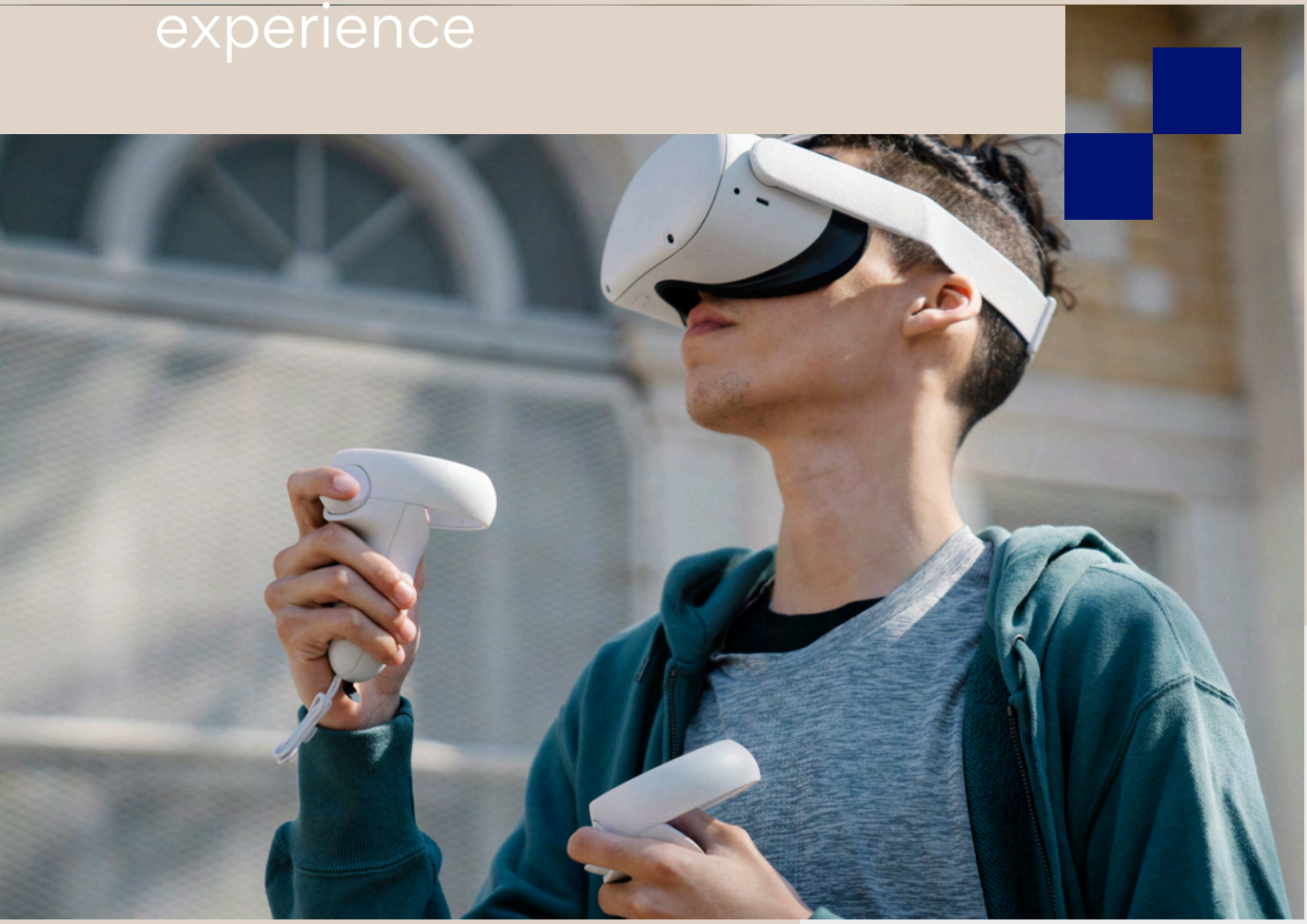
# VR ELITE - Virtual Reality for English Language Innovative Teaching

## Summary of the project's experience



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# Introduction

**VR ELITE – Virtual Reality for English Language Innovative Teaching** is an EU-founded project, where four institutions – one NGO and three primary schools from Poland, Finland and Estonia teamed up to run 2-years programme of extracurricular activities and international mobilities of students aged 12-15 years. The main aim was to test the use of virtual reality tools for teaching the English language at schools, at this stage during extracurricular activities.

In this publication, we would like to share the most valuable elements and conclusions from our experience with a wider audience of teachers and all the other recipients interested in this topic. Therefore chapters, which can be found on the following pages, contain:

- Presentation of the schools taking part in the project
- Methodology – how the activities were planned and implemented
- References to the national school curricula – to show the connection between our activities and the school teaching programmes
- Technical resources and tools – a list of equipment and online resources, VR games in particular
- Case studies – the main part of the publication - nine different examples of how the activities were implemented, in different schools and various groups of students
- Evaluation conclusions summarising the main benefits and challenges of our initiative
- Bibliography – the main sources on which our idea, the activities and this publication were based

We believe that this publication will be a source of interesting information for all practitioners looking for ideas for their work with young people and also for those who would be interested in this subject for theoretical reasons only.

# Szkoła Podstawowa nr 5 im. Mikołaja Kopernika

Primary School No. 5 (SP5) named after Nicolaus Copernicus is a public school run by the Wadowice Commune. It conducts didactic, care and educational activities typical for Polish primary schools.

It's a middle-sized school with ca. 450 students in age between 6 and 16 years old.

The school puts a lot of effort into extending its educational offer with different kinds of tools and activities, which may not be compulsory, but are very helpful in making teaching more attractive and effective. They do it either in the form of extracurricular activities or they implement new solutions to regular classes.

The main extracurricular activities are:

- Involvement in so-called "nights of scientists" organised by the universities from Kraków
- Meetings with scientists and science popularizers at school

- School trips to science centres or interesting places in the region
- Regular night sky observations
- Involvement in maths competitions and events like the International Pi Number Day
- Other events connected with the works and life of the school patron – Nicolaus Copernicus
- Robotics lessons for the students
- Thematic extracurricular classes of physics, chemistry, biology, geography, maths, theatre group, chess, art, music
- Training courses for teachers to extend/develop knowledge and skills related to teaching, using information technology and psychology achievements in and for education
- Wide range of specialist lessons for disabled children (including special IT use)

Thanks to the ongoing digitization of Polish schools students are increasingly using IT equipment during classes, including tablets, robots, programming kits, and a 3D printer.


# Smedsby-Böle skola

Smedsby-Böle school is a public school located approx. 5 km north of Vasa, in central Smedsby, Korsholm. In Smedsby-Böle school there are 260 students.

Although placed in Finland, they are a Swedish-speaking school, representing the Swedish minority in Finland. In the region, however, the Swedish language (the second official language in Finland) is the language of the majority and the school community speaks Swedish as its mother tongue.

The Core Values of the Smedsby-Böle school is that all students are unique and have the right to a good education. The school is based on humanity, equality, democracy, sustainable living and education. Cultural diversity is an asset. In Smedsby-Böle school, pupils, teachers and other staff aspire to create school well-being, achievable by caring, supporting and helping each other.

A good learning ability is created by building trust in the students and their parents, by giving time to listen and talk to the students as well as daring to put necessary limits. In addition to the social initiative in the school, teachers aim to maintain a good standard of teaching, where basic knowledge and work motivation play a central role.


Learning is the result of long-term work. Knowledge and skills acquired by the students outside the school are valued, utilised and strengthened.

The basis for teaching is the teacher's knowledge of and respect for the student's individual development. In the choice of working methods, the possibility of joint learning, activity and dialogue is emphasised.

The students are active and set goals and plans for their learning. The pupils can influence where, when and how they learn. Students are given the opportunity to choose working methods that suit them. Each student takes responsibility for his / her learning. The teacher creates an atmosphere in the classroom that allows the students to express themselves in versatile ways.

In Smedsby-Böle skola a lot of new technologies in almost every subject are being used. The school is equipped with a variety of robots for programming and with Oculus 2 VR goggles together with several Steam games downloaded on computers for game-based learning. The pupils are using iPads or a computer daily. Every teacher has been given an iPad and a computer to use when teaching.

# Tartu Catholic Education Centre

Tartu Catholic Education Centre is a private basic school and kindergarten (classes K-9), the owner of which is NGO Tartu Katoliku Hariduskeskus (Tartu Catholic Education Centre).

Tartu Catholic Education Centre (originally Tartu Catholic School) was founded in the early 1990s by a citizens` initiative with 15 children and one teacher. Today there are 620 children in kindergarten and school altogether.

The school principles are as follows:

- Cooperation of school, home and church.
- Equal development of intellectual and spiritual capacity.
- Supporting discipline.
- English teaching by total immersion method. The students start to learn English from the first grade five lessons a week using no mother tongue in the lessons.
- Using different active learning and inquiry-based learning methods and integrating the subjects as much as possible. The school is developing creativity and digital competencies through different activities including robotics and other ways that contribute to learning 21st century skills.

The school is developing towards better digital competencies. Therefore, the primary classes are supplied with iPads, robotic devices and computer classes and the teachers participate in courses to enhance digital skills.

The vision of Tartu Catholic Education Centre is:

- To value family, to help parents in their mission to raise a child.
- To value both academic education and character building through the cultivation of virtues equally.
- To create an environment in the school where love and respect for fellow human beings prevail and where the weaker ones are taken care of.
- To value Christian culture, traditions, folklore and pure nature.
- To notice and consider the individual characteristics of students, help students recognize and develop their strengths and talents.
- To raise a person with a sense of mission who dares and knows how to make ethical choices when operating in society.

# Methodology

In the next section, we present the 9 case studies describing examples of the most effective use of VR technology during extracurricular activities in three different primary schools extended with three international workshops of students organised once in each school. As an introduction to that section, in this part we would like to describe the overall methodology behind the activities showing their individual and common elements.

The whole process took two school years, during which each school was implementing year-lasting programmes of the extracurricular activities. In order to match the tools and methods with the national and internal school policies and considering the optimal effectiveness of such activities for regular class work, each of the school was free to choose topics, games and a way of running activities, such as specific class or group, teacher engagement, frequency and duration of meetings, and distribution of the resources for specific groups. Each school could also decide if the programme of the second year should be modified compared to the previous one or not.

As a result, we received three examples of the approach to organising extracurricular activities, related to the individual school culture and practical arrangements, students' needs and national school programme requirements. Thanks to that, we have the possibility to share with the broader audience various ideas of implementation of innovative technologies in schools, and we believe that every teacher willing to use such tools in her or his practice, will find something useful here.

