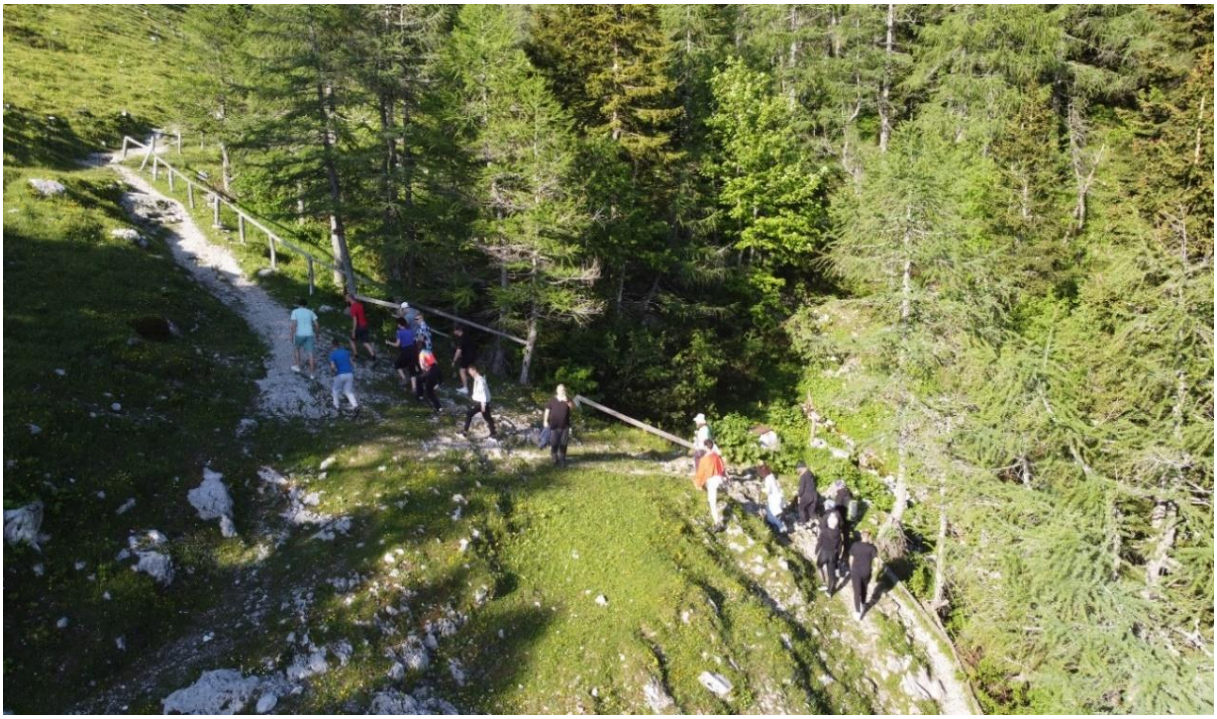
Students and teachers spent a day at school observing classes and attending workshops: stress level and nature and collaboration-ICT skills presentation about Slovenia. Students visited Ljubljana city centre. Working in groups they needed to find their way from one tourist point to another by using mobile phones, maps or other skills - communication. They designed an E+sign using GPS, app and streets of Ljubljana.

By staying in natural environment children practised cooperation and solving problems, flexibility and adaptability, leadership and responsibility, initiative and self-direction. They assimilated new skills such as how to survive, behave in nature, orientation in nature with ICT, GPS which will be used for life. They had to use their senses to get through sensual path but also lean on the person leading him/her through the path depending on trust. They got a chance to get used to taking care of oneself, independence, collaboration and accepting difference which will make them better and stronger human beings.

Nature was used as a special kind of classroom, where children got to know each other and oneself, experience and develop social skills. Students cooperated also in their free time. They got aware of the fact that how they feel basically depends on their decision and preparation of the programme in the evening as well. They were responsible for their own success or failure which created for many a child a new experience. Those skills will be used in everyday life.

Experiencing House of Experiments in Ljubljana empowered students with new ideas, inspired them to solve problems and gave insight to possible jobs of the 21st century. They gained skills for problem solving, collaboration, creativity and innovation. Students also applied skills for digital literacy (ICT literacy, media literacy and information literacy) at workshops held in school. All the skills mentioned above will contribute to getting a wider perspective of the world and reaching new goals.

