

DigIn—Digitalisation and inclusive education

Leaving no one behind
in the digital era



Inclusive Digital Education: Toolkit with Practical Examples

The ideas presented in this document are a result of the collaboration of the following organisations and people:

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Many teachers and other members of staff in each of the above stated partner organizations and schools contributed to the project. Whilst it is not possible to name them all individually, we would like to acknowledge their contributions and thank them.

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The DigIn Project

"Digitalisation and inclusive education: Leaving no one behind in the digital era" (DigIn), a two-year project (2021–2023) funded by the European Union, involved one school, three universities, and two NGOs in four countries: Austria, Bosnia and Herzegovina, Italy, and North Macedonia.

During the COVID-19 crisis and its aftermath, teachers have had to adapt to new pedagogical environments, which has forced them to develop new pedagogical approaches and modes of delivery. This has been even more the case when it has come to teaching students with disabilities, as they have been (even more) excluded from digital education.

And this is where the DigIn project comes in.

The focus of the project was to strengthen teachers' profiles. Because most teachers have not been trained, have not had sufficient guidance, and have lacked resources on how best to include students with disabilities in digital education, the DigIn project aimed to empower and professionalize teachers from various age groups and different school types in the fields of both digital education and inclusive education.

The Toolkit

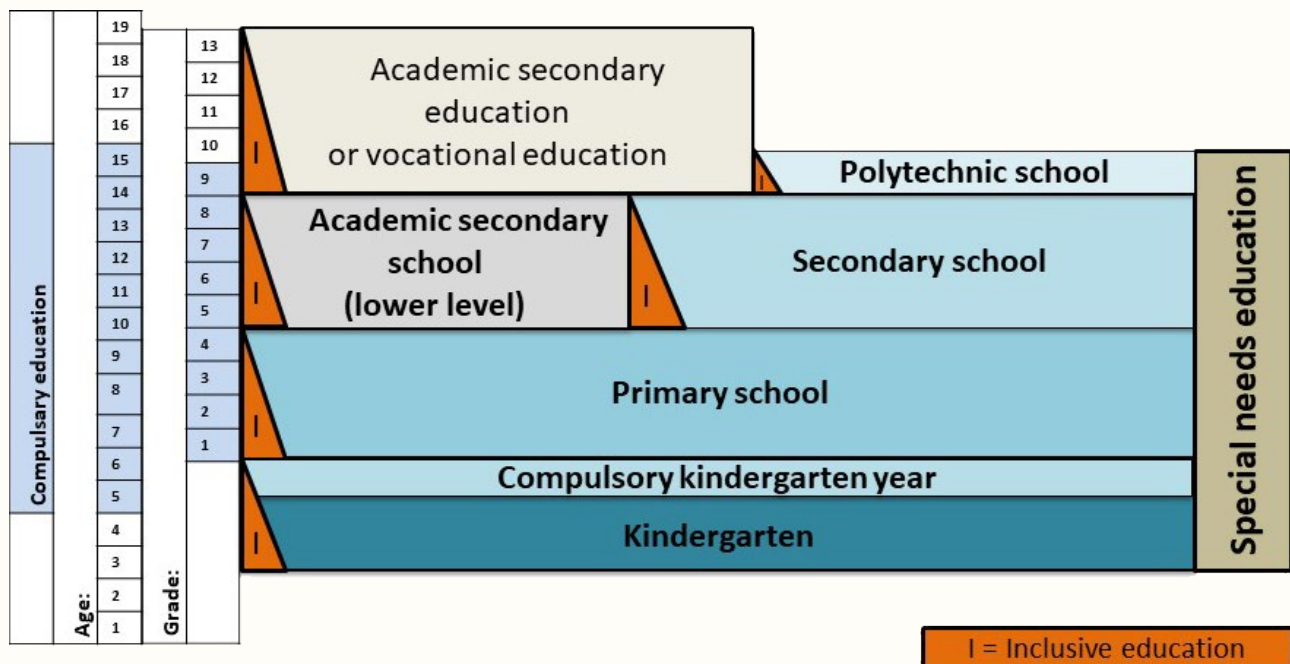
The toolkit aims to contribute to teachers' professional development. It should inspire you to use digital tools in your classroom. The toolkit provides lesson examples including advice and tips on how best to use digital technology in inclusive settings with students with and without disabilities. The lesson examples have been created by teachers from Austria, Bosnia and Herzegovina, Italy, and North Macedonia.

Where possible, additional information and pictures are included within the description. The examples are structured by country. Each country chapter includes a graphical representation of the countries' school system in English, a description of each example in English, and, where possible, a description of the author.

Examples from Austria



School System



The Austrian school system is public, free and uniform. Children start at age six and must finish at least nine years of education (Federal Ministry for Education and Women's Affairs's 2014), where children with SEN can choose between inclusive education or special needs schools. Initially, from six to ten, children attend primary school, and afterwards, lower secondary education begins (secondary level I), with the chance to choose between two different school types: the Secondary School and the Academic Secondary School Lower Level (Academic School). After completing secondary level I, children have to complete secondary level II (the 9th school year). Again, children can choose between two possibilities: the Academic Secondary School Upper Level and the Pre-Vocational Schools (Polytechnic Schools) (OeAD 2015). For more details, see Figure 1 (Bešić et al., 2016, p. 3).

Source for text and Figure: Bešić, E., Paleczek, L., Krammer, M., & Gasteiger-Klicpera, B. (2016). Inclusive practices at the teacher and class level: the experts' view. *European Journal of Special Needs Education*, DOI: 10.1080/08856257.2016.1240339

Learning About Traffic

Astrid Wieser
German / 2nd Grade



1. The Description

For the lesson, reading texts on the topic of „traffic“ (ships, trains, airplanes, and cars) were prepared. The students should read the texts and solve topic related tasks on the digital platform LearningApps.

The use of the platform served to intensify engagement with the previously read content and to promote reading comprehension. The students were given a brief introduction and explanation of how the lesson would proceed, then worked on the topic independently with a partner. Each team prepared a small presentation on the topic. The teacher prepared handouts with the student team on it as well as the chosen topic and the scheme that the students were supposed to follow in order to deal with their topic.

2. Classroom Context

The lessons took place in presence. In the class were 13 second grade students (seven boys and six girls). There are two students with disability in the class.

One boy with an attention deficit and a learning disability is accompanied by a school assistant. A girl with emotional epilepsy (without school assistant) shows phases of complete thoughtlessness (twitching of the eyes and emotional instability expressed by frequent crying). In such phases, it is difficult for the girl to understand tasks even though they did not cause her any difficulties the previous day. The daily school routine is hardly manageable on such days.

3. Lesson Goals

There were several sub-goals associated with the delivery of the lesson that relate to the goals of the elementary school curriculum.

Goal 1: The students will be able to read a text independently

- sub area reading: exercises in reading comprehension – from reading aloud to reading silently (Lehrplan der Volksschule, 2012, p. 111)

Goal 2: The students will be able to extract relevant information from texts in order to answer questions about a text

- sub area reading: reading comprehension exercises – answering questions about the reading text, distinguish important from not important information (Lehrplan der Volksschule, 2012, p. 111)

Goal 3: The students practice using the laptop's touchpad and keyboard (moving the cursor, typing, selecting, etc.)

- Teaching and learning in elementary school: Modern communication and information technologies (use according to the available equipment at school) – The possibilities of the computer should be used for independent, goal-oriented and individualized learning and creative work (Lehrplan der Volksschule, 2012, p. 86)
- DFC goals: Information and data literacy – 1.3 Handling data, information and digital content

Goal 4: The students work as a team to complete the task

- Experiential and Learning Area Community: Experiencing the class as a new community – make contributions to living together (e.g., help each other, share with others, take on and perform tasks) (Lehrplan der Volksschule, 2012, p. 86)

4. Method/Approach

Duration: 75 min.

Materials: Laptop for each team, LearningApps (and links to the app), handouts, DIN A4 sheet, "What's what"-books on the respective topic or copies of the reading texts from the books (one double-page spread on the topic per team), brief information on laptop use.

Procedure/Detailed Planning:

Preparation: laptops are ready to work (LearningApp is already opened up, laptops are placed on the seats of the students). On each laptop is a small note on how to solve the tasks and what to pay special attention to.

The teacher creates questions for the respective texts in the LearningApps.

Time	Procedure	Materials	Methodological-didactical considerations
10 min.	<p>Introduction:</p> <p>The "What's what"-books are placed in the middle of the classroom. The teacher presents the different topics and asks questions: "What do you see?", "What do they have in common?", "Where do you find these things?"</p> <p>The goal is to have an open conversation. The teacher arouses the students' curiosity by asking: "Since when do cars exist?" "How were ships created?"</p> <p>The teacher explains the content of the lesson using the handout „traffic" (see appendix). The handout serves as a guide for completing the tasks. The students form teams of two. The topics are assigned arbitrarily (airplanes, cars, ships, trains). The students receive the reading texts.</p>	<p>Handout on the topic</p> <p>copies of the reading texts</p>	<p>A discussion shall lead to the topic and create sufficient focus.</p>
40 min.	<p>Main part:</p> <p>The students read the text on the respective topic. Then they answer questions on the topic in the LearningApp in teams of two. The LearningApp reports whether a question was answered correctly or incorrectly.</p> <p>The teacher should visit each team at least once to clarify questions and to explain how to use the laptop, if necessary.</p> <p>After answering the questions, students create a mini-presentation. Therefore they answer the question: "What was especially exciting for you?". The students summarize the most important points on a DIN A4-sheet.</p>	<p>Laptops, DIN A4-sheets</p>	<p>train the reading comprehension and short-term memory</p> <p>playful encouragement of the use of digital devices</p> <p>practice excerpting from texts strengthening the team spirit</p>
25 min.	<p>Closing:</p> <p>Each team presents their mini-presentation.</p>		<p>normalize presenting to the class by frequent repetition</p>

Digital Tools Used

The LearningApps platform was used to consolidate what had been read, as the teacher was already familiar with the platform and had good experiences using it in class. With LearningApps, tasks and questions on a topic can be prepared by the teacher. The tasks are then solved by the students via laptop.

- topic trains: <https://tinyurl.com/yd7zn5sj>
- topic planes: tinyurl.com/yck4y42u
- topic cars: tinyurl.com/2p822m9f
- topic ships: tinyurl.com/22ys6uyd

The use of the platform is free of charge.

6. Similar Tools

Similar to LearningApps, the Quizmaker app is suitable for consolidating content in a quiz format. Digital devices (laptops, tablets, smartphones) in class size and a projector are required. The students then see the questions via projector and answer them on their digital devices.

One difference to LearningApps is that answering questions in Quizmaker has a more competitive nature.

My simple show app serves as additional support for the introduction and could even replace the analog reading text. Like all tools, the videos have to be created by the user.

These tools are free of charge.

7. Specific Needs (Disability)

Via LearningApps, the layout can be customized so that for example larger fonts can be used. In addition, the difficulty per text can be varied due to different question formats.

The topic "trains" was given an easier task (single choice questions) and a shorter text with a larger font. It was assigned to the students with disabilities. The other topics and tasks were randomly distributed to the other students. Further differentiation was not necessary.

For the mini presentation, the students with disability can answer the question on their own and are not bound to any specifications.

What could be observed during the lesson?

Due to the increased attention, reading as well as completing the tasks of the LearningApp (trains) were not a problem. The fact that working on a laptop is something special for the primary school students caused the motivation to rise. The urge to do everything correctly was clearly noticeable. The students with disabilities were able to solve the tasks independently (no help from the school assistance needed) and visibly enjoyed it.



8. Challenges

IT infrastructure of the school: There are nine laptops available for all students at our school, which is why it is always necessary to inform the other teachers in advance when you want to work with the devices.

There is no separate IT room, so the laptops must be placed (searching for sockets) and set up for the lesson in advance. This requires valuable time. The small number of laptops does not allow students to work on tasks individually. Therefore, the easiest way is to adapt the social form (partner or teamwork) when using the laptops.

The digital competences of the students: The digital competences of the students were quite diverse when the lesson took place. So, one student with stronger and one student with less digital skills formed a team. However, every child was familiar with the use of laptops.

9. Benefits

The students were attentive, motivated and ready to work with the laptops. They could hardly wait to start working and were very excited about it. All students with and without disabilities were positive about a repetition.

The occasional use of digital tools increases the students' willingness to perform and thus has a positive effect on their learning behavior.

10. Lessons Learned

The lesson was used as a supplementary part to the (weekly) topic "traffic" and offered an opportunity to train the students' reading comprehension and their presentation skills in front of the class. As it is not possible for the students to complete all four thematic blocks in one lesson, at least four lessons can be spent on it. The use of the digital tool was effective. With repeated use, the students get used to the tool even more, which reduces the excitement about being allowed to use digital devices. This means that more attention can be paid to the taught content, and knowledge can be conveyed.

For a more convenient and time-saving implementation, it would be of great advantage if the laptops were in an IT room or if tablets were available to all students. But portable digital devices enable easier and faster use in the classroom (no power cords, no mouse operation, no being tied to a specific place).

It's a good idea to open the apps and tools on the digital devices before the lesson begins so that students do not have to search for them for too long. QR codes are also a good way to enter an app or platform more quickly, if the digital devices are equipped with cameras.

If the children are not familiar with excerpting content, they may have problems working with the learning app as they refer to the text they have read. In this case, simpler questions or preparatory instruction in class would be helpful.

11. The Average Cost of Implementation Per Child

No charge was necessary for this lesson, as the use of LearningApps is free.

12. Evaluation/Feedback

To get feedback from the students on the lesson, they were asked three questions:

- What did I like?
- What was easy for me?
- What was difficult for me?

The students especially enjoyed the teamwork, working on the laptop, and answering questions using LearningApps. More than half of the students enjoyed creating the mini-presentation and presenting it to their classmates. Almost all students considered reading and answering the questions easy.

The main difficulties were in the technical-executive area. For example, typing the letters and the general handling of the laptop (PC mouse, clicking with the cursor) turned out to be a challenge for them, because both the LearningApp and the tasks were new to all of the students. Some students also experienced difficulties in finding the right words for their presentations. The teacher responded to all of the students' questions, explicitly considered the individual needs of the students and explained how to use the laptops and the app.

13. Connection to SAMR and 4C model

According to the 4C model, the competencies „cooperation“, „creativity“ and „communication“ are promoted. I would classify the teaching scenario on the „Augmentation“ level of the SAMR model.

Appendix I: Handout

LOTS OF TRAFFIC

Team:

Our topic:



What to do?

- Read the text!
- Work together on the computer! Try to solve the tasks!
- Create a mini poster: write and draw the most interesting information on the poster!
- Present your poster briefly to the class!

Have fun!

Appendix II: Hints for the students

The clues are printed out and cut into strips and stuck to one laptop each regarding the respective topic.

Hints on the subject of trains: Choose the answer using the mouse! The blue check mark will take you to the next question

Hints on the subject of planes: Click on the numbers in the grid puzzle! Type the words you are looking for on the keyboard!

Notes on the subject of ships: Connect the picture with the matching text! When you are done, press the blue check box!

Notes on the subject of cars: The i at the edge of the picture will give you clues! Drag the picture to a blue spot on the number line!

Image sources: Pixabay

- Car: tinyurl.com/4f7442yz
- Ship: tinyurl.com/mr4dcpb9
- Airplane: tinyurl.com/3kucpwwc
- Train: tinyurl.com/k65z6ptv

Practicing Multiplication Tables Digitally

Lisa-Marie Schörgi
Math / 2nd Grade



1. The Description

In this lesson, the students worked on their weekly plan. They worked independently on the tasks. One topic was to practice the multiplication tables via smartboard or iPad on the leaning platform "learningapps.org". On the platform are many different exercises to choose from. The students were allowed to choose on their own which multiplication table they want to practice.

2. Classroom Context

In class, there are 14 children (7 girls and 7 boys) at the age of 8 years.

Two students have an assistant. One of them has a cognitive disorder and has attended first grade twice. His behavior is still very infantile and not corresponding to his age. His IQ is below average. This is particularly evident in math classes. Calculation in the number range from 0 to 10 is only manageable with the support of his fingers or other materials. Practicing the multiplication table is also very challenging. The student has issues to remain concentrated over a longer period.

Another student with school assistance has ADD (attention deficit disorder). The child has also problems in math.

3. Lesson Goals

Goal 1: Students learn and practice at their own pace and according to their skill level.

- Stimulation to independent problem-solving behaviour. (Lehrplan der Volksschule, 2012, p. 58)
- Creating differentiated learning opportunities that allow students to learn individually and at their own pace. (Lehrplan der Volksschule, 2012, p. 25/28)

Goal 2: The students learn independently and repeat the painting sequences that are still difficult for themselves.

- Independent performance of arithmetic operations in the multiplicative range
- consolidate the acquired arithmetic operations
- largely automate basic arithmetic operations, especially the multiplication table (Lehrplan der Volksschule für Mathematik, 2012, S.3–4)

Opening the classroom and the tools and devices used (LearningApps, iPad/Smartboard) allowed for independent learning and practice for all students (differentiation).

4. Method/Approach

The students were familiar with the use of digital media in class, and they already knew how to use smartboards and iPads. The learning platform was already opened on each device at the beginning of the lesson. After the students received their weekly plan and they discussed the plans tasks, the students started practicing the multiplication tables. Each student was allowed to choose a multiplication table they wanted to practice, and the device they wanted to work with (smartboard or iPad). The smartboard is bigger than the iPad and for some students easier to use. Then the students practiced the multiplication tables. When they were finished, they showed the teacher the result and got a stamp in their personal multiplication pass and in the weekly plan.

5. Digital Tools Used

The multiplication tables were practiced on the platform LearningApps. There are diverse tasks for practicing, such as the multiplication table 6: tinyurl.com/5es3caev. On the platform, it is possible to create own tasks too.

The use of the platform is free of charge and no access data is required. For the Anton app, accounts must be created for the teacher and all students. Therefore, the teacher has insight into the students' learning process.

6. Similar Tools

One alternative to LearningApps is the Anton app: www.anton.app/de

7. Specific Needs (Disability)

The students really enjoy working digitally. For them, it is easier to concentrate for longer periods of time.

For the child with ADD who has difficulties with concentrating, working with the iPads is a relief. With the iPad, he can go to a quieter place outside the class with his assistance and work undisturbed. He enjoys working that way and sees it as a kind of reward.

The student with cognitive disability has difficulties with arithmetic in the number range 20. Working individually allows the child to solve easier tasks. When working digitally, the student can solve the multiplication tables 1 and 10 on its own. Solving the multiplication table 2 is possible with a little support.

The school assistants support the two students in solving the tasks, using the platform and the digital device, if necessary.

8. Challenges

In this lesson, there were no challenges. The students were already familiar with working with a weekly plan, digital devices, and the platform LearningApps. So, the students were able to work alone or in pairs independently.

The teacher can control the solved tasks in LearningApps only locally on the smartboard. Since the smartboard is located directly next to the teachers' desk, it is no problem.

AntonApp allows the teacher to monitor the student's progresses. When working with iPads, it is challenging to track whether the students worked alone or copied the solutions from a classmate.

9. Benefits

The benefit of working independently is, that all students can practice the multiplication tables they feel insecure about. There is no need for the teacher to provide worksheets for each multiplication table. The tables are available in the app. For the children with disabilities, it is a huge benefit to be able to work at their own pace and individual performance level. They often struggle with following the "normal" lessons and feel disadvantaged by giving the, differentiated lessons or materials. When working with the digital tools, they can decide for themselves which multiplication table they want to practice and don't feel so disadvantaged.

10. Lessons Learned

If it is technically possible, I would definitely recommend the use of this tool to all teachers who are already familiar with weekly plans or free work. For the students, these tools offer a special incentive and motivate them to learn.

11. The Average Cost of Implementation Per Child

The use of the tools is free of charge. However, iPads and/or smartboards must be available at the school.

12. Evaluation/Feedback

The students clearly enjoy using digital media. They help each other and are more motivated and engaged. It is important that the students are well trained in the use of the devices and apps in advance and also know how to handle the devices. If necessary, rules of conduct for the use of digital media can also be established.

13. Connection to SAMR and 4C model

According to the 4C model, the competencies „creativity" is promoted. I would classify the teaching scenario on the „Augmentation" level of the SAMR model.

Study Word Unit with the App "Wörter-Profi"



Pia Tscherne
German / 2nd Grade

1. The Description

The lesson was designed for the German classes. The main content of the lesson were the study words of the week. Since the study words were introduced previously, this unit aimed for practicing and consolidating the learning words. The unit was structured in a way so that each child could work independently and at his or her own pace.

The first step was a running dictation (ger.: Laufdiktat) in which the students had to write down the study words in their learning dictionary. If these were written down without errors, those students were allowed to continue their practice on the iPad. The app used for this was „Wörter-Profi“. This app was chosen because it is very clear and simple structure. The children have different opportunities to practice the learning words within the app, as it contains both easier and more trickier exercises. Since there were not enough iPads available, an additional worksheet was provided so that each student had sufficient opportunities for practice.

2. Classroom Context

The class consisted of 13 students in total. One of them is an eight-year-old student and is taught in this subject according to the curriculum of the general special school. The lesson was conducted in a face-to-face setting.

3. Lesson Goals

Goal 1: Students are able to read, memorize, and correctly spell words they already know.

- Subdomain Supportive strategies for learning spelling: visual-writing-motoric strategy
- Memorize standardized spellings by reading and writing
- Increasingly write down words from imagination (Lehrplan der Volksschule, 2012, p. 115)

Goal 2: Students have expanded and consolidated their vocabulary.

- Subsection Develop and secure a limited vocabulary
- Practice words: copying and writing down words, groups of words, and short phrases (Lehrplan der Volksschule, 2012, p. 114)

4. Method/Approach

The students had already learned the study words in the previous week. In this lesson, the study words were to be repeated, practiced, and consolidated. The child, who was taught according to the curriculum of the general special education, had its own study words in a decreased number than the other students. However, these were also appropriate to the topic and adapted to the abilities of the student so that working on the planned content was possible as well. Even though the students were familiar with using the iPad and the app, this was briefly repeated with all the students at the beginning of the day during the morning circle. Here, individual exercises were presented and briefly explained by the teacher on an iPad.

