Upskilling of schools' teachers to effectively support online education

CONNECT

Final Teacher's Guide

(Short version)

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Final Teacher's Guide (FTG) is a powerful tool for educators to implement the CONNECT approach. It summarizes the cardinal methods included in the CONNECT approach, indicating ways to implement them. Lessons learned from piloting along with practical guidelines stand out in the FTG.

Teachers are urged to read the Teacher's Guide, reflecting on their teaching while studying the material uploaded to the project's website. This will help them to better realize the added value of this intellectual outcome, and this will also whet their appetite for implementing the CONNECT approach at their Schools.

FTG has been developed under the auspices of the University of Cyprus with the contribution of all partners as the IO4 Intellectual Outcome of the CONNECT project.

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1. CONNECT Overview

The COVID-19 pandemic had a profound impact on education, leading to the adoption of distance learning as schools closed down. This prompted the emergence of blended learning, combining face-to-face instruction with modern teaching methods. European initiatives, such as CONNECT project, focused on promoting up-to-date educational practices like blended learning and the flipped classroom.

CONNECT project is a collaborative effort among partners from Greece, Italy, and Cyprus. Its goal was to upskill educators in implementing innovative teaching approaches. The project emphasized collaboration, problem-solving, and achieving shared milestones.

Upskilling in the CONNECT project referred to not only developing educators' basic digital skills but also enhancing their higher-level skills. The project aimed to create inclusive and active learning environments through valuable intellectual outcomes.

The intellectual outcomes in the CONNECT approach were designed to promote inclusion and cater to learners' needs. Learners were considered active participants, and the project materials and methods were adjusted accordingly. The Flipped Classroom Model played a crucial role in fostering active learning.

The intellectual outcomes aimed to provide meaningful learning opportunities for all learners. The training sessions in the CONNECT project adhered to the same principles and met specific quality standards.

1.1. Summarizing IO1 and IO2 outcomes

1.1.1. IO1 Outcome

IO1 aimed to develop a pedagogical framework for online course delivery in secondary schools (blended learning) and surveyed the landscape of online education during the COVID-19 pandemic in EU schools. The framework took a holistic approach, considering factors like school settings, curricular constraints, student psychology, and teacher profiles. It aligned with engagement, content, and the naturalistic teaching context, employing a multi-actor perspective.

The main target group was secondary school teachers, and the framework's transferability across EU countries was ensured. The work under IO1 involved two key activities:

1. Research on the European educational landscape during the pandemic: A survey and interviews were conducted to gather information on digital tools used, challenges faced, and mitigation steps taken in EU schools. The collected knowledge served as a foundation for subsequent project activities.

2. Designing the pedagogical framework: This activity developed the framework, considering principles of online learning and teaching, learning and assessment strategies, and the diverse factors mentioned earlier. Focus groups involving project partners and stakeholders were used to shape the framework. It provided the basis for designing educational scenarios under IO2.

The IO1 deliverables are available at the following link:

1.1.2. IO2 Outcome

IO2 of CONNECT project aimed to create educational scenarios to support teachers in delivering online courses, with a focus on Mathematics, Physics, and Language subjects. These scenarios were designed as a complement to in-class instruction. Teaching scenarios were detailed and structured descriptions of the teaching process, emphasizing specific educational goals and pedagogical principles. They spanned multiple teaching hours and utilized digital tools to enhance the learning experience. The development of scenarios in the program followed three phases: distance teaching and learning, face-to-face teaching, and distance learning for evaluation and feedback.
For Mathematics, the goal was to move away from traditional teaching methods and create environments that fostered dialogue, experimentation, and active student participation. The aim was to strengthen students' logical-mathematical thinking and its practical application.

In total, nine teaching scenarios were designed for Junior High School Mathematics, with collaboration among Greece, Italy, and Cyprus within the CONNECT project.

MATHEMATICS SCENARIOS
The nine scenarios were designed to be implemented with Blended Learning using the Flipped Classroom methodology in the framework of the "before", "during" and "after" methods. The teacher, considering the pre-existing knowledge of his/her students and their interests, plans his/her teaching so that the students acquire knowledge, while at the same time developing soft skills such as cooperation in groups, creative and critical thinking, problem-solving inquiry, decision-making, communication skills, and digital skills. Blended Learning is a new experience for students because it combines the advantages of face-to-face and distance learning with the use of the Internet. The scenarios designed for Mathematics aim to function as teaching suggestions, but also as a starting point for teachers to design their scenarios that will meet the needs of their classes. They can also be used as issues for discussion and reflection to upgrade the teaching of Mathematics. The organization of the class is an important factor in the success of the implementation of the scenario.

Worksheets (W) and Assessment Sheets (A) have been developed for the scenarios in addition to using digital material such as Google Classroom virtual classes, Videos (V), Virtual Labs (VL), Internet links (L), Digital Concept Maps (DCM), Images (I) and Google Forms Questionnaires.

PHYSICS SCENARIOS
The physics scenarios were designed on the principles of Blended Learning and Flipped Classrooms. In addition, physical laboratory instruments and everyday materials were used, with which students had the opportunity to acquire laboratory skills.

ENGLISH SCENARIOS
CONNECT educational Scenarios for English are focused on topics, which are either linked to the high school curriculum or are connected to the interests and needs of the students. In any case, they are interdisciplinary and focus on phenomena of the English language and/or a combination of vocabulary and grammar concepts with close links to everyday life and/or students' concerns and interests.

FRENCH SCENARIOS
One (1) French Scenario has been developed for the French Language by Greece:

Homeschooling

The CONNECT educational scenarios are available here:

Another important component of the IO2 Outcome was the "Instructions for Developing Educational Scenarios' which includes:
1. A brief overview of CONNECT Educational Scenarios.
2. Instructions for the development of an Educational Scenario.
3. A presentation of the structure of an Educational Scenario.

The instructions are also available here:

In parallel, other important components of the IO2 Outcome are:

1. A template of Educational Scenarios.
2. Evaluation Criteria

These deliverables are also available here:

1.2. Presenting CONNECT online Courses

IO3 focuses on online course design, specifically asynchronous courses, based on the findings from the survey conducted in IO1 and the training needs of teachers. The courses adopt a holistic approach, addressing both digital pedagogies and digital tools, to cater to the needs of STEM and human sciences teachers who may lack pedagogical or digital skills, respectively.
The design of the Massive Open Online Courses (MOOCs) in IO3 adheres to key principles:
1. Inclusion
2. Learner engagement
3. Effective learning
4. Coherence, consistency, and transparency
5. Ease of use
The online courses aim to empower teachers to integrate the CONNECT approach into their daily classrooms and provide access to open educational resources. They are available in English, Greek, and Italian. Course 4, for example, focuses on developing educational scenarios and includes specific examples of specific didactic objects.
The MOOC courses cover various topics, including a pedagogical framework incorporating modern methods, the significance of Flipped Classroom and Blended Learning, development of educational scenarios, online student assessment, incorporating digital tools in teaching, and digital safety.
MOOCs training leads to certification on the condition that the activities of all courses have been completed.
The MOOC courses are available here.

1.3. Intellectual Output 4 - Objectives & Activities

Intellectual Output 4 aims to develop a comprehensive guide for secondary school teachers on the online delivery of courses (Mathematics, Physics, and Foreign Language) using the CONNECT approach. The guide is designed to help teachers understand the pedagogical framework of the project and includes the Connect Approach Handbook material and other useful tools and resources.

The Teachers' Guide has two main objectives. Firstly, it seeks to increase teachers' knowledge and skills by ensuring their understanding of the program's needs and objectives. Secondly, it aims to improve the overall training process and educational experience by enhancing teachers' confidence and promoting their active participation through the pilot implementation.

The guide will have high transferability, as it can be easily adapted and used in other countries facing similar training needs in secondary schools.

The Final Teachers' Guide will provide practical support to teachers in effectively implementing the CONNECT approach. It will incorporate best practices identified during the project, along with teaching materials, methodologies, and sample educational scenarios. The guide will go through several phases, including the development of a preliminary version, MOOC training, pilot implementation in school practice, evaluation of pilots, and the finalization of the Teachers' Guide. The Preliminary and Final Teacher's Guide are available here.

1.4. Intellectual Output 5 - Exploitation of CONNECT approach

Intellectual Output 5 of the CONNECT project focuses on sustainability, exploitation, and transferability. It involves developing an exploitation plan to guide the adoption of the project's main outputs after its completion. The target audience includes policymakers in school education, local and regional school authorities, secondary schools, and vocational training schools.

The activities under this output involve engaging with stakeholders to explore the potential for utilizing the project's products. Partners will contact stakeholders through interviews to gather their input. The exploitation plan will outline how the project outcomes can be effectively used at national and European levels, identifying stakeholders and suitable forums for dissemination. The plan aims to mainstream the project's results and convince end-users of their value.

The IO5 deliverable is available here.

2. Focusing on the “Connect” up-to-date Educational Practices

The Erasmus+ CONNECT project fosters “the inverted learning with an emphasis on hybrid model” (CONNECT, 2021) aiming at reinforcing the ability of partner country education and training institutions to provide high-quality inclusive digital education.