We see the value and usefulness of these materials also because of their common features, which are rooted in the methodological principles which we wanted to grow our activities on. Those principles come from several innovative methodological approaches to education, from which the main are:

## 1. Contextual Teaching and Learning (CTL)

Contextual teaching and learning is a concept of teaching and learning that helps teachers relate subject matter content to real-world situations, and motivates students to make connections between knowledge and its applications to their lives, making learning more meaningful and relevant.*

Its effectiveness is based on the several attributes, which were present also in our activities:

- CTL often involves integrating multiple disciplines, showing students how knowledge from different areas is interconnected and applicable in various contexts. Our activities were based on teaching language in connection with other subjects, like geography, natural sciences, music, history, etc. This cross-curricular approach helped students understand English vocabulary in the context of other subjects.

- CTL promotes problem-based learning, where students apply their knowledge to practical, real-world problems, thereby deepening their understanding through experience. One of many examples of such an approach in our case can be Job Simulator, which allows students to engage in tasks related to different professions, and learning vocabulary and expressions specific to those jobs, or experiments in Futuclass.

- CTL recognizes the importance of social interaction in learning, where collaboration and communication are key components of the educational process. They were crucial for the success in playing Keep Talking and Nobody Explodes.

- CTL encourages reflective practice, where students think critically about their learning experiences and how they can apply their knowledge in different contexts. Following this, we spent a lot of time on debriefs, where students reflected on their experiences, discussed challenges, and considered what they had learned during each session.

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* Berns, Robert G.; Erickson, Patricia M., *Contextual Teaching and Learning: Preparing Students for the New Economy. The Highlight Zone: Research @ Work No. 5.* (https://eric.ed.gov/?id=ED452376)

- CTL supports authentic assessment methods that evaluate students' abilities to apply their knowledge in real-world scenarios, rather than through traditional testing alone. Such a role had discussions, reflections, and related assignments following geographical experiences through Wander, real-life-like situations in Mondly, and historical immersion in Anne Frank's House VR.

Overall, these approaches helped make learning more meaningful and relevant for students, allowing them to see the practical applications of their English language skills in various real-life scenarios.

**2. Game-Based Learning (GBL)**

This term can have two meanings:

- GBL is an active learning technique where games are used to enhance student learning. Here, the learning comes from playing the game and promotes critical thinking and problem solving skills. Game based learning can be accomplished with digital or non-digital games and may include simulations that can allow students to experience the learning first-hand.

- GBL, where game characteristics and principles are embedded within learning activities. Here, learning activities promote student engagement and motivation to learn. Components of game-based learning include points systems, badges, leaderboards, discussion boards, quizzes and classroom response systems.*

Our activities fulfil both parts of this definition. In details:

- GBL's focus is on using games to enhance specific skills in an engaging and interactive way. Obviously, the games were in the centre of the whole approach and during almost all activities.

- GBL emphasises "learning by doing," where students acquire knowledge and skills through active participation in game-like scenarios. Job Simulator is again a great example here.

* Top Hat Glossary (https://tophat.com/glossary/g/game-based-learning/)

- GBL often incorporates progressive difficulty levels that challenge students appropriately, keeping them engaged while gradually increasing the complexity of the tasks. A significant number of the games were designed in this way, that the students passing initial levels were invited to try something more complex and difficult, whether it was Futuclass, Cubism, Keep Talking and Nobody Explodes, or others.

- GBL often involves multiplayer or cooperative games that require students to work together, promoting social interaction and collective problem-solving. Students were invited for collaboration not only in Keep Talking and Nobody Explodes, where this is the crucial point of success, but also in other cases, including peer learning requirements in many occasions.

- GBL emphasises the importance of feedback, often built into the game's design, helping students understand their progress and areas for improvement. Again, our sessions typically ended with a debrief or reflection on what was learned, how the games were played, and what could be improved.

- GBL relies on the intrinsic motivation that comes from playing games, where the enjoyment of the game itself drives students to learn and improve. We noticed that many times students were losing the conscience of being taught something. They were eager to say that they had learned nothing during the significant time, while in reality, the situation was quite opposite – they were consuming knowledge faster more effectively than during regular class work.

Overall, the activities described in our case studies align closely with the principles of Game-Based Learning, leveraging the immersive and interactive nature of VR games to enhance student engagement, motivation, and learning outcomes. By incorporating elements such as skill development, learning by doing, progressive difficulty, collaboration, and reflection, these programs effectively utilised GBL strategies to create a dynamic and effective learning environment.

## 3. Peer learning

Peer learning is an education method that helps students solidify their knowledge by teaching each other. One student tutoring another in a supervised environment can result in better learning and retention of facts.*

Peer learning elements are quite prominent in the case studies. Situations, where students were engaged in knowledge sharing, problem-solving, and mutual support, were integrated into various activities in our VR-based English teaching programs. Here are some examples of such cases:

- The game Keep Talking and Nobody Explodes required students to work in pairs, with one student defusing a virtual bomb while the other provided instructions from a manual. This activity is a direct application of peer learning, as students had to collaborate closely, share information effectively, and support each other to achieve the task. The reliance on each other's skills and knowledge is a core aspect of peer learning.

- Due to the limited number of VR headsets, students were organised into small groups that rotated between different VR activities. While one group was using the VR equipment, others engaged in related tasks or observed and learned from their peers who were currently using the VR tools. This rotational system encouraged students to teach each other and share insights as they moved through the different activities. This setup fostered a collaborative learning environment where knowledge and skills were passed between peers.

- Students often worked in pairs or small groups. When one student was using the VR headset, the other might observe or assist, offering tips or guidance based on their own experience with the tool. This is a strong example of peer learning. It allows students to reinforce their own understanding by teaching others and also provides a supportive environment for those who might be less confident.

* Hansen, Jake, Peer Learning: Overview, Benefits, and Models (https://www.wgu.edu/blog/peer-learning2208.html)

- The use of VR for exploring natural sciences (Futuclass) involved students working together in small groups, where they shared tasks such as conducting virtual experiments or exploring virtual environments. Cooperative learning, where students work together to achieve common goals, is central to peer learning.

- Each VR session often concluded with a group debrief or reflection, where students discussed what they learned, shared experiences, and provided feedback to each other. Group reflection sessions are an important component of peer learning, as they provide a platform for students to articulate their learning, hear different perspectives, and collectively construct knowledge.

- When playing exploratory VR games like Wander or National Geographic Explore VR, students often discovered new places or features within the game and then shared these discoveries with their peers. Peer-led exploration, where students take initiative in discovering new information and then share it with their peers, fosters a learning environment where students are both teachers and learners.

- The students were also creating assignments, including so-called “escape rooms” for each other in the VR world, and played together in Rec Room or Gorilla Tag, which had a positive impact on their problem-solving skills.

Overall, peer learning was a fundamental element across the VR-based English teaching programs. Students were frequently engaged in collaborative activities, where they depended on each other's knowledge, skills, and support to succeed. This peer learning approach not only enhanced their understanding of the content but also developed important social and communication skills.

## 4. Other methodological approaches

Except for the above mentioned, our activities were influenced also by other methods, which our teachers brought from their practice in various fields. The goal was to create as effective and as attractive lessons as possible to fully use the potential of VR and other technologies. The main concepts to be found in our approach were:

- **Problem-Based Learning (PBL)**. Problem-Based Learning is a teaching method in which complex real-world problems are used as the vehicle to promote student learning of concepts and principles as opposed to direct presentation of facts and concepts.* Our activities were often problem-based, particularly in natural sciences, where students engaged in experiments and simulations (Rec Room for instance). This method encouraged critical thinking and contextual learning.

- **Flipped classroom.** The flipped classroom model reverses the usual school classroom by providing instructional, often online, content, outside of the classroom. Time is then spent for exercises, projects, and discussions that deepen understanding. Elements of the flipped classroom can be inferred from the way students prepared for VR activities and then engaged in interactive, hands-on learning during class. For instance, students were expected to familiarise themselves with VR tools and instructions, allowing classroom time to focus on practical application and peer interaction.

- **Blended Learning.** Blended learning combines traditional face-to-face lessons with digital and online media. We were not only connecting our extracurricular activities in schools with mobilities for international workshops, but also mixing and integrating digital tools with conventional ones, like worksheets, coursebooks, quizzes, and textbooks.

- **Experiential Learning.** Experiential learning involves learning through experience. The VR activities such as exploring historical sites or natural environments, or simulating real-life job scenarios provided students with experiential learning opportunities where they engaged directly with the content in a virtual, yet lifelike, setting.

- **Student-centered approach.** The activities were highly student-centered, focusing on what students were interested in exploring. Teachers took student input to plan lessons, ensuring engagement and motivation.

* Center for Innovation in Teaching & Learning (https://citl.illinois.edu/citl-101/teaching-learning/resources/teaching-strategies/problem-based-learning-(pbl) )

- **Use of VR as a complementary tool.** VR and other digital tools, were used not as a replacement for traditional methods but as a complementary tool that provided immersive, context-rich learning experiences. This approach helped bridge the gap between theoretical knowledge and practical application.

### 5. Integration with international mobilities

Despite that this part is not highlighted in most of the case studies, it is worth mentioning the role which another part of the project – international mobilities of students have in the general training programme.

Our school activities were extended with international student mobilities, where groups from each country met. This integration provided students with a broader cultural perspective and the opportunity to apply their learning in real-life intercultural settings.

Each mobility program had a 5-day workshop agenda including such elements like VR workshops for bigger, international groups, activities based on other digital media, cultural activities, group building activities, and knowing other environments and cultures. The students from all countries were also in contact in between the mobilities - they were meeting online and in VR, they were preparing short videos introducing the groups and partner countries.

This had a great impact on the overall teaching and learning process:

- **It supported Contextual Learning and Teaching.** The workshops offered an opportunity for students to apply the English language skills they've learned through VR in real-world contexts. When travelling, visiting schools, museums, or cities in another country, students encountered new situations where they had to use English to communicate, ask questions, or participate in discussions. Similarly, when it comes to engaging in team-building activities, hiking trips, and cultural exchanges. These real-life applications helped students to reinforce and solidify the language skills they developed in the controlled, virtual environments of the VR activities.

