Creating a digital lesson book

By Sebastian Hub

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Short description of the practice

Handwritten, hand-designed portfolio folders and hand-drawn mind maps or graphics can be used in many contexts, not only as so-called “main lesson notebook” pupils traditionally write in Steiner Waldorf schools to document their learning experiences. A frustrating observation of many teachers is that when older pupils switch to the digital version, much of the former characteristic and artistic expression is lost.
How to change this uniformity? Take time to introduce techniques and programmes thoroughly, as these digital variants also deserve the necessary attention to master. In this example we use Sketchbook, a free drawing programme, used on an iPad with a stylus.
Digital alternatives can help to retain or even expand creativity and individual character in digital main lesson notebooks or other portfolio works. They also provide versatile platforms for designing and organizing digital content.

Designed by Freepik

Age span of children/adolescents

- [x] 9 – 12 years
- [x] 12 – 15 years
- [x] 15 – 18 years
- [x] 18 + years

Target groups

- [x] Pupils
- [x] Educational staff
- [x] Parents / caregivers

HERMMES curriculum areas

The practice is related to the following areas (For all the areas, see the curriculum grid on the HERMMES website.)

- [x] **(DIGITAL) MEDIA CONTENT CREATION**
  - [x] Writing
  - [x] Visual / Image / Sculpture (VIS)
- [x] **CRITICAL INFORMATION AND DATA LITERACY**
  - [x] Analyse and (self)-reflection

DESCRIPTION AND USE OF THE PRACTICE

Work instructions and roadmap

Time learners need for the practice

1 to 2 double lessons for the introduction to the topic; 60 minutes to explain the app; 3 to 6 double lessons for digital work;

Group size

Best: up to 15 (everyone should have a tablet with a stylus)
Possible: the whole class (everyone should have a tablet with a stylus)

Preparation time for teacher/facilitator

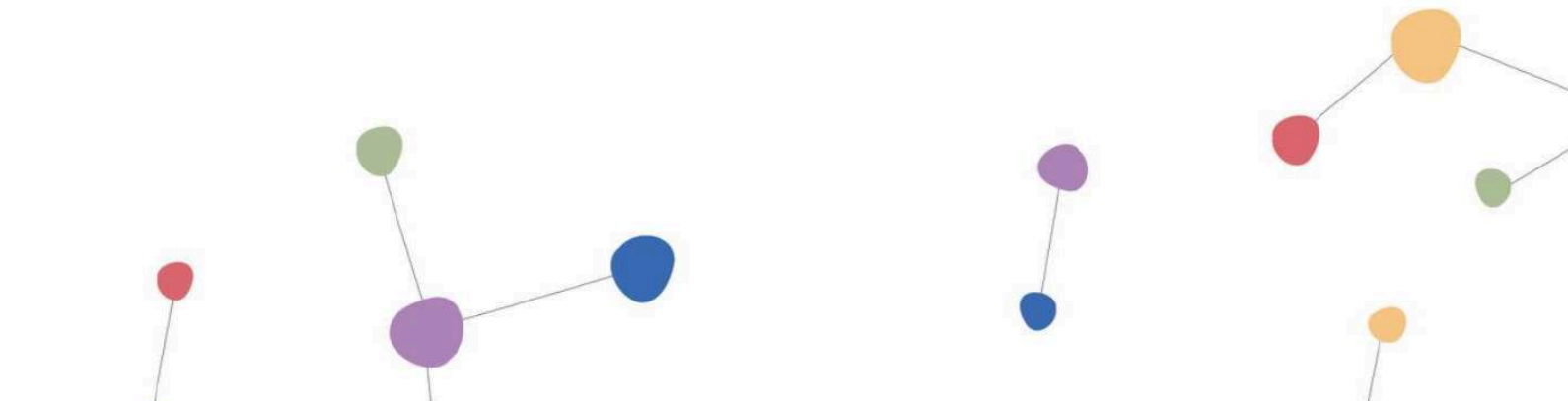
4 hours to learn how to use the software

Location / setting / specific circumstances

Indoors (introduction and digital work) or outdoors (digital work)

Necessary equipment and materials

Tablet with stylus (in piloting the practice, iPads with styluses were used). Alternatively, one can use another graphic tablet with notebook options.



Detailed description

Project classification
The project can be conducted as part of a separate media lesson or within Information Technology lessons. Likewise, the project could also be integrated into regular lessons covering various subjects. Ideally, collaboration with the art teacher would be beneficial, allowing for an interdisciplinary approach.

Step 1: Theoretical introduction

Begin with a general introduction to graphic design. Create a visual map with the pupils that can serve as an initial step to assess their prior knowledge, particularly from previous art classes. Subsequently, present various types of graphic designs such as: logos, advertisements, posters, flyers, booklets, etc. These various types of designs can be analysed and discussed with the pupils. Key design elements such as colour, typography, and overall composition should be emphasised during discussion.

If time permits, the following topics can also be explored:

- The history of graphic design
- Examples include cave paintings and posters, with a specific focus on propaganda posters from the Nazi regime during World War II in Germany or other examples from other countries.

Key questions to discuss:

Which design elements exist?

- **Colour:** Colours have a strong psychological impact. They evoke emotions and influence perception. For example, red is often associated with energy or danger, while blue conveys calm and trust.
- **Shape:** Geometric shapes such as circles, squares, or organic forms such as curved lines, evoke different moods and feelings.
- **Typography:** The choice of font affects readability and the tone of the design. Serif fonts are perceived as traditional and formal, whereas Sans-Serif fonts convey modernity and minimalism.
- **Composition:** The arrangement and positioning of elements on a surface influences the designs balance. A harmonious composition feels stable, while an unbalanced one adds tension.
- **Contrast:** Differences in brightness, colour, texture, or size create dynamism and highlight specific elements.
- **Imagery:** Visual elements such as photographs or illustrations directly communicate information and evoke emotions.

Which psychological mechanisms play a role in design?

- **Perception:** Visual information is processed differently based on contrast, brightness, and the arrangement of elements. A clear design aids faster information processing.
- **Associations**: Specific colours or shapes trigger culturally ingrained associations, such as red symbolises danger or love, while green represents nature or safety.

- **Attention and focus:** Designers can guide the viewer to focus by using contrasts, colour choices, and strategic placement of elements.
- **Cognitive load:** Simplified designs with minimal distractions reduce cognitive load, enhancing clarity and comprehension.
- **Emotional response:** Colours and shapes evoke emotions that influence the perception of a design, such as bright colours elicit joy, while dark, sharp shapes can evoke fear.

How do I get from an idea to the finished product?

1. **Conceptualisation:** Develop the core idea. Determine what the design should communicate, who is the target audience, and what emotions should be evoked.
2. **Sketching and designing:** Create initial drafts, either on paper or digitally. Use this phase to experiment with fundamental design elements.
3. **Gather feedback:** Present drafts to others to gain constructive feedback. This often highlights areas for improvement.
4. **Refining:** Fine-tune details such as colours, fonts, or placement to achieve a harmonious overall appearance.
5. **Prototyping:** Develop a functional version of the design, whether it is a printed mock-up or a digital preview.
6. **Final implementation:** Once optimised, finalise the design in the intended format, such as print or web deployment.
7. **Presentation:** Showcase the final product and, if applicable, test the effectiveness in the intended function to ensure desired goals are met.

Step 2: Practical Introduction

After covering the theoretical aspects, the participants can begin entering digital drawing.
In piloting the practice, Sketchbook by Autodesk was found to be particularly suitable for the purpose, although a number of similar applications exist, https://www.sketchbook.com/.

Getting started with the app
Begin by introducing participants or pupils to the programme interface and tools. Ensure everyone follows along effectively. It is a good idea to connect the instructor tablet to a projector. Encourage participants to use their own tablets during the demonstration, mimicking the steps being shown on the projector.

Creative Exercises
Once participants are familiar with the tools, they can start engaging in creative exercises. Below are some suggestions:

1. **Drawing a face**
    - Take a photo of your own face using the tablet and upload it to Sketchbook.
    - Place the photo in the background and trace over it step-by-step on a new layer to create a digital rendition of your face.
    - Participants can add a creative twist by turning the drawing into a caricature. *Note: participants should only draw their own faces for privacy reasons.*
2. **Creating a collage**
    - Encourage participants to use all the tools available to create a collage.
    - This exercise helps participants learn about composition and the assembly

of a complete artwork.

3. **Designing a poster**
    - Assign the task of creating a poster on a chosen topic. This could be for an upcoming event, such as a class performance.
    - You could collaborate with other teachers to design real posters for school activities or events.
4. **Free creative work**
    - Allow participants to create any artwork of their choice. They can apply the techniques and tools they've learned to produce a unique, creative piece.

Step 3: Final compilation

At the conclusion of the exercises, assign participants the task of compiling their completed projects into a portfolio or a "main-lesson book" or a notebook. This book can include a title page, table of contents, and all their work organised systematically. Participants can then export the final book as a PDF.

