SMART HANDS

Toolkit for school leaders

SMART HANDS

Erasmus+

SMART HANDS

Toolkit for school leaders secondary education

an introduction to facilitate schools in educating pupils to be ready for the ever changing world

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Schilderen

1.SMART HANDS – the project

SMART HANDS is an Erasmus+ KA2 Cooperation for innovation and the exchange of good practices in which four regions - Surhuisterveen(NL), Cluj-Napoca (RO), Aveiro (PT) and Karelia : Joensuu and Outkumpy (FI) - work together to create a sustainable future by combining hands to heads in multi-disciplinary lessons.

> *"Learn multi-disciplenary, like in the real world all things come together"*

Situation and challenge

Since the entry of the assembly line, we have segregated our 'head and hands' so to say, both in education and in the field of work. On the other hand, we now witness a growing interest for producing local products and circular and sustainable design and an increasing demand for skilled workers who can think and act. This shift demands a new young professional.

Ambition

Our ambition is to educate skills in a cross subject manner to create context for students. The combination of alpha, beta and gamma subjects in one task challenges students to be more exploring, creative, ingenious and inventive. Important aspect here is to create the circumstances for students to "learn to learn" this way.

By using both our HEAD and our HANDS, we reach our HEART. The student who is inventive, knows about material, is skilled, is focused and has a team spirit, has the future. We aim to create a recommitment to the vocational arts, in education and in life. Students learn to follow the path of their tendency and talent, rather than relegating everyone to a college prep tract.By challenging students to take their time, perform trial & error activities, we appeal to them to be clever and crafty. This also includes prolonging their attention span and be able to work in a focused manner on long term assignments, viewing an assignment from all angles.

> I have seen large improvement in pupils whom have been part of this project!

This toolkit

Imagine a classroom where pupils are inspired, staff are supportive, and where pupils care about one another and are working together to solve challenging problems from multiple angles, using their various talents. That's the SMART HANDS-HEAD-HEART approach in action.

Our SmartHands guide for school leaders supports school leaders to facilitate to implement (our) multidisciplinary lesson plans, working together with colleagues and with the work field, and it features experiences from school leaders and teachers across Europe in doing so!

Our HANDS-HEAD-HEART approach plays an important role in classroom climate—for example, how teachers approach pupils and work together with colleagues.

Another critical element is the interaction of school leaders, teachers and pupils with parents and world of-work stakeholders. This includes parent-teacher interactions, service-learning opportunities, and partnerships with organizations in the local community.

The HANDS-HEADHEART approach, when it's most effective, is part of daily classroom life where staff use everyday instruction to foster challenging education, increase pupil engagement, and model constructive behaviours.

In addition to facilitate pupil learning, staff' involvement in promoting the HANDS-HEADHEART approach goes beyond the classroom and includes:

- Participating on a school team or committee that selects HANDS-HEAD-HEART programs and oversees the implementation and evaluation of these activities; and
- Communicating regularly with pupils' families about HANDS-HEAD-HEART approach classroom activities to encourage reinforcement of the approach in private life and at home.

This Guide concerns the school leader's role in relation to our approach. You as a school leader are in a key position between school management, the teachers, the pupil, parents and the world of work.

2. Motivation

> *I hear and I forget. I see and I remember.*
> *I do and I understand.*
> Confucius

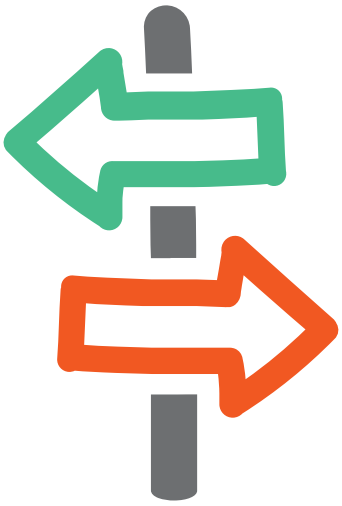
Pupils working with teachers who integrated the Smart Hands approach got more motivated, were proud of how they made maths or physics tangible by creating a product that they could show at home. They were quick in understanding the abstract subjects and had fun in learning through trial and error.

This is the aim of Smart Hands, a way to help pupils develop both their abstract thinking and their practical skills.

As Camelia Modovan, the principal from CNER, Cluj Romania put it:
"Through the Smart Hands approach, pupils are given the possibility to discover skills they are probably not aware of and, at the same time, develop their ability to work in a team. This approach develops critical thinking, creativity and originality and it also builds up on the pupils' ability to communicate and learn from different specialists about sustainable development, recycling and other important topics of our world today."