- **Step 1: Running dictation:** In the classroom, a sheet of paper with the study words and a sheet of paper with the learning words according to the general special education curriculum were placed at the door, on the windowsill and on the cupboard. All children were given their study word notebook. They had to run to the words and back to their seats to write down the words in their notebook
- **Step 2: iPad:** After the study words were written down in the study word notebook without errors, the children were allowed to take an iPad and practice them using the app „Wörter-Profi“ (Apple). One iPad was marked with a sticky note as the child taught according to the general special education curriculum had different study words
- **Step 3: Worksheet:** If an iPad was not available at the time, additional worksheets were provided. The study words then had to be organized in alphabetical order

5. Digital Tools Used

Short description of the app „Wörter-Profi“ (expert of words):

The app contains eight different exercises in which the study words can be practised at different levels of difficulty. The teacher has to enter the learning words into the app before they can be used. If the word is correct, the student receives points. The more difficult the exercise, the more points the student receives. When 100 points are reached, the word is deleted from the list. One word is practised ten times per exercise. The children only work in the app, there is no longer the need for a notebook, as all exercises are done using the iPad. Five exercises are used to write the words directly in the app.

Five exercises allow the students to write the words directly in the app, while two exercises encourage visual perception, whereby in one exercise the letters disappear when they are touched in the correct order and in the other exercise the letters have to be dragged into the correct order. This way, the word picture can be well memorised by the students. The last exercise includes a dictation function where the students can listen to the word.

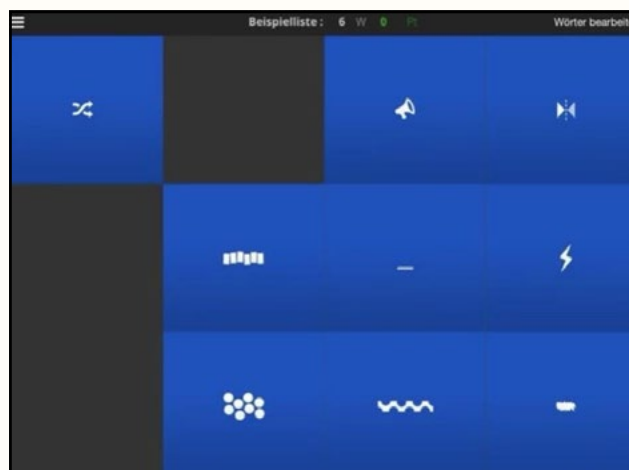
The last exercise includes a dictation function, where the children can get the word recited to them.

The app thus covers important learning types, such as the auditory and visual learning types and can be used in a very differentiated and individual way. The attached image shows an overview of the individual exercises that can be performed within the app. At the top centre of the image, the current list of examples that were previously created by the teacher and how many words are practiced in this list can be seen.

The price of the app is €10.99 and is only available via iPad.

6. Similar Tools

Unfortunately, I don't know any similar tools.



7. Specific Needs (Disability)

For this child, who is taught according to the curriculum of the general special school, no special arrangements had to be made in this lesson except for the adaptation of the study words. Writing sentences was easier within the app and took less time than without the app. The child could work faster using the app and had more opportunities to do different study word exercises. All that was needed was a separate iPad on which the student could practise the adapted study words.

8. Challenges

During this lesson no challenges occurred.

9. Benefits

I think the app is great for the use in inclusive learning environments and allows all students in a class to work individually. Each child works at his or her own pace. The exercises enable independent and individual work and can be adjusted optimally to the students with the free word input, as you could theoretically enter different study words for each student.

The students generally respected each other's differences. In my observation, the students supported each other even more in free learning settings like these even though they were aware of working on different contents.

Lessons that embrace an inclusive learning environment, in my view, promote and foster collaborative learning.

10. Lesson Learned

The students enjoyed learning very much, especially working with the iPad. The various exercises were also very well received by the children. It was also remarkable that the students made a great effort to fill in the study words correctly right from the start, since the study words deleted themselves from the list after being filled in correctly ten times. Their motivation to learn and enthusiasm were clearly perceptible.

11. The Average Cost of Implementation Per Child

Per iPad, the app costs 10,99€.

12. Evaluation/Feedback

Es wurde zwar kein spezifisches Feedback von den Schüler*innen eingeholt, aber während der Unterrichtseinheit hatten die Schüler*innen sichtlich Spaß an der Arbeit an den iPads.

13. Connection to SAMR and 4C model

I would classify the teaching scenario on the "Augmentation" level of the SAMR model.

World Animal Welfare Day

Stefanie Tupi

General education / 4th Grade



1. The Description

The children were asked to get together in groups – according to pets or animals to which they relate or are interested in. First, they talked about their pets in small groups (discussion for about 5 minutes). After the exchange, they were asked to create a presentation about their pet/ animal in those small groups, whereas the form of presentation could be chosen freely by the group. I provided different paper sizes, tablets and the stationary PC for the students and we talked about the possibility of creating mind maps, PowerPoint presentations, pictures, blackboard pictures.... For research purposes, I offered books about animals as well as the internet (children's search engine Frag Finn). The students searched and collected information in their groups, which they then recorded in a form of their own choice.

I chose working in small groups because this way presenting and organising is easier for children of this age. By working collaboratively, they can discuss and share several ideas; learn from each other and work together on a process, which was important for me in this lesson. Providing the materials was supposed to allow the students a lot of flexibility and creativity. By using the internet and the possibility to create digital presentations, the students can expand their abilities and skills as well as experience freedom of choice. Besides, even I don't know everything about every animal and this way the students can gather information quickly and easily.

- Finding a group according to pet / interest
- Task: choosing the form of presentation freely – creating a contribution for the classmates
- Providing material
- supporting/accompanying teachers



2. Classroom Context

24 student of 4th Grade in primary school; 1 student diagnosed with ASD

3. Lesson Goals

Goal 1: Students will be able to independently collect and record information about a selected animal

- Sub-area Responsible behaviour towards nature: Gradually recognize one's own responsibility towards nature:
- Recognize the importance of plants and animals for our habitat (plant and animal protection)
- Discuss experiences in dealing with pets (e.g., nutrition, keeping clean, care) (Lehrplan der Volksschule, 2012, p. 77)

Goal 2: The students can create a presentation in the group.

- Promotion of social learning (Lehrplan der Volksschule, 2012, p. 26)

Goal 3: Together, the students can find a way to present the content they have worked on and make it accessible to their classmates

- Writing and typography: writing and signs and simple design possibilities in everyday life – (...) create posters (...)
- Composing texts: Reproducing in writing what has been read, heard, seen, felt, and thought in one's own words (in complete sentences or key words) (Lehrplan der Volksschule, 2012, S. 123/124)

4. Method/Approach

- Introduction: Conversation – What day is today? Why do we need a World Animal Welfare Day? – Respond to the children's contributions
- Task: „Please get into groups. You should get together according to your pets, or those who do not have a pet should choose a group with an animal they are interested in or with which they have already had experience. Your task as a group is to discuss about your pet. What do you know about this animal? What does it eat? Where does it live? What does it like? I will give you different materials and together as a group you will make a presentation about your chosen animal. You decide together on how to do this. You can create a poster, a drawing, a PowerPoint presentation, a handicraft... you decide for yourselves, and each group is free to choose how they would like to present their animal to the others. For the research you can use the books provided, but also the tablets/the PC."
- Set the time limit: the students had 2 school lessons for this work
- Prepare the materials
- The teacher takes an advisory/ supportive role
- Dynamic guidance
- The children work independently in the group
- Presentations of the work (in this case they took place the next day)

5. Digital Tools Used

- PC
- Surface devices
- PowerPoint – because the students in my class can handle the program well; we have worked on how to use it and the children already have experience with it; flexible use – clear structuring possible + the possibility of printing something out and putting it in a folder
- Word – the students are familiar with the writing program; it is easy to save and modify something
- Search engine for children: FragFinn – the students know this search engine from other lessons: www.fragfinn.de

6. Similar Tools

- Online versions of Word/PowerPoint would encourage collaborative working
- MindMaps could be created digitally with a program (e.g., Mindmeister)
- Whiteboard – function via Miro

7. Specific Needs (Disability)

A student with diagnosed ASD – but hardly conspicuous in this working situation; principle of voluntariness benefits him; free choice of material or writing possibilities can be chosen in a flexible way (handwriting readable through digital writing)

8. Challenges

- Time commitment – the surface devices need some time to be ready for use
- Saving – the students need help saving the documents they create since we do not have devices that are permanently available, and the data is always deleted overnight
- Dynamic teacher guidance: support where needed, allow students to take their own path
- Open working – must be adapted to the group
- Children's search engine (e.g., <https://www.fragfinn.de/>) – information or pictures are not always satisfactory for all topics

9. Benefits

- Flexible usability
- High motivation / high demanding character
- Choosing freely according to interests and talents – natural differentiation
- Learning from others – exploring things collectively
- Exchanging experiences
- Learning from the competences of the group

10. Lessons Learned

- Good previous knowledge of PowerPoint, Word, and the use of equipment is required
- High degree of independence of the students/group
- Teacher as facilitator
- Not intended as an introductory lesson or introduction on how to use the program

11. The Average Cost of Implementation Per Child

Free of charge, as the equipment and programs were provided for the school by the city of Graz.

12. Evaluation/Feedback

Feedback was not requested directly – but observations of the children; the feedback was very positive; the children worked in a concentrated and accurate manner.

13. Connection to SAMR and 4C model

4C-model:

- Creativity – brainstorming, creative problem solving, choosing forms of presentation.
- Critical thinking – decision making; research – is it true? Does this match the statements?
- Collaboration – working together, achieving a common goal; enhancing learning

SAMR-model:



- Substitution – possibility of substituting analogue writing processes

Appendix

A product of the students – PowerPoint presentation


Der Zwergspitz

Präsentation von T., L., J., N., M. und Y.



Aussehen

- Wie ein süßer Fuchs
- Weiches, flauschiges Fell
- Das Fell wird sehr heiß! Im Sommer muss der Zwergspitz im Schatten sein.



Vorteile & Nachteile

Vorteile	Nachteile
Für Anfänger geeignet	Bellt viel
Für kleine Wohnungen geeignet	Haar sehr viel
Leicht hochheben	Hitzeempfindlich
Für Reisen geeignet	
Guter Wachhund	

Perimeter and Area

Katrin Wonisch
Math / 4th Grade



1. The Description

The lesson dealt with the topic „perimeter and area“. The topic was first introduced in a frontal teaching situation. Then the students worked in small groups with the Anton app to consolidate and practice the content. The students are already familiar with using the app, which made it easier for them to work independently. Among other things, the app offers voice output and hints for solving the tasks.

2. Classroom Context

There are seven students (six boys and one girl) in the class (4th Grade). One student has an autism spectrum disorder. The class was held in attendance. All students were present.

3. Lesson Goals

The goal of the lesson is for the fourth graders to be able to draw geometric figures with the given perimeter. They will also compare and calculate area and perimeter.

Curriculum Points:

Goal 1: Students will be able to independently investigate the areas they have learned about so far.

- Orientation in Space: In-depth investigation of surfaces – Name and describe surfaces, especially rectangles and squares
- Orientation in space: Working out the concept of surfaces – experiencing surfaces through action (Bundesministerium für Bildung, Wissenschaft und Forschung, 2012, p. 161)

Goal 2: Students will be able to graph surface areas.

- Sub-area Orientation in space: in-depth investigation of areas – representing areas
- Orientation in space: developing the concept of area – comparing areas (Bundesministerium für Bildung, Wissenschaft und Forschung, 2012, p. 161)

Goal 3: Students will be able to compare and distinguish different surfaces by shape and size.

- Orienting themselves in space: Investigate surfaces in depth – laying out surfaces, breaking down surfaces into sub-surfaces, putting surfaces together
- Orienting oneself in space: In-depth study of surfaces – comparing surfaces by shape and size (Bundesministerium für Bildung, Wissenschaft und Forschung, 2012, p. 161)

Goal 4: Students will learn to draw and calculate geometric figures with the given perimeter.

- Orient themselves in space: In-depth study of surfaces – Solidify calculation of perimeter length.
- Orienting in space: Calculating the area of rectangles and squares – Calculating the area with unit measures (Bundesministerium für Bildung, Wissenschaft und Forschung, 2012, p. 161)



4. Method/Approach

At the beginning of the lesson, the formulas for calculating perimeters and areas were repeated. After an example on the blackboard, the students worked in small groups with their books. Afterwards, each child received an iPad and was allowed to log into the Anton app with their own login data. Students worked independently in the app on the topic of perimeter and area. Since the students were already familiar with the app, no explanation of its use was necessary at this point.

5. Digital Tools Used

Anton is a learning app that can be used on a computer, tablet, or cell phone. Via a browser, the app can also be used without installation. Exercises from the subjects of mathematics, German, music, English, and science education are offered. Exercises for teaching German as a second language and exercises for use in secondary education are also available. Much content is aligned with the Austrian curriculum. The teacher can create an account for each child and thus track the students' learning progress. Pupils' successes are rewarded with virtual coins. The children can use these to buy exciting games within the app. The basic version of the app is free of charge.

6. Specific Needs (Disability)

One student has an autism spectrum disorder. He is very interested in technical work and is very skilled with his hands. However, he has great difficulties in the subjects German and mathematics. Especially reading comprehension is always a problem for him. The Anton app helps him solve mathematical tasks because the app has audio response so that the student can listen to the tasks. There is also a „hint“ button that stores useful information for solving the task. This way, the student does not have to constantly rely on the support of the teacher or his classmates.

7. Challenges

It was problematic that the WLAN connection was often interrupted.

8. Benefits

The Anton app can be used to repeat, practice, and deepen content. By repeating the formulas beforehand, the students were able to remember what they had learned and could start to work in the app. Working independently was very motivating for the children. At the end of the lesson, they proudly presented the virtual coins they had earned by solving the tasks. The students also benefited from the app's "hint" button. The hints do not reveal the result, but only help them find the correct solution. The speech output facilitated the student with ASD to solve the tasks.

If accounts are created for the students ahead of time, QR codes can be created for login. This simplifies the login process for the children. From the beginning, the use of the iPad was not difficult for the children. Many children already own an iPad or tablet and are familiar with the use of the device.

9. Cooperation with Parents/Guardians

The parents received the access code for their child, so the children can also work in the app at home.

10. Lesson Learned

I think, the Anton app is very helpful. In the paid version of the app, I can assign exercises to the children individually to suit their level of proficiency and encourage them according to their needs.

In the free version, exercises can be assigned to an entire group and not to individual children. If different groups are formed, tasks can be assigned per group.

The tasks and games can also be locked by the teacher to make sure that everyone is working on the right content.

11. The Average Cost of Implementation Per Child

Although the paid version has more features, I think the free version is sufficient for classroom use.

12. Evaluation/Feedback

Feedback from the students was not obtained. However, the way the students work with the app suggests that the children enjoy working with it.

13. Connection to SAMR and 4C model

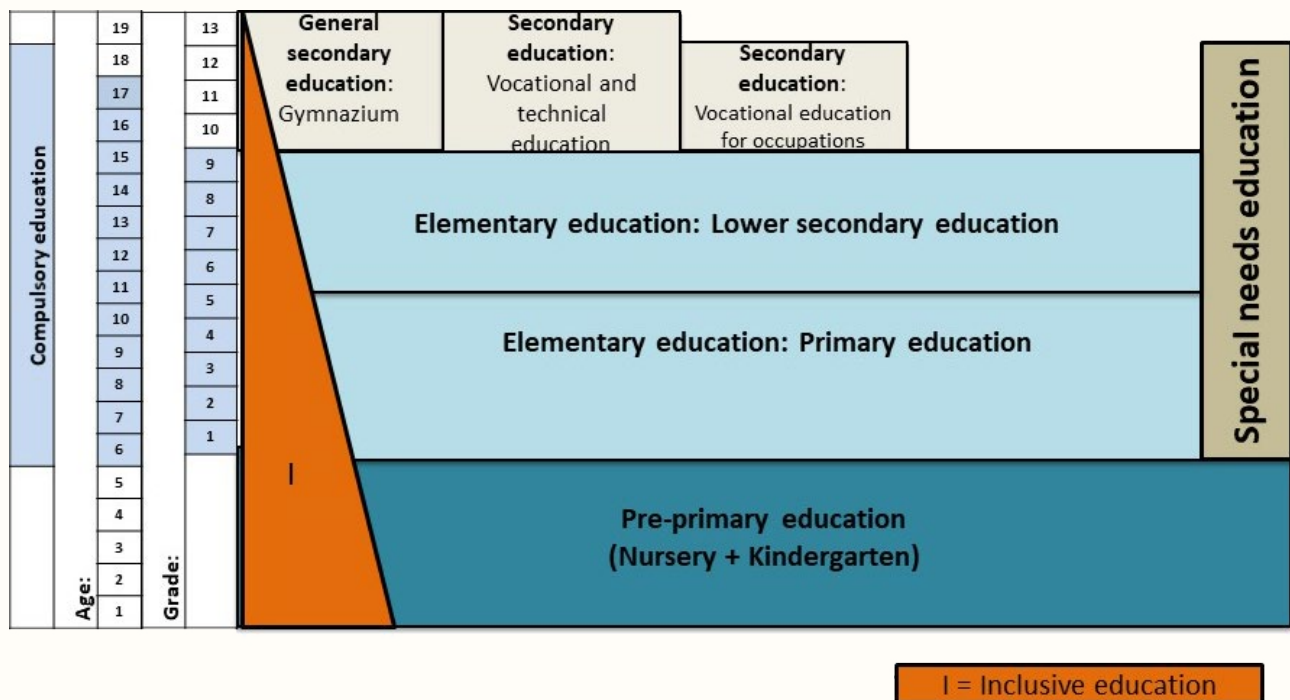
I would place the app at the „augmentation“ level in the SAMR model. In the 4C model, I think the app belongs to the field of „Critical Thinking (think for yourself, learn, act)“.



Examples from Bosnia and Herzegovina



School System



Education in Bosnia and Herzegovina is free for 13 years. Children start at age six and must finish at least 11 years of education. The first 6 years of what is regarded as primary education are spent at primary schools where the foundations of numeracy and literacy are laid. From here students move on to lower secondary education for the final 3 years of primary education. This completes the first phase of education.

At secondary school, students have the option of choosing between general and technical secondary schools where they may study for up to 4 years. At around age 19 they may qualify for a matura or a diploma respectively, which entitle them to study further at tertiary level.

Source for text and figure: Federal Ministry of Education and Science, www.fmon.gov.ba

Clothes

Anela

English / 4th Grade



1. The Description

The topic of the lesson was "Clothes". Pupils were learning to name summer and winter pieces of clothes, describing what a person in a photo is wearing. It was frontal way of teaching with some elements of independent learning.

The lesson was created during the total lockdown in Corona virus pandemic. The teaching choice was asynchronous learning, i.e., teaching through video lessons, because the younger students otherwise needed parents' support in getting the teaching materials and in communicating online with the teacher. Teaching with video and audio is particularly important in the case of younger children who are just starting to learn a foreign language, so they need to acquire the correct pronunciation of words and phrases. It was also important that pupils could watch and listen to videos multiple times. This is not the case when the lessons are held in a synchronous way, for example when using the Zoom platform.

2. Classroom Context

There are 21 pupils in the class 4. They are 9 years old and this is their third year of learning the English language. One of the pupils had individually adjusted curriculum due to a surgery of benign neoplasms of the brain and other parts of the central nervous system that required the need to reduce the amount of new concepts from all teaching subjects, reducing the content to remember. The pupil also has problems with motor skills especially when using school supplies in writing. It was noticed that the boy acquires teaching content more easily and quickly when using digital tools.

The classes were taking place online and the video lessons were uploaded to the teaching platform eSkola.ba. The pupils were downloading them from there to watch, solve the exercises and check their answers. At the end of the lessons there was a reflection in a form of a quiz or online exercises, after which they received prompt feedback.

3. Lesson Goals

In accordance with the Herzegovina – Neretva Canton Educational Curriculum for English language in the 4th Grade, the third year of learning a foreign language

tinyurl.com/c74zsvsy

- Learn the names of clothes
- Talk about them in relation to size and colour
- 3. Learn to describe the clothes of a person using the phrase "to be wearing."

4. Method/Approach

- prepare a PowerPoint presentation and design the whole video lesson in the form of notes / concepts according to the elaboration of the outcomes at the video lesson activity level
- plan in advance how to announce what will be discussed in the video lesson
- design motivation for monitoring and learning
- at the beginning, introduce pupils to all of the school supplies and things that are important for the implementation of the learning activity
- instruct the students at the beginning of the video lesson that they can stop it while answering questions or doing some other assigned activity or if they have not been able to understand or take notes
- when asking questions that encourage students to think, pause for a few seconds, give them time to think, do not immediately state possible assumed answers or continue with the video lesson.

It must be mentioned that mitigating circumstance for me was the fact that all the textbooks were already in a digital form, provided to us by the Publisher in PDF form during the pandemic. Thus, the power point presentation making was easier. I then used Free Cam application to make the video lessons, recording while I was going through the presentations, presenting the content, asking questions, and providing answers after a few seconds. Pupils also had time for independent work, while they could see the solutions on the screen after a few minutes and compare their answers to the correct ones. The students did not have a time limit for completing the exercises, they could stop the video and work according to their capabilities and the pace that suits them. At the end of the lesson pupils had a reflection in a form of a quiz which I made in the learningapps.org

Aplikacija je besplatna i jednostavna za koristiti. Potrebno se samo registrovati, izabrati odgovarajući template, unijeti sadržaj, sačuvati te podijeliti s učenicima u vidu linka ili QR – coda. Ima mogućnost pojedinačnih i grupnih vježbi, a vježbe mogu biti tipa spajanja parova, poredati redoslijed riječi u pravilnu rečenicu, unos teksta koji nedostaje, višestruki izbor odgovora, audio / video unos, križaljke, ukrštenice, itd. Na ovom linku se nalazi vježba kreirana za ovu nastavnu jedinku tinyurl.com/5adv4up

Note: To tickle the pupils' imagination and make this lesson more interesting in the video lesson, I used clips from the video material English Adventure Starter B – "It's a party" that I found available on YouTube www.youtube.com/watch?v=4vdpxypt3EO

5. Digital Tools Used

For the creation of this lesson, PowerPoint presentation was used, software FreeCam8 (www.freescreeenrecording.com) was useful for recording of the screen. It must be installed on the computer. For the quiz, Learningapp (learningapps.org) was used. The application is free and easy to use. The user needs to register, choose a suitable template, input the content, save it, and share it with the pupils in a form of a link or QR – code. It has an option of individual and group exercises. The exercises can be connecting the pairs, sequencing the words in a sentence, inputting the missing text, multiple choice answers, audio/ video input, crosswords, etc.

6. Similar Tools

Similar tool for screen recording is www.videoproc.com, and for quiz making is wordwall.net which is paid on a monthly or yearly basis. A teacher has the possibility to use different templates for interactive content (anagram, match the pairs, find a pair, balloons, quiz) and determine the time frame and speed of response required from the students.