Optional step 4: Critical reflection and comparison

It is possible to split the pupils into two groups after the first three steps, both groups working on a similar topic, e.g., mountain, clouds and sky collage, but one group using analogue artistic techniques, the other working with Sketchbook. Print out the digital results and create two exhibitions that can be viewed and compared:

- What are the drawbacks (e.g., no haptic difference in materials and textures) and advantages (easy layering) of the digital version?
- Can you observe a kind of nudging or mainstreaming by the programme or by the analogue materials that restricts the variability of the different participants' results?

Potential challenges

- Participants might remain using only one layer for all elements, limiting their flexibility.
- Participants may encounter issues when drawing on the wrong layer and assume the programme is not working properly.

By addressing these challenges during the introductory session, participants can learn to navigate the programme more effectively.

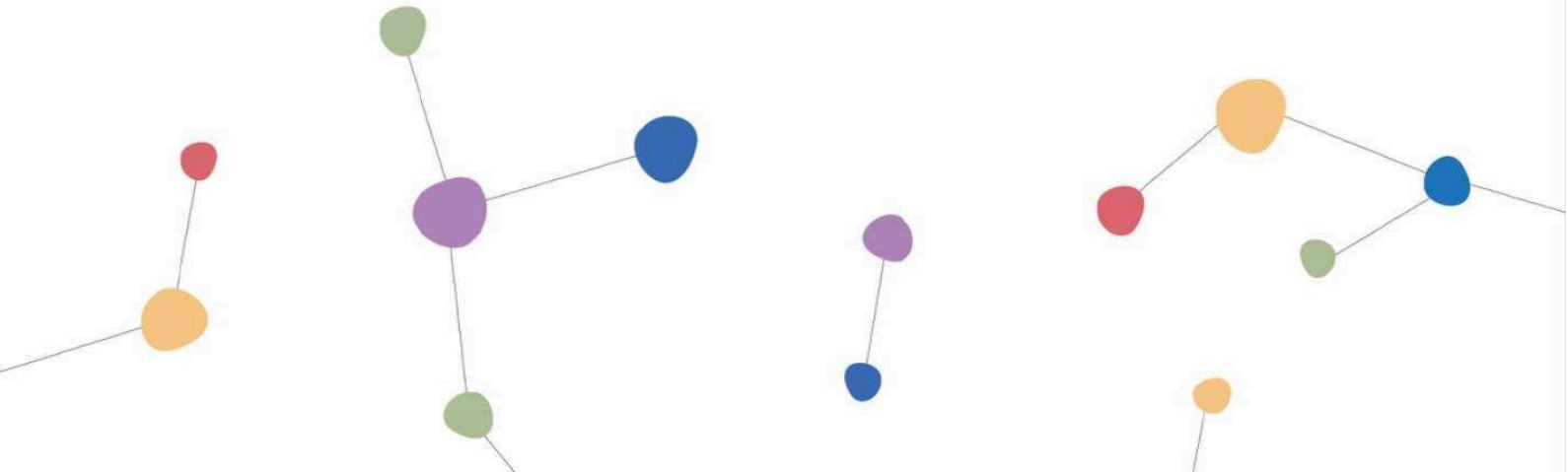
Additional information

Further online or offline information on the practice

https://www.sketchbook.com/

Additional information that might help

- Encourage participants to work on different layers.
- Remind them to save their work regularly.



Social media unplugged 1

Visualising social networks with a ball of wool

By Corinna Sümmchen, Paula Bleckmann, and Julia Kernbach

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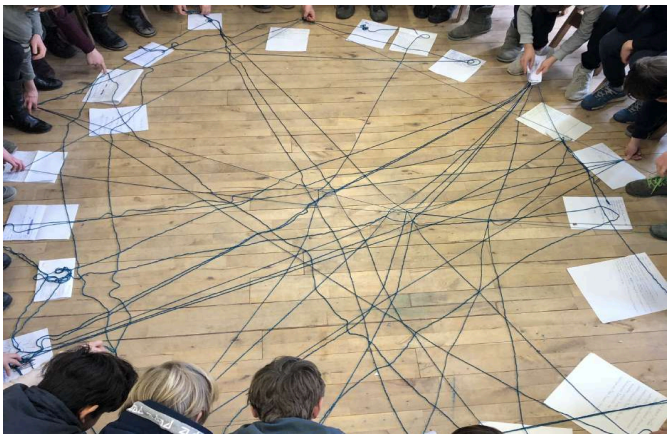
Short description of the practice

The Social Media Unplugged (SMU) project allows children and young people to train their skills for using social media mentioned in the DigComp “communication and cooperation” area, such as safe interactions, netiquette, and managing digital identity, without their being exposed to the dangers of digital social networks, such as cyberbullying, cybergrooming, sexting, and a multitude of online problematic content. The analogue network is “error-friendly”, i.e., pupils can make mistakes and learn from them in this relatively safe space. In SMU part 1, individual SMU profiles are written on a piece of paper by each pupil, and the connections in social networks are visualised using a ball of wool and messages are written and addressed to each other.



Age span of children/adolescents

- [X] 9 – 12 years
- [X] 12 – 15 years

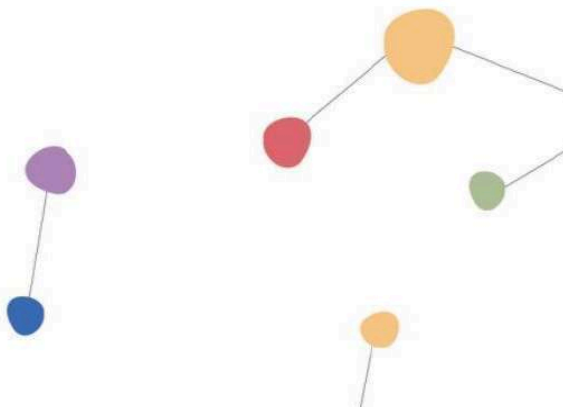
Target group

- [X] Pupils

HERMMES curriculum areas

The practice is related to the following areas (For all the areas, see the curriculum grid on the HERMMES website.)

- [X] **WELL-BEING AND SAFETY**
  - [X] Attention
  - [X] Safety and security
- [X] **(DIGITAL) MEDIA CONTENT CREATION**
  - [x] Writing
- [X] **CRITICAL INFORMATION AND DATA LITERACY**
  - [X] Analyse and (self)-reflection
- [X] **COMMUNICATION AND COOPERATION, EMPATHY**



DESCRIPTION AND USE OF THE PRACTICE

Work instructions and roadmap

Time learners need for the practice

90 – 120 minutes

Group size

variable

Preparation time for teacher/facilitator

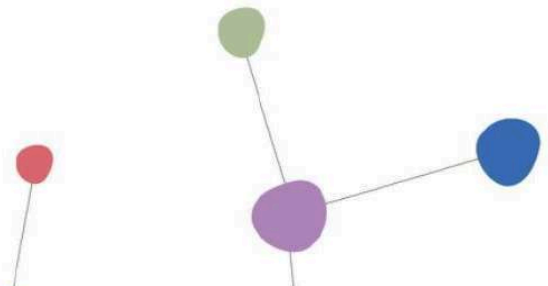
30 minutes

Location / setting / specific circumstances

Pupils in a circle

Necessary equipment and materials

Paper and pens, sticky notes in four colours, 1-2 long balls of wool or other string rolled up



Detailed description

Intro and rationale
A multitude of skills is required for using social networks in a productive way and for avoiding the hazards associated with their use. Many of them are listed in the European Digital Competences area “communication and cooperation”, such as safe interactions online, netiquette, and managing digital identity. For the prevention of risks associated with social media use, firstly, the HERMMES project’s approach is that teachers support parents in delaying smartphone ownership. In a second step, we can explore with young learners the history and the fun of written analogue social networks with the HERMMES “SAFebook before Facebook” practice. As a third step, one can carry out all five parts of the Social Media Unplugged (SMU) project. The best time to start this is BEFORE learners own smartphones, but it can also be done when a few pupils in the class already have such a device. In this way, social media topics can be addressed and discussed preventively in an analogue and protected space and social interaction can be strengthened.

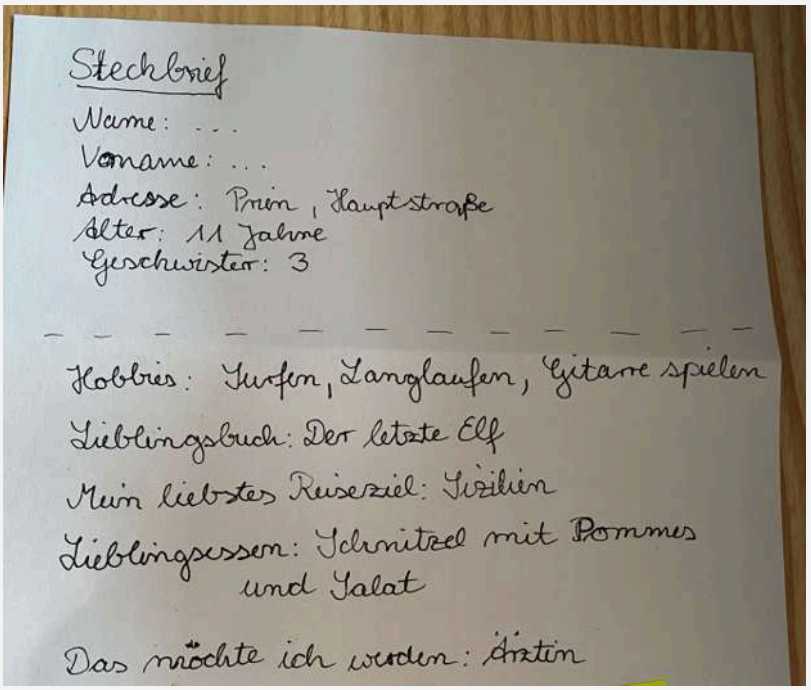
Preparation
Step 1: Sit in a circle and have an exchange with the group of learners to get a brief overview of what knowledge or experiences they already have with digital media and with social connections taking place via media. For example, ask closed questions that pupils can answer by raising their hand to indicate a “yes” without making verbal comments:

- Who has written a postcard in the past month?
- Who has written a letter?
- Who has made a phone call?
- Who has written an email?
- Who has used one of the following:
    - WhatsApp
    - TikTok
    - Instagram
    - Snapchat
    - other instant messaging services (if yes, which ones?)