- **It fostered deeper cross-cultural communication and understanding.** By participating in workshops in different countries, students were exposed to various cultural settings where English served as the common language for communication. This not only improved their language skills but also deepened their understanding of how language is used in different cultural contexts. The exposure to different cultures and languages through these workshops helped students develop a global perspective. We hope this encouraged them to appreciate diversity and understand cultural nuances, which are crucial for effective communication in a second language.

- **It enhanced students' motivation and engagement.** These international meetings created a unique environment where students from different countries came together, which was highly motivating. The excitement of travel (for many of them first travel abroad or travel by plane), meeting new peers, and engaging in diverse activities increased students' willingness for learning and using English.

- **It helped in improving interpersonal and social skills.** The team-building activities included in the workshops enhanced not only language skills but also interpersonal and social skills. Working together in diverse teams (groups of mixed nationalities) helped students practise English in cooperative settings, develop leadership skills, and learn to navigate group dynamics. These mobilities provided a platform for peer learning on a broader scale. Students could share their experiences, learning strategies, and knowledge across cultural boundaries, enriching each other's understanding of both the language and the world. Some of them became such good friends that they still keep in touch with each other.

- **It helped to bridge virtual and real worlds.** The workshops served as a bridge between the virtual learning experiences and real-world application. While VR simulates various scenarios, the international mobilities allowed students to experience these scenarios first-hand, making the learning experience more comprehensive and meaningful. The combination of VR and real-life experiences created a holistic learning approach. VR helped students practise specific skills in a controlled environment, while the mobilities provided a broader context for these skills, helping students see the practical relevance and utility of what they've learned.

Overall, the inclusion of these international workshops as extensions of the VR-centred extracurricular activities was highly beneficial. These workshops amplified the effectiveness of the VR activities by creating a stage for a bigger, nation-mixed activities and by providing real-world contexts where students could apply, reinforce, and expand their English language skills. Moreover, they contributed to the development of critical soft skills, cultural awareness, and global competencies, making the learning experience richer, more engaging, and more impactful.

# References to the national school curricula

Although the extracurricular activities were organised mostly in a different way than the regular English language lessons, they still were planned in a way to be aligned with the goals set up in the national school curricula in the particular partner countries.

Activities presented by the **Smedsby-Böle skola** were referred to the curriculum from the **Finnish** National Agency for Education, and the goals for the fifth and sixth grade education. They are the following:

- To instruct and encourage the students to practise their knowledge of English using digital tools
- To instruct the students to practise communicating in different ways and different environments
- To support the student's culturally appropriate language use by offering opportunities to multilaterally practise in social situations
- To support the student to develop environmental awareness
- The give the students the opportunity to gain knowledge and skills in three-dimensional work
- To develop logical, precise and creative mathematical thinking in students
- To support the students to deepen their ability to compare, classify and arrange, systematically search for alternatives

Teaching in primary school should be organised in a way that:

- It helps to guide the student in geographical thinking and to observe their surroundings and the whole world in a virtual way
- Central perspective is to value the diversity of nature and culture and increase global understanding
- It helps students to explore and learn about nature's structures, principles and cycles; such as the photosynthesis

- It helps students to immerse themselves in work and different professions
- The content of the teaching must consist of different environments, media cultures and virtual worlds
- Guides the students to purposefully develop their visual skills independently and together with others.
- Guides the students to examine visual culture and to reflect on how historical and cultural factors influence images.
- Arouse the student's interest in history as a science and identity-building subject.
- The students develop their ability to find similarities, differences and patterns.
- Guide and support the student in the development of the ability to solve problems.

Also, the specific topics covered by the activities, such us:

- Expanding vocabulary both oral and written in general
- Practising speaking and communicating
- Improving communication and problem-solving skills
- Learning common phrases for travelling, visiting restaurants & hotels
- Learning vocabulary and information about different cultures and countries
- Learning vocabulary related to photosynthesis
- Learning vocabulary related to buildings and construction
- Learning different expressions and vocabulary for specific jobs
- Practising speaking and communication by using different prepositions

are a part of the Finnish school curriculum for language teaching in primary schools.

**Primary School no. 5 from Wadowice** was working in relation to the **Polish** Core Curriculum. According to this document, students in primary schools:

- Are expected to develop reading, writing, speaking and listening skills (each year the same skills but the level is more advanced)
- Should acquire competency and knowledge of basic vocabulary which enable them to take part in typical, every day conversations
- Should be able to perform efficient communication in the modern foreign language and creative problem solving in a teamwork
- Should be able to use a basic resource of rhetorical terms (lexical, grammatical, orthographic and phonetic)
- Should be able to cooperate, work as a team, listen to each other and take account of different views, discuss, create and compare opinions.

Other goals set up in the school core curriculum in Poland, which were met during the activities are the following:

- The English language should ultimately become the main language of communication during the lesson in different kinds of interactions (teacher-student, student-student).
- Schools should encourage students to use computers and other digital tools and applications, search for information on the Internet in order to solve problems, acquire knowledge, and develop different skills.
- The school should introduce the young learners to the world of knowledge and to implement self-development, considering their individual capabilities and needs, even disabilities, emotional or health problems, so it's the teacher's role to know, motivate and help students.
- The school should follow the recommendations of The Council of the European Union on key competences for education. One of them is to promote competence development through innovative learning approaches (digital competence).
- The school should develop learners' knowledge about the world.
- The school should promote intercultural awareness, where learners can become more aware of their own culture and understand other cultures.

- The school should help learners develop social skills by working together cooperatively, accepting different points of view and negotiating.

Comparing to the above, the specific topics covered by the activities, such us:

- Practising vocabulary connected with geography and travelling
- Learning about countries and their cultures by visiting them in a virtual world
- Dialogues in a restaurant at the train station, in a taxi, in a hotel or similar places
- Familiarising with new vocabulary and useful phrases,
- Improving speaking skills
- Improving problem solving skills
- Developing cooperation and interaction skills
- Practising logical reasoning and making decisions

are just a concretisation of the above listed general goals.

Educational goals for the **Tartu Catholic Education Centre** are established by the **Estonian** Board of Education and Youth states. According to their policy, one of the most important aspects of education is mastering the digital competence of students.

Digital competence is the ability to solve problems that arise in a digitally enriched environment in one's (educational) work with the help of digital technology. In the national curricula of primary and high schools, it is listed as one of the general competences that must be developed by the learner as part of the subject lessons.

In Estonia, a digital competence model for learners (digital citizen) has been described to define up-to-date digital competence, where digital competence areas and competences are given.

In the national curriculum, the definition of digital competence is as follows: digital competence is the ability to:

- use new digital technology to cope in a fast-changing society by learning it, as a citizen acting as well as communicating in communities;
- find and store information with digital means and evaluate it relevance and reliability;
- participate in digital content creation, including texts, images, in the creation and use of multimedia;
- use suitable digital tools for problem solving and techniques, to communicate and cooperate in different digital environments;
- be aware of the dangers of the digital environment and know how to protect your privacy, personal data and digital identity;
- follow the same in the digital environment moral and value principles as in everyday life.

The Estonian state defined digital competence as a separate general competence to be developed in accordance with the recommendations of the European Parliament and the Council of Europe of key competencies.

When learning a foreign language in the elementary and primary school:

- Digital tools are used to search for information on the Internet and the information obtained for implementation by discussing various cultural and everyday life topics.
- The information obtained is applied by solving problems, discussing or creating new content, using the digital environment purposefully with other sources of information.
- Implemented online dictionaries, translation programs and other relevant digital applications, content is created and the creation is preserved in digital form.
- When communicating in a foreign language in the digital environment, the safety of information is monitored and shared.
- When preparing texts reflecting private life, including personal data, and when sharing, attention is paid to internet security.

Also in this case, specific topics of the presented activities:

- Improving and practising vocabulary, pronunciation, and listening skills in a contextual and engaging manner
- Improving and practising vocabulary pronunciation, and listening skills connected with geography
- Levelling communication skills of students
- Learning vocabulary related to nature, wildlife, cultural practices, historical events and places
- Learning about customs, traditions, and social norms
- Learning new vocabulary and phrases related to the subject of History and places of historical importance

were chosen to meet and concretise above mentioned goals.

# Resources

In this section, we would like to briefly present the resources used for running the extracurricular activities. We needed to use our regular materials and textbooks, however, the main focus was still on virtual reality and other digital resources. Their role was crucial for the activities and their connection with traditional teacher's materials will always depend on the individual competencies and preferences.

Below, we present the equipment, main VR games and apps and other useful digital resources recommended based on our experience.

**The equipment**


Our choice of VR headsets was quite easy, as we had previous experience in testing some of the resources during our regular practice or other projects. We chose **Oculus and Oculus 2** headsets from Meta, as those which had the necessary features to be used in classrooms, even if their primary destination was rather for entertainment than education (for us it was rather an advantage than an issue):

- they are stand-alone googles which can be set up in various locations without necessity of installing additional devices
- they offer sufficient vision quality needed to achieve a “wow” effect and interest students
- they are recognizable and perceived as attractive
- they were safe to use and relatively easy to set up and learn
- as for as they were also already available and we didn’t have to spend additional resources for the purchase.

In the beginning, we were testing also another type of equipment – **Class VR**, designed especially for educational purposes. These, however, were at the very initial stage of development at that time, had very limited offers for language teaching, and much less attractiveness and picture quality comparing to Oculus.

**Other digital equipment**, which we needed were:

- computers (PC and laptops)
- tablets
- smartphones

which were used either to support VR-based activities or to run parallel or supplementary activities to those.

All of them together enabled us to run **applications and games** which we list below starting from the most important ones, on which our case studies are built and followed by others – less important but still useful for the whole process:

# The main VR Games and Apps


## Anne Frank's House VR

Anne Frank's House VR is a transformative educational tool offering an immersive and empathetic approach to learning about the Holocaust and the effects of war. By bringing history to life, this VR experience helps students understand the profound human impact of historical events, fostering a deeper connection to the past and promoting critical thinking about the present and future.


## Cubism

Cubism is a puzzle game. While assembling increasingly complex shapes out of colourful blocks, the students reason their way through 90 puzzles which put their spatial thinking skills to the test. The game pace and environment are very calming. When casted to the screen so that other students and teachers can see what is happening in the game, it creates a great opportunity to practise communication skills and vocabulary related to shapes, colours and directions.


## Ecosphere

The main content of the game are 180° videos of wild places on earth like the savannahs of Kenya, jungles of Borneo, and coral reefs of Raja Ampat. It supports learning the English language, but also such subjects as geography, biology, earth & environmental science, and supports environmental awareness and protection. Students can learn about the biosphere, biome, various ecosystems, as well as how humans benefit from a diverse ecosystem, how they impact it and can protect it.