7. Specific Needs (Disability)

The boy with disabilities in the class had brain and central nervous system surgery. After the operation there was a need to reduce the amount of new information in all school subjects, and the quantity of content for memorising. He also has problems with motoric functions, so he handles the school equipment with difficulty. The use of digital tools is very significant as it is easier for the pupil to handle computer hardware. He also had a chance to look at the video lessons many times, and thus make the memorising easier.

8. Challenges

The greatest challenge was to find the right tools to implement my ideas. Since I did not have any special equipment at home, apart from the laptop, video editing often required a lot of time.

9. Benefits

The advantage in having the video lessons was that the pupils had access to them at the time that suited them the best. They watched/ listened to the lessons as many times as they wanted. They were offered the correct pronunciation of the vocabulary and they could acquire it without the fear of making mistakes. The practice was engaging and interesting as it was like the games they play on the computer. They learnt through play.

Since there is a platform eSchool in our Canton, all the pupils are registered, and accessed all the materials without any problems. The school made sure all the pupils had access to the internet and a device to participate in the online lessons. **There was no time frame for downloading the lesson or completing the tasks, so the lesson was available on the platform for the whole school year.**

10. Cooperation with Parents/Guardians

Communication with parents was through email and phone, the directions were given on how to access the teaching materials in case parents didn't have any IT competencies. After one week, the pupils were independent in accessing the materials and doing homework.

11. Lessons Learned

I would highly recommend the video lessons to all the teachers, and especially to the ones teaching pupils with disabilities, as they often require many repetitions to acquire new information. It is important to choose the right tools for implementing the ideas and to make it accessible and easy to use for everyone.

12. The Average Cost of Implementation Per Child

The digital tools used to create this lesson were free. Word Wall is an alternative, at 7 BAM (app. 3,5 EURO) monthly. However, it has a lot of created content that can be modified easily to suit the purpose.

13. Evaluation/Feedback

The reactions of pupils and parents were more than great. They enjoyed this kind of lesson delivery as pupils were able to follow the lessons independently and there was nothing for the parents to do with children additionally. The pupils were doing the exercises independently and they were able to check the answers in the solutions offered in the video lessons. They were happy to participate in quizzes and did them multiple times.

Parents were sending me messages about their children's impressions of the lessons. They encouraged to continue and confirmed that I made the right choice of the teaching method and the delivery. The parents and pupils nominated me for the best online teacher in BiH within the project "In healthy school the healthy children!" I was second according to the number of votes. These were some of the messages from the parents:

"Dear teacher, the video is great, you made our work easier."

"Good morning, I don't think anybody was happier than my girl when she heard your voice this morning. She kissed laptop :-)."

"Dear teacher Anela, all the praise for the online lesson. We enjoyed it. My son says it is better than in school :-)."

"Such a creativity, it is a joy to listen to you. We are looking forward to English lessons."

"Dear teacher, we enjoy lessons with you."

This practice comes from primary school "IV osnovna škola" in Mostar, Bosnia and Herzegovina. The material was prepared by Anela Omanović, English teacher.

Additional links:

- **Video lesson:** drive.google.com/file/d/1UcqoZ0dW2IkCAfB2jNGN_krrJ_ToMCFO/view?usp=sharing
- **Online quiz 1:** learningapps.org/display?v=psat3foa320
- **Online quiz 2:** tinyurl.com/4wkr678p

Subtracting the Sum and Difference from a Number; Multiplying and Dividing; Equations with Multiplication and Division



Mirela
Math / 5th Grade

1. The Description

The following Math topics were subject of the lesson: Subtracting the sum and difference from a number; multiplying and dividing; equations with multiplication and division – the fifth-grade students had a task to calculate how much they should save to be able to buy a desired product. Students were problem solving in small groups and then gave their creative solutions independently. The principles of Universal Design for Learning were employed here, as a general didactic model for planning and structuring of teaching and learning in an inclusive setting. The aim of UDL is to use methods which are flexible and adaptable to the strengths and needs of all students. The main goal is to reduce the barriers and increase accessibility. With UDL the teachers can create learning environments to accommodate the variety of students' needs.

It was agreed that students were to choose how to present the solution: by creating a cartoon using Pixton (www.pixton.com), by making a book in StoryJumper (tinyurl.com/42r3wvx3) or by doing a presentation. The task and creative solutions were discussed during online lessons. There was also one meeting with students from another school within the eTwinning project about the savings.

2. Classroom Context

Three fifth grade classes participated in this activity. There was one student with a Conduct disorder involving avoidance and suppression of emotions. Due to frequent surgeries in childhood (palate surgery), the student had problems with reading and understanding what he had read. It is very difficult for him to read and pronounce. Also, due to the therapy he receives, he showed destructive behavior in the lower grades and refused to cooperate. It was achieved that he gradually accepts his responsibilities but performs the tasks under the constant supervision of teachers and teaching assistants who break down the tasks into parts that he can understand. The lesson was held partly face-to-face and partly online.

3. Lesson Goals

Curriculum for 5th Grade was consulted while planning the lesson. (tinyurl.com/ascmkx8u)

Area A: Sets, numbers and operations:

A 5.2.

Selects and combines different operations to solve problem tasks.

- Performs arithmetic operations on the set NO
- Uses properties of arithmetic operations
- Composes a numerical expression in solving different problem situations

A 5.3.

Evaluates the accuracy and justification of the chosen methods through a discussion of the final solution.

- It verifies the accuracy of the obtained solutions by applying connections between computational operations
- Relates solutions to selected computational operations and explains them with their opposites where possible

Area B: Algebra:

B 5.4.

Applies equations and inequalities when solving problem situations.

- Makes an equation and an inequality that corresponds to the task text
- Solves equations and inequalities by applying connections between arithmetic operations

The aim of this lesson was for the students to learn the two ways of subtracting the sum from a number, to learn how to find the unknown factor in multiplication equations, and to learn the procedure for multiplication and division.

Digital content creation:

3.1. Developing digital content

3.2. Integrating and re-elaborating digital content

- To create and edit digital content
- To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licenses are to be applied



4. Method/Approach

Preparation and introduction:

Students were to research the price of a product they wanted to buy now or in the future (laptop, new mobile phone, TV, a car, a house, holiday at a chosen destination, etc.).

They were then to ask the parents about the average monthly income and expenditures, or to search on the Internet what is the average amount of income in the country and what are the average expenses in the household. The possible monthly savings were to be calculated from this information.

Group work:

Having the information about the monthly savings and the desired product, an equation was to be worked out to determine how many months they would need to save enough money to purchase this product.

(Equation: $\text{savings} \times \text{the number of months} = \text{the price of the product}$; $\text{the price of the product} \div \text{the savings} = \text{the number of months}$; if the savings are over 100 BAM the students were allowed to use the calculator as they still didn't learn division by three-digit numbers).

Individual work:

Students decide on the form of expression for their ideas. They can choose to create a cartoon, an e-book, or a presentation.

Form a classroom in Pixton and let the students choose their avatars (it is important for safety issues to have avatars instead of the real photographs).

The cartoons were created in Pixton. The completed cartoons with the problems solved were checked. Students didn't have to send the links as they were already contained in Pixton classroom. E-books and presentations were sent by email, and the students were given directions in case any changes were needed.

5. Digital tools Used

Pixton was used to form the virtual classroom and the cartoons. The student with disabilities created his cartoon with the support of parents, peers and the teacher. He needed the help of his parents during the online class in the part of the task that he had to do individually.

The e-books were created in StoryJumper. Have a look at this example one of the students created. tinyurl.com/42r3wvx3

6. Similar Tools

It can be suggested to the students to create their e-books in Bookcreator and their presentations in Genially, Emaze or Adobe Express.

7. Specific Needs (Disability)

One of the students had challenging intellectual abilities, thus difficulties in understanding. He couldn't do the textual problems independently, so the program was adjusted to execute the basic mathematical operations with two-digit numbers.

For the student with difficulties, the task was divided into parts for easier understanding. For example: determine what you would like to buy and how much that product costs; find out what the average salary is; find out what the average costs are; subtract the costs from the salary one by one or add all the costs and subtract them from the salary; write how much money is left; how much you need to save to buy the desired product.

8. Challenges

Pixton is free and there was no need to register the school, the teacher or the students to use it. However, the free options are free for a limited time. After this time the cartoons can still be created with previously devised avatars and on a white background. This was still interesting for the students. During the online classes in the previous period, the students already gained digital competencies and the use of this digital tool was not difficult for them. It was more **challenging to come up with the ideas for the content** than the use of this tool itself. .

9. Benefits

A **different approach to learning** had a motivating effect on most students. They were discussing in groups how to solve the exercises, they were communicating and collaborating. Students comprehended the teaching materials more thoroughly through the project work as everybody had to come up with their own solution.

The application of digital tools in teaching and learning Mathematics brings us one step closer to **"digital generation"**. The students are more motivated for learning, they give their creative solutions, cooperate with their peers exchanging ideas and presenting their work whereby they strengthen their competencies.

10. Cooperation with Parents/Guardians

One of the tasks was to discuss the average monthly income and expenditures with the parents, to better understand the importance and value of money and savings. Parents had great reactions to the project. They liked the idea of students learning in a different way and they valued the topic itself because the students learnt about the **importance of saving**.

11. Lessons Learned

I would recommend this approach to all teachers. Some areas need to be enriched with a different approach after the basic knowledge is acquired.

It is very important to master the basic calculation operations, to calculate the values of equations with addition and subtraction and with multiplication and division. When students have mastered the work technique, they can do tasks where their application is visible. In the given task, it is seen whether the students know how to compose a specific numerical expression based on the text and to solve different problem situations, whether they know how to recognize and set up an equation that corresponds to the problem situation and then solve it and give a creative presentation of the solution.

The preparation and the implementation in fact do not require much time, and the students more readily approach the solving of the exercises.

12. The Average Cost of Implementation Per Child

The digital tools used were free and additional materials were not required. I created the virtual classroom and all the students joined without the need to register first. As lessons were held online in the previous period due to the pandemic, all students had access to computers either at home or in the school.

13. Evaluation/Feedback

The parents were giving positive feedback during the regular teacher–parent meetings.

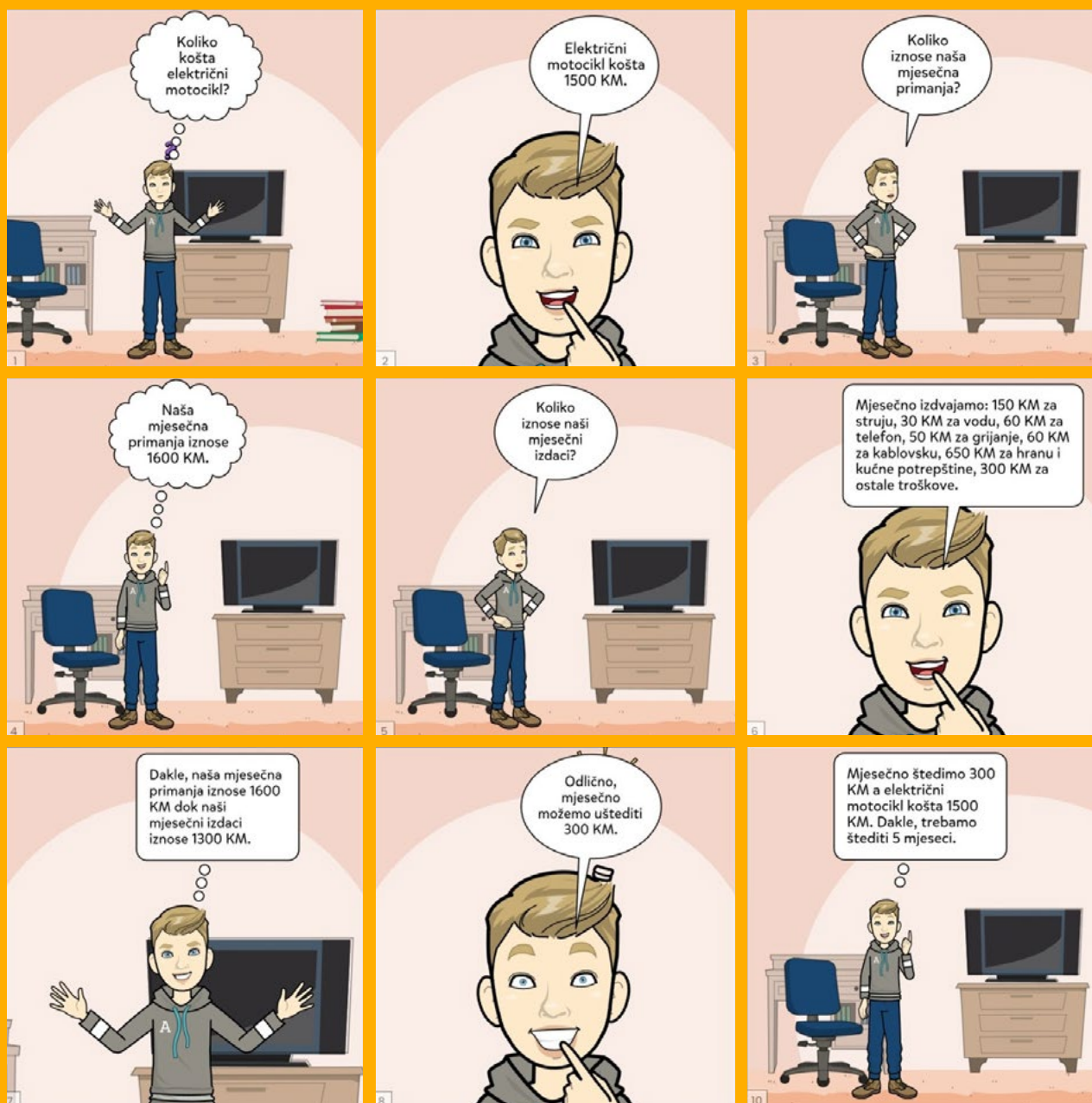
The parents of students with disabilities were very satisfied with the task given, for which they said that he was happy to approach each stage of the process and suggested what he would like to buy. The student was keen to find out the prices of the items that interested him, as well as the average salary and monthly expenses. He was thrilled to create his avatar in Pixton and the comic giving his solution to the task.

There were regular feedback conversations with students to talk about the advantages and disadvantages of the project. After the final work was created, the students shared their positive experiences with students at another school via an online meeting.

This practice comes from primary school "Pofalići" in Sarajevo, Bosnia and Herzegovina
The material was prepared by Mirela Avdibegović, Mathematics teacher



Additional materials, Work of the student with disabilities:



Another example



The Development of Bosnia and Herzegovina: Economy and Tourism



Denisa
Social Studies / 5th Grade

1. The Description

Students gained initial competencies for the application of knowledge about the BiH economy in practice to develop mini entrepreneurship. The following methods were used: learning by solving problems, PAR (Present-Apply-Review) learning model, explorative learning, and design-thinking.

Teaching was a combination of frontal, individual independent work, small group work (4-5 students) and working in pairs.

Didactic approaches applied in specific project phases were chosen according to the following principles: accessibility, economic value, age suitability, systematic and gradual approach, and obviousness and individualization.

2. Classroom Context

There were 26 students in the classroom, one of them had visual impairment. The lessons were held online due to the pandemic. The lesson had a concept of a small project, implemented over four sessions. Student's visual impairment was retinoblastoma with a very small percentage of visual ability. Difficulties due to low vision were overcome by adapting the material and encouraging the student to use different tools for completing the tasks. This is a boy with a high IQ, ability to concentrate, excellent memory and personal resourcefulness, which benefited him in his learning and made a great contribution to the realization of the project. We conclude that his visual impairment did not impair his ability to work.

During the project the boy with a disability used one of the specialized tools for visually impaired people. Below are the recommendations for using this tool:

Tool – writing:

- mobile app voice sound keyboard for android
- braille keyboard for the blind
- speech program – voice for the computer

Text-to-speech tool:

- Narakeet to create voiceovers using realistic text to speech (www.narakeet.com)
- Responsive voice to turn text to human digital voices (responsivevoice.org)

Tool – Screen reader:

- Android – commentary
- Windows – NVDA
- IOS – voiceover

Picture Description for Chrome

Lookout – Assisted vision on Google Play (tinyurl.com/bdeujkbb)

Lookout uses computer vision to assist people with low vision or blindness get things done faster and more easily. Using your phone's camera, Lookout makes it easier to get more information about the world around you and do daily tasks more efficiently.

Image recognition in Apple store

3. Lesson Goals

The general project goal was to enable students to recognize: the potentials of Bosnia and Herzegovina that can be employed to develop the economy, the economy objects, relationship between different economy branches, domestic products and to give them the priority when purchasing as to support the domestic economy, and to grow an interest for personal development in the development of the society.

The purpose of the practice is for the students, based on the acquired theoretical knowledge about the economy of Bosnia and Herzegovina, to obtain the initial competencies for applying them in practice in terms of developing mini entrepreneurship.

Specific goals were:

1. Development of thematic knowledge. The students:

- 1.1. Recognize the capacities of our homeland based on which the economy can be developed.
- 1.2. Observe important economic facilities of Bosnia and Herzegovina.
- 1.3. Notice the interconnectedness of the branches of the economy.
 - 1.3.1. Have knowledge about the economy and tourism of Bosnia and Herzegovina and their connection.
 - 1.3.2. Are aware that there are different branches of the economy and their representation in Bosnia and Herzegovina.
- 1.4. Recognize domestic products and give them priority when buying.
- 1.5. Know that by buying local products, they help the development of local economy.

2. Development of digital competences. The students:

- 2.1. Have a critically developed attitude towards information available on the Internet.
- 2.2. Know how to recognize the necessary information, form it linguistically and search for it on the Internet.
- 2.3. Are aware of the Internet etiquette and behave accordingly.
- 2.4. Know the advantages and disadvantages of Internet content and take care of it during use.
- 2.5. Choose the appropriate tool for creating tasks.
 - 2.5.1. Improving the use of assistive technology through methodology, practice and improving functionality for visually impaired people with an emphasis on autonomy, independence, quality of life and social inclusion.
- 2.6. Present the contents of their work with the help of digital tools

3. Development of an affirmative attitude towards personal and community development. The students:

- 3.1. Observe and critically approach facts about the community.
- 3.2. Recognize the importance of the individual in the community.
- 3.3. Contribute to the development of the social community.
- 3.4. Participate in the development of an inviting relationship with the environment and the cultural values of that environment.

4. Improving the use of assistive technology through methodology, practice and improving functionality for visually impaired people with an emphasis on autonomy, independence, quality of life and social inclusion.

From page 36. in The Curriculum:

3. Geographic features – features of Bosnia and Herzegovina

- 3.1. Natural resources, geographical features of Bosnia and Herzegovina
- 3.2. Development of Bosnia and Herzegovina, economy, and tourism
- 3.3. The mutual relationship of the economy

4. Method/Approach

This project activity was implemented in four online 5th grade social classes. Meet or Zoom platforms were used for online lessons.

- **Frontal** form of work proved to be justified in presenting content to the whole group (via Meet or Zoom platform).
- **Independent** work was used in the preparation and collection of information and materials for group work. (Study of Internet content on a specific topic, study of encyclopedias, collection of oral information from close people).
- **Work in small groups** was used because of the specific and high-quality engagement of each student.

Lesson 1:

Activity 1.

Online lesson via Meet or Zoom platform. The lesson begins with "brainstorming" after the input information is provided:

- Bosnia and Herzegovina
- The journey

The students were given the task of writing in the „chat“ everything that these words associate them with.

- By reading the results of the "brainstorming" the following activity is announced – online journey through Bosnia and Herzegovina.

(If the students are digitally competent, the introductory activity can be done on the platform Slido (tinyurl.com/n5dvpa5e), they need to scan the QR code with their camera and then use the platform to add their ideas.)

Boy with disability used Tool – to writing:

- Mobile app voice sound keyboard for android or speech program – voice for the computer

Activity 2.

With "screen share" option teacher shows the BiH map (Created in Padlet, the online map of Bosnia and Herzegovina with markings in some places tinyurl.com/2mxpvy4n). Please note that Padlet is not fully accessible for visually impaired students. They can navigate the site but cannot create new content independently as they cannot use the mouse as required. The teacher „travels“ with the students through the map, using signposts, discovering new places. If the students are interested, we study certain places. Together „mysterious journeys“ are solved. The teacher reads and explains in detail what is on the display.

1. Position the view of the online map to BiH. Click to the beginning of your journey:

- a. First journey is from Sarajevo,
- b. Second journey is from Ilidža,
- c. Third journey is from Pale,
- d. Fourth journey is from Vranduk (near Zenica),
- e. Fifth journey is from Sokolac.

2. Follow the directions given on each marked spot on the map. Travel through all given destinations.
3. Intend to find out and remember as much information about the cities as possible.
4. Finally, discover the end destination for each of the above routes.
5. Solve the puzzles: Write in chat the starting and the end destination of each journey.
5. Riješi zagonetke: na papiru zapiši početnu i završnu tačku zagonetnog putovanja (npr. Sarajevo).

Reflections on the journey – ask the students:

- Which destinations did we travel to on our journeys?
- At what border crossings did we arrive at the end of the journeys?
- What countries are at the border crossing where we arrived?
- Have you travelled through any of these border crossings (Gabela, Gorica, Donje Vardište, Bosanski Šamac, Metaljka)?
- What does each border crossing have? Who works there?

After the tasks from the map are solved, students will be forwarded a link with the map via chat, each child will independently study the map, discover new places on it and study it. A boy with disabilities uses explore-by-touch to read the map. Every marked place on the journey connects with [Wikipedia](#) information about that place. For one location on the map, the link to Wikipedia information about that city is followed. The boy with disabilities works alone using the Screen reader.

Activity 3.

Students choose one of the places they passed through on their journey (ex. Zenica). The most important economic facilities in Zenica are highlighted: the forge, the coal mine, Kamberovića polje nature park, the old town settlement, the Zenica museum, mountain Smetovi, where the SCORPIO extreme sports club operates.

The homework directions:

- Imagine that friends or relatives who don't live in BiH asked you to choose one of the towns to visit together. Which one would you choose?
- Explore the economy and touristic capacities of the chosen town and explain why you choose that town.
- Look at the suggestions of all students and vote for the one you like the most.

Homework directions are given on the Wakelet platform (tinyurl.com/yjefp4hy) which relates to Google Classroom. Students work online and vote on IdeaBoardz platform (tinyurl.com/48akmcz7). They write ideas for visits and vote for the best represented destinations.

Lesson 2:

Activity 1.

Online lesson via Meet or Zoom platform.