Optional: You can discuss which medium you would use in interaction with whom. Is there a typical medium for interaction with

- grandparents
- parents
- official authorities
- in case of emergencies
- best friends
- etc.

Step 2. Each learner is then asked to write one SMU profile: what defines me, what interests me, which hobbies do I have, what is my favorite book, movie, game, food, vacation spot, what do I want to become? Do I have siblings? If so, how many? Etc.
The learners are encouraged to be creative here, they are invited to invent new categories for their profiles (get inspiration on how to widen the scope by reading the HERMMES “SAFebook before Facebook” practice). Once the profiles are completed, they are pinned to a board or placed in the center. Before that, everyone folds their name tag back so that no one can read it, keeping the profiles anonymous for the time being. Now everyone can read through the profiles. Afterwards, the learners can raise their hands and, for example, say if they recognised someone and what feature helped them recognise that person. What surprised them? Can they identify a profile they can not assign to anyone?

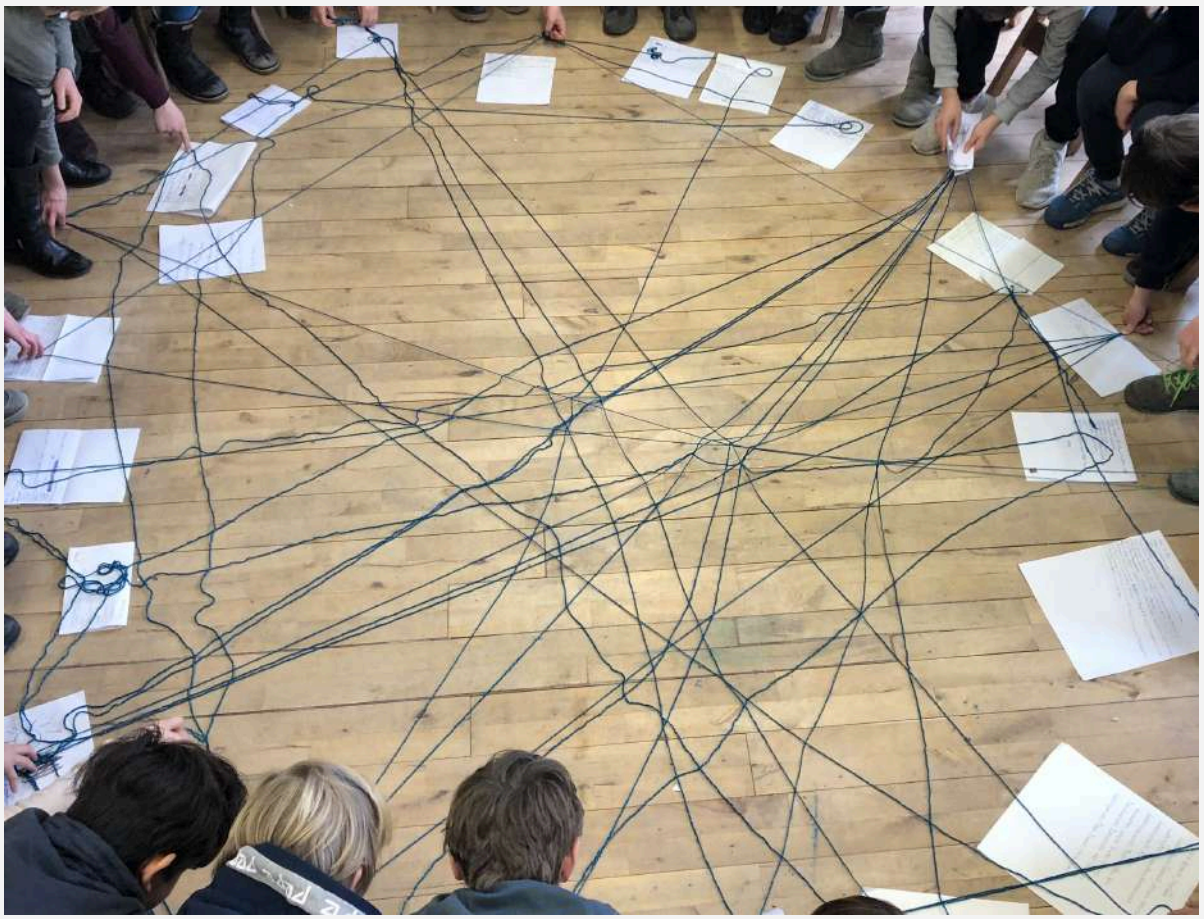


©Corinna Sümmchen
Real or fake? Social Media Unplugged profile of a pupil

Step 3: Visualising social connections - building a networkű

The learners sit on the floor or chairs in a circle and the teacher hands a ball of wool or other yarn to one of the learners. Each pupil has their profile in front of them now. Pupils are asked to make "friend requests" to each other, starting with one learner who states to the public of the class why they chose a particular person based on the profile. Then, they throw the ball of yarn to the chosen person, who can decide whether to accept the request or not. If they accept, it's their turn next to keep a piece of thread in their hand and make a new "friend request". If not, the requested friend throws the ball back to the sender without keeping the thread. The original sender needs to choose a different recipient, allowing a network of yarn to take shape.

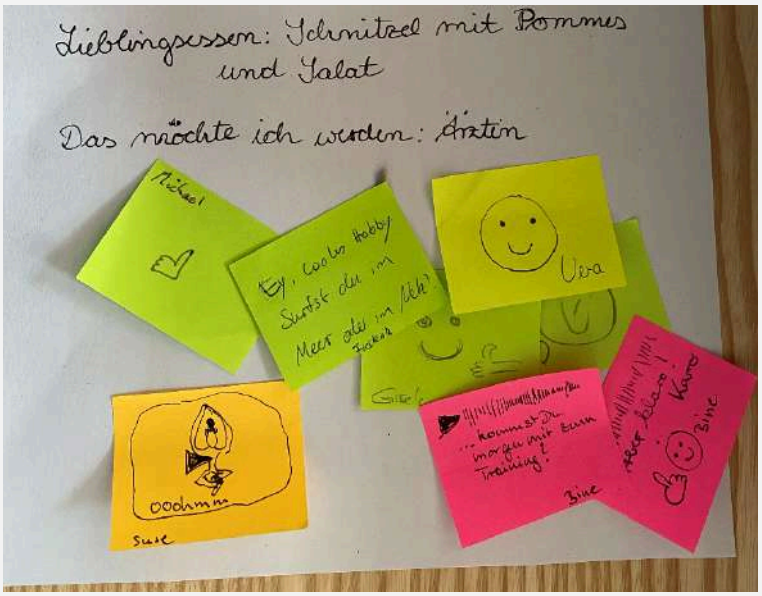
In the first round of play, senders can only throw the ball to someone who has not previously received it. This avoids that some pupils have several connections at the end while others have none, which could cause shame by visualising social exclusion. Optionally, a second ball of yarn can be used to speed up the process. Once everyone is connected to the network, the yarn is carefully laid on the ground so that the ends are on the correct profiles. Now, communication within the network can begin.



©Corinna Sümmchen Is anyone missing? The Social Media Unplugged Network lying on the ground.

Step 4: Using the network

Students are introduced to a colour code that corresponds to the different forms of communication in social networks, such as: sending text messages, sending pictures, sending video and voice messages. Each form of communication receives a color of the stickí note, e.g., pink for text message, blue for pictures, etc.



Before the first messages get sent, introduce a set of rules for the network, such as:
no anonymous messages;
no insults and/or abuses in any messages.

Then the pupils can start writing their messages and send them by sticking them on the addressee's profile. They are only allowed to write messages to people who have accepted their "friend request", which means they are connected via yarn. So the correct route in the network must be adhered to.

Step 5: Feedback session as a conclusion
A short feedback session with the pupils at the end is useful. The following questions could be asked:

- How did you feel when you were using the network? What experiences have you had?
- What was particularly nice? What did you enjoy?
- Can you describe a situation that was uncomfortable for you?

You can continue with the HERMMES practice *Social media unplugged part 2*.