## Futuclass

Futuclass is an VR app for teaching STEM education in secondary schools, offering interactive, game-based learning modules for hard science subjects. With Futuclass, students can learn in a safe, virtual environment - practice scientific concepts hands-on, experiment, make mistakes with no harm and receiving immediate feedback. Additionally, the immersive character of the app captures students' attention, and makes learning fun and effective.


## Gorilla Tag

Gorilla Tag is a multiplayer VR game including several game modes with the core mechanic being to avoid a tagger. Students can move by pumping their arms (like a running gorilla!) to run, climb, and jump through the environment. The game is perfect for improving the students' cooperation skills. They can play and create escape room challenges for each other.


## Job Simulator

The main features in Job Simulator is simple – it is set in a future where robots have mostly replaced humans. Students can dive into multiple simulations of what robots believe humans did in common jobs such as gourmet chef, auto mechanic, convenience store clerk, and office work. The student simply selects a simulation and dive in, completing 15 to 20 tasks per simulation before being given free rein to do whatever she or he wants.


## Keep Talking and Nobody Explodes

Playing this game one of the students is alone in a room with a bomb. Other students, have the manual needed to defuse it. They, however, can't see the bomb, while a person in the room doesn't know the manual, so they need to communicate quickly and effectively. The students need to cooperate and put their puzzle-solving and communication skills to the test to defuse bombs before the time runs out.


## Mondly VR

Mondly VR is the app containing chatbot and speech recognition. The students can practise real-life conversations with virtual characters in 30 languages, including English. They take part in realistic dialogues inspired by authentic events: making friends on the train, ordering dinner in a restaurant, checking into a hotel, etc. All these on all difficulty levels.


## National Geographic Explore VR

Thanks to the National Geographic App, the students become explorers who can discover two of the most iconic locations on the planet. In Antarctica the students can navigate around icebergs in a kayak, climb a massive ice shelf and survive a raging snowstorm in the search for a lost emperor penguin colony. In Machu Picchu they get immersed in amazing digital reconstructions of the ancient Inca citadel.


## Puzzling Places

This game brings a relaxing and wholesome 3D jigsaw puzzling to VR. The students bring together hyper-realistic miniatures of beautiful places from around the globe. During a meditative flow of puzzling each place is coming alive with their unique and immersive soundscapes as students complete them. It's simple gameplay and easy controls. The students have become familiar with famous historical buildings from all over the world.


## Rec Room

Rec Room is a free online multiplayer video game. Students can explore millions of player-created rooms and communicate with people from all over the world. They can also create their own environments (player-made items) to share with others. Rec Room is a great opportunity to build and play games together. Party up with friends from all around the world to chat or hang out. It is perfect for practising English communication.


## VRChat

VRChat is an online virtual world platform which allows users to interact with others with user-created 3D avatars and worlds. When playing VRChat, students can interact with others, express themselves, experiment with countless avatars, meet new people, or even create long lasting friendships, and just have fun. Some say that VRChat has helped them overcome social anxiety.


**Wander**

Wander is a VR application in which students can explore the whole world thanks to its connection with Google StreetView locations. They can “walk” around as if they were using this well known app, but in VR. The Social tab lets them hang out with others as they travel. They can also find some public meeting rooms to join, or they can host their own room in public or private mode.

**YouTube VR**

The YouTube VR app allows students to easily find and watch YouTube content, with added support for immersive 360 videos and virtual reality content, on certain headsets and devices. YouTube VR supports up to 4K resolution on purchased Movies viewed on Meta Quest.

# Other VR and digital Games and Apps

**Other VR games and applications**

- **Beat Saber** - One of the most known VR games, where your task is to slash the cubes in the rhythm of music
- **Elixir** - Perfect game for practising hand tracking (instructions and game play in English)
- **First steps** - VR simulation for VR beginners with instructions on how to use Oculus VR headset
- **Homestar VR** - application for the night sky and stars observations
- **Mission: ISS** - Real-like trip to the international space station. Follow instructions (English) and feel like a member of a crew
- **Moss** - Single player action game with riddles and puzzles
- **Oculus first contact** - second part, after First Steps of an app for practising VR experience
- **Star Chart VR** - Exploring solar system in VR
- **Titans of Space PLUS** - Exploring solar system in VR
- **VR English Lessons on YouTube** - short videos for English teaching and learning

**Mobile, computer and desktop games**

- **Estonian mind sports portal**
- **Games for the brain** - short quizzes, memory and brain games
- **Influent** - Language learning game
- **Kahoot** - short quizzes for every occasion
- **Lyricstraining** - Learn languages on the basis of the lyrics of the famous songs
- **Noun Town Language Learning** - for learning vocabulary and phrases
- **Reach for the sun** - game demonstrating systems of the plants' growth
- **Vocabulary games** by British Council
- **Wardwall** - for making short gaming activities for classroom

# Case studies

Below we present the central part of our publication – nine case studies elaborated based on the activities proposed to three schools taking part in the project.

**The first three case studies** are based on the activities run by the **Smedsby-Böle school from Korsholm**, Finland. In this school the teachers organised activities for the students in the 6th grade. There was a group of 11/12 students organised and the classes were usually run by two teachers simultaneously. The case studies show different examples of how to use several VR games and other digital resources during one session to introduce various topics and develop several types of skills.

**Another three case studies (4-6)** are based on the activities run by the **Primary School no. 5 from Wadowice**, Poland. In these schools the teachers organised activities for the students in the 8th grade. Each year, there was a group of 10 students recruited for the project activities. The group was divided in half and taught by one teacher at a time (although teachers were changing). Sometimes all the students were meeting together. In this approach, we focus more on one VR game or app to show its potential in supporting English teaching to a smaller group of students.

**The last three case studies (7-9)** are based on the activities run by the **Tartu Catholic Education Centre** in Tartu, Estonia. In this school extracurricular activities were proposed both, to whole classes and smaller groups, and, depending on the topic, the students from different grades were invited to participate. The teachers' engagement was adjusted to the group size and current topic, so there could be just one person or more running the class. Teachers could also change, depending on the class topic.

All the case studies illustrate the diverse applications of VR in enhancing English language learning, offering immersive experiences that improve communication skills, vocabulary, and cultural understanding. Each program also highlights specific challenges, primarily related to technical limitations and integration into traditional education frameworks, but overall, the benefits for students are substantial.

# Case study 1



## Learning and practising Interaction, communication and expanding vocabulary with popular VR and Computer Games

## Case Study 1

# Learning and practising Interaction, communication and expanding vocabulary with popular VR and Computer Games

### Topics covered

- Common phrases for travelling, visiting restaurants & hotels
- Practising speaking and communicating
- Interaction and improving of communication and problem-solving skills
- Expanding vocabulary both oral and written.

### VR games used for the programme

- Mondly VR
- Keep Talking and Nobody Explodes
- Gorilla Tag
- VRChat
- Rec Room

### Other resources

- Influent (computer game)
- LyricsTraining (online game)

### VR platform and equipment

- Meta/Oculus Quest 2

### Age of students/grade

- 12 years/grade six

### Involvement of teachers

- Two teachers were involved during all the lessons

# Case Study 1

## Size of the group

- 11-12 students

## Duration of the activity

- Four double lessons (90 min) for all the games (4 x 90 minutes in total)

## Additional tools and special arrangements

- A quiet space was needed for the students so the microphone registers the voice
- For the Gorilla Tag and Rec Room it was necessary to have enough space for movement.
- For Keep talking and nobody explodes the manual was needed, either printed on paper or downloaded and displayed on the separate screen.
- For Influent and Lyrics training headphones are preferable to not disturb other students.

## Activity description

The ideal situation would be to play one and the same game simultaneously with the whole group. However, due to the limited number of different Meta accounts, it was impossible in this case and the group was able to play VR games on three VR Goggles at the same time (three different Meta accounts). The students had to take turns and there were many different tasks going on at the same time.

Nevertheless, there are also positive effects of such a situation. The students learn that they need to be patient, try to figure out things on their own (learning by doing), and above all they need to help and teach each other!

An exemplary double lesson (90 min) looked like that:

1. At the beginning of the lesson teachers and students were gathering in a classroom and while the students were having a snack the group **planned and agreed on the lesson**. As these lessons were voluntary for the students it was very important to listen to what they were interested in trying out this time.

One of the main rules was to use only the English language during all extracurricular activities from the very beginning and translate to Swedish only when other ways of explanation in English didn't work.

## Activity description

2. Then the students could **circulate between these games**:

- 2 students cooperating and playing **Keep talking and Nobody Explodes**

The first time with a new group you need to explain and show a little bit more about how it works and the importance of describing specific expressions, like: wire, square, dots, colours, different directions, right, left, top, bottom, and so on. Later the students will start to teach each other. Print or view the Bomb Defusal Manual at www.bombmanual.com

- 3 students playing **Mondly** in different quiet spaces

A very short introduction on how the app works is needed. The students need information on how to change levels and lessons, how to use help info (NPC's bubble), suggestions panel, skip button, play audio buttons and so on.

We counted on the students' ability to help and teach each other and conduct dialogs in English. Afterward, we discussed how they managed to play and what they learned.

- 2-3 students playing **Gorilla Tag**, **Rec Room**, or **VRChat** together in one Classroom

In these games, the students need to learn how to teleport themselves suitably. These games were perfect for improving the students' cooperation skills. They could play and create escape room challenges for each other.

- Additionally to the VR exercises, 2-3 students were playing **Influent** and **LyricsTraining** on computers with headphones

3. Short **debrief** was organised at the end of the double lesson. Summary was built on questions like "How was it?" "Did you have any problems?" "What did you learn?" "What would you like to play more next time?"

# Case Study 1

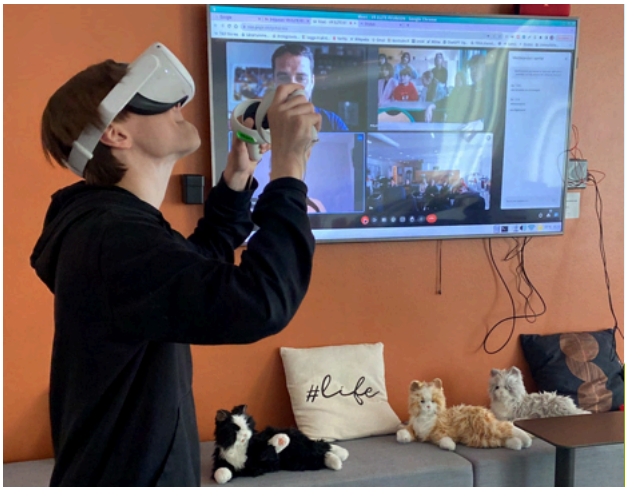
## The main challenge

- For the future, it would be good to change the Oculuses and have more Meta accounts and the students could play particular games at the same time on all headsets. This is something we strongly recommend!