This experience was priceless for all the participants which significantly contributes to an ascent of mutual relations quality, a longer-lasting and more useful knowledge of pupils, development of social skills, to accustom to independence and taking over responsibility. The newly acquired knowledge can be instantly practically tested by pupils. New environment, different from classroom lectures, is always extra motivating. Besides acquiring new knowledge, school in nature represents an ideal place where one can get used to independence, socialising, group work and qualitative spending of one's free time.



LESSON PLANS

Learning by doing, problem solving, cooperation, IT

School: I.I.S. PETRUCCI-FERRARIS-MARESCA Catanzaro, Italy

Aim: To learn and practice ITC competences together with Electronics

21st century skills: Cooperative learning, problem solving

Age group: 14-18

Participants: 10 students

Duration: Each lesson of 60 minutes, one month of working at school

Theme: Learning by doing

Methods: Learning by doing /experiential Learning

Venue: School/ home

The description

During the Informatics and Electronics lessons, and due to pandemic COVID-19, our students prepared an electronic device, a hat, that produced a sound when someone got too close. They used curriculum hours of Math, Law, ITC, English. The use of labs in our school is compulsory, so students are used to learn and practice electronic, engineering and computers. Together with a group of teachers of the school, they planned the activity, the costs, the feasibility study, and at the end they also used recycled materials. The hat works with a sensor inside programmed to beep when too close to someone was realized in a month work both at school and home.

Obviously these lessons in labs, were repeated inside our school to different classes, so all the school was involved in practicing a new way of learning, a new way of proposing math, that can be definitely considered a school with good practices. The activity is based on our PIANO NAZIONALE DELLA SCUOLA DIGITALE.

The hat was built during the curriculum lesson because our school is a vocational school, so all school students participated in it. The lesson was devided in three steps:

1. Presentation of the activity

2. Choosing the materials available at school

3. Producing the device.

The outcome

Students started a kind of Start-up building a hat called STAY AWAY, during the COVID period, to a Hat, that they used to participate to a National Competition. They won the trip to Dubai EXPO, in September 2020, and three of them with a professor from the school went to Dubai Expo.

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Learning by doing, critical thinking, analysis, productivity

School: Süleyman Demirel Anadolu Lisesi, Istanbul, Turkey

Aim: To learn the difference between a chemical reaction and physical reaction

21st century skills: Analyzing, critical thinking

Age group: 14-17

Participants: 9 students

Duration: 50 minutes

Theme/subject: Chemistry

Methods: Learning by doing /experiential learning

Venue: School/ home

The description

During the chemistry lessons the students learned about chemical reactions, the difference between a physical reaction and a chemical reaction. For example, melting sugar in water is a physical reaction. However, caramelizing sugar is a chemical reaction. Then they used the knowledge about reactions in cooking. They tried different cooking techniques and they also used the carbon footprints of their dishes.

The outcome

Students were able to tell the difference between a physical reaction and a chemical reaction. They prepared the food themselves taking notes at every stage and then presented their dishes. They, then, tasted the food and gave feedback to each other. Students prepared the food and then they prepared their posters. They made them visible by hanging them up at the Erasmus corner at the school.

Critical thinking, collaboration, creativity, IT

School: Technical school, Požega, Croatia

Aim: Analysis of pointer application in fields; creating programs with the use of pointers in functions and fields; analysis of program solutions with the use of pointers in functions and fields

21st century skills: Creativity, organization, persistence, confidence, communication, critical thinking, troubleshooting, teamwork

Age group: 16

Participants: 20 students of the 2nd grade of the secondary vocational school, occupation computer technician

Duration: 45 minutes

Theme: Repetition lesson – Pointers in the C programming language

Methods: Escape room - through the interactive game, students creatively and imaginatively solve puzzles, decipher codes, and discover secret passages in order to reach the final goal.

Venue: School

The description

In order to make the repetition lesson more interesting and enjoyable for the students, the teaching is focused on the students in order to enable them to develop freely, independently and personally, to feel the growth of their own competence, self-confidence and autonomy, and to express creativity and knowledge. Students will participate in the Escape room, which is thematically dedicated to pointers in the C programming language. The problem tasks are varied: knowledge text tasks, mathematical tasks, rebuses, program solutions. Participation is of a competitive nature with a time limit among opposing teams of peers, where the emphasis is on the adoption of cooperative learning strategies, i.e. teamwork. Through this kind of work, students will learn how to unite the individual potentials of students into a single unit.