Optional step 6:
An explanatory video on the more technical aspects of the "journey of data through the internet" can be found here explaining providers, search requests, routers, redirections in German by "personalizing" them, i.e., sending people with letters running around in a maze of underground tunnels. Teachers can watch the video in class or even better: use it to prepare materials for pupils to play the roles of provider, routers, etc., themselves.

Additional information

Further online or offline information on the practice

- Sümmchen, Corinna (2022). Social Media Unplugged. Handlungsorientierte Prävention von Cyber-Risiken, Erziehungskunst, Juli/Aug. 2022, p. 56 – 59, Free download (in German): here
- Sümmchen, Corinna (2023): Das analoge Soziale Netzwerk – Handlungsorientierte Medienkompetenzförderung und Prävention in einem In: Pemberger, Brigitte (ed.). Analog vor digital. p. 273 - 276. Free download (in German): here
- Sümmchen, Corinna (2022), Analoges Soziales Netzwerk oder Social Media Unplugged – handlungsorientierte Prävention von Cyber-Risiken In: Hübner, Edwin (Hrsg.). Medienpädagogik – Gesichtspunkte, Grundwissen, Praxisprojekte

Additional information that might help

Despite established rules, it can still happen that these are ignored and some messages may be sent anonymously, insults or abuses may be written on the messages, etc. These mishaps are usually addressed in the feedback round and communicated openly with one another. Solutions are usually found immediately. Giving pupils the space for this is very important to train and, if necessary, improve reflection and learning within social networks. An example from a German class was an anonymous severe insult written on a note. At first, the group was convinced that in order to set things right, the perpetrator of the bullying offense needed to disclose their identity to the group and apologise in public. The victim argued that she would be satisfied if the perpetrator just apologised in private to her, which is what eventually happened (additionally, see the remarks on the responsibilities of an administrator in the later parts of the SMU project).

That code is longer than you, Leo!

By Professor Dr Paula Bleckmann
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Short description of the practice

When Carla has finished putting little metal pegs in small holes within a long wooden board, she smiles and declares: “That code is longer than you, Leo!”. When Leo lies down next to the wooden board, they confirm this. Carla turns the crank of the wheel that belongs to the mobile xylophone on wheels that serves as a pickup for the giant codable music box they are playing with. The IPO-principle (Input-Processing-Output), the concept of binary code (1=yes=a sound is produced vs. 0=no=no sound is produced) and the idea of writing code that can be re-read several times are addressed in this practice. Learning goals are the areas of musical education, training fine motor, social, and language skills, and also coding skills are part of a kindergarten computing science curriculum: a four-in-one practice that has also been used by visually impaired children in a specialised schools with great enthusiasm, as they could feel the holes and pegs with their fingertips and hear the melodies.

Age span of children/adolescents*

- [ ] 0 - 3 years
- [X] 3 - 6 years
- [X] 6 - 9 years
- [ ] 9 – 12 years
- [ ] 12 – 15 years
- [ ] 15 – 18 years
- [ ] 18 + years

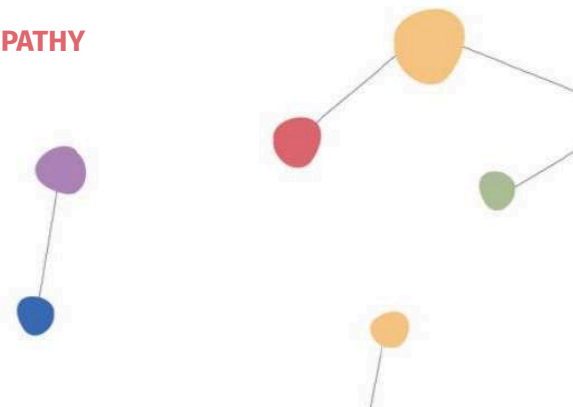
Target group(s)

- [X] Pupils
- [X] Educational staff
- [X] Parents / caregivers
- [ ] Policy makers and approval authorities

HERMMES curriculum areas

The practice is related to the following areas:

- [X] **WELL-BEING AND SAFETY**
  - [X] Attention
  - [ ] Safety and security
- [X] **COMPUTATIONAL THINKING (CT) AND PROBLEM SOLVING**
  - [X] ICT: CT, problem solving
  - [ ] Operate and apply / technical understanding
- [X] **(DIGITAL) MEDIA CONTENT CREATION**
  - [ ] Writing
  - [X] Audio
  - [ ] Visual / Image / Sculpture (VIS)
- [ ] **CRITICAL INFORMATION AND DATA LITERACY**
  - [ ] Search and organise information / data
  - [ ] Analyse and (self)-reflection
- [X] **COMMUNICATION AND COOPERATION, EMPATHY**



DESCRIPTION AND USE OF THE PRACTICE

Work instructions and roadmap

Time learners need for the practice

5 minutes or longer

Group size

Depending on age, small groups of one or two for kindergarten, can be five pupils per music box during early primary years.

Preparation time for teacher/facilitator

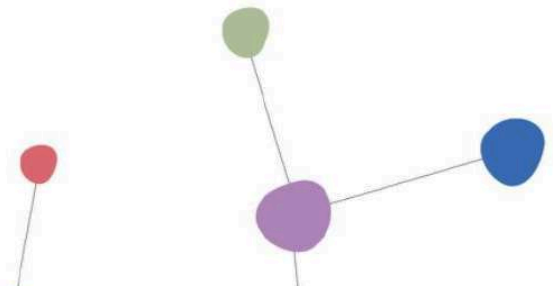
5 minutes to join together the boards that serve as music sheets.

Location / setting / specific circumstances

A small extra room, ideally with soundproof walls and door

Necessary equipment and materials

- Giant wooden music box https://www.manuscriptum.de/klangspiel.html
- Extra shelf pegs
- Alternatively, a version with a cylinder full of small holes for the pegs (Gloggomobil) can be found as a second-hand product, but they are not being produced any more.



Detailed description

This practice is not suitable for children under 3 years because of small parts (choking hazard).

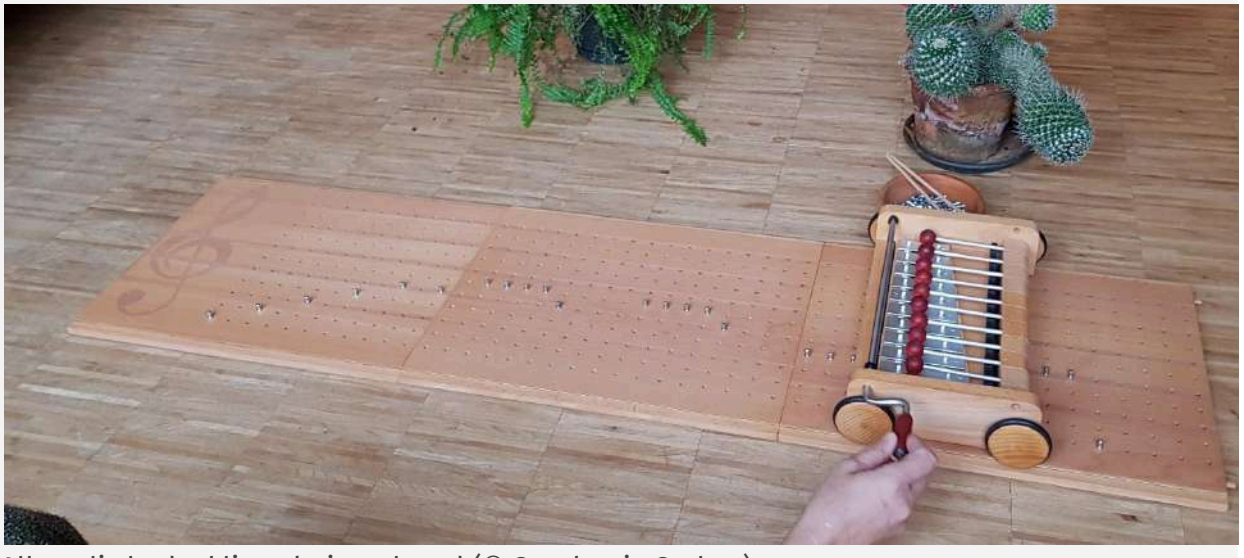
Intro and rationale
The learning goals of this practice are the areas of musical education, training fine motor, social, and language skills, and also coding skills as part of a kindergarten computing science curriculum. Within the last context, the IPO-principle (Input-Processing-Output), the concept of binary code (1=yes=a sound is produced vs. 0=no=no sound is produced), the idea of writing code that can be reread several times are addressed in this practice. The practice is designed to follow the two first stages in Discovery Learning according to Jerome Bruner's theory that educators should focus on optimising the mode of presentation, rather than the content. Mainly the first two levels of enactive (putting the metal pegs in the holes, turning the crank, etc.) as well as iconic (seeing the coded pattern on the boards) are addressed in this practice (Bruner 1966), whereas the symbolic level is not in the foreground.

Giant music box step by step

Preparation: Kindergarten staff can either assemble the sequence of wooden boards before letting the children join, or unpack the giant wooden music box from its package together with them and join the board.

Step 1. The teacher codes a simple melody on the wooden boards using the shelf pegs. For playing the music, put the pickup on the left side of the board and turn the crank to move it across to the left side at constant speed. We advise you to run the pickup along the board, even before finishing the entire code, to show how you can listen to what you have coded so far before you decide on the rest of the code.