## Benefits for students and learning process

- The students can **improve their way of learning** common phrases and expand vocabulary for travelling, visiting restaurants & hotels.
- The students **feel comfortable** speaking when no one is listening to them except the virtual person and the friends they are playing together with.
- The games where they have to cooperate with each other **train both their English communication skills and their problem solving skills**.
- The Influent game gives the students a chance to **learn and repeat new words at their own pace**.
- These ways of learning through games add a **varied value to ordinary teaching**. The motivation to learn among most of the students increases and then they usually learn faster.
- These VR games are perfect **for those students who are shy or who don't have enough self-confidence** to speak in front of the whole class.
- The computer and VR games offer a **good repetitive function** in a fun and not so boring way.

# Case study 2




## Teaching English in the context of Geography, Biology and Social studies

## Case Study 2

# Teaching English in the context of Geography, Biology and Social studies

**Topics covered**

- Vocabulary and information about different cultures and countries
- Vocabulary related to photosynthesis

**VR games used for the programme**

- Wander
- YouTube VR 360
- National Geographic Explorer VR

**Other resources**

- Reach for the Sun (computer game)

**VR platform and equipment**

- Meta/Oculus Quest 2

**Age of students/grade**

- 12 years/grade six

**Involvement of teachers**

- Two teachers were involved during all the lessons

**Size of the group**

- 11-12 students

# Case Study 2

## Duration of the activity

- Three double lessons (90 min) for all these games (3 x 90 minutes in total)

## Additional tools and special arrangements

- A quiet space for the students so the microphone registers the voice in Wander if you use voice search.
- If you want to cast Wander to a screen, you need a computer and a screen.

## Activity description

The ideal situation would be to play one and the same game simultaneously with the whole group. However, due to the limited number of different Meta accounts, it was impossible in this case and the group was able to play VR games on three VR Goggles at the same time (three different Meta accounts). The students had to take turns and there were many different tasks going on at the same time.

Nevertheless, there are also positive effects of such a situation. The students learn that they need to be patient, try to figure out things on their own (learning by doing), and above all they need to help and teach each other!

An exemplary double lesson (90 min) looked like that:

1. At the beginning of the lesson teachers and students were gathered in a classroom and while the students were having a snack **the group planned and agreed on the lesson**. As these lessons were voluntary for the students it was extra important to listen to what they were interested in trying out this time.

One of the main rules was to use only the English language during all extracurricular activities from the very beginning and translate to Swedish only when other ways of explanation in English didn't work.

2. Then the students could **circulate between these games**:

- 3 students playing **National Geographic Explorer VR** in the same classroom (then they can help each other when they need help)

## Activity description

It required a short introduction about how to start the game, what to do to operate the app properly, which tools you need, how to take photos, and how to teleport yourself in the app. Later the students started to teach each other. After each session, discussions were conducted about how it felt to visit these exposed areas. Visiting Antarctica was one of the students' favourite games.

- 2-3 students playing **Wander** or 2 students taking turns playing while the other follow the game on the casting screen

Just a very short introduction on how the app works was needed. Students caught the idea of using it quite easily. Some special attention was needed to teach how to use the voice search functionality and how to search by writing in the search field. It is advisable to explain how to use the controller and choose places nearby, saving favourite places and moving around virtually.

The app can be highly interactive, also with those, who do not wear VR goggles at the same time. If you cast the game to a screen, it is cool for the classmates to watch and be guided around by the person playing.

- 1-2 students playing **YouTube VR 360**

That was easy. A very short demo on how the app works, how to search for places and bookmark them is enough as an introduction. An additional value comes, If the school owns a 360 camera. Then the teacher or students can make videos, upload them on YouTube and let the others watch.

- 2 students cooperating in pairs and playing **Reach for the Sun** on one computer (1-2 pairs)

It was preferable but not necessary to create a small glossary with the most important words for this game. It was also good to have the students play in pairs so they could help each other.

3. A **short debrief** was organised at the end of each session. A summary was built on questions like “How was it?” “Did you have any problems?” “What did you learn?” “What would you like to play more next time?” Sometimes we also stopped in between for a while to discuss and improve and to teach the further refinements.

# Case Study 2

## The main challenge

- For the future, it would be good to change the Oculuses and have more Meta accounts and the students could play particular games at the same time on all headsets. This is something we strongly recommend!

## Benefits for students and learning process

- Students get **additional motivation** for learning English vocabulary and information about different cultures and countries.
- Thanks to the use of the additional game, they could **practice specific English vocabulary** related to photosynthesis.
- By visiting countries and different cultures virtually the students get a **broader perspective of the world** without actually travelling in real life.
- By visiting protected environments and experiencing endangered species, students gain an **increased understanding** of how important it is to actively take responsibility for and protect our world.
- These ways of learning through games **add a varied value to ordinary teaching**. The motivation amongst most students to learn about other countries and cultures increases when they can visit them virtually.
- The students have often got a true “**wow experience**”, which raises their interest in learning.

# Case study 3


## English in practice and training in logical and three-dimensional thinking

## Case Study 3

# English in practice and training in logical and three-dimensional thinking

### Topics covered

- Practising speaking and communication by using different prepositions
- Improving vocabulary related to buildings and construction
- Learning different expressions and vocabulary for specific jobs through trying different kinds of jobs virtually

### VR games used for the programme

- Cubism
- Puzzling Places
- Job Simulator

### VR platform and equipment

- Meta/Oculus Quest 2

### Age of students/grade

- 12 years/grade six

### Involvement of teachers

- Two teachers were involved during all the lessons

### Size of the group

- 11-12 students

# Case Study 3

## Duration of the activity

- Two double lessons (90 min) for all these games (2 x 90 minutes in total)

## Additional tools and special arrangements

- For the Job Simulator a bigger space is needed, but Cubism and Puzzling Places can be played anywhere.
- You need a computer and screen if you want to cast games from Oculus goggles to be watched by others.

## Activity description

The ideal situation would be to play one and the same game simultaneously with the whole group. However, due to the limited number of different Meta accounts, it was impossible in this case and the group was able to play VR games on three VR Goggles at the same time (three different Meta accounts). The students had to take turns and there were many different tasks going on at the same time.

Nevertheless, there are also positive effects of such a situation. The students learn that they need to be patient, try to figure out things on their own (learning by doing), and above all they need to help and teach each other.

An exemplary double lesson (90 min) looked like that:

1. At the beginning of the lesson teachers and students were gathered in a classroom and while the students were having a snack **the group planned and agreed on the lesson**. As these lessons were voluntary for the students it was extra important to listen to what they were interested in trying out this time.

One of the main rules was to use only the English language during all extracurricular activities from the very beginning and translate to Swedish only when other ways of explanation in English didn't work.

2. Then the students could **circulate between these games**:

- 3-6 students playing **Cubism** in the same classroom taking turns and helping each other (thanks to casting to a computer and screen)

## Activity description

IThe game is very easy to use. The students don't need much instruction which is good if a teacher has some other, more complicated game going on at the same time with some other students and that demands her or his attention and help.

When the students make progress the puzzles get more complex. Then it might be good to cast Cubism to a screen so the teacher or another student can assist and help out with solving the problem. Instructions and other communication should be going in English to practise phrases and vocabulary.

- 3 students playing **Puzzling Places** in the same classroom

Before the student dives into the puzzle, it is good to explain about the 3D experience which makes it possible, and sometimes necessarily, to look at the pieces and the puzzle from all directions to be able to complete it. It is worth also to explain that the puzzle comes more and more to life with lights and sounds for each piece you succeed in connecting. Teachers informed students that they could hear a click when they managed to join two pieces together.

Knowing your students it is good to advise them which puzzle you recommend so they will get the joy of succeeding instead of failing because of a lack of patience or choosing a far too complicated puzzle. All the consultancy should be in English.

- 3 students playing **Job Simulator** with enough space to move around

Job Simulator is best played standing, with instructions in English. You need to draw a bigger boundary than for most apps so you can spin around as needed.

Players perform tasks associated with specific occupations. The player is often afforded a large amount of creative freedom in how they complete a task. For example, when cooking pizza in the chef simulation, players can choose any ingredient they can reach. A perfect example of the "Learning by doing" approach! Most students loved this game!

3. A **short debrief** was organised at the end of the double lesson. A summary was built on questions like "How was it?" "Did you have any problems?" "What did you learn?" "What would you like to play more next time?" Sometimes we also stopped in between for a while to discuss and improve and to teach the further refinements!

# Case Study 3

## The main challenge

- It is advisable to download the Puzzling Places in advance. The process is time consuming and waiting during the activities may be a bit disturbing for the teaching process.

## Benefits for students and learning process

- Puzzling Places offers students an opportunity to **experience fantastic famous places** almost as if they were real. At the same time, it **develops students' logical thinking skills and the ability to digitally work with three-dimensional images**. An ability that will be indispensable in the students' future.
- Cubism offers students an opportunity to **train their three-dimensional thinking** in a visually pleasing way.
- All three of these games are based on the methodology behind game-based learning. The **students' motivation and desire to cope with the task grows** as they advance to more difficult levels.
- 2D games are rendered in two dimensions - they are flat. 3D games, on the contrary, have both depth and volume. This influences several things in the gameplay. **3D games offer a rich visual experience**, while 2D games do not focus on the landscape. 3D games also offer more possibilities to explore.
- These ways of learning through games **add a varied value to ordinary teaching**. The motivation to learn amongst most students increases and then they usually learn faster. The VR games offer a good repetitive function in a fun and not-so-boring way.