The homework is analyzed. The most attractive location presented by students is noted by the number of votes. The selected location is looked at briefly. (We hope you will visit this wonderful place sometime in the future.)

Learning about the economy in BiH continues through the activity "I love BiH". Students choose three products from their fridge and read where they were produced. It is then summarized how many of the products were produced in BiH. Boy with the disability uses KNFB Reader – tool (nfb.org/programs-services/knfb-reader) which turns printed text to voice.

The following questions can be asked:

- Is it important to buy products produced in BiH? What happens to the money we pay for the products produced in BiH versus the imported ones?
- Is the origin of ingredients safer in the products made in BiH compared to the ones made in other countries?
- Do we make a difference to the overall economy of BiH by purchasing the products made in BiH? In what way?

Activity 2.

The option „screen sharing“ is used to analyze the portrayed content about the economy.

- Ask the students: What economy branches were mentioned? Tell us what you already know about them?
- Then read through Padlet Wall content and add new information to it. (tinyurl.com/2vds8w8f)
- Ask the students: If you know someone who works in any of these economy branches ask for their experiences? How are different economic branches related (for example tourism and traffic)? Are all the branches related and connected?
- Role play: Imagine that you are the manager of one of the portrayed industries, for example "Klas". Would you change anything? If you were the coalmine manager, what would you do?

Students add new information to the content and expand their knowledge about the economy.

The following link is shared with students through "chat" in Meet or Zoom platform. They study facilities. tinyurl.com/yrev2mnb

The boy with disabilities participates in the activities. There is an audio recording of all the content for him.

Activity 3.

In the final part of the lesson, the students choose the most attractive economy branch to study.

Homework:

Study the Padlet Wall content carefully, read the information from the textbook and other available resources, talk to the family about their experiences in different economy branches.

Lesson 3:

Activity 1.

Online lesson on Zoom platform:

The activities from the previous lesson are continued. The "Screen sharing" option allows the insight into branches that had the most likes in Padlet Wall about the economy. The teacher explains the content of what was done, how many „likes" each branch had and which branch had the most „likes". The class talks about the economy in BiH, the different branches and the ones they choose as the most interesting. Students also share what they found out from the family and what they learnt from various resources used.

Activity 2.

The students are divided into groups according to their interests (crafts, food industry, tourism, etc.)

- Link 3 (tinyurl.com/45cv554x) is shared through Google Meet or Zoom with tasks made on Genially platform. (genial.ly/de).
- Everything on Genially Wall is analyzed, the tasks are read and made sure it is all clear.
- The parameters in the table for self-evaluation of student achievements are read, so that they can keep this in mind while doing the activity. The self-evaluation segments are: ACTIVITY, USE OF ADDITIONAL MATERIALS, CONCLUSION MAKING, PRESENTATION, DEADLINES.
- The boy with disabilities works using Screen reader.

An example of group work task:

- „Congratulations if you've chosen tourism. Bosnia and Herzegovina has wonderful resources for the development of tourism.
- Study the table for self-evaluation and see what is expected from you during the project work."

The tasks for group work:

1. Choose one of the students to be responsible for the work.
2. Research the available resources for the start of "mini entrepreneurship".
3. Devise a detailed way in which this entrepreneurship would function (what it would produce, what resources it would use, where the final product would be offered, the recommended selling price).
4. Determine what economy branches are related to this entrepreneurship.
5. Think of the brand name.

The boy with disabilities participates in the activity with audio recording of all the content from the Wall.

Activity 3.

- "Chat breakout rooms" on Zoom platform are used for the group to exchange information and share the tasks.
- The teacher enters the groups from time to time to note the group dynamics and answer any questions. The students are suggested to recognize the capacities of group members when sharing the responsibilities and tasks (information collecting, presentation skills, technical abilities, etc.)
- Students are advised to communicate in the agreed time slots through Meet or Zoom, to monitor the progress of the group work.

Lesson 4:

Activity 1.

Online lesson on Meet or Zoom platform: The teacher announces the lesson content by presenting the "mini entrepreneurship" and suggesting the layout:

- The name and the members of the entrepreneurship
- The activities of the entrepreneurship
- The economy branch it belongs to and its relatedness to other branches
- The presentation of the actual product

The teacher at the end announces the selection of the best entrepreneurship, to be chosen by voting. The arguments for the voting are taken from the table for self-evaluation of the achievements.

Activity 2.

Presentation of "mini entrepreneurship" via "screen sharing" option. They do the presentation of their Entrepreneurship according to their choice and depending on their digital competences –via ppt, poster, description, online presentation, (app.rolljak.com/templates), ROLLJAK (app.rolljak.com/templates), Prezi (prezi.com).

The most successful ones are chosen after the presentation. The voting is performed by the option "raise hand". The winning group gets to choose the topic for the next "classroom project". They also get to choose the industry/ economy place to be visited by the whole class.

Activity 3.

The students are told to evaluate the knowledge gained through the quiz. Students do the quiz on Google Forms (tinyurl.com/yckrc78z). The boy with disabilities works using Screen reader.

The teacher has the option to see all results and answers of students using the option to receive a mail with responses in Google Forms option settings.

5. Digital Tools Used

All digital tools used were selected purposefully in accordance with the requirements of online classes and individual parts of the project and are aligned with the requirements of each stage of work. The mentioned tools also have appropriate accessibility for students with visual impairments.

- The selection of tools is varied to maintain children's interest, curiosity, and motivation to work.
- All the mentioned tools are free and most of them do not require registration or installation on the device, except in the case of using Android OS.
- The parents were involved to support students in their work, all activities were designed so that students could work independently.

Digital tools used in project implementation with the students: Slido, Padletinteractive map, Padletinteractive all, GeniallyWall, GoogleForms, IdeaBoardz, Canva, Zoom, Meet, Narakeet, ResponsiveVoice, Vocaroo, KNFB Reader (for instant access to print forms) and MBraille App (brings a mobile braille keyboard) to accommodate the needs of the visually impaired student.

6. Similar Tools

There are various similar digital tools that can be used, but the above were tested and suitable for this project work with students.

7. Specific Needs (Disability)

- All the materials were adjusted to the needs of the boy with disabilities, so that he could use them equally as other students. Every step of the project tells how they were used (tinyurl.com/uiff25fn).
- The boy has visual impairment, so each platform also carries audio recording of the material and the content itself.

8. Challenges

- The challenges in the implementation of this practice were multiple, particularly because there was a need to switch to online teaching overnight due to the pandemic. Nobody was prepared for this.
- The main problem happened to teachers and students whose internet was not fast enough or who had older devices which could not support the use of particular tools.
- The challenge was also to find the tools which were not complicated to use and did not require license purchase or registration. It was also important to have the tools which offer audio recording and easy access for the boy with visual impairments.

9. Benefits

- Students were interested in using every digital tool, so I made sure there was a variety. I realized that students easily acquire digital competencies and enjoy the work. They even showed greater interest than in face-to-face lessons.
- All tools were simple to use and offered the adjustment of "visibility" of the materials, so it was possible for students to access the links without the previous registration.
- Students were acquiring digital competencies while gaining knowledge about the topic itself.
- The digital tools chosen arouse interest and motivation in students to learn and achieve the teaching goals. Learning through fun content was emphasized. The visually impaired boy had special satisfaction because he improved his general knowledge, as well as his digital competences.

10. Cooperation with Parents/Guardians

- Parents were involved as support in implementation of the project, although all the activities were designed for independent work.
- Parents of the boy with disabilities were involved in the completion of some of the activities.

11. Lessons Learned

I would advise this methodology and the use of digital tools for all subjects and topics, as it is interesting for students, and much easier to achieve long-lasting teaching goals. Project work encompasses many segments of child development.

Advice for teachers who wish to pursue this practice or its segment:

- When dividing the responsibilities and tasks it is important to tell the students to choose the ones, they would be able to complete with the electronic device they have and in line with their abilities.
- It would be a plus if each group could have at least one student with developed digital competencies, so that he/she could be supportive of others.

12. The Average Cost of Implementation Per Child

All the tools used were free and most of them didn't require registration or installation (in case of AndroidOS use, some tools required installation).

13. Evaluation/ Feedback

Students had a positive attitude during project implementation. They were thrilled because new ways of teaching and learning were employed. They enjoyed the synergy of digital components and learning, regardless of whether it was learning the new concepts or revision. The motivation of students increased if they were offered a choice of topic and the time in which they could do the task. The boy with visual impairment had an extremely **positive attitude** about the new way of learning and improving his digital competence on suitable platforms or mobile applications.

Parents expressed their satisfaction with contemporary and tailor-made content of lessons during the pandemic.

This practice comes from primary school "Hrasno" in Sarajevo, Bosnia and Herzegovina. The material was prepared by Denisa Karahasan.

This mini project resulted in the brochure summarizing all the steps. To view please click on the link below or scan the QR code. (tinyurl.com/uiff25fn)



Differences in my Neighbourhood – Celebrations



Adisa
Religious Studies / 5th Grade

1. The Description

The topic: Differences in my neighbourhood – celebrations with the aim of introducing the differences implied by the three monotheistic religions in BiH, finding what is common and unites the people. Detailed description of the lessons is given in Method/ Approach.

Didactic approach: Combination of frontal lesson in introduction, group work in the main part and presentations and individual work in the conclusion of the lesson. This didactic approach ensured that every student found the most suitable way to express their knowledge, competencies, creativity, and involvement.

The resources: Multimedia presentation, the game of associations, monitor, YouTube, Boardmaker7, as well the textbook, work sheets, cardboard paper, and stickers.

2. Classroom Context

Every classroom in primary school "Malta" is **IT equipped**. The students are used to digital tools application in teaching so there were no difficulties here. Our school is one of the 10 schools in Canton Sarajevo included in the training program for the application of assistive technologies in inclusive education and the use of Boardmaker7 in the teaching process. Three teachers participated in the training, and they further trained 26 more teachers in the school. The trained teachers use this software in their everyday work as well as for the preparation of materials for students with disabilities. The school accommodates a significant number of students with disabilities who attend the mainstream teaching process, thus **the idea of inclusion and the inclusive approach to students is already a common perspective of our school.**

There were 18 fifth grade students in the classroom, among them one girl with combined disabilities (significantly below average verbal and non-verbal cognitive functioning, and socio-emotional development, various health issues). The class was implemented face-to face. After the lesson in the school, students also went to a field trip whereby they had an opportunity to recognise and express the knowledge gained during the lesson in the natural environment.

3. Lesson Goals

Lesson planning and the lesson itself were done according to the outcomes of the curriculum.

D.5.1. Analysis of own role in the sustainability of natural wealth and cultural heritage of the country.

After the lesson the students will:

- understand and appreciate differences,
- be able to tell and describe the traditions and celebrations of other religions and beliefs,
- analyse the culture of living with other religions,
- choose a tolerant approach to differences.

The lesson had a focus on:

- encouraging positive attitude and appreciation of differences, as well as nice and open communication towards all religious groups through the analysis of own behaviour,
- familiarising with the values of each religion,
- developing the habit of pursuing the traditions and celebrations of own religion.

4. Method/Approach

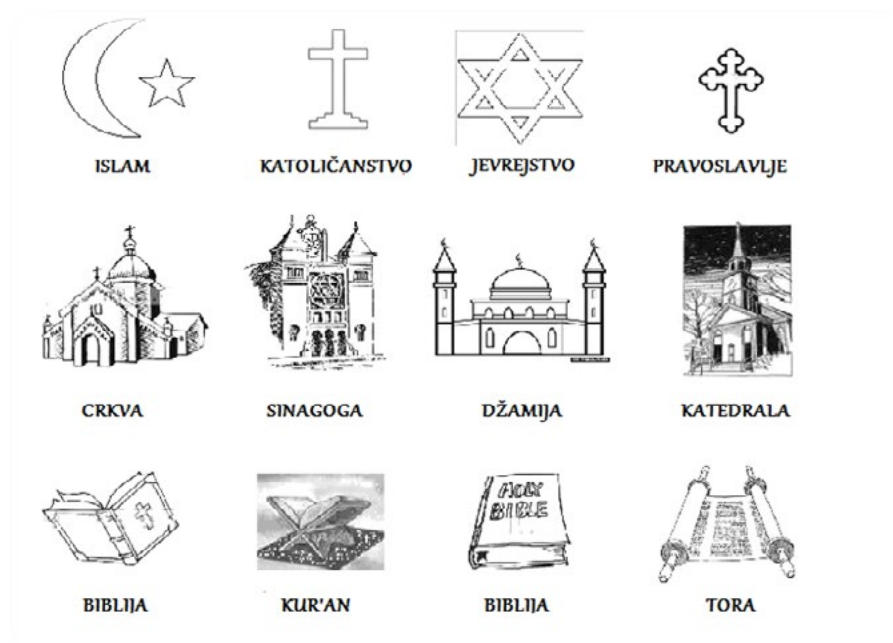
Introduction: The game of associations to arrive at the topic to be elaborated – Differences in my neighbourhood – celebrations. The game of associations can be prepared in PowerPoint, on the board, in a form of cards, or in a different way depending on students' interests.

The game of associations				
The bow	Decorations	Parents	Togetherness	Sweets
The ribbon	Lights	Safety	Candles	Eid
Gift wrap	Green	Love	Food	Chocolate
Gift bag	New Year	Joy	Business	Savoury
The box	Home	Happiness	Drinks	Christmas
The present	Christmas tree	Family	Lunch	Cakes

Presentation in the form of associations made it possible for the students to relax at the start of the lesson, think, connect the terms, and work out the solutions to understand the topic of the lesson.

Afterwards, the students learn about the meaning of religion, religion and faith, the various world religions, and their presence in BiH, with particular emphasis on Sarajevo centre where within a few hundred meters there are mosques, churches, and a synagogue.

Group work: Form four groups taking care to mix the students of different gender and school achievements. Each group is labelled with the name of one of the big monotheistic religions (Islam, Catholicism, Orthodoxy and Judaism). Every group reads the text written in an envelope on their desk. The task for every group is to find the answers to a set of questions based on the text (the text is chosen according to the quantity of information the students should learn during the lesson and depending on the desired outputs and lesson goals) they had in the envelope. The answers are to be written on the cardboard paper, together with the group name and the illustrations provided in the envelopes. While working, students listened to some songs related to religious traditions and celebrations. These were played from YouTube: Hava Nagila; We wish you a Merry Christmas; Zvaio bih Te Gospodaru. (tinyurl.com/2p88sar3).



Conclusion: Students presented the results of the task they did. They checked their answers on the slides of the presentation. The revision was possible through the available illustrations and questions raised during the second part of the Power point presentation.

The questions for the groups:

- What is the holy book of each religion?
- What is the place of worship of each religion?
- How is the religious leader of each religious group called?
- What is the religious symbol of each religion?
- Name the main celebrations of each religion.

In the concluding part of the lesson every group has a chance to work on the worksheet made in Boardmaker7 (BM7) online and in that way do a self-evaluation of work, attention, and content acquisition during the lesson. The worksheet mainly used the same illustrations as the presentation. The students were to connect all familiar items so that they made a meaningful whole.

The groups also had a task to photograph their work and add it to the booklet, while also having to fill it with the information to be explored until the next lesson. The lesson was concluded by having cakes and sweets to celebrate the successful ending of the school term.

For homework students were to explore: the festivities and transitions not mentioned during the lesson but occurring in the monotheistic religions; and the traditions of other religious groups living in BiH. The teacher can assign the tasks for students to do in groups or pairs in order to get as much information as possible until the next lesson. The students can also choose the topics independently and visit some of the sacred objects or talk to people who can offer more information.



Spoji simbol sa svetim objektom!











5. Digital Tools Used

- During their group work students listened to the following songs from YouTube: Hava Nagila; We wish you a Merry Christmas; Zvaio bih Te Gospodaru. (tinyurl.com/rpuds9d7).
- Software Boardmaker7 was used to create the worksheets. Free 60-day trial of a Boardmaker7 Subscription or a free 30-day trial of Boardmaker7 Standard is available. Boardmaker7 offers numerous possibilities for creating and downloading the teaching content in printable and interactive form: Art and Creativity, Books and Presentations, Flashcards, Matching, Labelling, Questions and Answers, and Sorting.
- Storyjumper was used to create the booklet with students' work.

6. Similar Tools

Instead of Boardmaker7, LessonPix could be used. It is an online, more affordable, resource to create custom materials for the learning, communication, and behaviour prompting.

There are tools that offer numerous possibilities for content creation, such as stories, quizzes, presentation of facts, cross words, association finders, etc. These tools are an excellent way for the students to express their creativity and strengthen their research and IT competencies.

Wordwall is a free template application to make custom activities for the classroom, such as quizzes, word games, and more.

LearningApps is free to use to create different tools as an addition to teaching or for independent learning.

StoryJumper is a free website that offers teachers and students the chance to create their own digital books.

Genially is a free online tool for creating interactive content, such as presentations, infographics, and games.

Canva is a free website for designing presentations, videos, social media templates, posters, etc.

7. Specific Needs (Disability)

Students with disabilities generally remember the facts better when accompanied by illustrations, whereby the illustrations tell more than the presentation itself. The illustrations should not be confusing and are not to contain too many details, the best is to have it describe the fact that students are supposed to memorise or learn about. The tools mentioned have an option of inserting audio and video content, thus enabling students with disabilities to stay focused for longer. The tool itself is chosen according to the affinities of students and the didactic methods according to their abilities and previous experience and practice.

The student in question here has **combined disabilities** (intellectual and health). She is loveable and accepted by her classmates. Considering that she readily participates in joint activities, the differentiation was related only to special materials or tasks. The activities were varied, and all students were able to choose the suitable ones (reading, writing, formulating the answers, arranging the illustrations, decorating the poster, presenting the group work). The worksheet can be produced in printing or online in Boardmaker7. The online version was chosen (with the option of audio content) for the girl with disabilities as she prefers this kind of work. The girl's task was to connect the facts familiar to her from her environment but also the ones she learnt in the lesson. She was offered support in a sense of additional questions and prompts as to connect as many facts as possible in a meaningful whole. The rest of the students were doing the worksheet in a printed form with an option to do it online at the end of the lesson.

8. Challenges

It is recommended that the licenced Boardmaker7 is installed on all computers in the school so that students and teachers can access the software. Boardmaker7 targets students with disabilities, but it can be used in **working with the whole class**. The software requires exploring of its opportunities and the expression of creativity in its use.

The facilitation of the teaching process, the preparation for it, and the choice of methods and techniques are the challenges themselves. The outcome in the form of learning depends on many factors and the **teacher is the key**. Therefore, professional development of teachers, not only in their area of expertise, but also in IT competencies, should be continuous to answer to the needs of the society and to offer students something innovative to overcome monotony and students' indifference.

9. Benefits

This didactic approach and the lesson concept as such enabled all students to actively participate and contribute to the group work in a chosen way. The group work made possible the **socialisation and peer support**. The application of digital tools made the lesson more interesting and engaging. Simultaneous use of various tools and resources ensured that every student found the **best way to learn and express the knowledge and creativity**. The girl with disabilities participated independently and equally with her peers.

10. Cooperation with Parents/Guardians

Partnership with parents needs to be **continuous and nurtured**. This is to ensure that the wellbeing of students is the priority, making it possible for students to experience school as a positive environment which offers all studying conditions, the fulfilment of individual needs and competency development. Communication with parents was through Microsoft Teams and whenever other opportunities arise (when they bring children to school, in consultations, etc). Significant is the involvement of assistants who work with students with disabilities on the acquisition of the lesson content. They also have regular communication

and interaction with parents. **This is a very meaningful support to the teachers in their everyday tasks.**

In this lesson the assistant helped the student with disabilities in its final part, while she was working on a worksheet in Boardmaker7. While participating in the group work, she had support of her peers. Assistant's support is welcome as the teacher cannot always dedicate the time and attention solely to a student with disabilities.

11. Lessons Learned

I believe that combination of methodologies and techniques can contribute to greater productivity of students and teachers. However, care should be taken not to use too many of them during one lesson. Maybe the best option would be to choose one method and technique for one lesson depending on the requirements and the goals. The use of digital tools is to offer a different and interesting way of conducting a lesson.

12. The Average Cost of Implementation Per Child

There were no specific costs to this activity as the school provides the basic resources to the teachers to use in the lessons (cardboard large size paper, coloured papers, glue, stickers, markers, etc.).

The Boardmaker7 organization licence quote with Multiple accounts for multiple students is available upon request.



13. Evaluation/Feedback

Feedback about the use of Boardmaker7 was received from the teachers who attended the training, and from the students who participated in the lessons. Students liked the content created in this software, they found it interesting and engaging. The teachers upload the created content to the Microsoft Teams group entitled Assistive Technologies. In this way the content created is exchanged and available to other teachers who can replicate and adapt them for their use.

Other digital tools I use for teaching have an option of providing feedback and insight into the number of students who did that, quiz, game, etc. Below are examples of the materials created for students:

learningapps.org/watch?v=ps5eafvpt22

learningapps.org/view10789437

learningapps.org/view10334661

learningapps.org/view10820215

learningapps.org/view10007283

www.storyjumper.com/book/read/81884465/5ea0096a711a2

www.storyjumper.com/book/read/89089055/5f7ac8401efde

www.storyjumper.com/book/read/82226235/5ea5a3cd44b62

wordwall.net/hr/resource/30698101

wordwall.net/hr/resource/38953984

This practice comes from primary school "Malta" in Sarajevo, Bosnia and Herzegovina
The material was prepared by Adisa Milić, Religious Studies teacher

Privacy

Selma

Civil education / 7th Grade



1. The Description

The lesson implemented was „Privacy“. In the introductory part of the lesson the students were motivated to think what privacy is, by asking them clear everyday questions. They afterwards watched a short video lecture on the topic of Privacy.

www.youtube.com/watch?v=IPvyUuvQ_D8.

In the main part of the lecture the students worked in small groups. Their task was to read/ listen to the story Privacy and answer some questions in writing or verbally. The story content was recorded as audio and all students had an opportunity to listen to it and read it again from the textbook if desired. The materials used in the lesson, as well as additional resources for better understanding of the topic were added to Office 365 for independent use (PowerPoint presentations and short video lectures from YouTube).

2. Classroom Context

There were 21 students in the classroom, one of them had adjusted program created. The lesson was conducted face-to-face, and the materials were made available on Office 365 – the files were also attached to Microsoft Teams. The students were thus able to use all the content in their own time while learning, revising or doing homework.