Then the teacher invites children to listen to the outcome.



All my little ducklings being played (© Stephanie Stalter)

"All my little ducklings, swimming in the lake, swimming in the lake
Heads dunk in the water, as little tails do shake."

Step 2. Individual children, or small groups of two children (for the youngest) or larger groups of up to five pupils can now try to code their own melodies by putting the metal pegs in the board and running the pickup with the xylophone along the board. Each peg lifts up a lever that raises one of the red mallets. After the peg is passed, the mallet hits the xylophone to make a sound. The sound is quite loud, so if you have an extra room that is isolated from the sound in the main room, allow the group of composers to go there.

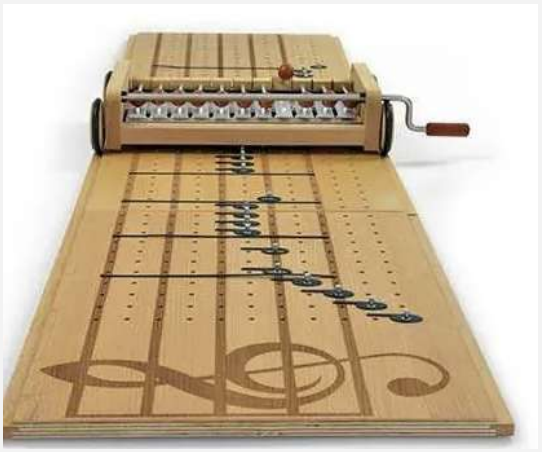
© Stephanie Stalter

Step 3. Present what has been produced. If you like, you can ask the composers whether their melody has a name. Or you can ask the listeners what it makes them think of.
Note: in the kindergarten age this reflective step is not advisable and if the pedagogical practice allows children to just be in the experience and let it sink through, this would be preferable. They might spontaneously come up with a name for the song or express what it makes them think of and this might then be a motor to create other sound-moods but then the learning follows out of their inner experience and drive.

Step 4. Tidying up. Together with the children, take all pegs out of the holes, disassemble the board, and place it back in the wooden case - until the next time it gets used. There can be a challenging amount of noise in the kindergarten or classroom otherwise.

Differentiation and variation

Putting music notes on the pegs. For older pupils, the board can also be used to write sheet music with musical notes that are also part of the package. They can transfer notes from a paper sheet to the giant music box to hear what the musical notes sound like.



Or the other way round: young composers can compose melodies by inserting the pegs into the holes and they can add the musical notation later on add the musical notes to the pegs, try out what it sounds like, correct any mistake that was detected, and copy the notation of the melody on a piece of paper to “fix it”, whereas the music box boards can be reused again and again.

Supporting emergent musicians in reading music scores
Children and adults can play pieces of music on this as an “instrument” within a very short time and discover the joy of making music. It is ideal as an accompaniment when learning to play a musical instrument or learning to sing from sheet music. A new piece of music is “copied” from the music scores to the board. When the learner knows what it should sound like, they can try to reproduce this melody on the other instrument they are learning.

Additional information

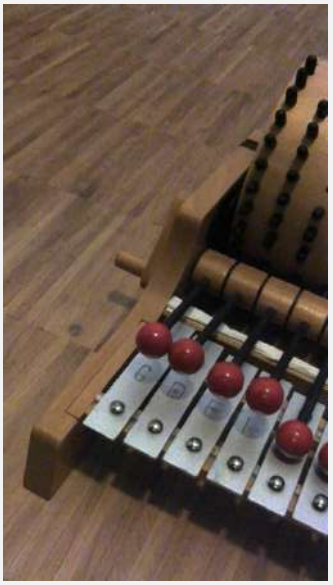
Further online or offline information on the practice

- For a richly illustrated short description on how to work with a similar, smaller, less expensive codeable music box with punched card strips, see p. 232 in chapter 10.2 in the book “Analog vor digital - Medien- und Informatikprojekte zum Begreifen” (Pemberger, Brigitte (Ed.) 2023). Punching the holes in the strips proved to be too difficult for the fine motor skills of most kindergarten children, and the pickup mechanism is tiny and not so well visible, which is not a problem for older children, but makes it less suitable for kindergarten.
- Order a giant music box here: https://www.manuscriptum.de/klangspiel.html. Last time we ordered one, there was a warning they were sold out, which turned out not to be true, so write to the producers and enquire about the reason for the warning if you are confronted with the same situation.

Any additional information that you think might help others

• The process is more important than the product

Except for the variation for older pupils where the idea is to compose a melody and correctly transfer it to sheet music, keep in mind that the process of coding the melody is more important than what the melody sounds like. If your goal is to help children understand the workings of information-processing systems, the melody is even less important than if you were focusing on musical education.



Often, kindergarten kids will put many pegs in a long line - a monotonous melody. Or they will fill up all the holes they can find to see what happens: “I want to try out what the hedgehog sounds like” was the comment of one 5-year-old when he filled all the holes of the Gloggomobil cylinder.

(© Paula Bleckmann)

Turning a written story into a radio play

By Ulrike Sievers
u.sievers@e-learningwaldorf.de

Short description of the practice

Pupils are invited to turn a written short story (or parts of a longer story) into a radio play. In group work they have to first understand the original text, discuss possible ways of transforming it into an audio production, write a script for the radio play, and finally present (analogue) or record (digital) the play. The description contains several variations, depending on the age of pupils and subject / language (mother tongue or second language). The activity asks for understanding of text, decision making regarding transformation, group work competence, and it invites creativity and is fun.

Courtesy of Pixabay

Age span of children/adolescents*

- [x] 12 – 15 years
- [x] 15 – 18 years
- [x] 18 + years

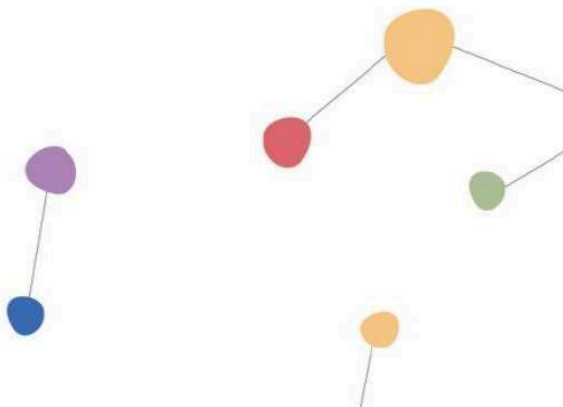
Target group

- [x] Pupils

HERMMES curriculum areas

The practice is related to the following areas (For all the areas, see the curriculum grid on the HERMMES website.)

- [x] **(DIGITAL) MEDIA CONTENT CREATION**
  - [x] Writing
  - [x] Audio
- [x] **CRITICAL INFORMATION AND DATA LITERACY**
  - [x] Analyse and (self)-reflection
- [x] **COMMUNICATION AND COOPERATION, EMPATHY**



DESCRIPTION AND USE OF THE PRACTICE

Work instructions and roadmap

Time learners need for the practice

Can be varied according to situation: minimum 90 minutes, better several lessons

Group size

Classes are divided into working groups of 3-4 pupils

Preparation time for teacher/facilitator

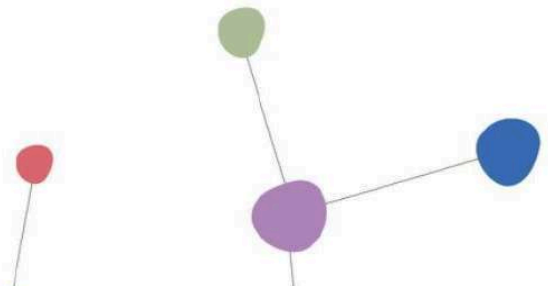
Depends on material and experience of teacher

Location / setting / specific circumstances

Classroom, it's helpful if pupils can find small / quiet spaces to work

Necessary equipment and materials

A story, pen and paper, (a recording device)



Detailed description

Aims:

Working in a group; deepening the understanding of a text (story); deepening the awareness of the different qualities of various media (text, audio, visual); practice listening; making decisions based on criteria; developing creative ideas of how to present descriptive parts of a text in an audio format.

With digital recording: learning how to use a recording device and how to edit recorded audio material.

Settings:

I use this method preferably in English (as-a-second-language) lessons; working with scenes from a novel in class 9 and short stories in class 11. However, the practice can also be adapted to other settings.

Intention:

Turning a written text into an audio production requires several steps:

Pupils

- need to read the text closely and really understand the setting, the characteristics of the protagonists, the relationships between characters, the plot, stylistic means such as suspense, irony, hidden messages, etc.
- have to consider which parts can be taken directly from the text and which parts need to be rewritten into dialogue.
- develop ideas of how to present aspects of the setting through sound / noises or descriptions to be included in the conversations of characters.
- write a script with all the necessary information for the production.
- practice speaking.
- produce / record the play digitally and edit the material or
- perform the play (analogue) in the classroom.

Writing and performing a radio play is an excellent way to practice listening, because it makes the pupils aware of all the aspects of listening when there is nothing to see. In the process of practicing, the cast should take it in turns to listen with their backs turned to the speakers, so that they can get a sense for what needs to be presented in an auditory way. Most children at the age of 10-12 will have listened to radio recordings before, so they usually have some experience

already, even though they might not be so aware of the special qualities and effects yet.