# Case study 4

## Practising vocabulary related to Geography and travelling with Google Maps and Wander

## Case Study 4

# Practising vocabulary related to Geography and travelling with Google Maps and Wander

| | |
|---|---|
| **Topics covered** | › Practising vocabulary related to geography and travelling<br>› Learning about countries and their cultures by visiting them in a virtual world |
| **VR games used for the programme** | › Wander supported by Google Maps |
| **VR platform and equipment** | › Meta/Oculus Quest |
| **Age of students/grade** | › 13-14 years/grade eight |
| **Involvement of teachers** | › Two teachers were engaged in implementing the programme, but working individually with a group. |
| **Size of the group** | › 5 students |
| **Duration of the activity** | › Six double lessons (90 min) for both these apps (6 x 90 minutes in total) |

# Case Study 4

## Additional tools and special arrangements

- It was essential for learners to sit comfortably or stand safely and have some peace, so that was the reason two teachers were present to help them.
- Students were working in pairs, so they were placed in a quiet well-equipped room.
- Sometimes we used corridor expanse to give students more place and distance.
- There were computers and a big screen on the wall to see what happens on the goggles.
- Learners needed to sit comfortably or stand safely and have some peace, so that was the reason two teachers were present to help them.

## Activity description

All the sessions lasted 90 minutes. They were prepared well by teachers and students were told in advance how to prepare for them.

Every single meeting started with **warm-up exercises** during which students could ask every question connected with this project. Students **communicated only in English**. In the beginning, it was a little bit complicated, but after a few meetings, they started using only English.

The students were given all the **instructions and explanations of how the game worked.** They were explained how to use goggles and controllers. The students mostly worked in pairs so often they instructed each other to get to their favourite places.

In **Google Maps** and **Wander** students were working in pairs. During the warm-up activities they chose places to go, they had the World at their feet, so they were able to travel virtually wherever they wanted. **Next, we discussed** these places, why students chose them, if they were there, and what is interesting there. Every place was described by one student and others could see it on the board.

# Case Study 4

## Activity description

The **main activities** were:

- **leading someone** to a place using directions,
- **choosing** one place by **showing** its advantages and **comparing** it with other places, **convincing** someone that it's worth going there,
- **guessing places,** names of famous buildings thanks to their descriptions (chosen by students or imposed by the teacher),
- **choosing the best place** to live, taking into account environmental conditions, communications facilities, weather etc.,
- **discussing global environmental problems** referring to different continents/countries/oceans, comparing implemented solutions and knowing the newest ones.

The teachers helped the students if they needed any help. **At the end a brief conversation** about the game took place. It was very important to know the students' reaction, opinion and also their feedback.

A common problem students reported was not having enough vocabulary to express their opinions, but it changed with time and students became more and more confident. Sometimes it was difficult for students to guess the places chosen by others despite providing a lot of information, only providing more detailed information allowed them to identify the place.

## The main challenges

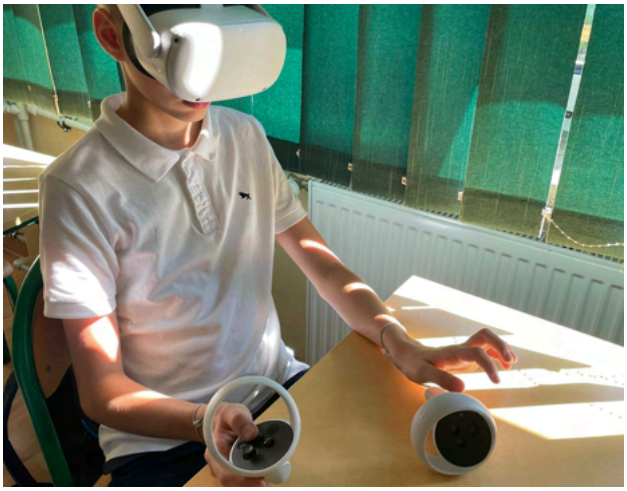
- There were some problems with the Internet connection during lessons. Although we have quite a good Internet connection at school, when we used all the VR sets the Internet slowed down or suddenly disconnected.
- We lacked the number of VR goggles as well.
- Sometimes it was necessary to use more classrooms, one next to another or share private Wi-Fi to ensure connection.

# Case Study 4

## Benefits for students and learning process

- By visiting and exploring the world and countries in this way (virtually) students get a great perspective just sitting in the classroom. They can **visit every single country without leaving the classroom.**
- Travelling in virtual reality creates some kind of **authentic context for language use,** the context in which the language can be practised **without stress** or when this stress is minimised.
- Students were very satisfied to learn how to convince each other, how to respect others' opinions, and how to commend someone. Their **relationship was getting better** every time they met and they were closer to each other relating not only to the lessons and tasks.
- For some of the students, it was a unique opportunity to use VR goggles and see the virtual world. It was also **exciting for them to travel virtually.**
- This activity made **students speak more fluently** and they felt **more confident.**
- Using VR technology was the **perfect way to introduce students to travelling topics.** They could feel like they were in another place in the world.
- Students **became aware of the fact that technology improves** and using VR and modern technology becomes more and more important in different spheres of life.
- At the same time, the **students behaved as they played and had fun**, forgetting the learning and teaching process. The majority of them treated it as a free time activity, not as a learning one. This way students **were motivated** to learn more.
- Visiting places they want to see in the future in reality, was very **useful** for them.
- The teachers were able to see how they discussed all the places they plan to visit in their future lives.
- The students were very eager to use VR sets.

# Case study 5



## Taching speaking and communication skills based on the “Keep talking and nobody explodes” VR game

## Case Study 5

# Teaching speaking and communication skills based on the "Keep talking and nobody explodes" VR game

**Topics covered**

- Speaking
- Problem solving
- Cooperation and interaction
- Familiarising with new vocabulary and useful phrases
- Logical reasoning, making decisions

**VR games used for the programme**

- Keep Talking and Nobody Explodes

**VR platform and equipment**

- Meta/Oculus Quest

**Age of students/grade**

- 13-14 years/grade eight

**Involvement of teachers**

- One or two teachers were engaged during each session

**Size of the group**

- There were 2 groups, 5 students each, working separately and merging for some activities.

**Duration of the activity**

- Three double lessons (90 min) for both these apps (3 x 90 minutes in total)

# Case Study 5

## Additional tools and special arrangements

- It was very important to sit comfortably in different parts of the classroom to hear the partner without any problems. First one of the students played the game with others' instructions and everything was seen on the board to better understand the game. Then when students were playing in pairs, it was possible to see on the tablets what they were doing.
- Besides, we used interactive whiteboards, tablets or printed versions of the manual.

## Activity description

The game is about defusing a bomb which is placed in a room. The person who defuses a bomb doesn't have instructions on how to do it. His partner has a manual but cannot see the bomb. The clue is to defuse it following the manual. **A very significant part is cooperation between students and learning how to defuse the bomb under pressure.**

Activities started with some **warm-up exercises**. It was very essential for the students to communicate only in English. That's why at the beginning we translated difficult words and phrases together. To learn and remember them better we played short quizzes.

While playing **Keep Talking and Nobody Explodes** the students played in pairs. One of them read the manual and instructed the other student who had the VR set on. The teachers helped the students if there was any need.

Students were very willing to use modern, technological tools. What's interesting, they could easily discover how the game worked without any further explanation.

Students had to work fast, **identifying keywords to avoid errors**. They used compensatory strategies when they did not know or remember a word, then they tried to find another simple form of expression, replacing it with another word, describing. They also used non-verbal communication like gestures, sounds, nodding, facial expressions or body language – it made the process of playing very expressive and energetic.

**At the end, we had a conversation about the game.** It was very significant to know our students' reactions, opinions and preferences. They always reacted positively, showing their excitement and pleasure. What's interesting, they wanted to play this game very often and it's easy to say that it was their favourite one.

# Case Study 5

## The main challenges

- It took us some time to connect to the Internet during each lesson. Sometimes the Internet suddenly disconnected and we were forced to connect again.
- It wasn't always possible to play the same game in one classroom – pairs were noisy, they spoke loudly and disturbed each other so we played also in the corridor. It was after school lesson so no one worried the group.

## Benefits for students and learning process

- This game is **perfect for making students speak English naturally**, without stress. They are so affected by the task that they don't think about the mistakes they make – it is easier for them because they have the instructions written in English. Defusing the bomb seems to be more difficult because of the time pressure but students are very focused on the task and didn't talk much.
- While playing, they worked in pairs which made them feel **secure and confident**.
- During the game, they wanted to defuse the bomb more than instruct the partner. They were **very excited and reacted spontaneously** - shouted, laughed and wanted to repeat the turn to be better and not to make the wrong decision or movement.
- In students' opinion, it was more interesting to wear a VR set and probably that was the reason why the activity of defusing was more attractive than instructing.
- Working with VR sets demands using **different senses like vision, hearing and touch.** Those factors made learning **more effective** because all three senses were used at the same time.
- For many of the students that was the first time when they used Oculuses and VR technology. They were very eager to use them and **discover new games, functions and techniques.**
- Due to the increasing number of technologies in the modern world, students are often bored with traditional lessons with coursebooks. They expect **lessons to be attractive, engaging and dynamic.** And this is exactly what our classes gave them.

# Case study 6


## Vocabulary and speaking skills related to travelling and tourism with the Mondly application

## Case Study 6

# Vocabulary and speaking skills related to travelling and tourism with the Mondly application

**Topics covered**

- Useful vocabulary, phrases and expressions for travelling and tourism
- Dialogues in a restaurant at the train station, in a taxi, in a hotel and similar

**VR games used for the programme**

- Mondly VR

**Other resources**

- Tablets and computers
- Printed worksheets
- Kahoot and Wordwall

**VR platform and equipment**

- Meta/Oculus Quest

**Age of students/grade**

- 13-14 years/grade eight

**Involvement of teachers**

- Two teachers were engaged in implementing the programme, but working individually with a group.

**Size of the group**

- 5 students

# Case Study 6

## Duration of the activity

- Seven double lessons (7 x 90 minutes). The main game was used in parallel with other activities.

## Additional tools and special arrangements

- Before each lesson, it was necessary to prepare and check the equipment (goggles and network connection).
- We also prepared activities related to the topic. As students couldn't all play Mondly at the same time, we used other resources to practise language skills in parallel. There were: tablets and computers, printed worksheets, Kahoot or Wordwall to engage them in quizzes and other activities including vocabulary and expressions related to the topic.

## Activity description

At the beginning of the lesson, the teacher explained the topic and the aims of the lesson. A **short introduction** to instruct students about the game was made as well.

Mondly imitates authentic situations that students may meet in real life so it prepares them well to manage them in the future. Travelling in virtual reality creates a nearly authentic situation/context for practical language use. This application shows students how important is efficient communication in modern foreign languages and the fluency in speaking.

While two of the students were **playing Mondly** practising the dialogue, others were **doing quizzes on Kahoot or Wordwall activities**. The teacher also asked students to work in pairs and to participate in short dialogues giving them the various topics to discuss. At the end of the lesson, students were asked to make mind maps with the vocabulary related to the topic or write the dialogues in pairs.