The pedagogical approach is, thus, expected, to provide opportunities for personal, socio-educational, and professional development of the target groups involved; using innovative online resources and tools to leave no one behind” (European Commission, 2020c) will be exploited towards this direction.
As such, it is preferred in the proposed scenarios of the CONNECT project to exploit the principles of differentiation in combination with the methodology of the Flipped Classroom. As Joe Hirsch (Hirch, 2014), an initiator of the mixed learning teaching model he calls "Fliperentiation", argues, combining its two components (Inverted Classroom and Differentiated Teaching), this combination enables teachers to engage learners quickly and effectively in the appropriate learning activities for them, enriching their learning experiences and facilitating the learning process (Hirsch, 2014 refers to. According to the "Fliperentiation" learning model, the course is organized and conducted in three (3) Phases (p.p. 206-7) (Flipped Learning Global Initiative ,2018; Flipped Learning Network, 2013; Flipped Learning Network, 2014; Bergmann & Sams, 2012; Giannakos et al., 2014; Hewitt et al., 2014).

During Phase A, students are provided with diverse educational content (websites, texts, audio files, video files, photographs, etc.) for autonomous study which must be relevant to the planned individual or group experiential activities of Phase B which are carried out by the students in the classroom. Each learning planning is completed with Phase C' where the participants are provided with alternative activities evaluation, which can be carried out at home or school and evaluated formally or informally. Differentiation can be applied with the help of technology in any Phase of the model, enhancing the ability of choice which is a key feature of Differentiated Teaching (Anderson et al., 2001).

3. Pilot implementation process

The CONNECT project's pilot implementation plan aims to validate the effectiveness of the pedagogical framework and educational scenarios. Teachers from secondary schools in EU countries will undergo training, including a three-month MOOC and face-to-face sessions in Athens. They will then deliver online lessons alongside in-class activities to evaluate the intervention's impact. The piloting phase will gather feedback and recommendations from teachers experienced in the field, ensuring the quality and usefulness of the designed framework and scenarios. The acceptance and effectiveness of the approach will be assessed through assessment instruments and reporting templates provided to the targeted users.

3.1. Describing the Process

The pilot procedure in the context of the CONNECT project is a crucial phase aimed at validating the effectiveness of the designed pedagogical framework and educational scenarios. It involves teachers from secondary schools in participating EU countries who undergo training and then deliver a part of the curriculum online. The pilot implementation plan includes gathering feedback and recommendations from the participating teachers, who possess the necessary expertise and experience. This pilot procedure serves as a valuable opportunity to test the acceptance and usability of the pedagogical framework and scenarios, ensuring their quality and usefulness in enhancing teaching and learning outcomes.

3.1.1. Objectives

- Strengthening teachers' digital skills and the skills to implement innovative educational practices, such as the flipped classroom (Gábor & M. Key, 2011).
- Enhancing teachers' capacity to develop educational scenarios based on innovative practices such as the flipped classroom but also based on appropriate digital interaction.
- Increasing collaboration between specialist teachers at the school level.
- Improving the learning process (increasing active participation, interactive interaction).

3.1.2. Guidelines for Piloting

The pilot implementation plan of the CONNECT project is a response to the inequalities highlighted during the COVID-19 pandemic, with the aim of fostering positive change in blended learning for Mathematics, Physics, and Foreign Languages. Taking place in Cyprus, Italy, and Greece, the pilot application will occur from January to March 2023, focusing on implementing teaching scenarios in the 3rd Lower Secondary School using the flipped classroom model. The plan includes upgrading teachers' digital skills, supporting their professional development, and providing necessary digital tools and resources for students. Peer review and collaboration within communities of practice (CoPs) are important elements in ensuring the quality and effectiveness of the pilot implementation, helping refine the approach before wider implementation.

3.2. Feedback and Reports

3.2.1. For Teachers

Pre-pilot Teachers' evaluation phase

The purpose of the survey is to evaluate the teachers' pre-pilot experience in flipped classrooms in terms of obtaining the students' specific learning outcomes (knowledge, skills, and competencies), fostering students' active participation in learning activities, and improving the whole educational process.

Initial Data Collection

Initial Data Collection will be completed before the pilot implementation procedure to mark some initial information from the teachers, especially as a token of preliminary or informal data. The completeness of initial data is identified before analyzing any given dataset.

Post-pilot Teachers' evaluation phase

The purpose of the survey is to evaluate the degree to which the desired objectives have been achieved from the teacher's perspective via students' active participation in learning activities and improving the whole educational process.

Reflection Diary

The reflection diary is an "account" of the teacher's work in progress, but more essentially an opportunity for reflection on the teaching experience, providing a means of engaging critically and analytically with flipped classroom content.

3.2.2. For Students

Pre-pilot Students' evaluation phase

The purpose of the survey is to evaluate the students' pre-pilot experience in flipped classrooms in terms of obtaining the students' specific learning outcomes (knowledge, skills, and competencies) via learning activities and the whole educational process.

Post-pilot Students' evaluation phase

The purpose of the survey is to evaluate the degree to which the desired objectives have been achieved from the student's perspective through their participation in learning activities and improving their educational process.

3.3. Results

3.3.1. Pre-pilot Teachers' evaluation phase

The outcome of the Pre-pilot teachers' evaluation phase is centered on the below issues:

- Increased engagement and motivation
- Enhanced learning outcomes
- Flexibility
- Technological challenges
- Professional development

- Cost-effectiveness
- Data analytics

3.3.2. Initial Data Collection

The initial data of teachers' evaluation phase on the flipped classroom is an important step in the evaluation process, as it provides valuable information for improving the implementation of the flipped classroom approach and optimizing student learning outcomes:

- Teacher demographics
- Teacher effectiveness
- Professional development
- Curriculum alignment
- Teacher retention
- Teacher workload
- School culture

3.3.3. Post-pilot Teachers' evaluation phase

The results of the post-pilot teachers' evaluation phase on flipped classroom procedure at schools provided valuable insights and feedback to improve the implementation of the CONNECT approach and optimize student learning outcomes. By using the feedback and data collected from the participating teachers, schools can make evidence-based decisions on how to effectively integrate flipped classroom into their teaching and learning practices:

- Increased confidence and comfort with technology
- Improved student engagement and outcomes
- Teacher feedback
- Professional development
- Challenges and limitations
- Sustainability

3.3.4. Reflection Diary

The key points on a survey about the reflection diary and its impact on the teaching experience based on the flipped classroom are the:

- Self-awareness
- Critical analysis
- Enhanced learning
- Professional development
- Improved student outcomes
- Accountability
- Motivation and engagement

3.3.5. Pre-pilot Students' evaluation phase

The Pre-pilot students' evaluation phase of the flipped classroom revealed several significant findings:

- Student engagement
- Access to resources
- Improved comprehension
- Time management
- Personalized learning
- Technological barriers
- Teacher support

3.3.6. Post-pilot Students' evaluation phase

An overview from the survey about the post-pilot students' evaluation phase in the flipped classroom:

- Improved learning outcomes
- Active participation
- Personalized learning
- The technology used
- Teacher support
- Classroom management
- Sustainability

3.4. Lessons Learned from Piloting

Some general important lessons that have been learned from piloting are:

1. There is a need to invest in students' collaborative skills and offer students autonomy in the learning process.
2. There is a need for the pedagogical use of digital tools in teaching and a need for teacher to act as a facilitator to enable students to learn in their way.
3. There is a need for a teacher to act as a facilitator, and a need to offer students autonomy in the learning process.
4. When students fail to take over the learning process, frontal instruction is needed.
5. There is a need for cooperation with the IT teacher in laboratory courses.
6. Learning theory at home can be time-saving and effective.

In a course-oriented approach, important lessons have been learned from the implementation of the Mathematics educational scenarios:

1. The best educational practice to implement the Mathematics educational scenarios is the combination of Flipped Classroom with Blended Learning.
2. Collaborative learning is the main ingredient in the successful implementation of Blended learning in the instruction of Mathematics.

In parallel, important lessons have been learned from the implementation of the Physics educational scenarios:

1. It is essential to invest in critical thinking, cooperation, and communication when executing a laboratory experiment.
2. The implementation of Physics educational scenarios calls for building up students' knowledge.

Finally, important lessons have been learned from the implementation of the Foreign Language educational scenarios:

1. It is vital to invest in the instruction of theoretical knowledge at home.
2. Dealing with misconceptions leads to students' upskilling.
3. Peer feedback increases students' engagement.
4. Peer review fosters critical thinking.

It is essential to underline that a couple of studies have proved that peer feedback positively affects students' engagement (Fagen et al., 2002; Crouch et al., 2007). In parallel, an important study has indicated the role of peer review in the promotion of critical thinking (Passias et al., 2014).

3.5. Educational Practices Accentuated in Piloting

The piloting underlined the importance of collaboration at the school level. In this spirit, educational coordinators promoted collaboration among teachers within the school environment in the following ways:

1. Establishing the peer-to-peer review process.
2. Creating Communities of Practice (Passias et al., 20222a; Passias et al., 2022b).

The good piloting outcome in all partner countries proved that teachers embraced this new strategy. Peer review and communities of practice moved the "collaboration climate" to another level.

3.6. Piloting Reverberation

Drawing from the reflection diaries and the final schools' reports, some important aspects have marked the piloting success:

1. The Peer-to-peer review and the communities of practice contributed to the effective implementation of the "Connect" Educational scenarios.
2. Educational coordinators and School authorities secured a good school climate during piloting.
3. The employment of the Flipped Classroom Approach fostered student and teacher collaboration.
4. The critical didactic incidents played an important role in promoting students' active participation.
5. The use of digital tools made the implementation of flipped classroom more attractive and contributed to unique learning experiences.