In the last 25 years, due to the massive technological advances, pupils are constantly drawn towards programming, which is seen as the job of the future. In Science classes, practical experiments have gradually been replaced by virtual experiments which are easier to achieve and shorter. What has not been considered is that real experiments go through a trial and error process and learning from mistakes is invaluable.
It is crucial for pupils to do the winding of a coil themselves, to fix on the axis of the wheels of a robot....to do the simple activities that teachers think pupils already know how to do.

When asked what they liked about the Smart Hands workshops, the pupils answered immediately: "We did something else than using the computer and discovered we are quite handy."



heads x hands

Smart Hands is about:

I enjoyed the maths and physics lesson using a monochord!
I liked the fact that we had the opportunity to learn about the connection between music and mathematics in an interesting and interactive way.
I knew in advance that Pythagoras had built the monochord and studied music, but I didn't know the details and I didn't think that I would end up making a monochord myself.

We learned that the string formed by the numbers a, b, their arithmetic mean and their harmonic mean $(a, \frac{a+b}{2}, \frac{2ab}{a+b}, b)$ *defines the musical proportion or the perfect proportion, this linking the 4 intervals that separate the sounds fundamentals from the diatonic scale.*
I also learned about how the length of the monochord string determines the height and frequency of the sound produced and the fact that the plucking of the strings of 4 monochords of different lengths (45 cm, 90 cm, 60 cm, 67.5 cm) results in a harmonical combination of sounds.
At the same time, I had the opportunity to make a monochord and test it. The making of the instrument was not very complicated, instead it was difficult for me to hold the string quite tightly.


PIDÄ SAARISTOSIISTINÄ ry
PUHTAIDEN JÄRVIEN PUOLESTA

3. Today

To feel comfortable in an always changing society it is necessary to learn how to be flexible and keep your own track at the same time. To be able to do this, you need to know you can count on your capabilities.

During the last decades we have been busy making life as easy as possible and developing solutions so we do not need to seek our own solutions. Everything has been focused to make us to be more efficient and use our time to be more economical.

Not only has this resulted in a linear system where we create cheap products for single-use or to use only a few times. Also we have developed a situation in which we do not know how a 'thing' is made and what made from.
T-shirts grow on a tree and laptops come from a factory. A factory is something magical as if it were a 3D printer printing a complete coffee machine made from.. #noidea.
Because in Europe we outsourced most of the production and material to other continents, we have no clue what process is hidden behind the making and also we do not know how to repair the products. And because we outsourced the production to cheap labour countries, the products have hardly any value so we throw them away if we are done with them.

A lot has happened in recent years. Our eyes have been opened to the effect of our practices on climate change and waste mountains in oceans and desserts, all thanks to our 'economic efficiency'.
We are educated to have perfect manager skills, know how to use digital tools and be entrepreneurial. And products are made not being repairable.
We have been removed from the material reality, it's difficult to say what exactly our job is and we have lost how we can derive meaning and value from our work.

All this has resulted that we are not trained in creating solutions ourselves and making us insecure of our capabilities. "I don't know how to draw so I cannot draw".
We lost contact with our hands!

Also we don't know the feeling of pride when making something that cost a lot of effort and many mistakes to get there.
We need challenges to develop skills, so give us problems to get our hands on!

Another benefit of being busy with manual work is that your mind can process all the impressions and stimuli of the day. Because many young adults have not learned to do things with their hands other than using a tablet or a mobile, they do not know how to find a way to relax and are constantly turned on.
We need to teach them how to get into a flow of making, that it takes time to learn a skill and let them experience what it does to you to be 'turned off'.

Smart Hands START KIT

4. Introduction

How can the Smart Hands approach contribute to your school?

Introducing the Smart Hands approach, using more *hands* on *head* schools, will help to introduce more practice in the theoretic learning. This will give more balance in their learning. It develops pupils' practical skills, making them more secure in making mistakes, arouses their interest in science, environmental protection and the approach helps to educate for sustainable development.

Adding *hands* to your STEM and STEAM teaching will help pupils to understand the topics in a different way, also sooner and contributes to the motivations of pupils. Through introducing societal topics and using hands-on activities, skills and aptitudes will develop more. Working on these topics in small teams allows pupils to share knowledge and skills, which will give an immense personal growth, a development of empathy, and an addition of values that contributes in the formation of the pupils' character.