3. Lesson Goals

The lesson goals were created according to:

- The Curriculum for Civil Education: learning outcomes A.7.3 and A.7.4 (tinyurl.com/yukhxbtw)
- The Teaching plan and program for Civil Education (page 9.) (tinyurl.com/ykj8wj3y)

Lesson goals were also related to digital competencies (page 5.) of students (goals 2.6 and 4.2 are achieved through lesson activities, while all goals related to digital competencies correspond to the final student project Privacy). (tinyurl.com/5n926hpv)

Lesson goals:

- Explain privacy and cultural factors which determine its understanding
- Differentiate between levels of privacy based on everyday life examples
- Understand the fact that the right to privacy is not an absolute right
- Build an attitude of protection of privacy of self and others

Digital competencies:

- 1.1 Searching and filtering of data, information and digital content
- 1.2 Assessment of data, information and digital content
- 2.1 Interaction through digital technologies
- 2.2 Sharing through digital technologies
- 2.6 Maintenance of digital identity
- 4.2 Protection of personal data and privacy
- 5.3 Creative use of digital technologies

4. Method/Approach

Activity 1.

In the introductory part of the lesson motivate the students to think what privacy is, by asking them clear everyday questions:

- What information you don't wish to share with strangers?
- How do you behave when showering/dressing? Do you close the door behind you?
- Do you have a password on your phone? Do you allow other people to read your messages and look at photographs and videos?
- Do other people know your access information to the social networks you are using?
- Was there a situation when your friend told your secret? How did it make you feel?
- Are you aware there are cameras in many public places, even in school corridors? Do you behave differently when you know the place is covered by video surveillance?
- In what way a profession or a hobby can impact the privacy (a singer, an actor, reality show participant, a politician)?
- Is privacy interpreted and considered differently in different cultures? Remember travelling to other countries.

Students write on the board their **associations to variations of privacy**. The conversation that follows leads to a conclusion that privacy is important, that it is a human right, that they should keep personal information safe, and that they should not threat privacy of others (record or photograph someone without their consent) as it represents a serious offense. Privacy is not an absolute right as there are situations when privacy is restricted by others (at the airport, border crossing, police identification, surveillance cameras in public places, etc.).

After the discussion and conclusion making the students watch a short video lesson on the topic of Privacy explaining different levels of privacy through examples.

www.youtube.com/watch?v=IPvyUuvQ_D8

Activity 2.

After the explanation of basic concepts and watching the video, students read/ listen to the story. The story called Marvin Veličanstveni part 1, can be found in the textbook Basics of democracy, page 22. Audio of the story Privacy used in the lesson as an exercise for critical thinking has been recorded in StoryJumper and Boardmaker7, but it can also be recorded in PowerPoint or any other software with audio recorder.

Such approach is **favorable for all students** as they can follow up the story in their textbooks while listening, thus ensuring better understanding. It is also suitable for visually impaired pupils, pupils with Dyslexia and those who have difficulty reading and understanding.

Students are then to be divided into four groups. They talk about the story and analyze the examples of privacy from the story. Afterwards they answer the questions as groups:

- Who wanted to keep something private?
- What did these persons want to remain private?
- Who did they want to keep private from?
- Why did they want to keep this private?
- What levels of privacy are shown in the examples?

The group representatives present the conclusions and answers.

Besides, the pupils had an opportunity to see a short video describing the situation in which privacy can be violated, especially in case of children: Protect Yourself Rules – A Friendly Stranger. Other videos were published in Office 365 platform for students to watch as homework:

- Protect Yourself Rules – Smart Choices
- Protect Yourself Rules – Secrets
- Mini lecture: What is privacy?

Activity 3.

Pupils were given a task to come up with the activities and share the responsibilities on the project Privacy. The project is to be implemented in teams as homework as there was only one computer in the classroom. The students should be offered various ways of portraying the topic and allow them to choose the way of expressing their knowledge according to their interests and abilities.

My suggestions were:

1. Portray the topic through privacy on the internet.
2. Elaborate on the topic through downloading applications or software on your mobile phone or a PC (what information needs to be provided to gain access).
3. Show the topic through the historical changes in the society – gather photographs of buildings or dressing codes through time.
4. Make a comic to say about privacy by using software or drawing.
5. Develop a scenario for a short animation or film (with parents' consent).

While planning and project implementation pupils develop their digital competencies through:

- creation of presentations, photography or recording.
- researching the privacy on internet.
- researching the conditions of use of various applications, as well as collecting and systematization of information.
- creation of a comic using specific software.
- the process of recording and editing of a short animation or video.

In the final part of the lesson a short assessment is conducted whereby all students need to connect the illustrations to the corresponding concepts related to the levels of privacy.

This approach in teaching did not differentiate the student following adjusted program. She had the same approach and the same worksheets as her peers but with less possible answers offered.

5. Digital Tools Used

Activity 1: Mini lesson What is privacy?

(www.youtube.com/watch?v=IPvyUuvQ_D8)

Activity 2: StoryJumper (tinyurl.com/2rw6mnr7) was used to produce the materials/ multimedia presentation. Audio story was significant for the pupil with disabilities.

Short video story about Privacy was shown on YouTube.

(www.youtube.com/watch?v=SY7RhBszipOk)

Activity 3: Worksheets were created in Boardmaker7 (any other software can be used for this purpose). Students had a task of connecting the illustrations to the corresponding levels of privacy. Worksheets were used as feedback about the acquired knowledge of the basic concepts of all students, including the one with disabilities.

The materials were uploaded to the platform for revision and help during the homework. All the materials were used in the lesson:

- The rules for protection – a clever choice (www.youtube.com/watch?v=XoyyvBoDoaA)
- The rules for protection – secrets (www.youtube.com/watch?v=uAD17zMgjHc)
- Mini lecture – What is privacy? (www.youtube.com/watch?v=jHlcGogP6uU)
- PowerPoint presentation to support the project development
- The textbook in pdf format
- The students who wanted to know more were directed to use the platform for Civil education (civitasonlineucionica.ba)

6. Similar Tools

There was no need to search for other similar tools for this lesson as the tools applied here were sufficient to answer to the needs of all students. Nevertheless, quality materials can also be created with the following tools:

- **Worldwall** for creating the classroom activities, such as quizzes, association, word games, etc.
- **Padlet** to create an online notice board.
- **Bunce** is a platform where teachers and students can create and share multimedia presentation, interactive lessons, digital stories, etc.
- **Learning Apps** support the creation and use of multimedia exercises, such as quizzes, tests and other ways of assessing the basic concept knowledge.
- **Quizizz** for knowledge assessment, teaching and practicing in a way that motivates every student.
- **Nearpod** is a platform for the creation of interactive lessons, videos, games and other activities.
- **Ahaslides** is used to create interactive presentation for assessing the knowledge. Up to seven students can participate live. Every student can see the questions on their device and provide an answer before the time is up.

7. Specific Needs (Disability)

By using Storyjumper and Boardmaker7 I managed to answer to the needs of pupils with disabilities. These tools enabled the creation of multimedia presentation which contains text with privacy examples and audio story for critical thinking exercise. Considering there are students who have adjusted programs in my class, and the ones who have difficulty with reading and understanding, this approach was accommodating for everyone. Moreover, I also created the worksheets used for student assessment in this way.

8. Challenges

There were no particular challenges. It is sufficient to have Boardmaker7 installed (the license is required, but a trial version can also be used) on the computer and internet connection. When you start using this software you always make a step ahead as the ideas keep coming up. No particular digital competencies of the teachers are needed, I believe that whoever used some digital tools can comprehend this one without problems. The content can always be improved, shared with others, printed in pdf format, or used as worksheets. Storyjumper is free and only needs registration. It can be used in the lesson, with the option of link sharing to make it available outside the classroom.

9. Benefits

The content and information are available to the whole class, and additionally adjusted for students with disabilities. Worksheets can be interactive and used on the PC or easily transformed to printed version. Students with disabilities are to benefit as the content can be listened to and the materials can be forwarded to the parents/ assistants if needed. The whole class also benefitted as creative, interesting materials were produced to make the achievement of learning goals possible. The time needed for special attention and work with pupils with disabilities is shortened or not necessary at all.

10. Cooperation with Parents/Guardians

Parents were not involved so much regarding the use of digital tools in the classroom. However, they supported all innovations in teaching and learning and happily used the materials prepared when working with their children. Students received all the materials in their account on the platform: links, lectures, and exercises.

11. Lessons Learned

This approach to teaching is recommended to all teachers, as well as school management who are to invest in innovative teaching approaches. It is more interesting for students than the traditional approach, content acquisition is easier, there is greater participation in the lectures, and teachers are offered great choice of activities while decreasing the time needed for resource preparation.

12. The Average Cost of Implementation Per Child

Boardmaker7 was free for our school as we had an excellent opportunity to receive license and training donation from UNICEF. The trained teachers further trained the other teachers in our school on the use of the software. YouTube can be used for short video and other content searching. Storyjumper is free and only requires registration and motivation for material creation, which can be made public or restricted to certain students, teachers and other users.

13. Evaluation/Feedback

Feedback was not collected in writing, but I received positive reflections from students, parents and teaching assistants.






This practice comes from primary school "Malta" in Sarajevo, Bosna and Hercegovina
The material was prepared by Selma Karović, Mathematics teacher

Additional materials:

Worksheet created in Boardmaker7:






Connect illustrations to concepts

Undo Check answers Stop

	PRIVATNOST POSMATRANJA 2
	PRIVATNOST PONAŠANJA
	PRIVATNOST INFORMACIJE 1
	PRIVATNOST POSMATRANJA 1
	PRIVATNOST INFORMACIJE 2

Connect illustrations to concepts

Undo Check answers Stop

	PRIVATNOST POSMATRANJA 2
	PRIVATNOST POSMATRANJA 1
	PRIVATNOST PONAŠANJA
	PRIVATNOST INFORMACIJE 1
	PRIVATNOST INFORMACIJE 2

Comic strip illustrating a story about privacy and observation.

Panel 1: puno više od toga piše svoje misli, svoje privatne stvari...
njenim vratom
Wow

Panel 2: Sofija kada je osjetila dah nad vratom prepala se
Da... Ali slučajno sam...dok si pisala nisam te htjela ometati...
Aaaa... Prepala si me... Jesi li ti to gledala šta sam ja pisala

Panel 3: Mama je nešto govorila Sofiji ali Sofija nije čula
Sofija, draga dosla je tvoja drugarica

Panel 4: Sofija nije ni slutila šta će se desiti... Ana je sve to ispricala i ako je obećala. Ana nije znala da Sofija stoji iza nje i da sve sluša šta ona govori o njoj.

Panel 5: Obećanje je dato
Uredu... Ne birni necu nikom reci... Obećajem!
Uredu... Molim te obećaj da nikom nećes reci za ovo što sam pisala! Obećaj mi!

Panel 6: Ali...obećala je..
Znate šta.. Sofija je napisala nešto vrijedno za ispricati citavoj školi...znate kako je smijesno...eh ovako...

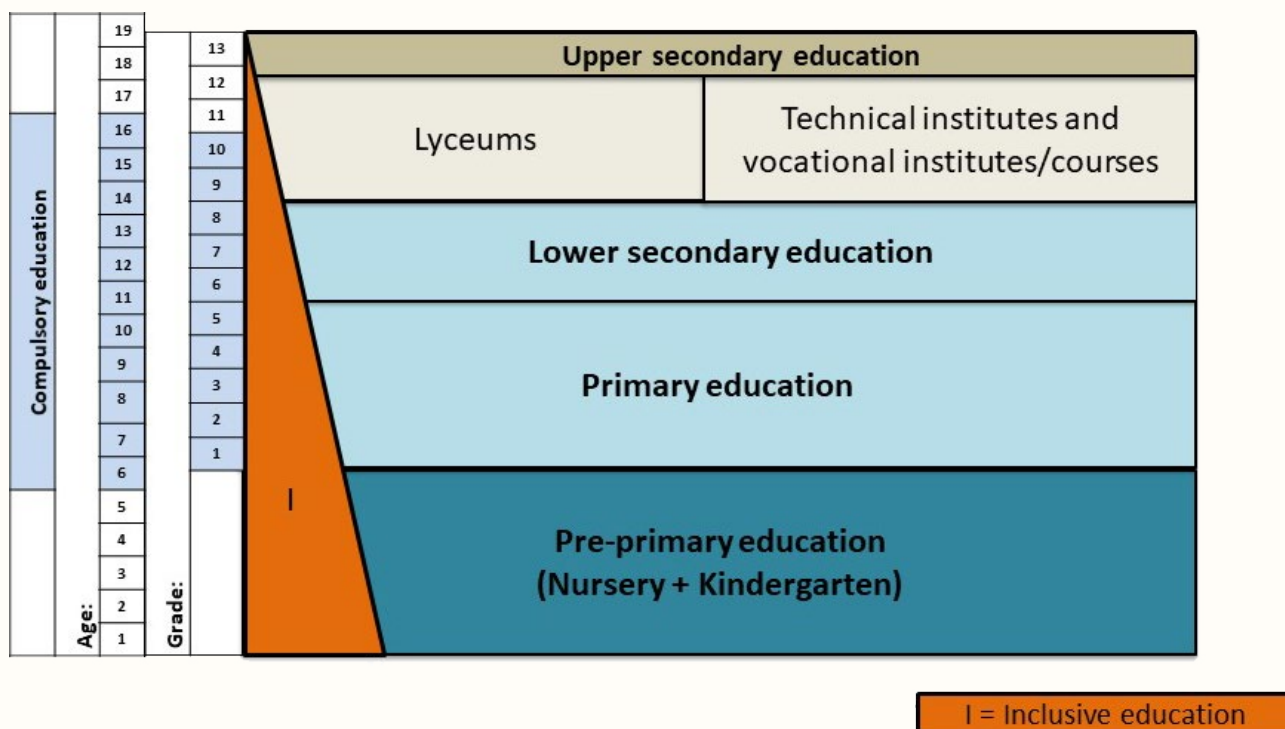
An example of work done by students:

- Story created in Storyjumper
(www.storyjumper.com/book/read/144934351/6389e1741bab7)
- Examples of created comics
(www.storyjumper.com/book/read/146120801/PRIVATNOST-RADOVI-UENIKA#page/4)

Examples from Italy



School System



The Italian school system is public, free and fully inclusive (no special schools/classes are formally foreseen by the school legislation). All pupils and students have the right to access all school grades and types regardless of their (dis)abilities or other individual or socio-economic characteristics. Compulsory education comprises 10 years of schooling ranging from 6 to 16 years of age.

The first level of the Italian education system consists of an integrated and voluntary (not compulsory) system of pre-primary education for children aged up to six, comprising nursery (0–3 years) and kindergarten (age 3–6 years). At level two, the first cycle of compulsory schooling begins. This consists of: 5 years of primary education (age 6–11); and 3 years of standardized lower secondary education (age 11–14). After that, at level 3 (upper secondary education), students can choose among lyceums, technical institutes and vocational schools. These three types of schools differ in the curriculum. However, graduation from all of them gives access to university.

Source for text and Figure: Ianes, D., Demo, H., & Dell'Anna, S. (2020). Inclusive education in Italy: Historical steps, positive developments, and challenges. *Prospects*, 49(3–4), pp. 249–263.

The Sumerians in Comics

History / 4th Grade primary school



1. The Description

The lesson was aimed at strengthening the relationships between the students in the class through cooperative learning work. The objective of the activity was to write and collect stories contextualized at the time of the Sumerians to create an illustrated comic book (printed and digital). The technologies used were: (1) Storyboard That, a software program which allowed the children to create comic strips contextualized in Sumerian times; (2) PowerPoint, used to group the various stories and create the digital book.

This approach was chosen due to the relationship difficulties between the students in the classroom context; hence the cooperative creation of these stories could have been an effective method to enhance the group's relationship skills, giving the children the tools to be able to relate to each other consistently with the task and objectives.

2. Classroom Context

The lesson was designed for a fourth-year primary school class, consisting of 20 pupils in total, and took place face-to-face (school year 2019/2020). The class included one child with mild cognitive disabilities and four students with SLD.

3. Lesson Goals

The Sumerians were the topic of the lesson. The main objective was to deepen the already acquired knowledge of the civilisation and enhance creative writing through the use of stories.

4. Method/Approach

Initially, during a circle time, the children were shown a cartoon story on the Sumerians taken from a comic book, to serve as an example. Afterwards, the class was divided into groups (5 groups of 4 students each) and each child was given a role (e.g., time controller, voice controller, etc.). Then, each group had the task of creating a Sumerian-themed story. To make the activity more dynamic and fun, the children used "storytelling dice". After rolling the dice three times, starting with the images that came up each time, every group had to invent a story, setting and contextualising it in Sumerian times. In addition, each child had tokens to adjust the various inputs: in turn, everyone shared their idea, using the tokens, to contribute to the creation of the story. Once the stories were written, they were reviewed by the teacher, who provided individual feedback to each group. Finally, the children had to transform the written text form into an illustrated story by creating a comic strip. The texts were transformed into a series of cartoon images and dialogues.

The children had prior knowledge regarding the characteristics of comics (prerequisite). At this point, the pupils moved to the computer room where the software program Storyboard that and its features were explained to them and they transferred the drawings/sequences into digital form. The advantage of this software is, precisely, its versatility and the fact that it allows a great deal of customisation to the final product. The pupils were free to choose the colours, the physical appearance of the characters, the backgrounds, the shape of the vignettes, etc. The various sequences were then downloaded, saved and merged into a PowerPoint presentation. In the final phase, the children also recorded the voices of the characters and inserted the respective audios onto the PowerPoint presentation. The end result was a digital book (illustrated and narrated). Finally, a return session was scheduled to conclude the activity, in which the final product resulting from the group work was commented on. The book was then printed so that it would remain with the students and the school, perhaps to share it with other, current and future, classes.

5. Digital Tools Used

- Storyboard that: www.storyboardthat.com/it
- PowerPoint: tinyurl.com/59wzzx6p

6. Specific Needs (Disability/SLD)

The specific learning objective for the pupil with cognitive disabilities was to foster the acquisition of interpersonal skills. The pupil indeed often related incorrectly within the class by, for example, making irrelevant interventions, or by isolating himself or intervening too much. Beside this, the use of visuals was successful in addressing the specific needs of the students with SDLs.

At the same time, the digital tools used also helped those who were somewhat less confident at drawing, as the software allowed students to simply choose the features of the comic strip, facilitating those who were not very graphically talented, improving their self-esteem. Finally, the digital technologies used made learning more meaningful for all students through an active and stimulating experience.

7. Challenges

Having limited access for the use of the computer room led to some organizational difficulties. In addition, explaining how to use the software was a delicate process as the teacher was not sure about the digital competences held by the pupils (e.g., copy and paste functions, etc.). In this case, the students already possessed good basic knowledge, so there were no major problems. However, there were a few pupils who had some difficulties at the beginning but, in such cases, help was provided.

8. Benefits

One of the benefits related to the activity was that it made learning meaningful. We learn best when we have fun; thus, the creation of an imaginative context allowed children to be more motivated and, at the same time, assimilate better concepts. In this way, educational contents were somewhat decontextualized and made more informal than using a more traditional (frontal) teaching approach involving the exclusive use of the textbook. The possibility of transferring language competences to the historical field was an additional benefit of the activity, ensuring a cross-curricular and flexible approach. Finally, the use of the educational software itself enabled the children to enhance digital skills.

9. Lessons Learned

The lesson was a positive experience for the pupils, which I would recommend. I would also recommend the use of the software. However, the importance of providing clear guidelines must be stressed, both in terms of the content/product that the students are going to create and the use of the digital tool.

10. The Average Cost of Implementation Per Child

The use of the Storyboard that software is free of charge. There was a printing charge for the printed illustrated book.

11. Evaluation/Feedback

For the evaluation of this activity, self-assessment forms were given to the pupils. They were asked three simple questions: "How do I think I worked?", "What were the positive aspects and what did I learn?", "What were the difficulties encountered?". Furthermore, throughout the course of the activity, the teacher constantly observed, informally, how the pupils worked and collaborated with each other. Instead, there was no formal evaluation at the end for the work. An alternative for a more "structured" evaluation of the experience could be the creation of observation grids.



Appendix A. Photos of the printed illustrated book.

Digital Tools for the Study of Civilizations



History / 5th Grade primary school

1. The Description

In this example, reference is made to an approach used to study history in a fifth-grade elementary class. It is not a specific lesson, but rather a series of strategies and procedures applied and repeated over several lessons.

During the year, for each civilization studied, an attempt was made to identify a fixed pattern that analysed the same themes and elements for each civilization. Various tools were introduced as we went along and used to support the proposed activities. Initially, maps were used; later, other tools such as digital books. For the construction of the latter, software programs – such as Book Creator – were adopted. Genially, instead, was used to create quizzes and games. The work could be carried out in different ways: sometimes starting from what was done in school, sometimes pupils were asked to document certain aspects and bring back to school materials they had found and/or produced themselves. These were reviewed and placed on digital tools at school. This approach was used for the whole class, including students with SLD.

2. Classroom Context

The activity was carried out in a fifth-grade primary class, consisting of 19 pupils, including 3 with SLDs. The classroom context was deeply multi-ethnic, with many children with different cultural backgrounds. Many of them presented difficulties with the Italian language, due to the fact that they spoke in their native tongue at home.

The lessons described took place mainly in class, face-to-face. Only on certain occasions did hybrid teaching have to be implemented due to the presence of some Covid-19 positive pupils.

3. Lesson Goals

The topic of the lectures was the study of civilizations. For each civilization addressed, an attempt was made to identify the same study pattern, examining the same elements from time to time (e.g., religion, customs, social relations, etc.). This was very useful because, on the one hand, it gave the possibility of proposing a structure repeated throughout the lessons, and on the other hand, it facilitated comparisons between the various civilizations.

4. Method/Approach

Over the course of the school year, the modality used changed as students became more autonomous in their work. However, three main modalities can be identified:

1.) At first, the teacher narrated the story, highlighting key aspects, such as the connecting nodes of a hypothetical map. Then the pupils were asked to search for the information in the text and create conceptual maps. They then had the task of verbalizing what had been done in graphic form.

2.) Once the pupils became more autonomous, they began to work independently on the text. Initially, they had the task of researching the information on their own; then, they checked it with the teacher, who clarified and re-explained what, if anything, was unclear. The aim was to always have correct material at the end of the lesson so that those who needed it could use it. At the same time, the teacher would also bring in texts from other books or from specialized magazines on history, such as Focus. In this way pupils were also working on authentic texts.

3.) At a later time, we switched to a completely different approach. When group work was possible (again), the children began to work in heterogeneous groups. With the tablets, they built digital maps using Book Creator and created digital books using Genially. Each group would create materials and then share them with the others.

These three modalities changed over time, also depending on the current situation (i.e., in relation to the pandemic trend).