This game is successfully implemented in lessons in practice and repetition lessons.

The students were randomly divided into 5 groups. Everyone comes up with a team name. Through a short presentation, the role and mode of operation of the Escape room game is shown. Tasks are given to students. Within 30 minutes, students solve tasks, find answers, codes. Students solve tasks in pairs and in groups. They use a textbook and a workbook. This is followed by the anticipation of the solution, the winning team and the presentation of the solution.

The outcome

Solved tasks related to program solutions with the use of pointers in functions and fields in the C programming language.

Critical thinking, collaboration, communication, IT

School: Osnovna šola F. S. Finžgarja Lesce, Slovenia

Aim: To practise 21st century skills, to ask questions in English, to practise speaking skills, listening skills, ICT skills, to learn about famous landmarks

21st century skills: Collaboration, information literacy, communication, critical thinking

Age group: 13-14

Participants: 13 students of year 8

Duration: 45 min

Theme: Technology in English class

Methods: Group work, task based learning, Content and Language Integrated Learning, usage of smart speaker and smartphones

Venue: School

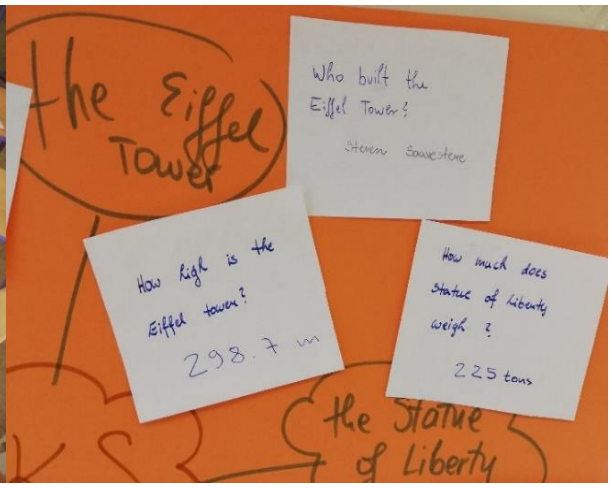
The description

Students got familiar with smart assistant (Alexa) and the idea of a smart house using ICT, cameras and smart speakers and how we can use them at home. They were asked to do some critical thinking in groups trying to list pros and cons of using the smart assistant and finding information online (smartphones) of how to use it. The English teacher then presented how it works in her home and held a discussion what we need to be aware of when using technology.

Students were asked to come up with questions about different tourist sights working in groups. They formed questions and wrote the answers they got from the Alexa smart speaker on a poster. All the questions had to be asked in proper and correct English in order for Alexa to understand it. There was a lot of collaboration needed among the students to make it right.

The outcome

Students learnt how to use a smart speaker to get information but also how to form grammatically correct questions in English. They learnt facts about famous landmarks.



Collaboration, communication, analysis

School: Kanepi Gymnasium, Kanepi, Estonia

Aim: To learn the vocabulary and competences of different professions

21st century skills: collaboration, communication, analysis

Age group: 16-17

Participants: 10 students

Duration: 50 minutes

Subject: English

Learning methods: Outdoors class activity, on spot, in groups

The description

During the outdoors English class students learned about different local professions by going around in small groups, visiting different institutions and completing a group task regarding the professions that exist locally. For example, they had to list the professions that exist in the local government or at the grocery store. Thereafter, they had to pick a few from the list according to their personal preference in order to describe the skills and competences necessary for those jobs.

The outcome

Students were able to name different professions in English and could analyse the steps that need to be taken in order to become a certain specialist. They broadened their horizon regarding the variety of professions/competences that exist and are needed even in a small community like ours. Furthermore, the students got a more realistic idea about the career options that are locally available for them after graduating high-school or acquiring a higher education.