I usually don't do too much talking beforehand, but rather let the pupils work and experience things themselves and let them reflect during the process and afterwards. Hence my focus is not so much on a perfect outcome, especially in class 9, but rather on the process of exploration.

When working with a novel in second language lessons, we have usually read the book beforehand and have discussed the content. Then either the teacher divides the book into scenes or class and teacher do it together.

Pupils choose groups and decide on the scenes they want to work on (in class).

The play can be recorded digitally in class by the teacher, individually by the pupils, or it can be presented in class.

Alternative ways:

For younger pupils, the digital recording of the audio play can be replaced by a presentation in class in which the audience closes their eyes or turns around while listening. Or the performance takes place behind a curtain.

I have also tried out (after reading a book) leaving it open to the pupils to choose one scene which they liked to turn into a recording. Moreover, they also had to do the recording themselves as part of the group work and we listened to the recordings in class afterwards.

Another time, in class 11, we had read five chapters of the book together and then different groups got the task to turn one of the following chapters (6,7, and 8) into recordings. The students had to read and understand their chapter first and then work out and produce a recording of the story.

Since it might be difficult to skip two chapters, I would tell a group of stronger pupils to read through the next two chapters (6 and 7) quickly and then work on a recording of chapter 8. Chapter 6 and 7 would be done by the other groups.

After listening to the recordings, we read the rest of the book together again.

Dealing with difference - slower and faster readers

Once in class 9, the pupils had read the class reader in groups and when some groups had finished the novel, I asked them to do radio plays of the last scenes of the book and asked the groups that had read slower to work on scenes from the middle of the book or even from the beginning. In this way, the faster readers

didn’t have to wait, the slower readers didn’t feel pushed, and everybody got to know the whole story at the end.

With older pupils, I like to use this practice in connection with short stories. The pupils work in groups of 3 or 4. They choose a short story, which they first read on their own and then turn it into a radio play. Here it becomes especially important to understand the message of the story first, so that it becomes really clear in the recording later.

Reflection:

I really love this practice, because it creates an authentic reason to read text closely; it invites creativity as well as decision making; the pupils usually enjoy the work process and develop a lot of good ideas; and the results are always different and surprising - and create an authentic reason for listening!

Additional information

Further online or offline information on the practice

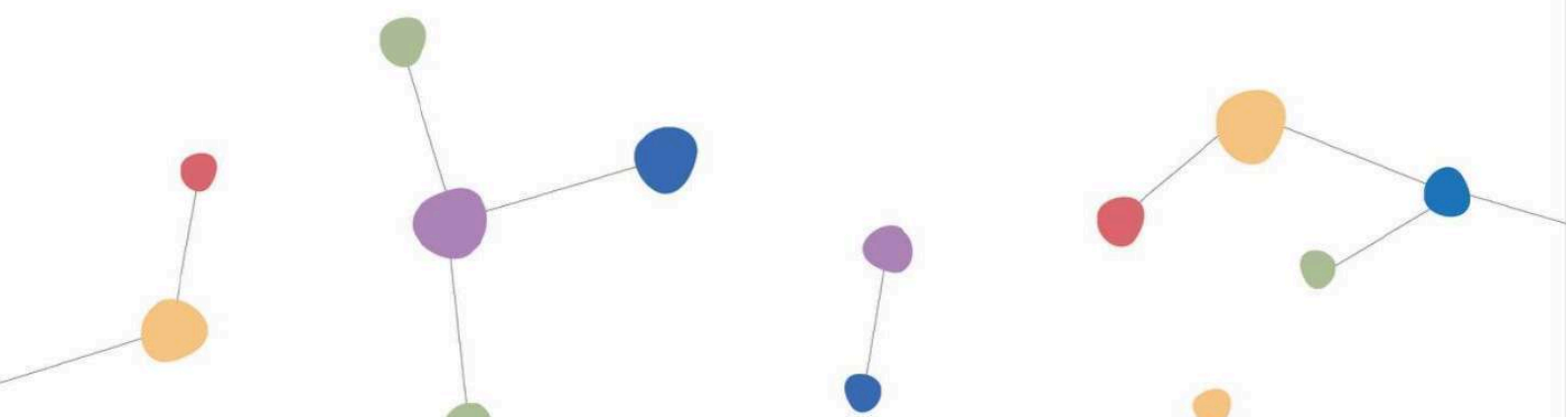
In the HERMMES learning journey on media content creation, you find a video interview with a teacher who shares her classroom experience with this practice. There you can also find additional material for implementation in class.

A more detailed description can also be found in:
Ulrike Sievers, 2017: Creative teaching, sustainable learning. BoD Norderstedt.

Any additional information that you think might help others

Don’t be afraid of a little bit of creative chaos in the classroom😊

Have fun!



“You are the number 4! - Flip your card!”

Basic understanding of binary numbers

By Robert Neumann and Eva Janzen
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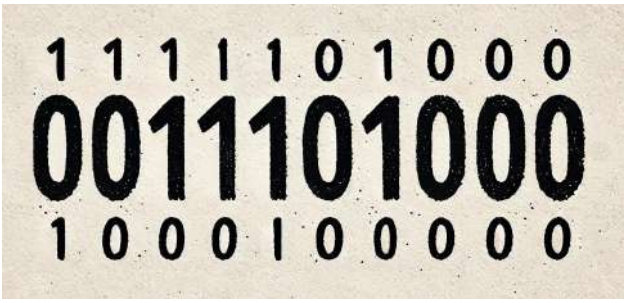
Short description of the practice

Understanding how a computer works is essential for maintaining a basic and well-informed relationship with technology. This lesson can be part of a computer science curriculum but can also be used to introduce binary numbers to adults in an engaging way. No previous knowledge of computer science is required. Pupils representing a certain “place-value system”, such as 1, 2, 4, 8,..., stand in a row with flip cards in front of them to reveal or hide their “value”. In this way, counting with the binary system can first be experienced. Later, pupils are invited to write down tables of sequential numbers and to practice conversion from decimal to binary numbers in a step-by-step manner. The HERMMES practices: *“Geez! I did not think 10 kB would be higher than a table!” – Introducing and visualising bits and bytes* and *Data storage unplugged - Experiments and visualisations for optical, magnetic and electric ways of storing digital information* are the next logical steps for introducing fundamental principles of ICT - without increasing screen time.



Age span of children/adolescents

- [X] 9 – 12 years
- [X] 12 – 15 years
- [X] 15 – 18 years
- [X] 18 + years

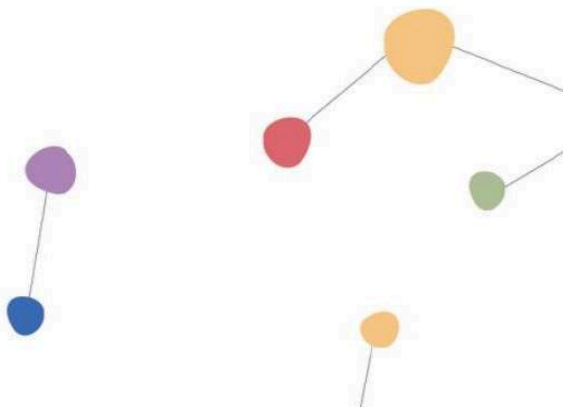
Target group

- [X] Pupils

HERMMES curriculum areas

The practice is related to the following areas (For all the areas, see the curriculum grid on the HERMMES website.)

- [X] **COMPUTATIONAL THINKING (CT) AND PROBLEM SOLVING**
  - [X] Operate and apply / technical understanding



DESCRIPTION AND USE OF THE PRACTICE

Work instructions and roadmap

Time learners need for the practice

Around 90 minutes

Group size

variable

Preparation time for teacher/facilitator

Depending on previous knowledge, 1 to 3 hours

Location / setting / specific circumstances

Classroom

Necessary equipment and materials

Print out the templates for the students

Detailed description

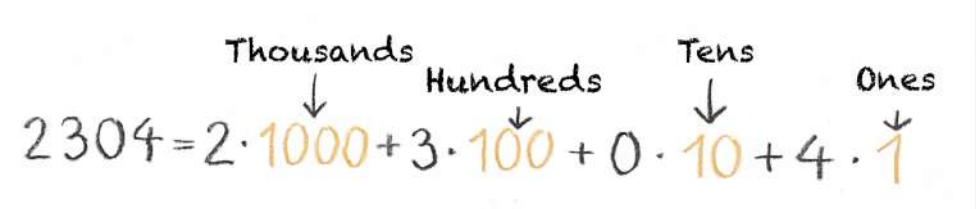
Understanding how a computer works is essential for maintaining a basic and well-informed relationship with technology. By comprehending the basic underlying principles of computation, individuals can make a better-informed decision on how they will use and interact with digital systems. The basic knowledge helps prevent over-reliance on machines, ensuring that technology remains as a tool that serves human needs rather than controlling or limiting humanity. Furthermore, a deeper understanding allows users to identify limitations and potential biases related to algorithms, fostering a more balanced approach to technological integration in the common daily life.
After each section, it is advisable for pupils to discuss personal experiences with failed or working technology, for example, by writing short stories in which they describe their insights and experiences with phones, computers, apps, etc. As a group or class, discuss where the difference between humans and computers lies.