5. Digital Tools Used

Examples of digital tools used to carry out the activities are:

- Wordwall: [wordwall.net/it](https://www.wordwall.net/it)
- Worksheet: www.liveworksheets.com
- Learning apps: learningapps.org
- Educaplay: www.educaplay.com
- Mentimeter: www.mentimeter.com
- Genially: genial.ly/it
- Book Creator: bookcreator.com

A website was also created on which we made these tools available to colleagues with tutorials to provide examples.

6. Specific Needs (Disability/SLD)

The three pupils with SLDs in the class were completely different from each other: one had difficulties with mathematical skills (therefore in subjects such as Italian and History he did not present particular problems), another presented difficulties with written texts (i.e., reading and writing), and the third one had difficulties related to participation and the relationships with peers. The use of digital tools made it easier to meet their needs thanks to the use of text-to-speech for reading text, for example. Moreover, efforts were made to particularly take advantage from the visual channel by using many maps, pictures, and videos for review. Another useful method was group and/or pair work.

7. Challenges

No difficulties were encountered in using this approach. Of course, to implement it, the school must have minimal technological equipment: an interactive whiteboard and a computer are enough, but the lack of internet connection can create an insurmountable problem. I am fortunate enough to work in a school where everything is available. However, I also used my own devices when necessary. Otherwise, it takes significant training: you need to come to class prepared. What concern the pupils, they never showed any difficulties in using the digital tools nor were there any critical issues regarding their participation in the activities.

8. Benefits

The main benefit has been a successful inclusion of all pupils. The digital tools used indeed facilitated everyone's learning without emphasizing anyone's difficulties. Moreover, they represent the tools the students are most familiar with and allow greater engagement in learning because they are not used passively but enable the students to be the protagonists, i.e., to do the work in first person. They are also inclusive in the sense that they allow for the creation of materials that then the pupils can then (re)use individually to study.

9. Lessons Learned

I strongly suggest everyone to use this approach. In my opinion, you cannot ignore the support of digital tools. What I would recommend to those who are perhaps a little frightened of technology is to start by adopting one tool and try to use it methodically, imposing on yourself, for example, to use it at least once a week, so that then within a while it becomes an established practice.

10. The Average Cost of Implementation Per Child

Only free tools have always been used for lessons.

11. Evaluation/Feedback

Feedback from students was immediate because whenever a digital activity was proposed they were always enthusiastic. Positive feedback also came from some parents. Families often collaborated, and if parents had some difficulties with the digital tools, it was the children themselves who taught them how to use such tools. Some parents told us it was a good experience to work together with their children.

Enhancing Mathematical Skills through Educational Robotics



Cross-disciplinary project / 5th Grade primary school and 3rd Grade lower secondary school

1. The Description

This example consists of a project adopting a STEM and project-based learning approach. For this activity, we used robotics and specifically a LEGO® MINDSTORMS® robot by Lego Education¹. The project involved the 5th grade classes of a primary school and the 3rd grade classes of a lower secondary school. Its main aim was to enhance students' mathematical competences through the construction of a LEGO® MINDSTORMS® robot, which was meant to solve a real school safety problem. The school building had indeed cracks in the walls, damp stains, and other anomalies that could potentially pose a safety problem. The goal was therefore to build a robot to mathematically and geometrically map such cracks and stains (to know their thickness, size, depth, width, and breadth) to write afterwards a technical-scientific report to be sent to the municipality.

2. Classroom Context

About 60 students were involved in the activity. Among them, there were students with Specific Learning Disabilities (SLDs) such as dyslexia, dysgraphia, dyscalculia and many foreign students, with difficulties in their social and language integration. The project took place at school (face-to-face) and lasted approximately three months, involving several lessons, conducted mainly by an expert in robotics and STEM (external) and a math teacher. The meetings took place weekly and lasted approximately four hours each.

3. Lesson Goals

The project aimed at enhancing students' mathematical skills through educational robotics.

4. Method/Approach

The STEM approach falls into the category of project- and experience-based learning approaches (i.e., involving construction, problem solving, etc.) that allow students to draw theoretical and cross-disciplinary inferences through experience. The activity involved several disciplines including geometry, mathematics, technology, computer science, and also Italian, given that the students had to write a report with adequate vocabulary for the municipality technical office.

The first phase of the project involved the physical construction of the robot, which had to present very specific features (e.g., webcam installed on its back, ultrasonic sensor to check the depth of cracks, etc.). The work started with the analysis and design of the intervention: what tools we would have to use, the spaces we would have to inspect, the problems we would have to solve, the subjects we would have to involve, the knowledge and competences we would have to reinforce. Afterwards, various attempts were made to build the robot, and meetings between the classes of the two grades were organized so they could exchange the acquired information. All of this was realized taking advantage from effective peer tutoring. The lower secondary school students indeed played a role for the reinforcement and enhancement of the mathematical competences that the primary students did not fully manage yet.

At this stage, some practices of the STEM approach, such as tinkering and coding, were implemented. In fact, the robot had to be programmed from a mathematical point of view to reach certain points. To do this, students had to work, for example, with software such as Cabriexpress, to calculate the path it had to take to reach the crack and then be able to photograph it. At this early stage it was therefore also necessary to map the surfaces of the areas of the interior and exterior school spaces to be inspected.

Then, once the photographs were obtained, a software program called Imagemeter allowed the students to create a reference scale on the photograph to measure exactly, for example, how wide and long the crack was. Once the pictures were taken, a movie was then created, so there was also some video making at this stage, where the students had to create and edit a video, informing the parents, the municipality, other teachers and students of what had been accomplished. Next, we had to do the calculations,

so we returned to theory again, analysed the data and calculated the length, depth, width, width of the cracks using different tools. The final step required students to write both an email and a report to the municipality, finally making it public to parents.

For all the activities we created technical intervention teams. During the first meetings, the students were free to choose the groups. Later on, instead, we intervened because our goal was to foster the inclusion of the students with difficulties and to form heterogeneous groups according to the various competence levels. Depending on the specific goal we needed to achieve, we would create groups assigning very clear roles. For example, within each group we always designate a negative and a positive "observer". At the end of each task there was a circle time, where the team leaders had to report what their group had achieved that day. The negative observer would then intervene presenting the challenging aspects of the team's work followed by the positive observer who would instead point out what had been successful. Through this metacognitive process on collaboration, the students learned to collaborate better, respect each other, and listen.

During the meetings, the classrooms were organized in workstations with the necessary materials, depending on the plan for that lesson; so if we had to do math there were books and notebooks, if we had to do tinkering or assembly the robots there were kits with Lego, if we had to do coding there were computers, etc.

5. Digital Tools Used

- **Autodraw**, it is a drawing and artificial intelligence program. It was used at the beginning of the project to imagine the school spaces and draw them. It also has a compensatory function, given that it recognizes and creates a drawing from any type of sketch. It allowed us to initially analyse what our areas of intervention would be and draw them. Link: tinyurl.com/4xtaejp7
- **Cabriexpress**, program within which we could build areas and measure their exact distances. We used it to map the various spaces of the school building (e.g., the attic, the basement, the warehouse, etc.) and to imagine the path the robot would take. Link: tinyurl.com/5n8rh75x
- **Vex code vr**, a real simulator that allowed us to code and simulate the path of the robot. Link: vr.vex.com
- **ImageMeter**, an app for tablets or mobile phones, used to upload the taken photos creating the scale and reference points to calculate the measurements of the object in question. Link: imagemeter.com
- Text editor to write reports.
- **Google Workspace**, including **Google Classroom** to share documents and **Google Presentations** to create presentations to show the project outcomes to the technical department, teachers and parents.
- **Audiophonic mediators**, such as **Vocaroo**, **Audacity**. In some cases, we asked the students to record their speeches or narrate what they had discovered. In this way they could not only listen to each other again (to correct mistakes and pronunciation), but also use the audio files to act as text-to-speech in the slides of the presentations and exchange information with other classes through mp3s that were uploaded in the shared google classrooms. Links: vocaroo.com; www.audacityteam.org

6. Specific Needs (Disability/SLD)

Digital technology acts as cultural mediator offering language support to those who need it. This was crucial in our case to meet the needs of the many foreign students present in the classes involved. For example, we used Scratch to code, which allows you to choose the language. I can, for example, select Chinese and then translate everything into Italian. Of course, digital technology has also a compensatory function for the students with SLDs. For example, those who had difficulties related to dyscalculia were helped by the use of **ImageMeter** which directly communicated the object/areas measurement to them. The infrared sensor also acted as a compensatory tool because when it was pointed at an obstacle, the cm/mm distance at which it was located appeared on a readable LED.

Finally, all the students with difficulties (language-related and cognitive) participated in the writing of the report and had to speak in public. In fact, we chose speakers who needed to develop communicative-expressive competences. Those students had to speak using specialized vocabulary, hence not-so-familiar terms, implementing their skills and their vocabulary through first-hand experience.

7. Challenges

A first challenge was to overcome the colleagues' distrust to devote many lesson hours and days to this kind of activity. An open-minded school principal, who allows you to go beyond the ordinary and is more open to the territory and to experimental ideas is also needed. Of course, an activity like this requires adequate tools and resources (here we are talking about a school that has won funds participating in public calls). Another challenge was the management of the time because an experience like this completely disrupts the school routine. Finally, difficulties were also sometimes encountered at the beginning in the groupwork, because students were not used to it.

With respect to students' digital competences, however, no critical issues emerged. On the whole, students did not show any difficulties in using the programs/software. At most they struggled with some manual activities, like screwing, disassembling, etc. With regard to participation, everyone was engaged, including girls. Only when it came to the writing activity, we did have to occasionally motivate students, as they expected to continue with this more scientific and technological experience. In the end, however, they all worked quickly and were very motivated, thanks in part to the use of technology.

8. Benefits

First of all, a sense of legality and ethics of responsibility was built within a citizenship education path because the students involved, who were also the main users of the school space, contributed to making the school safer. Then, of course, the development of mathematical thinking was the main aspect of the experience, as all the activities were connected to maths, computational thinking and problem-solving. However, there was also cross-curricular learning that involved other subjects, such as physics and Italian. Another benefit is that the students learned to better analyse and observe spaces and places, while maintaining higher levels of concentration (they demonstrated strong intrinsic motivation). Concentration was also present when planning and solving math problems. In addition, students learned to work independently and collaboratively.

Students with difficulties, particularly those ones with different cultural backgrounds, were very involved because they were more interested in the activity and thus more compromised. We discovered that some of them had great manual skills. For example, one boy who could not succeed in the theoretical parts due to language problems, was very good at assembling the robot and solving programming issues with the computer.

A metacognitive path can also be identified, through which many students recognized their mathematical limitations in the theoretical field but were able to overcome them through practice. The activity developed students' digital competences, because they had always to find solutions, including various programming ones. Creativity was the focus of the whole project and allowed the students to solve many problems. Moreover, students who usually did not engage regularly suggested ideas and solutions. We felt that we were not only digital citizens, but also real active citizens because we helped in a way to create a more peaceful coexistence in the neighbourhood.

Finally, at the end of the school year, we noticed a greater willingness of the students to cooperate. Especially those who were usually socially excluded from regular school activities were more integrated, showing responsible participation, operational autonomy and great self-assessment skills.

9. Lesson learned

I would recommend this activity to all teachers and all schools. You must abandon the idea that if you do not teach two hours of classical maths then you are not following the curriculum. You can also develop knowledge through this type of experience. This applies not only to mathematics, but also to Italian, science, technology, etc. Any educational field, even the more humanistic ones, can benefit from such approaches.

Teachers do not need to be digital experts; they only need to deliver technologies into the hands of students. Students often already possess enough digital competences, but in school they generally cannot use them.

10. The Average Cost of Implementation Per Child

All the software used were free (no need to buy a license). The robots, on the other hand, were bought using the funding won by the school.

11. Evaluation/Feedback

To evaluate the project, we gave a questionnaire both to the students and their parents to see what had emerged during the experience and to some of the teachers to identify whether anything had changed with respect to student engagement. All feedback were positive. The teachers, at the end of the course, noticed that the project resulted in greater autonomy and interpersonal skills shown by the students, as well as in the enhancement of their mathematical competences. Students, on the other hand, were satisfied with the experience and wished to enrol in the project for the following year as well. This demonstrates how much they enjoyed the activity. Parents themselves also noted that their children went to school more willingly. Finally, the project was used to write the school's Improvement Plan and thus to implement the school educational offer.

Realizing a Life–Project through Collaborative Writing



Cross-disciplinary project / 4th and 5th Grade upper secondary school

1. The Description

This activity describes a two-year project that arose from the concrete need of a student with physical disability who wanted to participate in the selections to enrol in a prestigious school for graphic designers–cartoonists. In particular, the girl needed support in creating a website where she could publish some of her works. Hence, the decision to also involve her classmates in a collaborative writing process, aimed at producing a story written by several people and then illustrated by the student herself to be later published on the created website. At the end of the two years, two exhibitions were held, one inside the school and one outside where both the student's drawings and the story were presented.

2. Classroom Context

The project was proposed in a fourth (then fifth) grade class of a higher secondary school, consisting of a total of 22 students, including a student with a Special Educational Needs certification (socioeconomic, linguistic and/or cultural disadvantage) and one student with physical disability.

3. Lesson Goals

The project aimed at the construction of the website to publish the work of the student with physical disability and the development of a collective writing activity. The project was indeed meant to promote the single student in connection to her life plan, while at the same time trying to ensure her inclusion within the class by involving all her classmates in the activity. The class environment was somewhat excluding towards the student with disability, who had an individual educational plan and, up to that moment, had never been able to show her abilities within the school.

4. Method/Approach

Several teachers were involved in the project, including the art history teacher, the Italian teacher and the support teacher. The activity ran over several sessions. With regard to digital tools, software programs to make presentations (e.g., Power Point) and Google Sites were used to create the website. During the lessons, the interactive whiteboard was used at various times, for example, to project what was being created as it was made or during brainstorming moments in the class. In addition, several devices were used for collective writing, while the completed work was saved in a shared space. Finally, the student with physical disability drew in digital format, using professional software programs thanks to a graphics tablet and editing programs of a certain level.

The project was divided into the following phases:

- Introduction to the activity.
- Introduction to the methodology.
- Breakdown into groups.
- Supervision of the groups.
- Evaluation of the outcomes.
- Socialization of outcomes.

The project was initially presented to the class directly by the "target" student. She had, in fact, already started writing the story and had created some drawings. She informed her classmates of the work she had done so far, thus providing an insight and introducing the main characters of the story. Next, the narrative junctures had to be chosen. Students could think collectively about how the story would develop. Through brainstorming, ideas were collected and selected. After that, the class was divided into groups, each with the task of carrying out the previously chosen narrative junctures. During the writing activities, the class was divided into workstations. Each group worked on a device and saved the file in a shared space so that everyone could see the completed work. Two versions of the story were created, a more extensive one and one consisting of the individual work created by various groups. Finally, the website was created using Google Sites and an exhibition was organized in which the drawings made by the students and the collectively written story were presented.

5. Digital Tools Used

List of links to the digital tools used:

- PowerPoint: tinyurl.com/59wzzx6p
- Google Sites: sites.google.com
- Google Drive: drive.google.com

6. Similar Tools

There are similar resources to those used in this activity which could be chosen without changing the result. For example, WordPress could have been used instead of Google Sites, while Canva could have been used instead of PowerPoint.

7. Specific Needs (Disability/SLD)

The student with disabilities had a specific need to create a portfolio of her work in order to present herself for the selection at a prestigious school for graphic designers–cartoonists. Creating a website seemed the most suitable choice. In this way, it was indeed possible to make public both the work she was creating independently and the product of the more complex activity she had completed at school with the participation of her classmates.

The student, despite having a severe physical disability and differentiated learning goals compared to the rest of the class, could draw and write very well. Moreover, there was a desire to involve her classmates in the creation of a collectively written story. Notwithstanding her fundamental contribution to the writing (especially when voicing her opinion on the drawing), she was unable to handle everything independently, thus it was decided to involve the rest of the class. In this way, an effort was also made to foster her inclusion and participation within the class by involving all her classmates in the implementation of the project and through the collaborative writing process.



8. Challenges

The class context in which the project was carried out was hypercompetitive, both students and teachers were mainly oriented/interested in the academic achievement (grade). Therefore, part of the class initially struggled a little to devote time to the project, but slowly the students were able to appreciate its validity. The teachers, on the other hand, had trained the class in this regard, and so carving out time to carry out this activity was not easy.

As for the student with disability, although this activity was very professionalizing for her, it hinged on differentiated planning, and she presented many problems with the continuity of her educational plan.

There were, however, no difficulties related to the use of digital tools. The class did not need to conduct preparatory training activities to learn how to use the digital devices. Only some extra information was required on how Google Sites worked, but then the students were perfectly autonomous. In addition, the whole course was designed and implemented from a UDL perspective: the website was accessible from any kind of tool, the students had the link and could safely view the work step by step. Moreover, everyone had permission to act as editor. The course and materials were sensory-motor, cultural, and linguistically accessible. The words and topics covered were also those discussed in class.

9. Benefits

First of all, the student with disability passed the selections for the school; therefore, the project was actually useful for her application. In general, this project gave her an extra boost both professionally and in terms of motivation, self-efficacy, and confidence. As she went along, she was gradually made responsible for the whole project, making her the lead coordinator of the activity. This was definitely beneficial to her. In fact, she was the one who had the narrative development in mind and created the drawings. As for her inclusion, the project was a way to bring her closer to her classmates in a common activity where, for the first time, they had to adapt to her and not vice versa.

10. Lessons Learned

Certainly, the contexts where we work guide us to the most appropriate choices. I am very proud to have participated in this project because the class had the need to pursue such an activity. In a different context it would most likely not have made any sense. The suggestion I would make is to be guided by the professional context in which you are immersed because, depending on the needs that emerge, it will be necessary to develop and research the most appropriate choices and tools to enhance the context itself.

11. The Average Cost of Implementation Per Child

All digital tools used were free of charge.

12. Evaluation/Feedback

There were several assessment steps. Firstly, the written work was evaluated by the Italian teacher. Secondly, there was a "public" evaluation through the exhibitions. In addition, at the end of the two-year period, there was the high-school final exam. On the one hand, this granted additional value to the student with disabilities as the bulk of her exam was narrating the two-year project. At the same time, it also added value to all the other students, because each of them had taken part in this inclusive project, which was very appreciated by the exam board.

There was also a follow up evaluation, if you can call it that, because this project resulted in the student being admitted to the school for graphic designers-cartoonists. Finally, the family of the student with disability was delighted about the project because everything revolved around their daughter and was being taken outside the school environment and had received recognition.

Creation of an Escape Room on Sustainability



Citizenship Education / 1st Grade lower secondary school

1. The Description

Involving a first-grade lower secondary school class, two support teachers organized an activity to build an escape room on the topic of environmental sustainability. The children, divided into groups, created the escape room step by step, starting with a selection of content to the creation of the games for each room. The activity took place over the course of a school year, partly at school and partly at home. The final product can be viewed at the link: tinyurl.com/5f3htc88

2. Classroom Context

The activity was carried out in a class of 22 students, including a girl with disability, 3 boys with SLDs and a girl who had recently arrived in Italy with language difficulties. In the class, despite the fact that the students were not all from the same comprehensive school, a well-blended group was immediately created.

3. Lesson Goals

The objective of the activity was to deepen a topic of digital citizenship applying technologies to teaching and learning. In particular, it was chosen to create a sustainability themed escape room.

4. Method/Approach

Firstly, the teachers showed to the students an escape room created by them and let them play with it. This was to show them what the final product could look like. They then asked the students if they had liked the activity and if it would be interesting for them to further explore the topic. A preliminary lesson centred on digital citizenship was then planned, which was focused on developing the students' awareness of how to use web resources: how to search for content online, how to distinguish fake content from real one, how to use images correctly (creative commons licenses, copyright, etc.).

The activity was then carried out in stages. From time to time, the assignments were presented in the presence of the class and explained step by step. They were then uploaded together with tutorials in a specially created **Google Classroom**, so that the children had reference points, allowing them to review the steps in case of difficulties or doubts. Heterogeneous working groups were then created. Significant attention was paid when dividing the groups, trying to take into account the different competences so as to create balanced groups in which everyone could participate, considering the level of task execution and taking into account the different personalities. Efforts were made to create the conditions for peer support, so that the weakest students could be supported while still managing to participate and make their own contribution.

The first phase consisted in researching a specific topic for the escape room (each group was assigned a different topic within the main theme "sustainability"), which the students then had to present to the rest of the class. All research had to follow precise criteria provided by the teachers. In fact, the escape room would be developed by highlighting three main aspects: presentation of the environmental problem, investigation of its causes and consequences, and, finally, identifying concrete actions to be implemented in individual daily life to help solve the problem. In addition to these criteria, each group also had at its disposal a sitography prepared by the teachers and a set of guiding micro-topics.

Once the first part of research was completed, the digital part began. **ChatterPix** and **Toontastic** apps were introduced to the classroom (also by using tutorials), through which the narrative linking the different rooms was developed. The narrative describes indeed the struggle of a team of children against a villain, "Dr. Stinky", cause of all the environmental problems. From time to time, an animal related to a specific environmental problem would need their help (e.g., the polar bear because of the melting glaciers) and would send a video message (recorded by the students). The students thus had to write the stories for the rooms on **Google Docs**, which were then corrected and recorded in the classroom. After this part was finished, **LearningApps** was introduced, and students were shown how to register on the platform and how to create games. Again, the first part was a writing and planning phase of the questions/answers for the games. Teachers helped by trying to improve and correct, sometimes giving new input to give consistency to the work. Finally, the actual design part started, in which games suitable for the escape room were identified. Students were free to choose three. Also, to give the rooms more dynamism, the questions were created on **Wordwall**, because **LearningApps** is slightly more static from a graphical point of view. Both the writing part of the games and their implementation were done almost entirely in the classroom (on the Chromebooks provided by the school).

After that, teachers took care of the assembly of the escape room, since **Thinglink**, the software used, in its free version does not allow collaborative work. Students then uploaded all the links to the games created to the **Classroom**, and the teachers created the final game by joining all the elements. Once the escape room was assembled, it was replayed in its entirety in the classroom to check durability and any flaws in the design. Finally, the final product was reviewed and proposed to the entire school.