4. The Need for Attractive Activities

The flipped classroom approach transforms traditional teaching by delivering instructional content outside of class and utilizing interactive activities during class time. Engaging activities, such as online quizzes, virtual labs, collaborative problem-solving, inquiry-based learning, and interactive language practice, enhance student engagement and critical thinking skills. These activities create a dynamic learning environment that fosters active participation and improves learning outcomes. A list of attractive activities for Mathematics, Physics, and Foreign Language is presented below. The Greek attractive activities are analytically presented in Appendix A:

The Activities for Mathematics include the below didactic objects:

- Pythagorean Theorem.
- Rectangular parallelepiped and cylinder.
- Learning Activities KAHOOT.
- Designing an algebraic expression.

The Activities for Physics include the below didactic objects:

- Activity on the Coulomb's Law.
- Activity on Newton's 3rd Law.
- Exploring Sound

The Activities for English are designed for the below didactic object:

- Graffiti versus Street Art (Think-Pair-Share, Jigsaw, Digital Escape Rooms, Fishbowl Strategy, and Tic Tac Toe)

The Activities for French are designed for the below didactic object:

- Speaking about myself (The "Millionaire Game")

5. Implementing the CONNECT approach in school teaching

5.1. The Instruction of Mathematics

The CONNECT approach suggests two (2) important methods for the instruction of Mathematics:

Critical Didactic Incidents (Souralis, 2023)

The term Critical Incident (CI) is commonly used to describe significant teaching moments that are considered important by teachers and researchers in the field of education. It serves as a means for accessing and studying teaching and learning phenomena, as well as facilitating the professional development of mathematics teachers. Different dimensions and frameworks have been proposed to understand and analyze CIs (Goodell, 2006; Skott, 2001; Potari & Psycharis, 2018; Souralis, 2022). These dimensions include aspects such as understanding, classroom management, student motives, student relations, student behavior, who and what is attended to during teaching, and the kind of CIs that teachers focus on. Researchers have explored the noticing skills of teachers and the various categories of CIs, such as affective, cognitive, and social dimensions. Understanding and utilizing CIs in educational contexts offer valuable opportunities for teacher growth and research advancements in the field (Callejo & Zapatera, 2017; Amador & Carter, 2018 ; Van Es & Sherin, 2006; Star & Strickland, 2008).

The critical didactic incidents are presented in the CONNECT approach Handbook (Page 43), which is available here:

Problem-Solving

Numerous researchers have emphasized the significance of engaging students in problem-solving activities that relate to authentic mathematical concepts. These activities have been shown to develop students' reasoning abilities and enable them to explore important mathematical ideas while achieving the learning objectives outlined in the curriculum (Schroeder & Lester, 1989; Schukajlow & Krug, 2014; Große, 2014; Cai & Cifarelli, 2005; Silver et al., 2005; Kosyvas, 2016). Problem-solving practices contribute to the development of higher-order cognitive skills and effective communication, enhancing students' conceptual understanding of mathematics. By actively engaging in problem-solving activities, students have the opportunity to improve, integrate, and adapt their acquired knowledge, leading to a deeper and more meaningful learning experience in the classroom (Schoenfeld, 1992; NCTM, 1991; Van de Walle, 2003; Kosyvas, 2017; Hiebert et al., 1997).

The Problem-Solving technique considering collaborative learning is presented in the CONNECT approach Handbook (Page 32), which is available here:

5.2. The Instruction of Physics

The CONNECT approach suggests two important methods for the instruction of Physics:

Investing in Students' Alternative Ideas (Stefanidou, 2023)

The constructivist model of teaching acknowledges the presence of alternative ideas held by students, which may conflict with scientific concepts taught in the classroom. Teachers are faced with the task of addressing and reconciling these alternative ideas with scientific explanations. However, in recent years, the inquiry model of teaching and learning has gained prominence as an approach that familiarizes students with scientific methodology and procedures. Within the inquiry approach, students are encouraged to formulate hypotheses about phenomena and conduct experiments to confirm or reject them. In the context of science education, students develop their understanding of the world through their everyday experiences, often leading to the formation of alternative conceptions or misconceptions. It is essential for teachers to be aware of their students' perceptions and employ appropriate teaching strategies to guide them towards scientifically acceptable explanations. For instance, students may initially hold beliefs such as the geocentric model or the notion that the human heart produces blood, requiring educational interventions to foster accurate scientific understanding (Chalkia, 2012).

The Students' Alternative ideas are presented in the CONNECT approach Handbook (Page 18), which is available here:

Inquiry-Based Learning (Pefanis & Apostolopoulos, 2023)

In modern classrooms, teachers prioritize differentiation and the use of inquiry-based teaching within the flipped classroom model. By tailoring educational content, processes, and products to meet the diverse needs of students, teachers create a flexible learning environment that promotes engagement and the development of science process skills (Smyrnaiou, 2014). The CONNECT project incorporates these principles through its three-phase approach. Recognizing the significance of alternative ideas and misconceptions, the inquiry-based approach is employed to foster cognitive conflict and facilitate conceptual change when necessary. Overall, the goal is to empower students in constructing their knowledge while addressing any conceptual difficulties that may arise.

The Inquiry-Based Learning is presented in the CONNECT approach Handbook (Page 88), which is available here:

5.3. The Instruction of Foreign Language

Two methods that stand out in the CONNECT approach for Foreign Language are:

Differentiated Instruction (Tigka, 2023)

In order to promote educational equity and address the diverse needs of students, there has been a shift towards de-tracking and in-class alignment, highlighting the complexity of the teacher's role. To effectively support student learning, differentiation of classroom routines becomes crucial. Differentiated instruction is a pedagogical approach that involves making conscious decisions to cater to individual learning profiles and needs within a mixed-ability classroom. This differentiation can occur across the curriculum, teaching processes, resources, and student outputs. Teachers may allocate more time to low achievers or provide advanced students with less time, ensuring that all students have opportunities to thrive. Differentiated instruction can be convergent, focusing on supporting weaker students to reach their potential and minimizing performance gaps, or divergent, where the lesson is modified to accommodate all students without excluding anyone. It recognizes that learner differences are dynamic and encompasses a range of factors such as cognitive abilities, interests, prior knowledge, and learning profiles. The ultimate goal is to maximize the potential of all students through tailored instruction (Tomlinson et al., 2003; Smale-Jacobse et al., 2019) .

The Differentiated instruction is presented in the CONNECT approach Handbook (Page 13), which is available here:

Reflection through Critical Learning Incidents (Gyftoula, 2023)

The Flipped Classroom technique has gained popularity among educators worldwide, particularly in the wake of the Covid-19 pandemic. By combining online and face-to-face teaching, this approach offers a fresh perspective on traditional instruction. The process involves using digital tools and platforms to encourage students to take a more active role in their learning. As teachers review educational scenarios for subjects like English language instruction, they strive to identify critical learning incidents that can significantly impact students' growth and development. These incidents, defined as powerful and personally meaningful learning experiences, contribute to the overall effectiveness of the educational process. Through reflective thinking and analysis, educators can better understand how these incidents shape students' learning strategies and facilitate their progress. Reflection through Critical Learning Incidents is the pillar of the "Connect" Educational Scenarios for Foreign Languages (Soini, 2012; Tripp, 1993; Thiel, 1999; Farrell, 2008; Finch, 2010).

The Reflection through Critical Learning Incidents is presented in the CONNECT approach Handbook (Page 51), which is available here.

5.4. Collaborative Learning

Collaborative learning is a crucial aspect of education, as it fosters an interactive environment where students can actively engage with their peers. Through collaboration, students develop effective communication skills, learn to appreciate diverse perspectives, and take collective responsibility for their learning. This approach emphasizes shared problem-solving, promotes critical thinking, and enhances social and cognitive development. By implementing collaborative learning strategies, educators empower students to become active participants in their education, fostering a sense of ownership and deeper understanding of the subject matter. Ultimately, collaborative learning prepares students to navigate real-world situations that require teamwork and cooperation, equipping them with essential skills for success in the 21st century (Rochelle & Teasley, 1995; Rowse & Emerson, 2016; Arta, 2018; Slavin, 1996 in Le, Janssen & Wubbels, 2016; Stein et al, 1994).

Collaborative Learning is presented in the CONNECT approach Handbook (Page 108), which is available here.

5.5. Peer Assessment and Communities of Practice

The role of teachers in an education system is paramount, as the quality of education cannot surpass the quality of its teachers. Educational reforms in today's complex and rapidly changing world rely heavily on the individual and collective capacity of teachers to facilitate new forms of learning. Transforming schools into learning organizations and communities of learning is essential in the modern knowledge society. Such transformation involves creating professional learning communities where teachers collaborate, explore their practice, engage in continuous inquiry, and improve their professional competencies. The primary objective of a learning organization is to foster learning for all, emphasizing trust, collaboration, reciprocity, creativity, and change. Assessment plays a vital role in the learning organization, with a focus on formative assessment, including assessment for learning and assessment as learning. Peer assessment is a dynamic method that supports the transformation of schools into learning organizations. It promotes collaborative learning among teachers, encourages reflection and improvement, and contributes to school improvement. The introduction of peer assessment signifies a paradigm shift from external inspection and control to internal assessment, fostering a culture of reciprocity, trust, and professional dialogue among teachers. Overall, the transformation of schools into learning organizations and the integration of peer assessment contribute to the continuous improvement of teaching practices and the development of a collaborative and reflective learning community (Pasias, et al., 2022a; Senge, et al. 2012; Kools & Stoll, 2016; Pasas, 2023; Harris& Jones, 2010; Marsick, et al., 2013; Pasias, et al., 2022b).