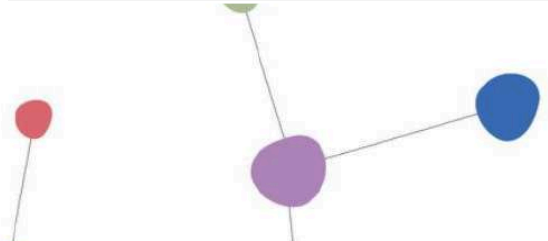
Preliminary remarks and background knowledge

Any information that a computer needs to process must be translated into a language that the machine can “understand”, for example, commands that can be carried out by the central processing unit or CPU. The computers we use today only recognise two "words" for the purpose of understanding: "On" and "Off" - a one and a zero. Therefore, every piece of information and every command must be translated into this language of ones and zeroes.
The foundation for understanding computers is the binary number system, which consists solely of ones and zeroes. It is possible to introduce the binary number system with "number cards" without needing to discuss the concept of a “place-value system” beforehand. Pupils can discover on their own how the system works without necessarily explaining a complete theoretical framework.
This technique is particularly useful when the teacher feels that some pupils may be overwhelmed if the seemingly fixed decimal system is suddenly "disrupted" by the realisation that there can be multiple number systems (which for them basically means that there is more than the decimal system). In the approach outlined here, pupils actively and playfully recognise that all numbers can also be expressed using ones and zeroes without needing to question the decimal system.

Step 1. Preparation for the teacher: place-value systems

As preparation for the teacher, it is useful to briefly revisit the topic of "place-value systems" to have the concept clearly understood.





Our decimal system in which we normally calculate, is a “place-value system”. This can be understood with a simple example: for the number 2304, the first digit on the far right indicates the number of ones, the next digit indicates the number of tens, the next digit indicates the number of hundreds, and the last digit on the far left indicates the number of thousands.
You can also imagine the individual places as "bundles." We always start with the ones on the far right: the digit on the far right indicates the number of ones. Then the next place indicates the number of tens bundles, the next the number of hundreds bundles, and so on. Not only the value of each digit matters but also the position it occupies. Such a system is referred to as a “place-value system”.

Preparation for work in class

For preparation, the number cards (see attachment) from the downloadable material should be printed on sturdy paper and cut in half, so that each card is A5 in size.
If you want to work with the flip-number sheets they should be printed and properly cut to be used.

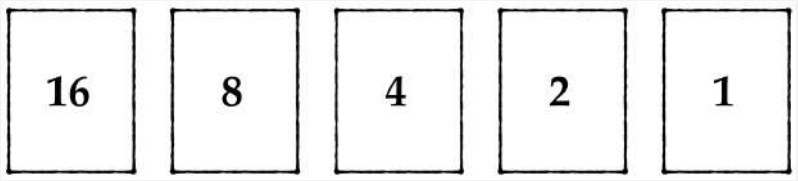
Step 2 (optional): Magic card trick

One way of starting is to present the "magic card trick“ where the teacher presents some cards to the pupils and is able to guess which number they picked. This can be found in the HERMMES practice *Card tricks with binary search algorithms*.
The “magic card trick” uses the binary system but it is not necessary to tell the pupils at this point. It will be understood when they know how the binary system works.

Step 3: Introducing flip cards for binary counting

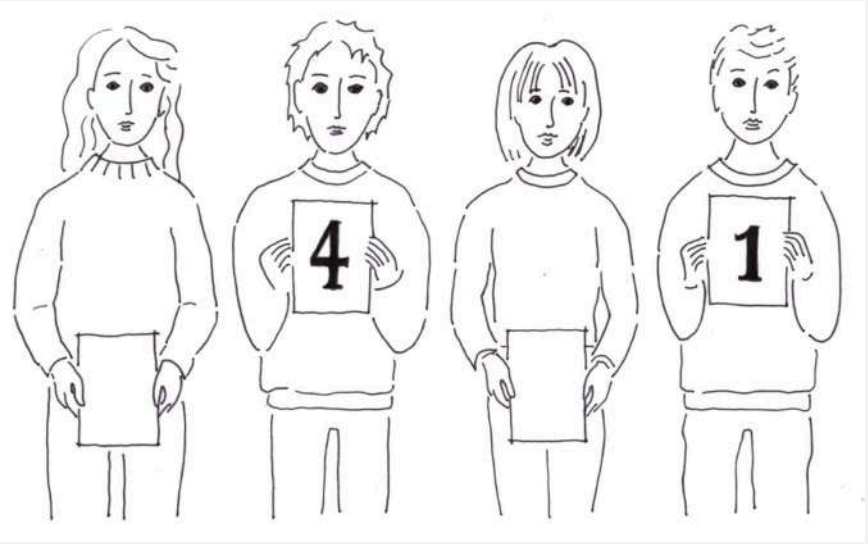
You can inform the pupils that you will now count using a new system and that this has to do with how a computer counts. The fact that a computer counts differently from humans is immediately understandable to the class.

- Five pupils are asked to come to the front of the class, and they are each given a card



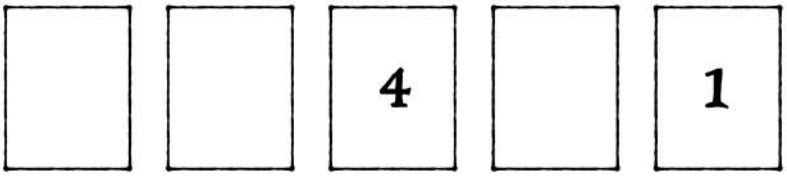
one by one. First, the "1" is handed out, then the "2", then the "4" - and here comes the first surprise, because there is no "3". When the "8" is handed out, some pupils will have an idea of which card comes next but it is still unclear why. This should not be discussed at this point, as the experience of the lesson is meant to come first.

- The first question is how to count with these numbers. The rule is that the individual



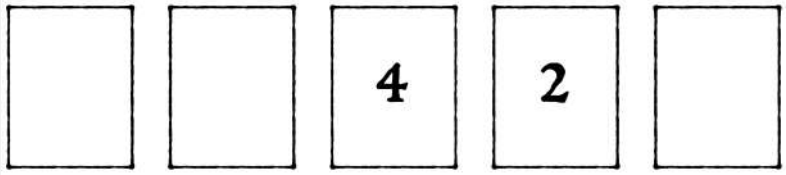
digits are always added together. The numbers represented are displayed by the pupils so that all the number cards that are not needed are held down or folded and all the number cards that are needed are held up, as shown in the illustration. For the number "5", this situation arises:

- The counting starts slowly from 0 up to 32. At the beginning, it is normal that things often go wrong or the pupils correct each other about which card should be held up. It is useful to do two or three rounds, and by the end, it goes relatively smoothly.
- It is very helpful to ask if any pupils have noticed a rhythm. It quickly becomes clear that the number "1" always alternates up and down, the number "2" follows a two-beat rhythm, you have to start counting from zero. The number "4" follows a four-beat rhythm, and so on. The number "1" has the most work to do, while the number "8" or the number "16" leads a rather “relaxed” or “boring” life.
- Next, the teacher can say a random decimal number and ask how this could be



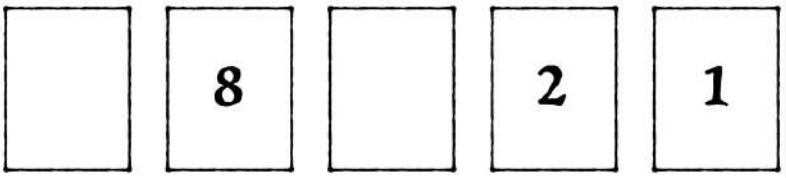
expressed in the system of cards that the pupils are holding. For example, you ask to start with the number "3". To do this, you need the number "1" and the number "2". What about the number "5"? It is clear that you need a number"4", because the number "1" and the number "2" are not enough. Additionally, you only need one more number "1". 5 = 4 + 1.

- We can also look at the number "6". It’s clear that you need a number "4", a number



"2", but not a number "1", because that would be too many. Are there any other combinations? No, because 4 + 1 = 5, which would not be enough, since only addition is used. So 6 = 4 + 2.

- For the number "11", you definitely need a number "8", but then no number "4",

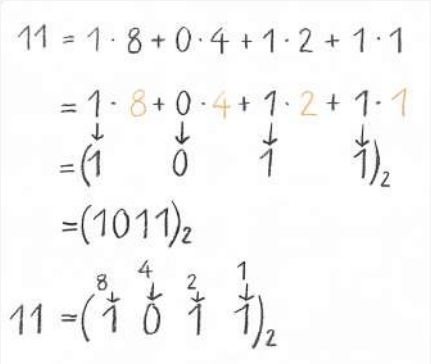


because that would be too much, instead you need a number "2" and a number "1". So, 11 = 8 + 2 + 1.