The very important part of the lesson was the **evaluation**. Students analysed and reflected on the VR experience. The teacher asked them questions about their feelings, difficulties, pros and cons of learning with Mondly in comparison to traditional methods. Students were encouraged to work and discuss cooperatively in pairs or groups. The activities were as learner-centred as possible.

# Case Study 6

## Activity description

Students explained that thanks to the classes, they learnt how to create short, coherent and logical conversations, referring to their experiences in the game. They expressed feelings and emotions. They adapted their style of expression to the situation. They learn how to introduce themselves, respond in typical situations, make social contacts, and start, conduct and finish conversations. They learnt how to maintain a conversation and ensure that the interlocutor understood what was said. They use polite phrases and forms.

## The main challenge

- The main problem was to find a school place where the Internet connection was good enough and where students could play undisturbed.
- The microphone in the game was very susceptible to interference. Students had to repeat their sentences several times and sometimes they were not accepted. It was difficult, especially at the beginning when the students had not yet gained self-confidence and were shy or embarrassed to speak loudly and clearly, they even had to speak excessively carefully.

## Benefits for students and learning process

- Lessons with Mondly were **fun and interactive**. It was an interesting and innovative way to practise vocabulary in **real-life conversations**.
- Both teachers and students had the same conclusion that **VR technology helps them learn faster**.
- The game is a great support in teaching because it helps students expand their vocabulary in a fun way. **Students are very enthusiastic** about using games and VR technology at school and this way it was **more effective** than using traditional methods.
- **Students learnt faster** and seemed **remarkably eager to learn**. They developed fluency in speaking tasks. They learned how to interact socially and appropriately in a given situation.
- This way of teaching **increases learners' self-confidence and motivation.**

# Case study 7


## Integrating VR lessons in English to Learn Curriculum-Based Topics in Natural Sciences (Chemistry, Physics, Geography)

## Case Study 7

# Integrating VR lessons in English to Learn Curriculum-Based Topics in Natural Sciences (Chemistry, Physics, Geography)

**Topics covered**

- Improving and practising vocabulary vocabulary, pronunciation, and listening skills in a contextual and engaging manner
- Improving and practising vocabulary pronunciation, and listening skills connected with geography
- Levelling communication skills of students

**VR games used for the programme**

- Futuclass Education
- YouTube 360 Virtual Reality Tour Around the World

**Other resources**

- Curriculum-based textbooks

**VR platform and equipment**

- Meta/Oculus Quest

**Age of students/grade**

- 13-15 years/grade eighth-ninth

**Involvement of teachers**

- Most of the time only the teachers concerned for the subject (English, Geography, Natural Sciences) were involved working in pairs or alone, depending on the stage of the activities.

**Size of the group**

- 12 students working in pairs or individually

# Case Study 7

## Duration of the activity

- Ten double lessons (90 min) for the whole process of mastering the topic (10 x 90 minutes in total)

## Additional tools and special arrangements

- Prior theoretical knowledge of physics and chemistry was imparted during the lessons drawing up to the VR activities.
- On a few instances the teachers required the school's technical person to be at hand as a few headsets failed to run or run the required app.

## Activity description

The VR activities were always well-planned. Students knew well in advance when, where and about when they would be conducted. The **first five minutes were always spent reiterating the rules of usage and the consequences of abusing the device and polite use of language**.

Teachers always ensured the wristbands were in place and there was sufficient room to manoeuvre and cause no harm to self or others.

The activities were conducted for a group of 12 or 24 students. Each session took 90 minutes. Due to the limited number of goggles (12 pairs), in the case when there were 24 students engaged, they were split into two groups.

One group of 12 students were **in the classroom doing paper-based tasks** while the other group of **12 were involved in the VR experience**. At the 45th-minute mark, the situation was **reversed** - the 12 who were on the VRs went to the class to do the paper-based tasks and the remaining 12 took up the VR.

Our activities were organised as a problem-based, contextual and cross-curricular approach to teaching, where we decided to mix different school subjects enhanced by innovative technologies in order to gain better results in students' learning.

The project **VR activities were conducted in the English language**, henceforth exploring different environments introduces the students to new vocabulary related to natural sciences, which would help them in their future academic pursuits.

# Case Study 7

## Activity description

The natural sciences curriculum is normally taught in Estonian and Futuclass helps students acquire knowledge of the same in the English language and this in turn improves their English vocabulary, pronunciation, and listening skills contextually and engagingly.

The VR activities for geography provided students with immersive experiences that not only enhanced their understanding of the world but also improved their vocabulary whilst improving their listening and speaking abilities.

## The main challenges

- VR technology presents sometimes significant challenges for students who are not digitally adept and those who are indifferent to technology. By recognising these challenges and implementing targeted solutions, teachers had to constantly monitor and guide the students.
- Integrating VR into the existing school curriculum and teaching methods can be challenging, especially for educators who are not familiar with digital tools. There may be a lack of resources, training, and support for effective VR integration.
- The lack of sufficient curriculum-oriented VR apps is a significant barrier to the widespread adoption of VR in education. Addressing this issue requires collaborative efforts between educators, developers, and policymakers to create high-quality, relevant, and accessible VR content.
- Some teachers are averse to implementing or incorporating any technologically advanced gadgets or systems into their classrooms/teaching methodology. The reason could be the reluctance to learn the new technologies or simply resisting change.

## Benefits for students and learning process

- One of the standout features of Futuclass is its **alignment with Estonian primary school educational curricula**, both in English and in Natural Sciences. The platform's content is designed to match national educational standards, ensuring that the VR experiences complement and enhance traditional classroom instruction.

- In the real world environment conducting practical experiments in physics and chemistry can lead to disastrous results. It also can be very expensive to conduct live experiments. **VR offers a very cost-effective way of conducting experiments in a safe and immersive environment**. Students can make unforced errors and mistakes and yet can continue at their own pace to achieve the desired task oriented results.

- The YouTube 360 videos are an excellent resource for students to **explore places otherwise inaccessible to students and easily learn English**. The 360 videos allow students to explore the flora and fauna of even the remotest places from all over the world. The 360 videos viewed via VR goggles provide a **visually stimulating and realistic environment.**

- VR allows students to participate in hands-on simulations that **make abstract concepts tangible**. They can virtually mix chemicals and explore the consequences without blowing up the school science lab. They can explore the geographical landforms, go deep sea diving, climb Everest or explore Earth from space, all within the safety of four walls, **which can reignite their curiosity and passion for learning**.

- In VR, students can participate anonymously, without the fear of being judged or embarrassed when making mistakes in experiments. This **anonymity helps introverted students feel more comfortable expressing themselves and engaging in class activities**.

# Case study 8

## Integrating Curriculum-Based VR lessons in English Language Lessons positively impacting social skills

## Case Study 8

# Integrating Curriculum-Based VR lessons in English Language Lessons positively impacting social skills

**Topics covered**

- Vocabulary related to nature, wildlife, cultural practices, historical events and places
- Learning about customs, traditions, and social norms, which is essential for understanding language in context

**VR games used for the programme**

- Ecosphere
- National Geographic Explore VR
- YouTube 360 Videos

**Other resources**

- Oxford Solutions - Third Edition, Units related to the aforementioned topics

**VR platform and equipment**

- Meta/Oculus Quest

**Age of students/grade**

- 12-15 years/grade sixth-ninth

**Involvement of teachers**

- One English language teacher conducted the lessons

**Size of the group**

- The ideal size of the group was 12 (as we have 12 headsets), sometimes it was up to 16.

# Case Study 8

## Duration of the activity

- Ten hours (60 min) for the whole process (10 x 60 minutes in total)

## Activity description

We decided 60 minutes was the way to go for the VR experience. On very few occasions students had to share the VR goggles amongst themselves as there were more than 12 students in the group. They managed to share the devices without any qualms and we were able to achieve the desired results efficiently and effectively.

The VR Lessons were always well-planned. Students knew well in advance when, where and about what these lessons would be conducted. **The first five minutes were always spent reiterating the rules of usage and the consequences of abusing the device and polite use of language.**

The whole activity was devoted to the main topics: **visiting places and acquainting about different cultures**. Both apps - Ecosphere VR and National Geographic VR were used to “transport” students to diverse destinations around the world, allowing them to explore new places and cultures firsthand. Through VR, students could virtually visit iconic landmarks, bustling cities, and remote villages, gaining a deeper understanding of the geography, history, and cultural practices of each location.

For instance:

- **Ecosphere VR** offered immersive journeys to places like the Amazon rainforest and the savannas of Kenya. Students could experience the daily lives of indigenous communities, and understand their traditions, languages, and customs.

- **National Geographic VR** took students on expeditions to various parts of the globe, including ancient ruins, modern cities, and natural wonders. This exposure helped students appreciate cultural diversity and fostered a global mindset.

These experiences enhanced language learning by providing context for vocabulary related to geography, culture, and social studies. Students could engage in discussions, write essays, and complete projects based on their virtual travels, thereby improving their descriptive and narrative writing skills.

There were also **separate sessions devoted to feedback and analysis.**

# Case Study 8

## Activity description

The programme of these activities was **synchronised with the programme of the international mobilities of students** organised as part of the project.

The mobilities programme provided a platform for students to practise social interactions in a controlled, less intimidating environment where they had to interact with teachers and students from partner schools/nations. This practice translated into better social skills and increased participation in real-life group activities such as listening and comprehending instructions, successful accomplishments of VR assignments and creating videos based on a given topic.

Students conducted guided tours of their respective schools and local landmarks, using English to describe and explain various points of interest. They gained a deeper understanding of Finnish and Polish cultures, traditions, and daily life. This exposure helped them appreciate cultural diversity and develop a broader mindset.

Working with international peers improved students' ability to collaborate across cultural and linguistic boundaries as students had to communicate in the English language, which required students to communicate effectively, delegate tasks, and work together to achieve common goals.

Above all, students showed significant improvement in their English language skills, including vocabulary, grammar, and fluency. The immersive and interactive nature of VR and the mobilities provided ample opportunities for language practice.