The monochord making of

"I learned how the monochord works, I learned how to measure frequencies, what frequencies are, what waves are and much more.
I really liked working in a team with my colleagues.
The applications were also very interesting. At the same time, I had a lot of fun making the monochord. I failed a few times, and had to start over, but in the end something beautiful came out. I felt very good during this lesson."
pupil CNER: Ilie

5. Experiences of other school leaders and teachers

Experiences from the partner schools using the Smart Hands approach

During the project the partner schools and experts from The Netherlands, Finland, Romania and Portugal used the approach in their schools. Below you will find inspirational quotes of other school leaders and teachers about the change that they noticed during the introduction of the Smart Hands approach.

Quotes from school leaders or principals:

What do the school leaders of the participating schools say about their experience using the Smart Hands approach?

Camelia Moldovan
(principal CNER, Cluj-Napoca, Romania):

"I would definitely recommend implementing a Smart Hands approach to Principals of other schools because it's a way in which pupils discover having skills they did not know about. I was very impressed by a bird house that our pupils built during a learning activity in The Netherlands. It was the first time the girls had ever built something made of wood and it was their own creation ; they were so proud of themselves they wanted to take the product back home to show it to their parents. Up to that moment the pupils had been convinced that theory was the only thing they were good at, so the Smart Hands approach gave them the opportunity to use their practical skills – a very rare thing nowadays."

Rick Lei
(principal OSG Singelland, Surhuisterveen, The Netherlands)

"I see the combining of thinking and doing and the balance within it, as a valuable addition for pupils. It works well for the motivation. How children learn at our Technology&Application class, how motivated they are compared to theoretically lessons. The pupils don't want the class to stop. We are not a slave to a method, not a rat race. More space to let children discover which way of learning they want and which route is needed. Other talents become visible and they also learn to appreciate each other. They learn to use each other's talents. Everyone has the chance to excel where their quality lies"

Glória Leite
(Principal Agrupamento de Escolas José Estêvão, Aveiro, Portugal)

"Smart Hands had a huge importance during the lockdowns of the pandemic Covid 19. The project contributed to pupils and teachers to lose some fears regarding the technology; regarding the way of knowing how to deal with the unknown scenarios. The teachers and pupils were at home and the school was not normally working, everyone had to be imaginative, had to find new ways of working; had to be creative and think out of the box, using recycled materials. "

Heli Lepistö
(principal of Rantakylän normaalikoulu, Joensuu, Finland)

" Most important skill for students is that they can express themselves with speaking, art or what ever their way of expressing is. We have seen huge development in this skill during the Smart Hands project. We hope that we can teach these skills also to students who didn't participate to this project. When students find their own strengths, their self confidence improves and this can help them in their studies and life in the future."

Quotes from teachers using the Smart Hands approach

Different teachers from the partners' schools have experimented with the multi-disciplenary approach of Smart Hands.

Corina Toma (physics teacher at CNER, Cluj-Napoca, Romania):
"The "Smart Hands" approach was very useful for me. The most interesting part of this approach is how one transfers theoretical ideas into practical work. I developed some new ideas. For example, I taught a lesson about Leonardo da Vinci; the pupils had (as homework) to prepare speeches on encyclopaedia texts. Then, we visited a Leonardo da Vinci artefacts exhibition, and the pupils' homework was to build a bridge like Leonardo's from recyclable objects or matches."

Hannah Hariri (teacher biology and physics at VO Singelland Surhuisterveen, The Netherlands):
"I like the combination of the use of head and hands. I think that's how you make learning the most efficient. And isn't that what we want in education? Prepare pupils for their future and really teach them something that will benefit them later on in life?"

Corina-Nicoleta Dindelegan(teacher literature and grammar at CNER, Cluj-Napoca, Romania):
"I used the "Smart Hands" approach during my regular classes and in extracurricular activities:
I had a project about Jules Verne's imaginary worlds with the 5th graders and we spent a day at the "Science Factory" in Turda, where children and parents took part together in a lot of scientific experiments. After that we visited the salt mine to understand what it would look like if you travelled inside the planet, we also saw a play about one of Jules Verne's novels and had a workshop with the scenographer who explained and showed how he did the scenography using recyclable materials, then he let the children try to make different objects themselves."

Gabriel Rego (teacher geometry, photography and drawing at AEJE, Aveiro, Portugal):
"The Smart Hands approach emulates the real life and comes close to the pupils' interest and motivation. I think there is too much theory in our class models, without sharing ideas and practical results and experimentation is a way to demotivate and distance pupils' interests in school affairs. "

Hanne Partnanen (class teacher Kummun koulo Outokumpu, Finland)
"The Smart Hands approach helps my pupils to develop their curiosity and motivation to learn; to find meaning and to combine things in new ways, develop their emotional and empathy skills, social and collaboration skills; collaborative learning skills and democracy skills. It influences their development towards a safe, just and sustainable future."