After making a few simpler conversions with the students, the process can be reviewed again and it quickly becomes apparent that for larger numbers, it is difficult to do it "just like that". What do you do if, for example, you want to represent a number "9"?
The students at the front can try it themselves and quickly realise that it makes sense to always start with the largest card because the smaller cards will not reach the number "9" and, except for the number "1", will not be needed once the number "8" is used.
When the teacher reads out the situation, it is useful to do it as follows, emphasising the "one" and "zero".
We are looking for an expression for the number 6, so 6 = 4 + 2. "For the '6', we need one 4, one 2, and zero 1."
Or for the number 9 = 8 + 1. "For the '9', we need *one* 8, *zero* 4, *zero* 2, and *one* 1." (the teacher can emphasise the “ones” and the “zeros”, while reading these out loud).
In this way, the next step is “linguistically” prepared.

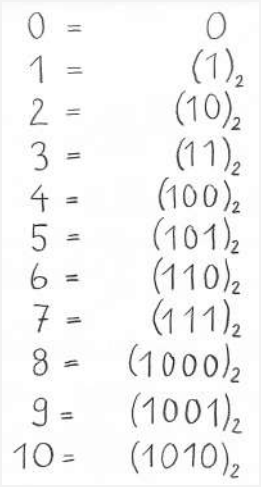
Step 4: The Step to binary numbers

The next step is the transition to the binary system. If possible, this lesson should take place the following day, as this is when the concept of binary numbers will be developed. It is good to have some time between lessons for better understanding and assimilation.
Now, you can start with the question of how to write the numbers. At first, perhaps in detail, like "11 is one 8, zero 4, one 2 and one 1", but it quickly becomes clear that this will be cumbersome. However, if you remember the order, it would be sufficient to simply write "1011". You can read them “one, zero, one, one” as well.



Since we only know two states, namely "used" or "not used", the "1" and "0" are sufficient. To distinguish binary numbers from decimal numbers, it can be agreed that to write the binary numbers in parentheses with a subscript of 2, so 1 = $(1011)_2$. The "2" is used because there are only two digits: "one" and "zero".

It is important that every pupil realises the big step we just made to the binary numbers system!
Now, you can also make a similar connection to a computer. The computer hardware can be in two states as well: "power off" or "power on", which can be illustrated by turning the classroom lights on and off. "Power off" corresponds to "0", and "power on" corresponds to "1." The first numbers in the binary system are therefore:

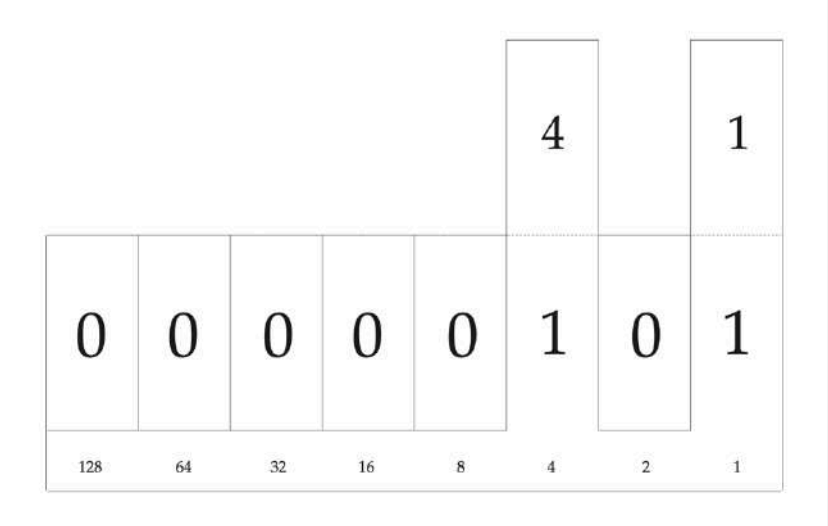


At this point, it might be interesting to observe these numbers and discover where we can find the “rhythm” of the numbers. If you go down vertically in one row, you can count the alternating ones and zeroes.

Step 5: Applying and practicing what has been learned

The next step is to apply and practice what has been learned. It is helpful to write the series of the first 16 or 20 binary numbers on a flip chart or the board and leave this series visible during the exercises.

For solving the tasks, the flip-number sheets can be used. The flip-number sheets are primarily intended as a tool for students who do not feel confident at this time.
In the next example, the number "5" is represented. You need a 4 and a 1. In the top row, the "card numbers" are displayed, and in the bottom row, you can directly read the corresponding binary number, which is $(101)_2$.

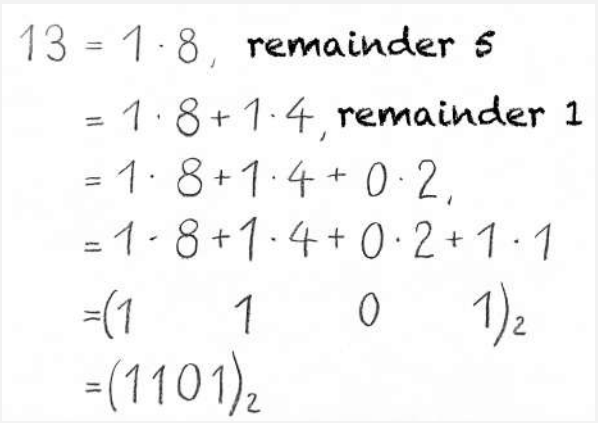


Step 5: Converting decimal numbers to binary numbers and vice versa

Converting a decimal number into a binary number can initially feel unfamiliar. It is helpful to follow a systematic approach. Practicing this principle of a systematic approach, even with small numbers, is useful because it helps to establish the method that can later be applied to larger numbers.
For example, if you want to determine which binary number corresponds to the decimal number “13”, proceed as follows:

1. First, find the largest card number from the list that you need. The number "16" is too large, so we need a number "8" and will have a remainder of 5.
2. Now we need to account for the remaining 5.
3. Using the number "4" brings us to 12, so we write the number "1". The remainder is now 1.
4. Adding a number "2" would bring us to 14, so we don't need a number "2". We write the number "0". The remainder is still 1.
5. Finally, we add the number "1" to reach 13.

Thus, the binary representation of 13 is: $(1101)_2$.



Converting numbers from the binary system to the decimal system is simpler because you only need to add the corresponding "card numbers." To convert the number $(10011)_2$, first count from right to left to determine the value of the highest position. In this case, it is 16. This means we have one 16, zero 8s, zero 4s, one 2, and one 1. Mathematically, this can be expressed as:

$$(10011)_2 = 16 + 2 + 1 = 19.$$

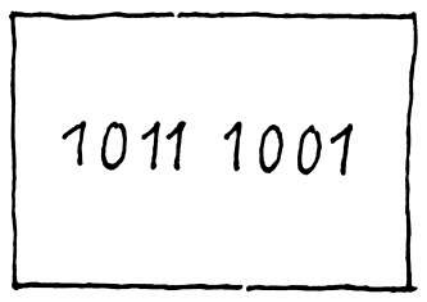
Practice exercises
You can now provide practice exercises for conversion. As a challenging task, faster students can attempt to perform the conversion mentally, without using the flip sheets.
Depending on the mathematical abilities of the class, you can assign numerous exercises. At the appendix there is a worksheet template provided for this purpose.

Step 6: Interesting observations

- The numbers 7, 15, 31, 63, 127, 255, ... are special. What do these numbers look like in binary?
  They are always numbers that precede the next "card number", so you need all the previous “card numbers”. Therefore, these numbers consist entirely of ones in binary code: $7 = (111)_2$, $15 = (1111)_2$, $31 = (11111)_2$, and so on.
- Another interesting question is why adding a zero doubles the number.
  In the binary system, the number 2 plays the same role as 10 in the decimal system. Adding a "0" in the decimal system makes a number ten times larger, while in the binary system, it makes the number twice as large. So, if a zero is added, the “1” becomes the “2”, the “2” becomes the “4”, the “4” becomes the “8”, so every “1” is doubled.
- Adding two zeroes consequently leads to a number that is the original number multiplied by 4 (in the decimal system adding two zeroes leads to a number that is the original number multiplied by 100)

Outlook

Finally, you can discuss how a computer represents the “1” and “0" using electricity: a "1" means current is flowing and a light is on, while a "0" means the light is off.
As an additional viewpoint, it can be mentioned that the number 256 plays a special role in computing. For example, there are 256 brightness levels of colors on a website, and some image formats use 256 colors. To represent these 256 different values, the numbers 0 to 255 are needed. This can be numerically expressed using exactly 8 digits from "1" to "128." Specifically, 255 = $(1111\ 1111)_2$. An expression consisting of eight ones or zeroes is called "one byte."



Additional information

Further online or offline information on the practice

A lot of information on this practice can be found here:
Csunplugged.org
But keep in mind that they advise you to carry out many projects with pupils who are younger than the recommended age in the HERMMES curriculum.

Binary Numbers for Students, Front Side
print double-sided

1. Cut along the solid line at the top
2. Fold forward along the dashed line
3. Cut out along the remaining outer lines
4. Cut the lines between the tabs

128	64	32	16	8	4	2	1
1	1	1	1	1	1	1	1
128	64	32	16	8	4	2	1

0 0 0 0 0 0 0 0

1 2

4 8

16 32

64 128