The Peer Assessment is presented in the CONNECT approach Handbook (Page 182), which is available here.

6. Final Teacher’s Guide (Added value and Perspective)

Final Teacher's Guide (FTG) provides valuable perspective and guidance for educators, particularly in the fields of Mathematics, Physics, and Foreign Language. It supports teachers in implementing the CONNECT approach, which has the potential to transform teaching and contribute to a positive school environment. FTG emphasizes the importance of professional development and a shift in mentality, especially in response to the challenges posed by the COVID-19 pandemic. It offers attractive activities and educational scenarios that can engage students and integrate digital media effectively. FTG's compatibility with different curricula and its focus on reflection and self-evaluation contribute to teachers' ongoing growth and improvement. It is a sample of the CONNECT approach, and all stakeholders are encouraged to explore the complete approach and look forward to future resources or updates that will further enhance its implementation.

Additionally, the Teacher’s guide is designed in a course-oriented approach. Important elements such as attractive activities, educational scenarios, and proposed methods are presented in a course-oriented approach that is tailored to the needs of Mathematics, Physics, and Foreign Language. In this sense, the Teacher’s Guide directions apply to these didactic objects.

The added value of these activities lies in the fact that they can be easily implemented. Along with the educational scenarios, the attractive activities are based on a robust pedagogical framework and therefore they can be implemented in terms of any educational curriculum. Thus, similar attractive activities can be designed by European educators in alignment with their curriculum. This European educational compatibility and interoperability is also a feature of the educational scenarios.

The development team wishes all European educators’ success in implementing the CONNECT approach and achieving professional excellence!.

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Appendix : Attractive Learning Activities (Greek Teachers)

Mathematics (Brousseau, 1970-1990)

Pythagorean Theorem

Creator	RDPSEA
Course	Mathematics
Didactic unit	Pythagorean Theorem
Estimated Time	45 minutes
Learning objectives	The activity aims at improving the conceptual understanding of the Pythagorean Theorem. The activity is designed to be completed before introducing the algebraic formula and after its proof. The activity emphasizes inquiry. Students are asked to formulate a conjecture and to test it. It also connects algebraic and geometric ideas and it provides a general pattern.
Target Group	14-year-old students
Description	**(a)** Copy the table below into your notebook. For each row of the table: Draw a right triangle ABC ($\hat{A}$ = 90) considering the given length of the vertical sides on the dotted sheet (square canvas). Draw a square on each side of the triangle. Find the areas of the squares and fill in the data on the table.

	<table><tr><th>Length of Perpendicular Side AB (units)</th><th>Length of Perpendicular Side AC (units)</th><th>Area of Square on the Perpendicular Side AB (sq. unit)</th><th>Area of Square on the Perpendicular Side AC (sq. unit)</th><th>Area of Square on the Perpendicular Side BC (sq. unit)</th></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td></tr><tr><td>1</td><td>2</td><td></td><td></td><td></td></tr><tr><td>2</td><td>2</td><td></td><td></td><td></td></tr><tr><td>1</td><td>3</td><td></td><td></td><td></td></tr><tr><td>2</td><td>3</td><td></td><td></td><td></td></tr><tr><td>3</td><td>3</td><td></td><td></td><td></td></tr><tr><td>3</td><td>4</td><td></td><td></td><td></td></tr></table> (b) Remember that conjecture is the best idea for guessing a mathematical relationship. It's usually a generalization of a pattern that you think may be correct, but you are not aware of its correctness. For each triangle, identify a relationship between the areas of the three squares. Come up with a conjecture regarding the squares you drew on the sides of each right triangle. (c) Draw a right triangle in a way that the sides' lengths could be different from those given in the table. Use your triangle to check the conjecture based on the question (b).

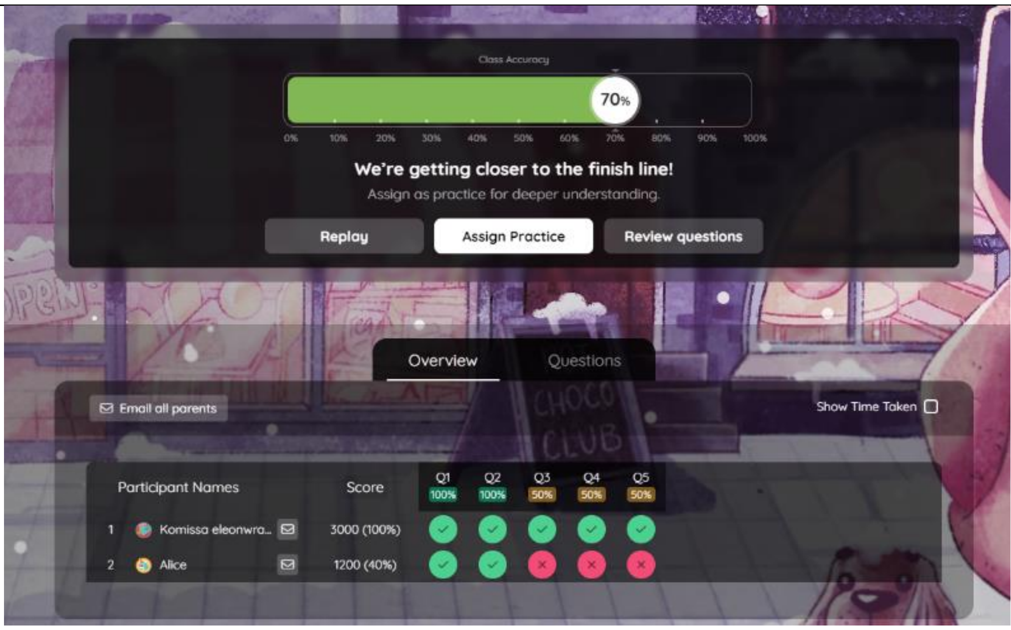
Rectangular parallelepiped and cylinder

Creator	RDPSEA
Course	Mathematics
Didactic unit	The volume of rectangular parallelepiped and cylinder
Estimated Time	90 minutes
Learning objectives	It is an experiential activity drawn from students' daily life. Students should be able to: • calculate the volume of the rectangular parallelepiped and the cylinder. • verify their answers in real cases.

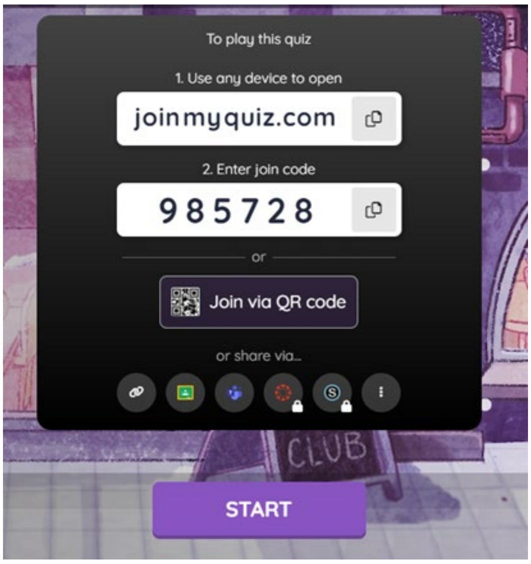
Target Group	14-year-old students
Description	 **The planters**: *Outside the classroom, there are 3 identical empty rectangular parallelepiped planters measured to be 81.2X31X36 centimeters. The students of the class were divided into three groups. Each group of students must cover a planter with natural potting soil. They can use: a) small containers, the radius of which is 8 cm and the height is 25 cm, and b) large containers, the radius of which is 10 cm and the height of 32 cm. Group A is given cylindrical containers, group B is given large containers and group C is given both small and large containers.* ***a)*** *How many pots of potting soil must each team carry to cover the planter?* ***b)*** *Transfer containers full of topsoil from the school garden to your planter and verify your calculations.*

Learning Activities KAHOOT (Xezonaki, 2023)

Creator	RDPSEA
Course	Mathematics
Didactic unit	Pythagorean Theorem
Estimated Time	15 minutes
Learning objectives	Revision exercise on the Pythagorean Theorem
Target Group	Students 14 years old
Description	This activity is a revision quiz, that was created using the application https://quizizz.com/ and is supposed to be used for the students that have studied the Pythagorean Theorem and the squared roots. This exercise can be used by teachers on students' evaluation, on https://quizizz.com/admin/quiz/63aafa3f042ca4001ed5a201?source=quiz_share. This quiz can be used as a gamification application, either in face-to-face teaching or in the third phase of distance learning, in education. This game provides each student with his/her results and allows students to evaluate their experience playing. The teacher can send the results to the parents via e-mail and can estimate the overall time needed for the completion of the exercises by the students.