5. Digital Tools Used

- ChatterPix: apps.apple.com/it/app/chatterpix/id734038526
- Google Classroom: classroom.google.com
- Google Documenti: docs.google.com
- LearningApps: learningapps.org
- Toontastic: toontastic.withgoogle.com
- Wordwall: wordwall.net/it
- ThingLink: www.thinglink.com/channel/1126564801531609089

6. Specific Needs (Disability/SLD)

The ultimate goal of the activity was to involve the girl with disability who needed to learn how to work in group and take responsibility for her tasks. In addition, it was possible to involve the weaker students as well. In particular, the construction of heterogeneous work groups was designed precisely to develop peer tutoring processes and to make sure that everyone felt included, participating and contributing to the task. This was to avoid students feeling left out, allowing them to be part of a group and work together on a common product. This aspect is very important since in the classroom tests are generally differentiated, making visible the existing differences (although the students are used to this by now and take it for granted). In contrast, this activity did not involve any individual differentiation, because everyone participated, making their contribution and taking advantage of the peer tutoring. Moreover, the sequenced structure of the work and the various topics were very helpful, especially for struggling students. The fragmented presentation allowed every child to understand and acquire the topic at his own pace.

7. Challenges

Since this is not an activity subject to evaluation (apart from the first phase of the research), it was occasionally necessary to "push" the motivation of students. Moreover, group work did not always go smoothly, especially in the beginning. However, it was still useful as the students learned from their mistakes.

Sometimes problems occurred when the tasks were carried out from home, although not always due to the students. For example, parents were out and the students could not get online. Some technical glitches also emerged in the use of the applications, but only at the beginning. For example, when registering some students forgot their passwords, or in the shared research document when someone changed the text the night before without informing the others, thus creating panic.

On the other hand, a critical issue connected to the planning was related to the time factor and the possibility of having and working with the class "exclusively". Since the activity was proposed by the support teachers and with it being a rather long activity, it was necessary to ask colleagues for their lesson hours, which were limited. In some cases, substitute hours had to be used (when there were absent colleagues), leading to a lack of clarity and limited weekly planning.

8. Benefits

First, digital competences have been acquired and/or enhanced by all students. In addition, group work meant that tasks that might have been a bit complicated for some, for example, the use of some digital applications, was mediated and learned thanks to the greater competence of a peer. The playful element made the activity less stressful; students learned, created and planned by playing, with the help of each other, without experiencing performance anxiety. There was also a strong motivation given by the use of technology. Students were happy to use a computer in the classroom, the interactive whiteboard and to work with certain applications.

There was development in the student relationships, group cohesion and responsibility. Everyone felt a sense of participation and accountability. Inclusion occurred in the structuring of the whole project, through the gradual presentation of the activities, the group work and any shortcomings were compensated for by the competences of another.

Since this was a cross-curricular activity, it was possible to activate several key citizenship competences (those defined by the European framework) in addition to digital competence, such as learning to learn and multilingual competence (native and foreign language).

With regard to the girl with disability, all objectives were achieved. The group work also benefitted another boy with severe difficulties, helping him to feel part of the class. For him, the transition to secondary school has not been easy, his self-esteem was low, and this activity made him feel part of a team. His attendance in class improved, including his level of contribution.

9. The Average Cost of Implementation Per Child

Only free Apps were used to carry out the activity.

10. Evaluation/Feedback

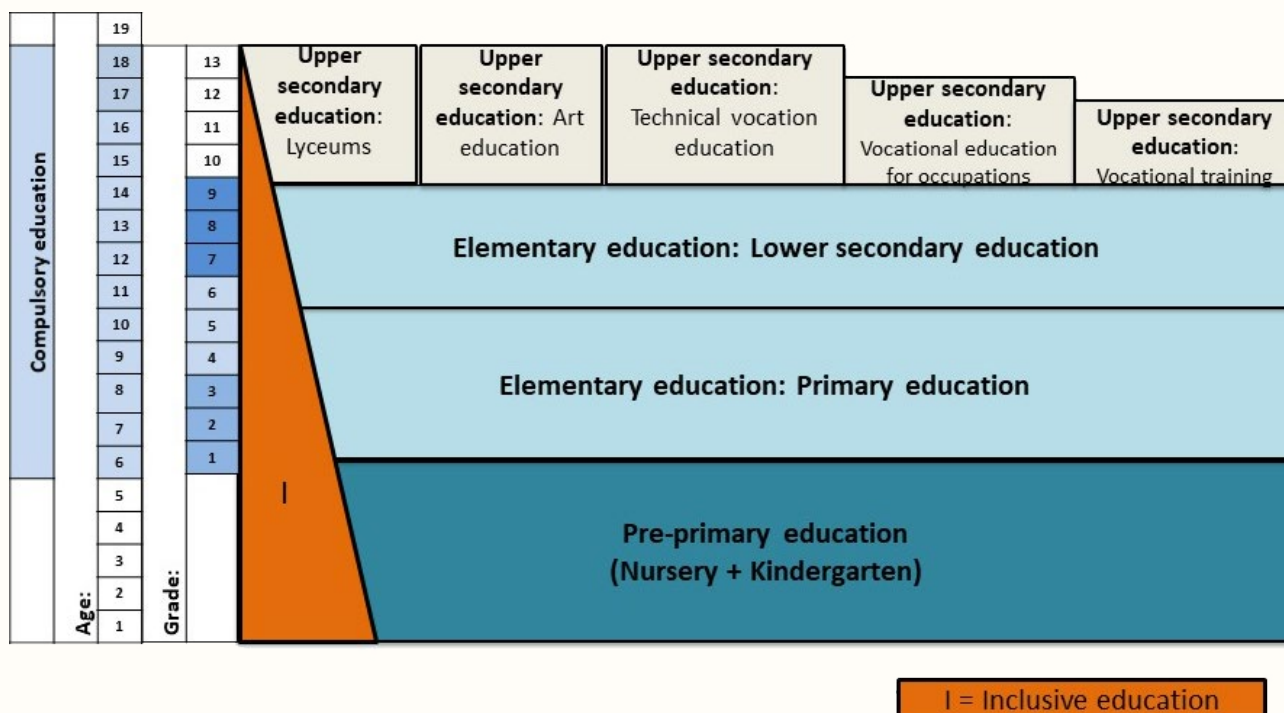
The initial research was formally evaluated. It was a rather traditional task, and the students received a mark from the science teacher. During the final phase, in which the escape room was tested by playing together, critical feedback on the final product was received directly from the students. Overall, they were engaged and satisfied. They were also very happy that students from other classes saw and played with their product.



Examples from North Macedonia



School System



The education system in the Republic of North Macedonia is composed of preschool, elementary, secondary, and higher education. Elementary and secondary education are compulsory, inclusive, and free of charge. The elementary education is of a nine-year duration, organised in 9 grades for students aged 6 to 15. It encompasses primary and lower secondary education and is implemented through primary schools, primary schools for adult education, primary music schools, primary ballet schools, primary schools with resource centers and international primary schools. The primary music and ballet schools are not compulsory and they are not free of charge, they are attended parallel to the compulsory primary schools. The secondary education lasts for four or three years, depending on the chosen education type – general secondary education (Lyceum) lasts for four years, and vocational education lasts for three (vocational education for professions) or four years (vocational technical education). Within the vocational schools, there is a possibility for a two-year education track preparing the students for different professions. Secondary education is attended by students aged between 15 and 19, depending on the selected stream.

Source for text and figure:

Republic of North Macedonia Ministry of Education and Science. (2018). Republic of North Macedonia – Country Background Report. In: OECD (2019), OECD Reviews of Evaluation and Assessment in Education: North Macedonia, OECD Reviews of Evaluation and Assessment in Education, OECD Publishing, Paris, doi.org/10.1787/079fe34c-en

The Influence of Forces on Motion

Gabriela Boskovska
Physics / 8th Grade



1. The Description

This teaching unit is part of the Physics curriculum for 8th grade of primary education. The influence of forces on motion was studied and practically examined. During the lesson, the methods of working in small groups, in pairs, and independent study were applied. I used the Phet.colorado.edu digital tool. This tool enables interactive simulations in the field of natural sciences and mathematics. It is easily accessible, all students are involved, the acquisition of knowledge is visual, and the problems/tasks can be repeated several times to get the correct result.

2. Classroom Context

There were 25 students in the class. One of them is a student with a disability. The student's disability (cerebral palsy accompanied by epilepsy) is determined in his official medical documentation and has been officially confirmed by the student's parents. The class was held with a physical presence, in the computer room at our school, so every student can use the tool online.

3. Lesson Goals

The lesson described the effects of forces on motion.

At the end of the lesson, the student was supposed to:

- Use Newton's Second Law, $\text{force} = \text{mass} \times \text{acceleration}$.
- Do simple calculations.
- Discuss results using scientific knowledge and understanding.
- Share results clearly with others.

4. Method/Approach

At the beginning of the lesson, in its introductory part, we used the Forces and Motion: Basics – Tug-of-War simulation from the phet.colorado.edu platform, for reviewing the concepts of balanced and unbalanced forces. Then, divided into pairs, the students worked on the simulation Forces and Motion: Basics – Motion from the same platform, with each student receiving a worksheet that described the tasks that were to be performed. Every 8–10 minutes, the students changed their places to work on the simulation and each student (having prior to the start been assigned separate values, different from his/her classmate) got to set his/her own values on the app for the purpose of research and coming to conclusions on their own. Next, the student writes the findings down in his/her worksheet. Before the lesson end, each student had the opportunity to explain the tasks he/she completed (conclusions could also be repeated), to clarify the steps he/she followed in order to come to the solution/conclusion and to explain where difficulties occurred during the performance of the activity.

5. Digital Tools Used

- tinyurl.com/ynmbwu64

6. Similar Tools

- Yes, schools.mk., schools.mk

7. Specific Needs (Disability)

Although we work with students with disabilities following an individual educational plan (IEP), during this lesson, the student had the opportunity to work on achieving the goals in the same manner as the students with learning difficulties who study according to the regular education plan. The results were visually represented, they could express their conclusions, they used a worksheet that did not differ from their classmate's worksheets, recording of the data was performed using an everyday tool (stopwatch, calculator) that the student could handle. When necessary, the teacher would help the student to graphically present the result (to write it down manually) on his worksheet.

8. Challenges

Teaching in a class in which there are students not only with disabilities, but with different levels of acquisition, is a challenge every day and during every class. To teach the students a specific content, and at the same time to cover all the levels and fulfill all the goals requires a lot of time, good preparation of the teacher, as well as solid ICT equipment and infrastructure in the school. When it comes to the parents of students with disabilities, from the moment the parents accept their children to follow an IEP, we have excellent cooperation, the students feel more accepted and useful, and they become active participants in the learning process. An additional challenge is the sometimes weak Internet connection in the school.

9. Benefits

Physics as a subject requires demonstrations and experiments; in cases when they cannot be performed (due to external conditions, lack of teaching aids, number of students in class), this tool helps me a lot. The tool itself offers different activities and is easily accessible.

10. Cooperation with Parents/Guardians

I do cooperate with the parents; we communicate personally, and we communicate through sending messages when there is a need for clarification of the assigned activities or feedback during their implementation. The mother of the student with disabilities is present in the school every day, so at the end of each class we discuss what has been done, as well as what the next steps will be.

11. Lessons Learned

I recommend this tool because it offers insight (a clear visual representation) in the functioning of physical forces and laws. Experience shows that a large part of our students face difficulties when solving tasks in physics, mostly due to the lack of tangibility or absence of a clear idea of what is required from them in the task. In this way, through the platform and the possibility of visually changing the parameters and the results thereof, they not only gain a clearer idea of the functioning of the forces, but also receive a stimulus to solve the set tasks.

12. The Average Cost of Implementation Per Child

This tool is completely free and it should stay that way; it provides the basics of a certain subject. For my classes, I prepare worksheets myself, depending on the class. There is no need for registration.

13. Evaluation/Feedback

After each completed lesson, I receive feedback on the achieved goals – whenever digital tools are used, feedback is welcome for new content. In this class specifically, the students provided positive feedback about the opportunity to see practically and visually presented a content that is mostly theoretically discussed. It contributed to achieving the goals more easily and efficiently, and deepening the acquired knowledge.

This tool is also acceptable for parents.

The lesson description was provided by Hristijan Karposh Municipal Primary School in Kumanovo, North Macedonia. Responsible teacher: Gabriela Boškowska.

Worksheet – The Effect of Forces on Motion

Important note: Prior to entering new values, make sure that you have checked "values", "masses" and "speed" on the top right.

Note: The student with a disability needed a teacher support in solving tasks no. 6 and 7; the teacher needed to tell the student precisely which number is dividend and which is divisor.

1. Mark the forces that act on the given body in the same magnitude but opposite direction, and write do their resultant force.

2. When will the forces be balanced? (draw and label the forces)

3. For a mass of the crate of 50 kg, note the time values (use a stopwatch) at force:

Force (N)	Speed (m/s)	Time (s)
1	1	
2	1	
3	1	

Conclusion:

4. For a force of 5 N acting on bodies with different masses, write down the changes of time:

Mass (kg)	Speed (m/s)	Time (s)
100	1	
180	1	
240	1	

Conclusion:

5. Calculate the accelerations ($a=v/t$) using your data (use a calculator)

- from the first measurement ($m= 50$ kg), the acceleration is _____, _____, _____

- from the second measurement ($F= 5$ N), the acceleration is _____, _____, _____

6. How does acceleration depend on mass?

7. How does acceleration depend on force?

Addition and Subtraction of Numbers up to 20

Ljubinka Velkova
Mathematics / 2nd Grade



1. The Description

The topic of the lesson was precise identification and ordering of numbers from 1 to 20, along with classroom objects and ICT assisted addition and subtraction to 20. I used the frontal approach to give instructions, whereas I placed the emphasis on independent learning and group work during the activities we had in class. Besides classroom objects and previously prepared printed worksheets, I used the application Playmood, a valuable tool which facilitates students' learning and revision of mathematical operations in a fun and enjoyable way. The activities related to number identification, ordering of numbers and addition and subtraction help them to develop their motor skills and contribute to the improvement of their intellectual abilities, memory and concentration.

2. Classroom Context

There were 23 students in the class, all of them at the age of 8. There was one student, a girl with a disability (autism spectrum disorder). The class took place face-to-face, in our classroom at school.

3. Lesson Goals

- Identifying numbers from 1-20
- Counting and ordering numbers to 20
- Addition and subtraction to 20

4. Method/Approach

Introduction: Guess the number! (game) Students choose a number from 1–10 without letting their classmates see it and illustrate it in the shape of a favorite object, for example, they transform a number into a doll/a car etc. by adding braids, a hat, wheels... After the completion of the activity, all worksheets are displayed on the board with the help of the students who order the number worksheets in the right order.

Activity 1: Let's add and subtract! (Group work)

This activity required previous preparations. The students worked in groups of 5. I had prepared worksheets with math problems prepared in advance for all the groups (10+4, 8+3, 15+5, 9-4, 10-6, 18-8...) I had also placed 20 blocks on each of the group stations, along with worksheets with the signs: +, - and =. The students were given directions to first present the math problem with the blocks, and then order themselves holding the sheets with numbers and math signs displaying the result (5+5=9). Depending on the number of tasks, you would probably need at least 10 minutes for this activity. It can also be organized as a competition among teams and you can have points allocated for each correct answer in a chart on the board, a poster paper, etc.

Activity 2: Time to play! (Individual activity) The application Playmood was used for this activity. On tablets, the students opened the app and started solving the addition and subtraction problems. The student with the disability chose to do the activity "Puzzle" (Сложувалка) on the app, where you put the pieces of a number together and you order the numbers on the screen. She was supported in the process by her learning assistant.

Final activity: Find your favorite corner! The purpose of the activity was to let the students choose the activity they feel the most inclination for, so as to round up the whole process of counting, number ordering, addition and subtraction and simply leave them in a good, relaxed mood. They had three activities to choose from: 1. Find your way in the maze (a math maze worksheet, where for ex. they trace the path from 3+2 to the solution, i.e. number 5), 2. Crossword puzzle (find the key word by adding given math terminology in the crossword: plus, minus, equals...) and 3. Choose a number and write down at least 5 words that start with the first letter of that number.

5. Digital Tools Used

- Playmood (playmood.mk)

6. Similar Tools

- SplashLearn: KidsMathandReading (tinyurl.com/4m6cue2z)

7. Specific Needs (Disability)

The student has previously demonstrated interest in activities which involve mazes and visual aids. Therefore, I made sure to include both of these components in the learning process during this lesson (the app, the blocks and the maze activity). These helped her to more easily identify and order the numbers, whereas connecting a number to its quantitative representation turned out to be a large challenge for her.

8. Challenges

The lesson required preparation of worksheets in advance. Also, we needed to make sure the app is properly installed on all the tablets we used during the lesson. The app itself is completely free and there is no need for registration, you simply download it. It is safe, simple and easily accessible. Once downloaded, you need no Internet connection, which could otherwise be a bit of a hindrance. Both the students and their parents like it immediately after the students start using it.

9. Benefits

Students solve mathematical problems more easily and confidently. They precisely identify and order numbers to 20. They learn while having fun, support and cooperate with each other to come to a solution of a math problem.

10. Cooperation with Parents/Guardians

I did not need any cooperation from the parents during this particular lesson. I had, however, the full support and help of the teaching assistant of the student with the disability.

11. Lessons Learned

Kids at a young age learn best through games, visualization, TPR and a variety of activities. These are the reasons I chose to implement all of these aspects in the lesson. While playing games and being actively involved all the time, they adopt new knowledge on a deeper level. I recommend this approach for your face-to-face lessons, and have different corners and differentiated goals so everyone can feel the benefit of their abilities.

12. The Average Cost of Implementation Per Child

The tool, as mentioned above, is free and can easily be downloaded on any device. No registrations required. Paper, copies and blocks are something we have in the classroom, however, you need to make sure you have everything ready in time.

13. Evaluation/Feedback

Feedback from the students was given after the use of the Playmooood application. They loved it and stated that it has made addition and subtraction easier for them. They all enjoyed the time they spent during this activity. Also, being able to choose what they want to at the end of the lesson made them feel more confident.

The lesson description was provided by Hristijan karposh Primary School.
Responsible teachers: Ljubinka Velkova, primary school teacher and Maja Vukanovikj, educational assistant

Spatial Orientation and Giving Directions for Movement



Milica Timchevska
English / 8th Grade

1. The Description

The topic of the lesson was spatial orientation with the use of appropriate prepositions and adverbs and promotion of students' English-speaking skills. I used visuals and kinesthetics throughout the lesson as aids in facilitating the processes of learning, retention of information, interaction and inclusion. Different approaches were implemented: frontal, individual and group work. Besides classroom realia (I used a ball and a Rubik's cube), I used a map of a city with places labeled on it, a picture with a description deliberately full of mistakes and four different pictures for students to describe in groups. During class I used Immersive reader for turning a text-to-speech and highlighting parts of the text so mistakes made during the description of the photo can be detected and corrected by the students. I used Flipgrid/Flip to set a challenge for the students, i.e., a homework assignment. I asked them to record a short video of themselves at home holding and describing a photo/picture they really like. The reason I chose this platform is because I wanted to promote creativity and encourage not only the more outgoing students, but the more reserved ones and the student with cerebral paralysis to join the discussion without feeling stressed or anxious. In other words, I wanted to shift their focus to active participation.

2. Classroom Context

There were 24 students in class. There was one student with a disability (official medical documentation confirming cerebral paralysis, experiencing challenges with fine motor skills). The students were in Grade 8 (12 years old). The class took place in the English room at our school, where we have a computer and a projector we use during lessons.

3. Lesson Goals

- a) Use of adverbs and prepositional phrases for precise location (near, past, between, next to, at the end, at the front, in the back/ background, opposite, on/at the corner...).
- b) Promoting students' speaking skills and interaction while describing a scene in a photo/picture.

4. Method/Approach

Topic introduction: True or false? (In order to elicit target vocabulary for prepositions and adverbs, the teacher starts making sentences using prompts and objects from the classroom so students can decide if they are right or wrong and correct them when necessary. Next, the teacher encourages the students to continue making similar sentences challenging each other, thus encouraging active involvement and participation.)

Activity 1: Where on the map? (The teacher shares a picture of a map of a city with places such as: library, museum, restaurant, supermarket, park, etc., as well as street names on it, so students can ask and answer questions about the places. E.g. Where is the restaurant? Where else? The goal here is to encourage students to give all the possible answers, e.g. The restaurant is across the park, between the hotel and the post office, in front of...). Again, the teacher initiates the conversation, then the students take over asking and each other.)

Activity 2: Can you help me? (The teacher shares a picture with its description full of mistakes and asks the students for help in making the description better. I used immersive reader here for highlighting parts of the text so they can be corrected by the students. In this way, students become active participants in creating a solid and correct description of a photo, while the whole experience is fun, engaging and entertaining. If any of the students wants to, they can write down the correct description in their notebooks.)

Conclusion: Photo description (I divided my students in groups of 4 for this activity. Each of the groups was given a picture for description. I used pictures from some of the class books we have in the classroom, you can either print some pictures out, use comics or magazines, books/book covers... Give students directions about what to include in the descriptions: Who is in the picture? Where are they? What are they doing? What's the weather like? What do you think is happening? Make sure they understand that they need to give precise location of both things and people. After they are done, each of the team members gets to say something about the picture they have been assigned.)

Homework challenge: Record a video of yourself describing a photo/picture you like. (I used Flipgrid for this assignment. I showed the grid to the students where they are asked to make short videos of themselves describing a photo of their choice.)

5. Digital Tools Used

- Immersive reader (www.naturalreaders.com)
- Flipgrid (info.flip.com)

6. Similar Tools

I have not used similar tools with my students.

7. Specific Needs (Disability)

Due to his medical condition (cerebral palsy), the student experiences difficulties with his fine motor skills. His English is great, though, and he speaks it better than his mother tongue, which is an alleviating circumstance regarding our English lessons. He tends to learn better when visually and kinesthetically involved in the learning process. By using Flipgrid and immersive reader I have tried to consolidate his use of adverbial and prepositional phrases, as well as to encourage and further improve his English-speaking skills, without putting him under the pressure to either write or feel anxious for participating in a class discussion (here in the form of recording short videos at home). Additionally, by being able to watch his classmates' videos before/after posting his own, I believe I have managed to boost his creativity and make learning for him more attractive and enjoyable.

8. Challenges

The main challenge was to introduce Flipgrid as a tool for the students and help them sign in on the platform. I had to sign in and create a group so I could invite them to join in. I used a link, which I shared with them in our group chat, but there is also the possibility of using a joining code. I asked them to join in using their Microsoft Teams accounts, since that is the platform, we use(d) when teaching online. Some of the students needed my assistance in joining in, which is why I did this a couple of days earlier. The tool is free, safe, inclusive and accessible. We usually have a solid internet connection in the English room. Alleviating circumstance was that the assignment using Flipgrid was set for homework, so we did not face any technical difficulties, which does not mean we don't often do. Since the mother of the student with the disability is always present during lesson hours, she helped her son sign in and was happy to help him record the video as well.