EVENT PLANS

Learning by doing, problem solving, cooperation, STEM

School: I.I.S. PETRUCCI-FERRARIS-MARESCA Catanzaro, Italy

Aim: To promote the importance of STEM

21st century skills: Learning by doing/ problem solving, cooperation, initiative

Age group: 14-18

Participants: 10 students

Duration: 4 hours

Theme: Learning by doing /experiential Learning

Venue: Conference Hall of the school

The description

Students at school organized a way to promote and spread the activity we did at our school. First they did it inviting schools nearby, because we know that acquiring knowledge in math, physics and informatics is very important for their future work. Soon after they organized a public event. We had to face all the troubles due to pandemic, but at the end they succeeded because schools were opened again. To work on electronic device need a cooperation at school, and only in presence many activities can be done. All the school prepared different devices, and at the end of the day, a jury voted the best device proposed. Our school won the first prize with the "stay away" hat. This activity was promoted and financed by our Ministry of education inside the national "PREMIO SCUOLA DIGITALE" that implements and favour the knowledge of STEM inside schools as long term activity.

The outcome

Students and teachers of our school organized an "Orientation Day" inside the planned PREMIO SCUOLA DIGITALE, where all the interested Schools in Calabria participated presenting the devise invented by students. A jury formed by experts declared the winning school, and our students obtained the first prize (as in the photo). This activity was done to make students aware of the importance of studying STEM for their future work.

https://catanzaro.gazzettadelsud.it/articoli/societa/2021/04/29/catanzaro-il-cappello-intelligente-che-misura-la-distanza-di-un-metro-realizzato-dagli-studenti-del-ferraris-a70a1020-b881-457d-b76e-


LCEO
SCIENTIFI
STATALE
GALILEO
GALILE
LAMEZIA TERME
GIURIA
GIURIA

Critical thinking, collaboration, creativity, IT, STEM

School: Technical school, Požega, Croatia

Aim: The drone league is a pilot project for gifted high school students in the Republic of Croatia, which enables the adoption of advanced STEM technologies through mentored, methodically designed, continuous, practical work with drones. The Croatian Interdisciplinary Society participates in the project as applicant, and four secondary schools as partner institutions.

The goals achieved by the project are to strengthen the motivation and increase the level of knowledge and skills of students for the STEM field, higher education or work in the STEM field, developing 21st century skills, and connecting secondary schools with the possibility of networking and further cooperation in STEM activities and the field.

21st century skills: Creativity, communication, critical thinking, troubleshooting, teamwork, collaboration, digital literacy, computer competences

Age group: 16 -18

Participants: 5 students - members of the Drone League of the Technical School

Duration: 3 hours

Theme: Drones as modern technology

Venue: Zagreb, Technical Museum “Nikola Tesla”

The description

Drones as a modern technology encourage students to understand the more complex cognitive processes necessary to acquire knowledge in the fields of physics, mathematics and informatics.

The final meeting of the teams of the state project Drone League was held on June 20, 2022, at the Technical Museum “Nikola Tesla” in Zagreb. Along with the demonstration of students' skills in operating drones, the company Orqa d.o.o. from Osijek was presented. Their mission is to become the world's number one technology provider for First Person View (FPV) and advanced Remote Reality (RR) applications. Croatian interdisciplinary society with the company Orqa d.o.o. cooperates in the field of development and application of unmanned aerial vehicles. The students tried out their glasses for controlling unmanned aerial vehicles according to the principle of "first person view" (FPV). The Drone League project is financed by the Ministry of Science and Education.

The outcome

By training young people to work with drones in the "Drone league for high school students" project, it focuses on the STEM field and contributes to the development of their competencies, which are significant in the long term on the labor market.

https://www.facebook.com/photo/?fbid=5301673936542579&set=pcb.5301680713208568

Critical thinking, collaboration, initiative, creativity

ENGINEERING DAY

School: Kanepi Gymnasium, Kanepi, Estonia

Aim: to develop students' thinking skills, engineering skills, cooperation skills

21st century skills: to develop critical thinking skills, problem solving, cooperation, communication, self-direction, creativity.

Age group: 10-18

Participants: 30 students of different grades

Duration: 4 hours

Theme: Engineering Day with Rube Goldberg

Venue: School hall

The description

The idea of building Goldberg's machine is to give an option to students to connect their thinking and practical skills. Machine is designed to perform a simple task in an indirect and (impractically) overly complicated way. Usually, these machines consist of a series of simple unrelated devices; the action of each triggers the initiation of the next, eventually resulting in achieving a stated goal (Vikipedia). Students have the opportunity to build exactly the kind of machine they can build based on their creativity and knowledge.