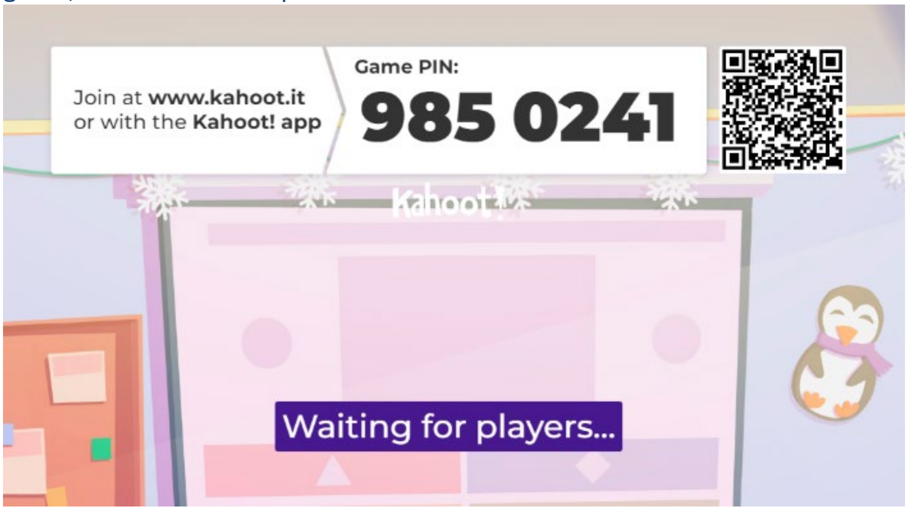
We advise students to enter the site joinmyquiz.com and we provide them with the number that needs to be entered so that they can play the game (985728). The duration of every exercise is set by the teacher. In this example, two minutes are given per exercise.



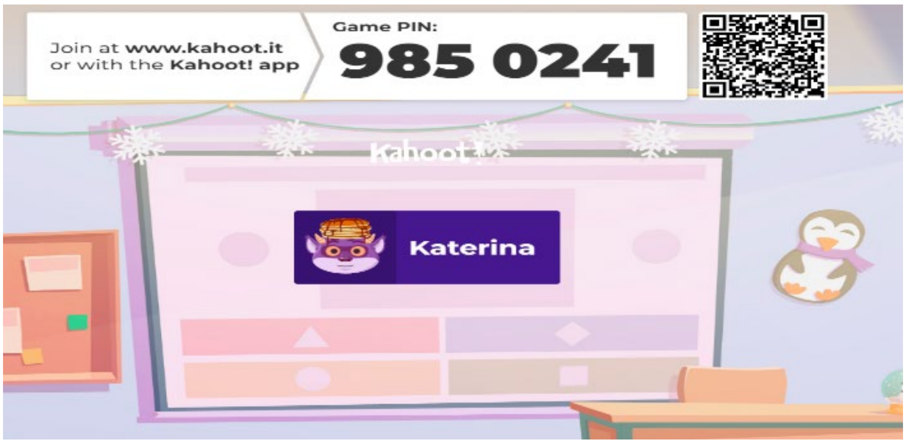
Kahoot Attractive Learning Activities

Creator	RDPSEA
Course	Mathematics
Didactic unit	Teaching the identity $(a+b)^2=a^2+2ab+b^2$
Estimated Time	Approximately 10 minutes
Learning objectives	Use the identity $(\alpha+b)^2=\alpha^2+2\alpha b+b^2$ in solving exercises. Give feedback on learning, understanding, and using the identity $(\alpha+b)^2=\alpha^2+2\alpha b+b^2$
Target Group	15-year-old students
Description	The task can be found at: https://create.kahoot.it/share/excercises-on-the-first-identity-square-of-two-factor-sum/d4951c74-b877-471e-b4f2-98615d368b2d According to sources, 80% of students tend to use playing games as a way of learning. The use of gaming concepts and procedures in the learning process makes up the notion of gamification. It aims to attract users to come in contact with non-gaming subjects, through gaming. The teacher can use either the classic mode or the team mode of the game, according to the plan of his/her lesson. The activity can be used in phase C (after the lesson - Distance Learning-asynchronous) as an assessment test for the understanding and application of the identity $(\alpha+b)^2=\alpha^2+2\alpha b+b^2$. The test has been created on kahoot.com. The teacher can either get the reports for every student, by signing up/ logging in, or he/she may continue navigating as a guest, without access to the results.

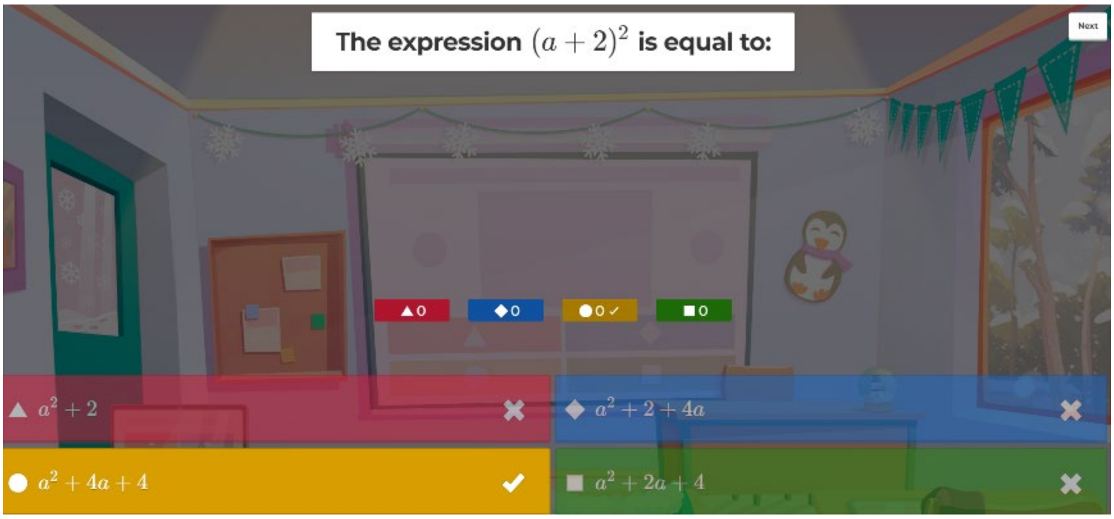
Students can join the game at www.kahoot.it where they may be given the game pin. In every game, there is another pin.



When students join the game, we may have the necessary access to their nicknames.
We invite the students to enter www.kahoo.it and enter the given game pin.

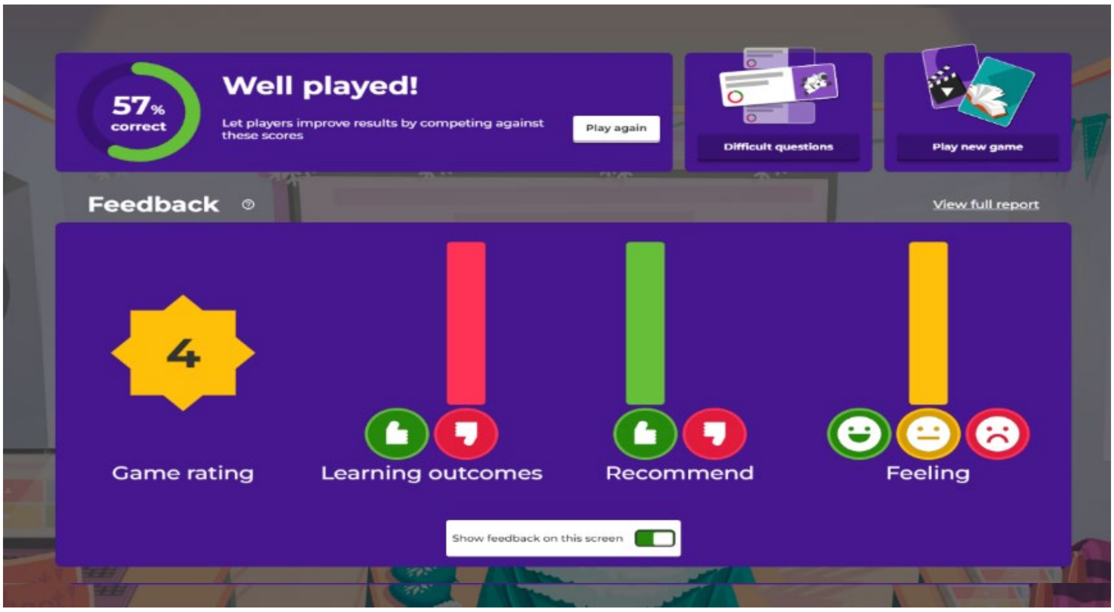


Students must choose the correct answer.

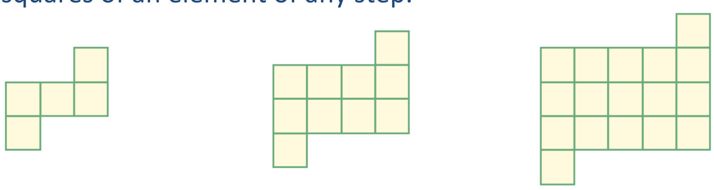


The teacher may have access to the student's answers. He/ She may note the questions which had a great number of false answers, so that he/ she may organize their teaching material and revisions. After the game ends, the application kahoot.com, using gaming, presents the 3 players with the highest scores and shows the questions with the falsest answers. It also allows students to evaluate their experience playing the game, providing the teachers with the necessary feedback on whether this game helped students learn, how they feel about it, and whether they recommend it.

The only noted difficulty is that when students use their smartphones to play the game, they can only see the possible answers as color options and not as phrases- a screen that shows the answers as phrases are necessary for the classroom.