9. Benefits

Stimulating primarily students' visual, and then their audio and kinesthetic learning skills is the recipe for efficient adoption of a foreign language. When students interact with each other and work in groups on achieving a goal, the results are more evident.

Flipgrid is an excellent video platform which can be used to stimulate fruitful discussions. It enables new ways of learning and interaction, and it intends to improve students' learning by maximizing and prompting their speaking skills. They can record a response as many times as they need to and post the version, they feel comfortable with. Even though other students can see and hear them, the pressure of presenting in the classroom in front of a live audience is gone.

Furthermore, it boosts students' creativity. While the more outgoing students get to be even more creative, the more reserved and quieter ones get the opportunity to be active participants and express themselves. Learning gets shifted to a more profound level, information retention is more solid, and they are having fun in the whole process.

Each video gets to be seen and appreciated by the teacher and the other students, which is great, since not all students get to present their work in the classroom. Plus, receiving feedback from your peers is a form of positive reinforcement.

10. Cooperation with Parents/Guardians

I communicate with the mother of my student with a disability after every lesson, and she is actively involved in her son's education. I inform her about what is taught, and we share ideas about what her son can do. As for this particular lesson, I informed her about the intention, and she helped her son sign in and make a video recording of himself at home.

11. Lessons Learned

Immersive Reader is a valuable tool which can be used with all students, regardless of their abilities and has proved itself as an asset in foreign language classes. It improves reading for all students, it helps boost reading comprehension, spelling and pronunciation, and it enhances communication for all students. I warmly recommend Flipgrid to all English or any other foreign language teachers, since it is a valuable tool for promoting speaking skills. This component is something that can always be improved and stimulated in the foreign language curricula. It is completely free, and it can be used for classroom discussions either set for homework, or for online lessons.

12. The Average Cost of Implementation Per Child

The tool is completely free. You can download the app on your laptop, desktop computer, phone or tablet. The school does not need to be registered.

13. Evaluation/Feedback

Student and teacher feedback was included in the Flipgrid activity. Both the teacher and the students could give feedback and encouragement to a student video in a text or a video format. Since an explanation and questions to be answered were included in the assignment set by me, my feedback was based on the criteria included there. On the other hand, the students' comments were more focused on the component of letting themselves get out of their comfort zone (recording a video) and the creative additions they have inserted in their videos.

The lesson description was provided by Hristijan Karposh Primary School.
Responsible teacher: Milica Timchevska, English Language Teacher.

Activity 1: Where on the map?

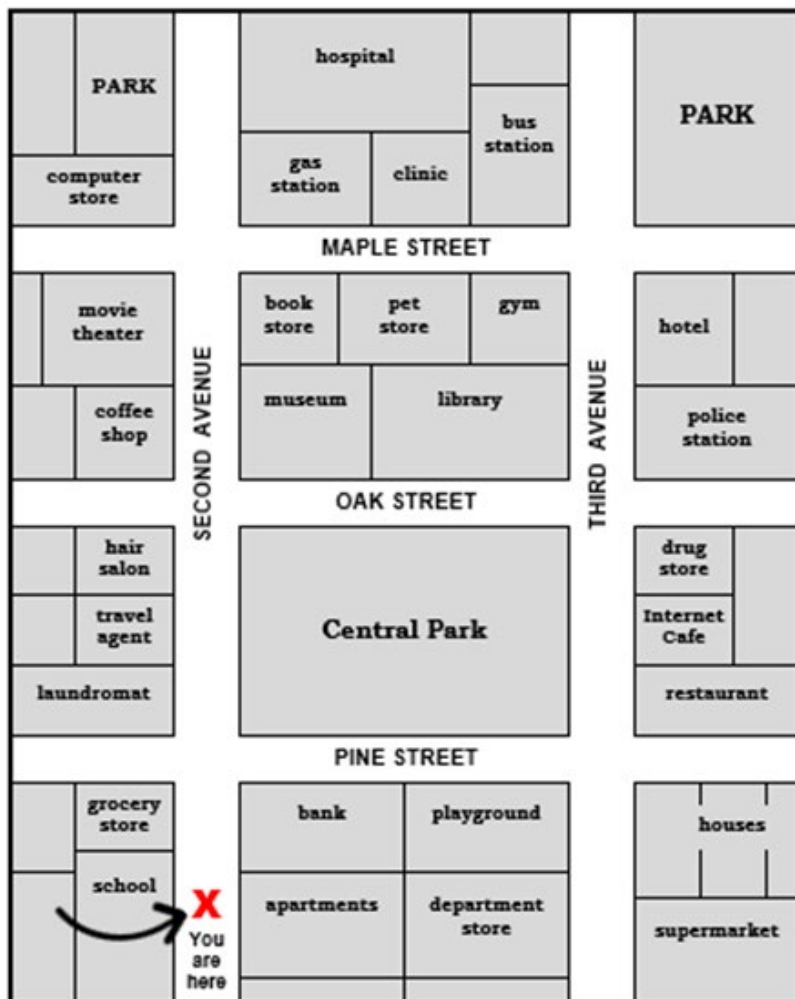
DIRECTIONS info-gap

- Give directions to the places below – don't say the place names!
- Your classmate will listen to you and try to find the locations.



A

1. bus station 2. museum 3. supermarket 4. Internet café 5. hotel



Activity 2: Can you help me?



I can see a family of four in the photo. They are having a picnic with their dog. All of them are sitting under the blanket. The boy in the orange T-shirt is holding an apple behind his back. The mother is holding a baby on her arms. The dog is standing between the mother and the baby. The boy in the blue T-shirt is sitting opposite his father. There is a carved watermelon in the blanket behind them. There are trees in front of them. I can also see a bag with drinks across the boy in the blue T-shirt. Oh my, there is a lot of tasty food in the blanket opposite them!

Origin, Properties, and Application of Materials

Biljana Stojanovska
Nela Slezenkova Nikovska
Natural Science / 2nd Grade



1. The Description

This is a lesson in natural sciences for second grade of primary school, as part of the **Origin, Properties and Application of Materials** unit. Regarding the didactic approach, a frontal method was applied in the beginning, and working in small groups later. I used the C Board application and the LearningApps tool as digital support. I decided to use these tools as they are easy to use, pictorial, appealing and instructive, and I chose working in small groups due to the previous positive experiences and achievements with my students – they have more confidence and learn more easily in a group.

2. Classroom Context

There are 18 students in the class, one of them a student with a disability. The student with disability shows weak communication skills, his vocabulary is poorer than expected regarding to his age, he pronounces many of the sounds incorrectly, regresses in development of mental abilities, and his psychomotor development is deviant, especially regarding social interaction. The class was conducted in person.

3. Lesson Goals

Assessment Standards from the second-grade science curriculum p. 4 and p. 8:

[At the end of the lesson] The student:

- Names different materials from the environment;
- Identifies types of materials from the environment;
- Lists various uses of a particular material;
- Understands and accepts that digital literacy is necessary for functioning in everyday life – it facilitates learning, life and work, contributes to the expansion of communication, creativity and innovation, offers various opportunities for entertainment.
- + Collaborates through digital technologies (by Digital Competence Framework for the European Schools).

4. Method/Approach

To introduce the topic, I started with a game. At the beginning of the lesson, students played the game Hangman together and guessed the types of materials (e.g., wood, stone, cotton, wool, silk, metal, plastic, rubber, glass, ceramic, paper, styrofoam, nylon). One of the students started the game and wrote on the board, and the student who guessed the word first was the next to come up with a word to be guessed.

In the main part of the lesson, the students, divided into smaller groups, use the C Board application on their tablets, phones, or laptops. In making the groups, grouping the students with mutual disagreements together was considered, in order to develop possibilities for them to communicate additionally on different topics and overcome challenges together. A student with a disability joined one of the groups. Using a pre-created board with pictures and words related to our topic, they created sentences and then discussed the application of a specific material. (If there is no possibility to use this application in the lesson itself, the application itself gives the possibility to print the cards.) Other cards can be added to the board itself in the application, depending on the needs of the class. After a while, each group shared the conclusions they made during the joint work.

In the final part of the lesson, students played an online game created on the Learning Apps application in the same groups, with the aim to determine their knowledge. They were asked to group the images of objects according to their material, using the drag-and-drop function.

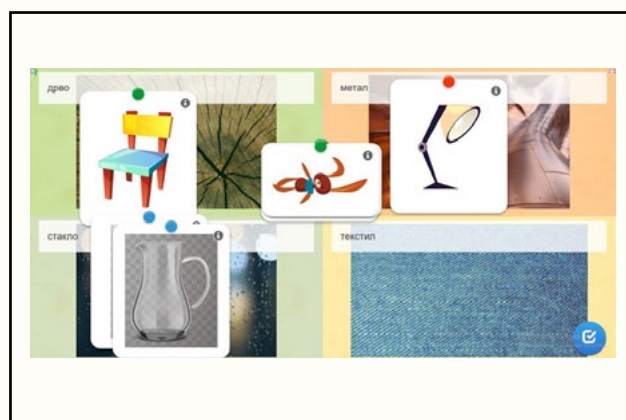
5. Digital Tools Used

C board

- tinyurl.com/mry4d3wa
(a link to the board used in class)



- tinyurl.com/yzdt58u6
(user manual and link to the application)
- tinyurl.com/mweyspwz
(link to the game played on the Learning Apps website)



6. Similar Tools

Here, I would also mention the Liveworksheet website (tinyurl.com/yh4s85b4), which, with a proper preparation of the exercises, provides easy and entertaining use for the students.

7. Specific Needs (Disability)

The student with a disability needs encouragement and motivation to communicate not only with the other students, but also with the teacher. These tools, especially the C Board tool, make our mutual communication much easier. With the application of alternative and augmentative communication, through this tool, the self-confidence of the student increased because it provides a certain form of direction as term bank, and it helps with pronunciation and creation of sentences. I would also like to emphasize that his general motivation and interest in using digital devices and applications have increased. It is important because by using tools that are interesting and attractive to him, he feels confident, and we expect that there will be progress in communication with other students, and in general.

8. Challenges

The challenge in this class was to create the groups, because there is mutual impatience among certain students. Therefore, in creating the groups, attention was paid to the structure of each group. This issue does not apply to students with disabilities. This student is especially accepted by all the other students, and they all want the student in their own group.

9. Benefits

The advantage of using these tools is indeed great, because it contributes to the improvement of students' mutual communication, the increase their self-confidence and the development of critical and computational thinking. The whole class benefits, and especially the student with disabilities. In this way, the student feels more secure and safe, his attention is focused longer on reaching the intended goal (otherwise it is very difficult to maintain his attention) and his social communication skills can be developed step by step. Our school is technologically well equipped, so we had no problem with the use of digital devices and applications. That is the reason why we often use them.

10. Cooperation with Parents/Guardians

We have full cooperation with the parents, we keep them informed about all the changes. For this lesson, the links to the exercise and the game with specific directions were sent to the parents, so that they could repeat and practice them at home.

11. Lessons Learned

I recommend this approach and methodology, because they are both complementary with the demands of these modern times. All students, not only students with disabilities, are particularly focused on technology. That is why digital tools will only be used as an assistive tool that will help us achieve our educational, pedagogic, and other goals and standards.

12. The Average Cost of Implementation Per Child




Both tools are free of charge, easily accessible, and understandable, and I believe that every teacher will be able to use them. The only necessary components are good organization and preparation prior to the lesson.

13. Evaluation/Feedback

During the lesson, a reflection was made in the form of discussion through the following questions: 1. What did we do today? 2. How did you feel? 3. How can we use what we have learned in our everyday life?

We received spontaneous positive feedback from some of the parents after they had repeated and played the game.

The lesson description was provided by Ss Cyril and Methodius Municipal Primary School (OOU "Sv. Kiril i Metodij"), Centar Municipality, Skopje, North Macedonia
Responsible teachers: Biljana Stojanovska and Nela Slezenkova Nikovska

Subject: Natural Sciences for II grade Topic: Materials			LESSON SCRIPT		
Contents (and concepts)	Assessment standards	Classes (date)	Lesson Script	Tools/Mean	Progress tracking
• Application of materials	The student names different applications of a certain material	1	<p>Introductory activity :</p> <p>Students play a game of Hangman together and guess the types of the materials. Ex. wood, stone, cotton, wool, silk, metal, plastic, rubber, glass, ceramic, paper, styrofoam, nylon. One of the students starts the game and writes on the board, and a student who guesses the word first is the next to come up with a word to be guessed.</p>  <p>Main activities:</p> <p>Working in groups, the students use the C Board application on their tablets, smart phones, or lap top computers.</p> <p>https://app.cboard.io/board/63bdca570572b0001240d159</p> <p>Using a pre-created board with pictures and words related to our topic, they create sentences and then discuss the application of a specific material. After a while, each group shares the conclusions from their joint work.</p>  <p>Concluding activity:</p> <p>Students, in the same groups, play an online game created on the Learning Apps application. Their task is to group the images of objects according to the material they are made of with using the drag and drop function.</p> <p>https://learningapps.org/watch?v=pja53dd6t22</p>  <p>Reflection (summarising and linking the learned content to the everyday life):</p> <ol style="list-style-type: none"> 1. What did we do today? 2. How did you feel? 3. How can we use what we have learned in our everyday life? 	<p>tablet, smart phone or lap top computer</p> <p>https://app.cboard.io/board/63bdca570572b0001240d159</p> <p>https://learningapps.org/watch?v=pja53dd6t22</p>	<p>- oral answers to discussion questions;</p> <p>- the contribution in deriving conclusions;</p> <p>- contribution to group activities</p>

Senses and Stimuli

Nikolija Kostovski
Gabriela Najdova
Natural Sciences / 1st Grade



1. The Description

The topic of the lesson was „Senses and Stimuli“, and the students were divided into small groups of four. At the beginning of the lesson, the students watched a presentation (attached) on the screen, in which questions related to the topic are included at the end. In addition, the students were asked to answer quiz questions in groups through a tool. This was done in order to encourage competition among students and, at the same time, to help them adopt the knowledge about the connection between the senses and the stimuli. At the end of the lesson, a picture of a human figure was used as a tool to practice connecting the senses with the corresponding organs. It was of help when bringing this topic closer to the student with disability, because it offered a partial introduction to the parts of the body in an interesting and captivating way for the student, and, at the same time, it was used for the student to point to the body parts himself.

Considering that we have a student with combined disabilities (congenital and acquired) in the class, the most proper way to connect senses and stimuli – the main goal of the lesson – was the use of this digital tool. Using the tool, the student with atypical development performed the task with more concentration and paid more attention to it. Regarding group work, we also fulfilled the main goal – full involvement of the student with atypical development.

2. Classroom Context

The class is composed of 30 students, one of whom is a student with atypical development. The class was conducted in person.

3. Lesson Goals

The goal of the lesson (page no. 6 of the Natural Sciences Curriculum) is for the students to learn the connection between stimuli and senses; in doing so, students learn to identify different stimuli through their senses.

4. Method/Approach

The topic of the lesson was „Senses and Stimuli“. The teachers divided the students into groups of four. At the beginning of the lesson, the teacher starts a discussion by asking questions: – What are the parts of our body? Then, each group is provided with a mirror in order to name the parts of the face, thus having their own answers direct them to the lesson goal – connecting the senses with the stimuli.

The students are shown a presentation titled “My senses” on the screen. At the end of the presentation, there are several questions related to the topic. The students' task was to answer quiz questions in groups, using the Interacty project tool. The purpose was to enhance a competitive spirit among the students, but also to help them learn about the connection between the senses and the stimuli. At the end of the lesson, the tool displaying a picture of a human body was used, and the students were asked to connect the senses with the corresponding organ. We found this aspect very useful for bringing the topic closer to the student with atypical development, because it offered the student an introduction to the parts of the body in an interesting way, managing at the same time to keep his attention. This tool was used for the student to identify and point to the specific body parts himself.

5. Digital Tools Used

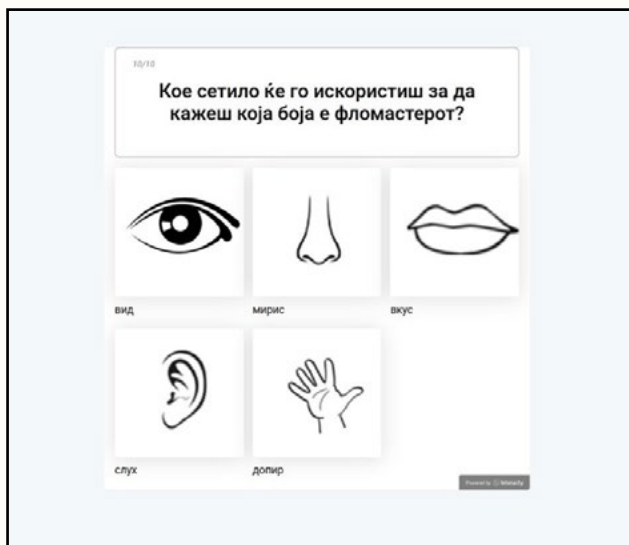
- A PowerPoint Slide Show presentation



- A link to the class evaluation tool (LearningApps) tinyurl.com/2p8zmsvt



- A link to the quiz (Interacty Project link on a website) tinyurl.com/ufnzecdj



The 10 Quiz Questions:

- 1. Which sense will you use to tell if the sky is clear or cloudy?
- 2. Which sense will you use to tell if food is spicy?
- 3. Which sense will you use to feel if the bunny is soft or hard?
- 4. Which sense will you use to know what your teacher is saying?
- 5. Which sense will you use to tell someone that they have a nice perfume?
- 6. Which sense will you use to tell if the pizza is salty or sweet?
- 7. Which sense would you use to say that garbage stinks?
- 8. Click on the sense with which you will check if the water is hot or cold!
- 9. Which sense will you use to tell if the music is quiet or loud?
- 10. Which sense will you use to tell what color the marker is?

Possible answers to all the 10 questions:

- sight
- smell
- taste
- hearing
- touch

6. Specific Needs (Disability)

Due to the disability type, the student faces different challenges. The student experiences difficulties in understanding the teaching material, has attention deficit both during the classes and the breaks, quickly switches his attention from one activity to another, often refuses to participate in required activities, shows anxiety when making mistakes in tasks, has difficulties in understanding and using speech as well as in understanding social stories and implementing the learned skills in other social situations.

At the beginning of the school year, individual goals were set for the student; the purpose is to make it easier for the student to cooperate according to his abilities and opportunities, as well as to encourage his social skills and integration. In order to understand the teaching unit, in addition to the modified educational program in use, we also included digital tools. The goal is for the student to understand the teaching material more easily and be able to demonstrate greater involvement (participation) during the lessons, but also to provide a safe and happy environment for the student.

Visual support proves to be particularly successful in the learning process for students with learning difficulties. Each segment of the teaching unit is presented with visual support, and it makes it easier for the student to understand the parts of the activity, to point them out, and to apply them accordingly. By including the digital tool, we encouraged improvement of the student's fine motor skills and provided an alternative for speech expression (in direction to his present difficulties in language expression). We also contributed to increasing the students' curiosity. Regarding the approach, it was very important for us that we were able to increase his participation in class, leading to him feeling safe and accepted. At the same time, it offered a more fun way of learning for him. We were especially pleased that the lesson goal was reached by the entire class. We got correct answers to the tool questions from the student, which was our main proof that the teaching content was acquired, and the goal of the lesson was reached. The tool contributed to increased cooperation of the students both at school and at home. The student needs to regularly repeat and revise the material, and this tool offers the opportunity to be also used at home.

7. Challenges

The use of digital tools requires registration by the teacher. Before using digital tools, it was necessary for the teachers and students to familiarize themselves with the rules and guidelines, as well as with the safety aspects of tool application. The most important thing for us is to educate students and encourage them to acquire new skills and knowledge.

Since the aim was to include all students, especially students who have certain difficulties, we needed additional computers/laptops for presenting and implementing the teaching unit. In the treatment of the student with atypical development, the best results were shown by applying content visualization, because the student has a harder time focusing on one stimulus at a certain time, so with the help of visual representation, he receives clear and simple instructions. Because the student's attention is often diverted by too many stimuli in his environment, experience shows us that using a screen reduces the stimulation from the environment and increases the student's interest and focus. The exercises presented on the digital tool increase focus on work due to visual and auditory support. The goal is to minimize distraction and use what will be a clear and specific task. In our case, it was easier for the student to focus on the screen where the instructions are clearly presented – step by step, instead of using textbooks that are filled with too much information.

In that way, we encouraged greater interaction and inclusion during the lesson. Cooperation with the parents was of great importance to us because the same tool can be used at home, and thus the student can revise and internalize newly acquired knowledge in an entertaining way.

8. Benefits

The use of digital tools allows for easier learning and acquisition of the material, their application in the different forms and phases of the teaching process, while saving time and enabling long-term acquisition of the teaching content. Regarding the student with atypical development, as we indicated, the benefits of using the digital tool are: much greater desire and motivation to work, significant improvement in concentration, reduced challenging behavior. By applying the tool, the child's emotional state also improved because this way of learning proved to be the safest and most interesting for learning new content. The student showed a greater desire to come to school, and, at the same time, all students were involved and motivated.

9. Cooperation with Parents/Guardians

We presented the digital tools to the parents as well as the advantages and goals we want to achieve, and, with their consent, we started using them. It was of particular importance to us that the parents used the shared tools at home with their children, in order for them to more intensively master the tasks and be able to apply them.

10. Lesson Learned

As mentioned above, the use of digital tools allows us to create a safe and positive learning environment. Students with certain difficulties need a more specific/visual representation of things, so this helps us to achieve greater levels of student involvement and cooperation.

We would recommend this learning approach to any teacher/colleague definitely contributes to achieving greater commitment and increased interest among the students. As for students with difficulties, we need to strive to encourage them and enhance their interests.

11. The Average Cost of Implementation Per Child

The tools we have chosen are free and allow us to create new exercises and use existing exercises. In order to achieve greater efficiency and inclusion, we needed additional printable sheets on which we presented the main segments of the teaching units and encouraged group work.

The lesson description was provided by Johan Hajnrh Pestaloci Municipal Primary School, Centar Municipality, Skopje, North Macedonia
Responsible teachers: Nikolija Kostovski, teacher, and Gabriela Najdova, special educator and rehabilitator



University College of
Teacher Education
Styria



Freie Universität Bozen
Libera Università di Bolzano
Università Lìdia de Bulsan



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