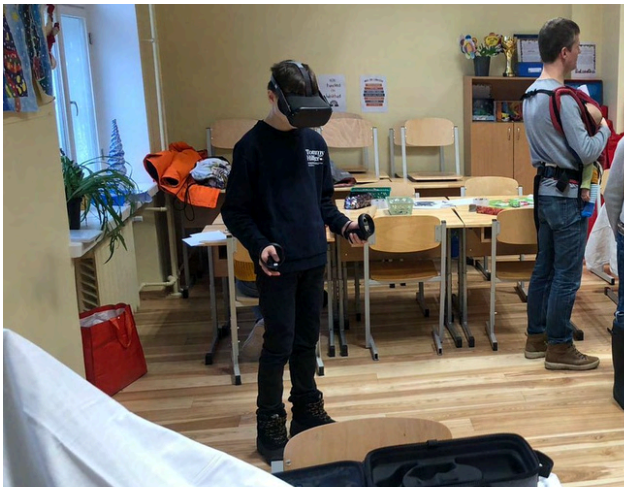
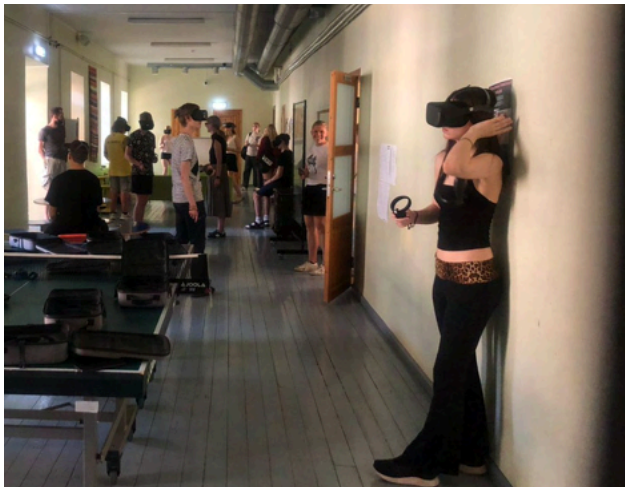
## The main challenges

- Integrating VR into the existing curriculum and teaching methods can be challenging, especially for educators who are not familiar with digital tools. There may be a lack of resources, training, and support for effective VR integration. Therefore it is advisable to prepare teachers properly before they start introducing VR tools to their students.
- The current lack of sufficient curriculum-oriented VR apps is a significant barrier to the widespread adoption of VR in education. Addressing this issue requires collaborative efforts between educators, developers, and policymakers to create high-quality, relevant, and accessible VR content.
- Due to the age of the VR goggles, some technical difficulties did crop up once in a while. The battery life cycle began to drop, the headset required frequent charging. Some of the game features began to glitch as the old chipset was not able to process data efficiently.

## Benefits for students and learning process

- The VR setting provided a **safe space for students to practise social interactions** without the fear of judgement or embarrassment. Activities were designed to progressively increase social complexity, helping students build confidence in manageable steps.
- As technology continues to evolve the **possibilities are endless especially for introverted and less motivated students,** building confidence and reducing anxiety are crucial for academic success. VR helps in this regard by creating a supportive and non-threatening learning environment.
- The collaborative interactions with partner schools in other countries successfully **enhanced English language proficiency, fostered intercultural exchange, and improved interactive skills** among the students taking part in the activities.
- The immersive and interactive nature of VR technology, combined with meaningful cross-cultural interactions, provided a **unique and effective learning experience**.

# Case study 9

## Integrating Curriculum-Based History VR lessons in English Language and impact on students' English comprehension, vocabulary, communication skills, and fluency

## Case Study 9

# Integrating Curriculum-Based History VR lessons in English Language and impact on students' English comprehension, vocabulary, communication skills, and fluency

**Topics covered**

- Learning new vocabulary and phrases related to the subject of History and places of Historical importance

**VR games used for the programme**

- Anne Frank's House
- YouTube 360 videos of historical places

**Other resources**

- History textbook
- English language textbook - Oxford Solutions Third Edition

**VR platform and equipment**

- Meta/Oculus Quest

**Age of students/grade**

- 12-15 years/grade sixth-ninth

**Involvement of teachers**

- One teacher was involved during all activities.

**Size of the group**

- 12 students working in pairs or individually

# Case Study 9

## Duration of the activity

- Ten hours (60 min) for the whole process (10 x 60 minutes in total)

## Activity description

School corridors and two classrooms were being used to manage boundaries and freedom of movement as Anne Frank's House application requires room to move around, look around and explore.

The VR activities were always well-planned. Students were informed well in advance when, where and about what these lessons would be conducted. The **first five minutes were always spent reiterating the rules of usage, the consequences of abusing the device and polite use of language.**

**Anne Frank's House VR** is a transformative educational tool that aligns with the Estonian national curriculum for primary school history, offering an immersive and empathetic approach to learning about the Holocaust and the effects of war.

By bringing history to life, this VR experience helped students **understand the profound human impact of historical events**, fostering a deeper connection to the past and promoting critical thinking about the present and future.

This immersive experience allowed students to explore the rooms, see Anne's diary, and hear excerpts from her writings, creating a vivid connection to the past. By stepping into Anne's world, students gained **a tangible sense of the daily realities and emotional struggles faced by those in hiding during the Holocaust**.

Students demonstrated a deeper emotional and cognitive understanding of historical events. Post-VR graded assessments of the units/chapters showed improved retention of facts and concepts related to the Holocaust. Improved proficiency and memorization of English vocabulary related to subject matter, historical events and places were noticed.

It is said that history repeats itself and if this statement is true, Anne Frank's House and the events leading up to it, would lay a definitive path to understanding and appreciating cultural diversity that would help reduce stereotypes and prejudices, fostering a more inclusive and tolerant society.

# Case Study 9

## The main challenges

- VR technology presents sometimes significant challenges for students who are not digitally adept and those who are indifferent to technology. By recognising these challenges and implementing targeted solutions, teachers had to constantly monitor and guide the students.
- Integrating VR into the existing school curriculum and teaching methods can be challenging, especially for educators who are not familiar with digital tools. There may be a lack of resources, training, and support for effective VR integration.
- The lack of sufficient curriculum-oriented VR apps is a significant barrier to the widespread adoption of VR in education. Addressing this issue requires collaborative efforts between educators, developers, and policymakers to create high-quality, relevant, and accessible VR content.
- Some teachers are utterly averse to implementing or incorporating any technologically advanced gadgets or systems into their classrooms/teaching methodology. The reason could be the reluctance to learn new technologies or just vehemently resisting change.

## Benefits for students and learning process

- The students **learned about the impact of war on daily life**. They were exploring the confined and secretive living conditions of the Frank family highlighting the severe disruptions and hardships caused by war.
- They could **learn about resistance and resilience** - Anne's writings and the family's efforts to maintain a semblance of normalcy despite the dire circumstances offer lessons in human resilience and the will to survive.
- They **reflected on the consequences of hatred and intolerance:** The VR experience provided a powerful reminder of the dangers of hatred, prejudice, and intolerance, encouraging students to reflect on these themes and their relevance today.
- Extended historic-cultural programmes during the mobilities, the visits to museums and other historical places also helped students **to reinforce the vocabulary, comprehension and fluency of the subject matter.**
- The collaborative interactions with partner schools **enhanced English language proficiency**, **fostered intercultural exchange, and improved interactive skills among the students.**

# Evaluation - the main benefits and challenges

In the end, there are a significant number of benefits of organising extracurricular activities based on VR tools and supported by other digital resources and teaching methods. There are also some challenges of such activities, which appeared during our classes and which we would like to mention below. Both of them were pointed out by students and teachers during the evaluation process based on the feedback rounds, participatory observations and online questionnaires.

**The main benefits**

- The most important is that across all schools, students expressed growing confidence in using English as resulting from participating in VR-based activities and international mobilities.

- The students were very excited to use VR technology in learning. Many of them described experiencing a "wow" moment when using VR, which greatly enhanced their interest in the learning activities. They found the visual and interactive elements much more stimulating compared to traditional classroom environments.

- A lot of them stressed the comfort of using VR – they felt that the virtual environments allowed them to practice speaking and interacting without the fear of judgment or embarrassment.

- The students noted improvement in their social and communication skills. They learned how to articulate their thoughts better in English, negotiate with peers, and collaborate in group activities.

- They found working in pairs or small groups to be a valuable experience. They enjoyed helping each other, sharing knowledge, and working together on solving problems in the games.

- They appreciated the experiential, hands-on learning aspect of VR. They enjoyed being able to "live through" real-life scenarios, such as ordering in a restaurant, talking to a taxi driver etc., as opposed to simply learning the vocabulary through textbooks.

- Also, the teachers saw VR as an innovative and effective way to teach English. They appreciated how it created immersive environments that allowed students to practice language in realistic settings.

- Teachers noticed a significant increase in student motivation and engagement when VR tools were introduced. The technology captivated students' attention and made them more eager to participate and learn.

- Teachers emphasised the benefits of collaborative learning through VR activities. They observed that students were learning not just language but also valuable communication, teamwork, and problem-solving skills.

- Teachers appreciated how VR added a new dimension to the teaching process by blending experiential learning with language practice. Many found that students learned vocabulary and communication skills faster through interactive VR scenarios.

**The main challenges**

While overall feedback was positive, both students and teachers mentioned some challenges, necessary to overcome when one wants to organise such activities. The main of them were:

- Unstable internet connections and bandwidth limitations posed significant challenges, particularly during VR sessions where multiple headsets were in use.

- The limited number of VR headsets and Meta accounts was a recurring issue across all schools. It slowed down the pace of activities, as not all students could participate simultaneously. It also increased the planning complexity, with teachers needing to rotate students between different tasks.

- Some of the applications had issues with the sensitivity of the microphone and voice recognition system. Students needed to repeat their sentences multiple times for the system to correctly register their responses.

- In many cases, teachers needed more than one classroom to perform correctly all the activities. It was caused by the requirements of specific games.

- Not all teachers were fully familiar with the VR technology or felt confident using it as part of their teaching methodology. Some of them found integrating VR into the existing curriculum to be too challenging.

While most of the challenges were possible to overcome quite easily, thanks to the creativity of teachers and students, and they should be possible to tackle by our potential followers, the last one needs to be addressed with more attention. Preparation of a teacher, her or his attitude towards using VR with students is crucial in this case.

Teachers need to work in advance to prepare for the lessons and to be flexible in their approach to the subjects they teach. They need to overcome their fear of new tech and adapt well-known paths of teaching to new opportunities. This way, well-prepared teachers should not only be familiar with the equipment and games but also should be aware that the technology, although extremely attractive and powerful, can be only a part of the broader programme leading to an improved teaching process. With this approach and knowledge, it will be possible to run interesting lessons and adapt oneself as well as VR games to the lessons.

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