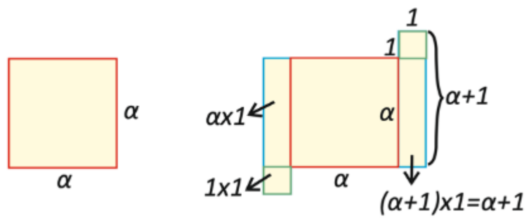
Designing an algebraic expression (Radford et al., 2007)

Creator	RDPSEA
Course	Mathematics
Didactic unit	**Designing an algebraic expression**
Estimated Time	Approximately 90 minutes
Learning objectives	• Expansion, generalization, remarkable identities, the transformation of algebraic expression, and area of rectangles. • Figurative and evolutionary patterns, finding the rule, recursion, generalization, investigation, and reasoning.
Target Group	15-year-old students
Description	**Problem A: Design an algebraic expression** **a)** Represent geometrically the expression $\alpha^2 + 2(\alpha + 1)$ where a is a positive number. **b)** Show that, whatever the value of the positive number a, the following four expressions are equal: $\alpha^2 + 2(\alpha+1) \quad (\alpha+2)^2 - 2(\alpha+1) \quad \alpha(\alpha+2)+2 \quad \alpha^2+2\alpha+2$ **Problem B (Pattern): the small squares** With small identical squares, we construct a pattern according to the evolutionary model below. Find a way to count the number of small squares of an element of any step.  **Step 1** **Step 2** **Step 3**

Teaching guidelines

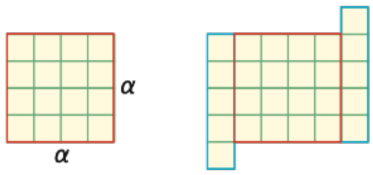
Problem A: Design an algebraic expression (45 minutes)

In the context of differentiation, recourse to manipulative material is suitable for the formation of mental representations. From the given shape, students create the expected shape.



α^2 $\alpha^2+2(\alpha+1)$

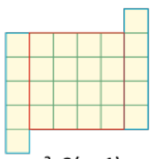
The square can be divided into smaller unit squares. In this case, the 4x4 square is an example. However, we are referring to the general case axa.



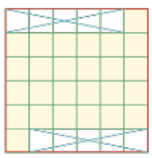
α^2 $\alpha^2+2(\alpha+1)$

B. Problem B (Pattern): the small squares (45 minutes)

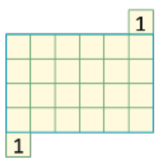
This approach promotes the formation or stabilization of mental representations of the distributive property and the product. The proposed geometric approach has the advantage of reducing shape errors $\alpha(\alpha + 2) = \alpha^2 + 2$.



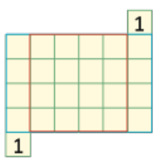
$\alpha^2+2(\alpha+1)$



$(\alpha+2)^2-2(\alpha+1)$



$\alpha(\alpha+2)+2$



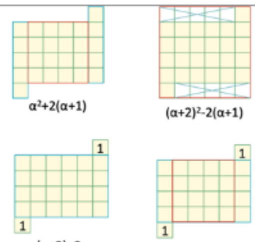
$\alpha^2+2\alpha+2$

- The meaning of each algebraic expression is formed using **rectangle area representations** (rectangular numbers, product expression).

- Geometric interpretations make it possible to prove the equality between the four algebraic expressions. Some students find it difficult to escape the idea that representations are made **for a particular value a.**

Teaching strategies

- Figurative and evolutionary patterns, rule finding, recursion, generalization, investigation, and reasoning.
- In this figurative regularity, recognizing the structure and explaining it is of a higher level of skill because the relationship is not linear.
- The problem gives rise to work in algebraic calculus to justify the equivalence of the representations proposed by the students.

Strategies	Patterns	Comments
We count the small squares at each step.	The numbers we need to add, to move from one step to the next, are the odd integers greater than 5. Steps: 1, 2, 3, 4, ... Number of squares: 5, 10, 17, 26 +5 +7 +9	With a spreadsheet, for example, we get the number of small squares for a given step.
We identify a structure that includes a large square or rectangular layout.	 $\alpha^2+2(\alpha+1)$ $(\alpha+2)^2-2(\alpha+1)$ $\alpha(\alpha+2)+2$ $\alpha^2+2\alpha+2$	Proving the equality between different algebraic expressions will make it necessary to use algebraic properties of calculus to transform the expressions (factorization and expansion).

Physics

Activity on Coulomb's law

Pre-activity prediction

Consider that a force F is exerted between two charges q_1 and q_2. If we increase the distance between the two charges, the measure of the force

a) will increase

b) will decrease

c) will not change

Briefly justify your view

………

………

Activity

Open the following link:

http://www.seilias.gr/index.php?option=com_content&task=view&id=74&Itemid=32&catid=20

A. With charge values, $q_1 = 1\ \mu C$ and $q_2 = 2\ \mu C$, move one or both charges to the distances shown in the table below. For each position measure the electric force and complete the table below

Table 1

	Distance r (cm)	F (N)
1	1	
2	2	
3	3	

4	4	
5	5	
6	6	

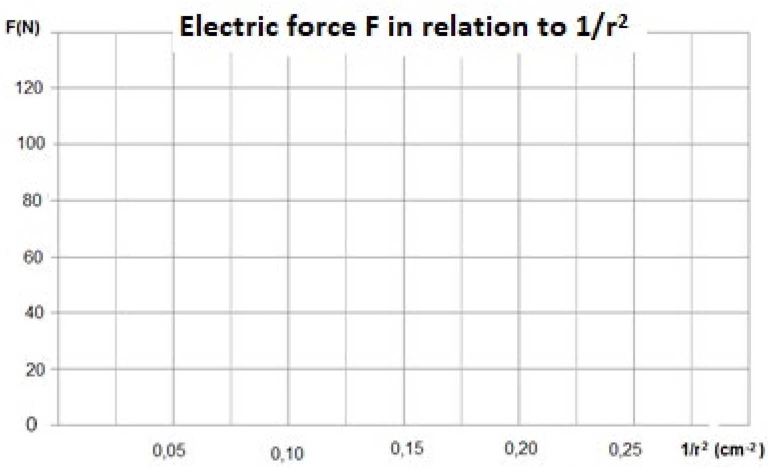
B. Based on the findings from your measurements, is your prediction confirmed or not? Explain ……………………………………………………………………………………

C. Make the appropriate calculations using a calculator and complete the following table.

Table 2

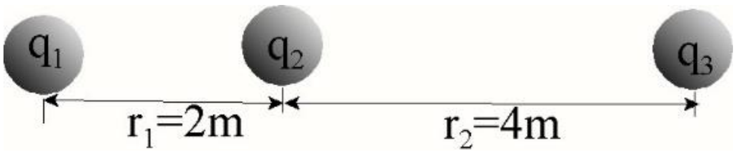
α/α	r (cm)	r^2 (cm^2)	$\frac{1}{r^2}$ (cm^{-2})	F(N)
1	1			
2	2			
3	3			
4	4			
5	5			
6	6			

Draw the graph F=f($\frac{1}{r^2}$).



Conclusion……
………

Post activity task



In the figure above, all the spheres have the same amount of charge. The charges q_1 and q_3 are positive, while q_2 is negative.
a) Plot the forces acting on each charge.
b) If q_2 is left free

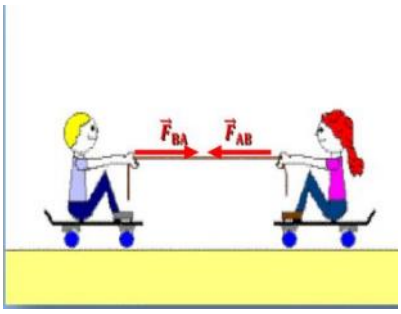
A. it will move to the left
B. it will move to the right
C. will remain stationary

Choose the correct one and explain your choice.

Activity on Newton's 3rd Law

Pre-activity prediction

Two children pull on a rope with two springs with a hook attached as measuring devices.



a) the force the boy receives is greater
b) the force the girl receives is greater
c) the forces are equal in measure

Briefly justify your opinion

……………………………………………………………………………………………………

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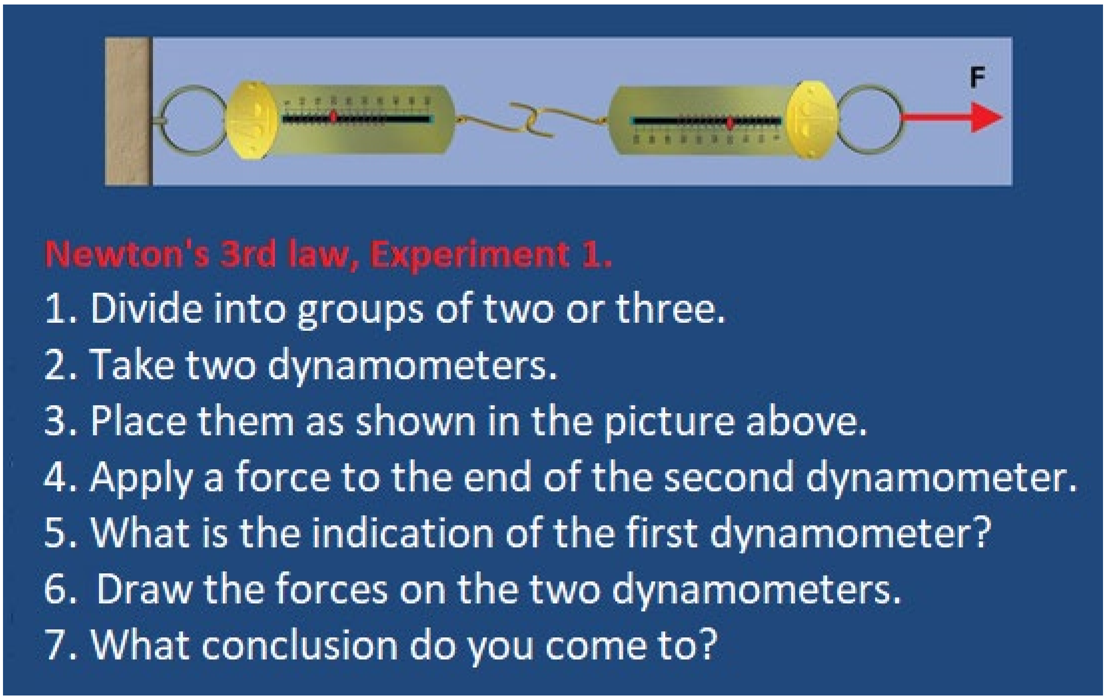
Activity

Carry out the experiment described in the image below:



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Alternative activity, in a virtual environment
Click on the link below:
https://www.seilias.gr/index.php?option=com_content&task=view&id=582&Itemid=32&catid=21

In this virtual experiment, there are two wagons in which we can place boxes of different masses. You also can vary the strength of the magnets that cause mutual attraction between the wagons. Once you are familiar with the application, set the power of magnet 1 to be twice that of magnet 2, and by varying the masses, complete the table below:

Table 1. The power of magnet 1 is twice that of magnet 2

α/α	Wagon mass 1	Wagon mass 2	F_1	F_2
1	*1*	1		
2	*2*	1		
3	*3*	1		
4	*2*	3		
5	*1*	3		

Then reverse the power of the magnets and complete the table below.