The general idea is to engage different age groups all over the school to participate in this event. Therefore, it is crucial to start with preparations early and include older students in this process. One aim is to develop cooperation between different age groups in a way that older students support younger students.

Engineering Day starts with science theatre show where some science experiments are introduced, after that students will form groups and find their place where they can start building Goldberg's machine. All the places for each group are prepared, also the materials and equipment.

After students have finished their machine building, they will introduce and present their machine.

Finally, the machine that best meets the given conditions is selected.

The methods

Groups of students are formed. All the materials and needed equipment are prepared for students, also they have an option to use materials they bring their own. The students are given

the conditions that the machine must be able to do – for example: the machine have to work at least 180 seconds but no longer than 230 seconds, it has to have at least 8 triggers, etc.

The outcome

Students have participated in engineering day and during that developed their knowledge about field and developed also their cooperation and 21. century skills. The Goldberg machine is built considering all the conditions.

Collaboration, problem solving, communication, IT

School: Osnovna šola F. S. Finžgarja Lesce, Slovenia

Aim: To learn about World War 2, to practise 21st century skills

21st century skills: Collaboration, problem solving, communication, technology literacy

Age group: 14

Participants: 24 students of year 9

Duration: 5 lessons (5x45 min)

Theme: World War 2

Venue: School and historical place in Begunje na Gorenjskem

The description

Students of year 9 took part in a workshop based on the topic of World War 2 which was prepared by the history teacher.

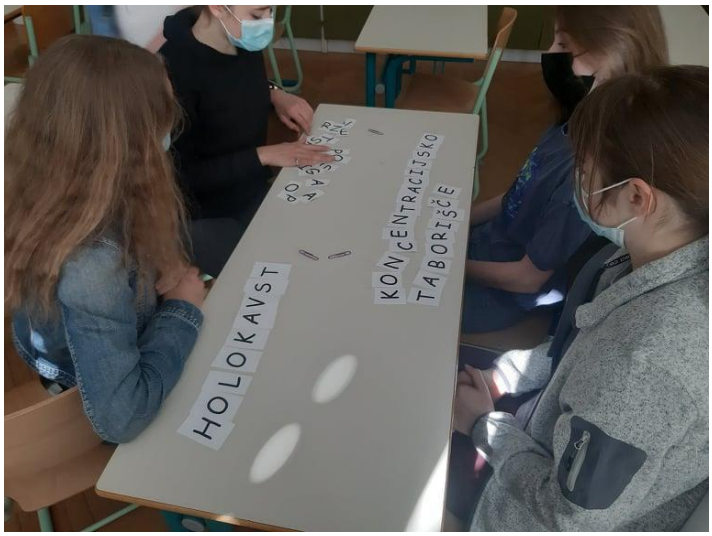
The first part of the activity day took place in school doing WW2 workshop. The students watched a video about it, solved puzzles and riddles in groups and wrote down their findings by using ICT.

This was followed by a field work to explore the history of Begunje na Gorenjskem. The students discovered many interesting but also upsetting facts from a representer of The Museum of Hostages Begunje na Gorenjskem. A local guide presented many interesting local stories and facts.

The outcome

Students learnt about the history of World War 2 in the local area.

https://www.oslesce.si/2021/06/02/dan-dejavnosti-9-razred/



Critical thinking, collaboration, technology literacy, IT

MATHS IS MORE THAN FORMULAS

School: Süleyman Demirel Anadolu Lisesi, Istanbul, Turkey

Aim: 21st century skills, critical thinking/analyzing

Age group: 14-17

Participants: 9 students

Duration: 7 hours

Theme: Learning by doing /experiential Learning

Venue: School/ Haghia SophiaMuseum

The description

As part of our project, we wanted to observe how math is applied to the historical buildings in our city. The idea of this event is that, when we think about Math, we only recall a time when a formula is learnt by heart and is tried to apply to one of the problems. But in fact, it is part of our daily lives.

The outcome

After visiting the museum, students became more aware of the fact that the formula for the calculation of the diameter of the dome of a colossal building is the same and necessary. Maths is not a subject that we can exclude from our lives.

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