Table 2. The power of magnet 2 is twice that of magnet 1

α/α	Wagon mass 1	Wagon mass 2	F_1	F_2
1	*1*	1		
2	*2*	1		
3	*3*	1		
4	*2*	3		
5	*1*	3		

What do you observe? To which conclusion do you arrive?

………

………

……

Post activity task

Is the horse right? Explain your opinion

Phase A activity: Exploring sound

Expected learning outcomes	Activities	**Materials/Tools**	Time
Raising interest in sound and its characteristics. • Explain that the sense of sound is caused by vibrations. • Identify the characteristics of sound: volume and pitch.	Activities 1A, 1B, and 1B΄. Study the characteristics of the sound produced by stretched rubber bands.	Activities 1A, 1B, and 1B΄. • 1 container (wooden or plastic taper type) • 2 common rubber bands • 1 small thin wood or two small hard business cards joined together.	30′

Activity 1A: Vibration and sound

Attach one end of the rubber band to a fixed point, e.g. the handle of a drawer, and pull the other end of the rubber band so that it stretches enough. Pull and release one side of the rubber band sharply.

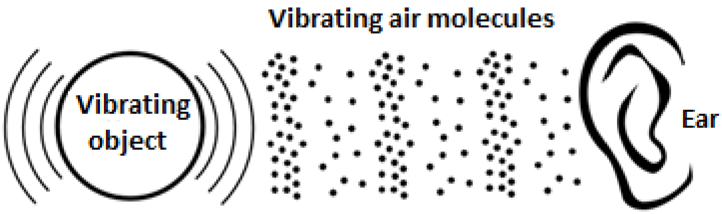
<u>Question 1:</u> The sound produced is loud or faint;

………

<u>Question 2:</u> How do you think the energy emitted by the vibration of the rubber band reaches our ears as sound?

………

………



Activity 1B: Changing the volume and pitch of the sound

In a container, attach two different rubber bands, as in the picture on the right.

α) Pull a little and leave one rubber band.

Question 3: The sound you hear, compared to the sound of activity 1, is different. Which features of the sound have been differentiated?

……

……

Question 4: Can the presence of air under the rubber bands play a role in the change in sound characteristics?

……

……

b) Pull enough and leave the same rubber band.

Question 5: Is the sound you hear, compared to the sound of the previous pull, different? In what way?

……

Question 6: Do you think the loudness of the sound is related to the amplitude of the vibration caused?

……

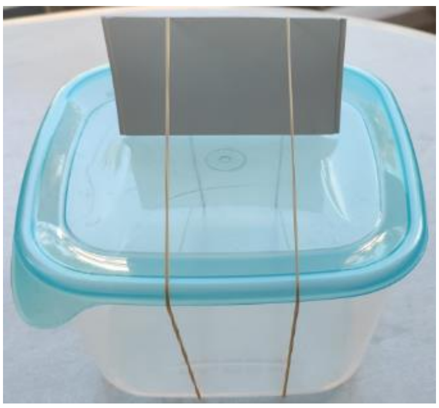
c) Pull a little and release one rubber band.

Question 7: Is the sound you hear now, compared to the sound of the other rubber band, different? In what way?

……

Alternative activity 1B΄

Make the following construction. In a container such as the one in the figure, attach two non-identical rubber bands. About a third of the way down the container, place the two cards upright and slip the rubber bands over them, which should be relatively taut.



α) Pull and release one side of one rubber band very quickly.
b) Pull and release the other side of the same rubber band or the other rubber band.
c) Move the position of the cards forward or backward and pull again the rubber band.

Write down your observations.

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……
……

If there are any questions, write them down so that we can discuss them in class.

Phase B activity: Exploring sound

Expected learning outcomes	Activities	**Materials/Tools**	Time
• Describe how sound waves are produced and propagated. • Relate the intensity and pitch of the sound to the amplitude and frequency of the vibration.	Activity 2A: Watch a video that clearly shows the vibration of the strings of a guitar as they produce sounds. Activity 2B: Study of a simple simulation for sound waves. Announce the findings of each group and discuss them in plenary.	P/C or tablet	10’ 15΄ 15΄

Activity 2A:

Watch the video: The Physics of the Guitar! In particular, observe the vibration of the strings. https://www.youtube.com/watch?v=RNt8d6vJj8c

To record the vibration you see in the video (so that it can be perceived by the human eye), a camera was used that takes 60 frames per second.)

Question 1: Is what happens to the guitar strings similar to what happened to the rubber bands in the experiments we studied at home?

……

……

Question 2: What characteristic of the vibration/oscillation of the string do you think is related to the intensity of the sound we hear from it?

……

……

Question 3: Why does the pitch of the sound change when we change the chord?

……

……

Activity 2B

Study the simulations

a) The sound wave.

http://photodentro.edu.gr/v/item/ds/8521/11356

β) Visualizing Sound in a Medium.

https://openscied-static.s3.amazonaws.com/HTML+Files/openscied-sound-interactives-master/sound.html?version=v4

Question 4: Fill in the blanks in the sentences with the appropriate words:

α) Sound waves are .... (transverse, longitudinal).

b) Sound waves propagate .... (in materials, in vacuum).

c) The number of oscillations an air molecule makes in 1 second is called .... (period, frequency).

d) The time it takes a wave to complete a cycle is called .... (wavelength, amplitude)

Question 5: The energy from the vibration of the rubber band (which we did in the activity at home) or the string is transferred to our ear:

α) Because it creates compression and rarefaction patterns that propagate through the vacuum.

b) Because it pushes air molecules towards our ear.

c) Because it causes the air molecules to oscillate and this oscillation is propagated through space.

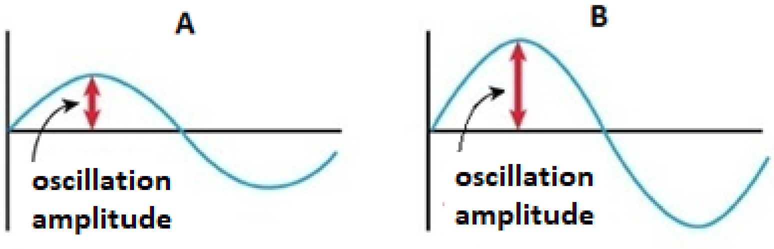
Choose the correct sentence and explain your choice.

……

……

……

Question 6: The diagrams below show two different sound waves. Which one corresponds to a louder sound?



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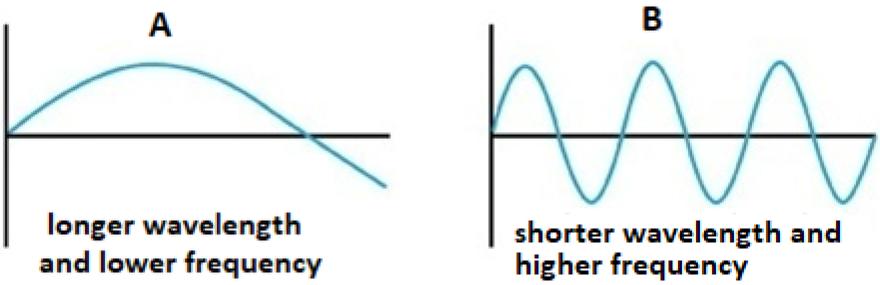
Question 7: The graphs below show two different sound waves. Which one corresponds to a sharper sound (a higher pitch sound)?



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Foreign Language

Think-Pair-Share (Hetika et al., 2017)

Creator	Eftihia Papahristou
Course	English
Didactic unit	Graffiti versus Street Art
Estimated Time	15 minutes
Learning objectives	**Think-pair-share** is a **collaborative learning strategy** where students work together to solve a problem or answer a question about an assigned reading. This strategy requires students to **(1) think individually about a topic or answer a question, and (2) share ideas with classmates**. Discussing with a partner maximizes participation, focuses attention, and engages students in comprehending the reading material. **Why use think-pair-share?** • It helps students to think individually about a topic or answer a question.

	• It teaches students to share ideas with classmates and builds oral communication skills. • It helps focus attention and engage students in comprehending the reading material.
Target Group	C Class Students of Junior High School
Description	**Think-Pair-Share/Write-Pair-Share** • The teacher poses a question that demands analysis, evaluation, or synthesis. • Students take a few minutes to think through an appropriate response. • Students turn to a partner (or small groups) and share their responses. • Take this a step further by asking students to find someone who arrived at an answer different from their own and convince their partner to change their mind. • Student responses are shared within larger teams or with the entire class during a follow-up discussion. **How to use think-pair-share** Decide upon the text to be read and develop the set of questions or prompts that target key content concepts. Describe the purpose of the strategy and provide guidelines for discussions. Model the procedure to ensure that students understand how to use the strategy. Monitor and support students as they work through the following: **T : (Think)** Teachers begin by asking a specific question about the text. Students "think" about what they know or have learned about the topic. **P : (Pair)** Each student should be paired with another student or a small group. **S : (Share)** Students share their thinking with their partners. Teachers expand the "share" into a whole-class discussion.

Jigsaw (Mengudo & Xiaoling, 2010)

Creator	Eftihia Papahristou
Course	English
Didactic unit	Graffiti versus Street Art
Estimated Time	15 minutes
Learning objectives	**Jigsaw** is a **collaborative learning strateg**y that enables each student of a "home" group to specialize in one aspect of a topic. Students meet with members from other groups who are assigned the same aspect, and after mastering the material, return to the "home" group and teach the material to their group members. With this strategy, each student in the "home" group serves as a piece of the topic's puzzle and when they work together as a whole, they create the complete jigsaw puzzle. **Why use jigsaw?** • It helps build reading comprehension. • It fosters collaborative learning among students. • It helps improve listening, communication, and problem-solving skills.
Target Group	C Class Students of Junior High School
Description	**How to use a jigsaw** Introduce the strategy and the topic to be studied. Assign each student to a "home group" of 3-5 students who reflect a range of reading abilities. Determine a set of reading selections and assign one selection to each student. Create "expert groups" that consist of students across "home groups" who will read the same selection. Give all students a framework for managing their time on the various parts of the jigsaw task. Provide key questions to help the "expert groups" gather information in their particular area. Provide materials and resources necessary for all students to

	learn about their topics and become "experts."

Digital Escape Rooms

Creator	Eftihia Papahristou
Course	English
Didactic unit	Graffiti versus Street Art
Estimated Time	15 minutes
Learning objectives	**(Digital) Escape rooms** are a **collaborative learning strategy** that can be a fun, exciting way to unlock a mystery collaboratively. In physical escape rooms teams work together to solve various clues and unlock codes so that they can essentially escape the room. Escape rooms can be engaging active learning activities that allow students to review course concepts with their peers during class. Escape rooms can translate well into virtual, synchronous settings by building them in a tool such as Google Forms and assigning students to specific groups or breakout rooms to solve the clues. **Why use Escape rooms** An escape room is a critical-thinking adventure game. Participants work together to solve a series of puzzles, riddles, and physical challenges to unlock a door. Teachers can craft their challenges to raise students’ motivation to participate in the activity.
Target Group	C Class Students of Junior High School
Description	**How to implement Digital Escape Rooms** See the 10-step process below presented by Neumann et al. (2020, p. 420-421) to understand how Digital Escape Rooms can be implemented:

	1. Determine which group of students you are creating the digital escape room for, the length of time you will give students to complete the escape room, your intended level of difficulty, the topic(s) to be covered, and learning objectives. 2. Create a list of the 3-5 most important takeaways from the topic your digital escape room will be covering. 3. Write one question for each important takeaway that would encourage students to demonstrate and/or apply what they have learned. 4. Write a background story that provides the context or theme for the room or environment your students are trying to escape from. Hide clues in the background story that presents the first puzzle students need to solve to unlock the first lock. 5. Find or create an image of the "room" or environment students will be escaping from. In step 7, you will hide links to additional puzzles that assist students in unlocking other locks. 6. Create puzzles for the remaining questions you wrote in step 3. Consider using the provided puzzle resources to assist you in creating the puzzles. 7. Hide the links to each puzzle you created in step 6 in the image of the room or environment students will escape from. 8. Create a form for students to submit their puzzle solutions and unlock each of the locks. If possible, create a section for each lock and require response validation for a text that contains only the answer; this will prevent students from moving to the next lock before they have submitted the correct response. 9. Compile your background story, room/environment image, and form in a single location for students to access and complete. 10. After implementing, evaluate the learning objectives, get feedback from students about their experiences, and update the digital escape room as necessary.

Fishbowl Strategy (Pearson et al., 2018)

Creator	Eftihia Papahristou
Course	English
Didactic unit	Graffiti versus Street Art
Estimated Time	15 minutes
Learning objectives	**Why use Fishbowl Strategy?** Fishbowl is a collaborative engaging and student-centered strategy that builds comprehension of complex texts while developing group discussion skills. In the inner circle—or "fishbowl"—students practice responding to multiple viewpoints. Observations from students in the outer circle provide insight into what makes for effective small-group discussions. Research supports the use of fishbowls as a particularly effective way to engage students with a range of abilities in multiple settings.
Target Group	C Class Students of Junior High School
Description	**How to Implement Fishbowl Strategy** 1. Choose a text. The text can be read independently before class or in class. 2. Begin by selecting four or five students to join the fishbowl group. Only students in the fishbowl are allowed to talk. 3. Instruct the outer circle to remain quiet, observe and take notes on the content and process of the inner circle's discussion. 4. The first few times, play the role of the facilitator yourself. Once the process is familiar, select a student facilitator. The facilitator does not participate in the discussion but poses questions along the way to prompt deeper discussion and to make sure everyone inside the fishbowl has a chance to talk. 5. Identify the focus of the discussion and provide text-dependent questions for students to answer during the fishbowl discussion. 6. Allow the conversation to progress where students take it. Rotate students in and out of the fishbowl throughout the course of the discussion. Set up a procedure ahead of time so students know to expect this rotation. Allow the fishbowl discussion to continue for at least 15-20 minutes. 7. After all students have rotated through the fishbowl, divide the class into small groups and invite students to debrief. Students can use their

	observations from the outer circle to highlight the strengths of the discussion and make suggestions for ways to engage each other more meaningfully. These discussion starters can facilitate the conversations: ▪ *What did you observe during the discussion of the text?* ▪ *What is one thing you heard that you agree with?* ▪ *What is one thing you heard that you disagree with?* ▪ *How did you feel while on the outside of the fishbowl?* ▪ *How did you feel while on the inside of the fishbowl?* 8. Wrap up the process with a full class discussion. Pose a final question and allow everyone to respond by turning and talking with a partner or doing a quick write: What is one thing you have learned from the fishbowl process about discussing texts? learningforjustice.org/classroom-resources/teaching-strategies/community-inquiry/fishbowl

Tic Tac Toe (Romano, 2014)

Creator	Eftihia Papahristou
Course	English
Didactic unit	Graffiti versus Street Art
Estimated Time	15 minutes
Learning objectives	**Why use TicTacToe Strategy?** Think-tac-toe is a strategy that harnesses the visual pattern of the tic-tac-toe game to broaden student understanding of instructional content, challenge students who already have some mastery of a subject as well as provide a variety of means to assess student mastery in a way that is fun and unusual. A teacher would design a think-tac-toe assignment to support the purpose of the study unit. Each row could have a single theme, use a single medium, explore the same idea across three different media, or even explore a single idea or subject across different disciplines.
Target Group	C Class Students of Junior High School

Description	**How to implement TicTacToe Strategy** 1. There are 1–4 students per team. Two teams play the game, with one team as Os and the other as Xs. 2. The teacher distributes the premade Tic Tac Toe grids, or the students copy them from the board. 3. The teams take turns choosing any square to try to score "3 in a row." 4. The team jointly makes one sentence with the selected grammar or vocabulary. 5. The other team judges the sentence with teacher assistance, if necessary. If correct, the team places the appropriate letter (O or X) in the square. If the sentence is incorrect, the square stays as is. 6. The winning team is the first to get "3 in a row" horizontally, vertically, or diagonally. 1. You can make several grids on a piece of paper and then copy one per team, or you can have the students draw their game boards modeled after your sample on the board. 2. You might want to consider placing more difficult language items in the center row going across the puzzle. That way, for a team to win, they will likely need to get a harder item correct. 3. Suggested grammar forms to use: A. simple past irregular verbs (write the infinitive form and a past form needs to be created; e.g., to ask, to believe, to cry, to go, to protect, to sing, to talk, to wish, to give) B. adverbs or adjectives (use one part of speech and the other needs to be created; e.g. slow, quick, happy, bad, fast, sweet, silent, angry, extreme) C. verbs followed by gerund or infinitive (write the verb and a second verb in the infinitive or gerund form needs to be created; e.g., start, stop, try, begin, dread, forget, keep, need, regret, remember). D. You can also use vocabulary from any text the students are studying, interested in, or learning.

Foreign Language (French)

Resembling the "Millionaire Game"

Creator	RDPSE of Attica Stelios Markantonakis
Course	French
Didactic unit	Speaking about myself (linguistic knowledge)
Estimated Time	30 min
Learning objectives	Vocabulary and syntax
Target Group	LEVEL A1
Description	This game activity resembles the well-known "Millionaire" Game. It could be exploited to recapitulate what is taught in the didactic unit "Introducing ourselves". The activity could be given as a project where students could create their own question sets. http://photodentro.edu.gr/ugcc/Franconnaire1_pidx006839


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