Jesse Hietala (teacher science and mathematics at Kummun koulu, Outokumpu, Finland):
" The Smart Hands approach develops especially students' innovation and co-operation skills."

Corina-Nicoleta Dindelegan(teacher literature and grammar at CNER, Cluj-Napoca, Romania):
" I particularly enjoyed the ,Visible Maths' project where the pupils got involved in also using their Physics knowledge(such as light reflection in flat mirrors, electrical circuits) to emphasize mathematical laws.In this case, the pupils put into practice and reinforced their previous knowledge. The result is added value to the learning process."

Magda Barata (teacher design at AEJE, Aveiro, Portugal):
"In recent years we have seen humanity 'loss' in physical and manual skills. I truly believe that when pupils get emotionally involved in projects, they develop a lot of other skills, manual, intellectual and even emotional, because they are happier with the results and strive to achieve goals".

Hannah Hariri (teacher biology and physics at VO Singelland Surhuisterveen, The Netherlands):
"Nowadays, great importance is attached to the highest possible education. The higher, the more theory you are learning is often the idea. The lowest levels are called practical education. The theoretical learning path in the Netherlands (the average of the Dutch population) mainly has theoretical subjects at school, while later in life they often also have to use their hands and the demand for skilled workers is very high. So it is very strange that our education system does not prepare you for the profession that many people will get later in life. "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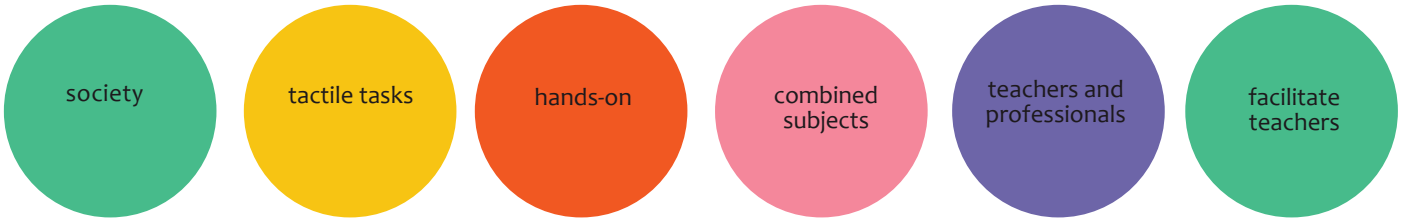
6. The Smart Hands approach

- Smart Hands in society
- Smart Hands invites you to add tactile tasks to your STE(A)M lessons.
- Hands-on lessons
- Classes in which subjects are combined.
- Cooperation teachers and professionals
- Facilitate teachers



Smart Hands in society
In real life, societal issues are not subject based. At school we have cut all topics in different subjects to learn a little part of the whole.
For the education of pupils it works beneficial if teachers cooperate around important societial issues that are currently at play to address the issue from different angles and interconnect them.

In school, pupils should have the opportunity to work on a topic and use a combination of competences and knowledge gained in different subjects. On the other hand, teachers themselves get into a learning process - they might learn new knowledge and also new teaching/ learning strategies. The cocreation of a lesson can make it possible to have a two or three block lesson and combine different subjects within one lesson.

Smart Hands invites you to add tactile tasks to your STE(A)M lessons
In your STE(A)M lessons you can use craft lessons and activities to create tangible examples to explain a subject in a different way. Teachers using the Smart Hands approach have experienced how this contributed to the motivation of the pupils and help them to understand the subject better. During the Smart Hands project different combinations have resulted in combined lesson plans like maths x music, maths x crafts, physics x dance, history x illustration, etc.
The Smart Hands START KIT invites and challenges teachers to co-create and add different combinations of subjects in their lessons.

Hands-on lessons
Smart Hands lessons in which 'making' is added, work the best if the lesson takes a minimum of 1,5 hours on end.
This amount of time is needed to unleash the pupil's creativity, to pass on the manual skills and knowledge which are lost with the digital age.

Also to learn how to get into the flow of working and experience the tranquillity the contemplation gives while using your hands, that your head unwinds.
During these lessons pupils learn that making mistakes is part of the learning. The extra time is needed to be able to correct their mistakes and experience the euphoric feeling of finally completing the task.
How to add 'making or creating' to existing and combined lessons can be developed by using the Smart Hands START KIT.

Cooperation teachers and professionals
The Smart Hands approach requires collaboration between different teachers of different subjects and/or with professionals (such as: designers, musicians, artists, constructors, mechanics, builders, furniture makers).
For example, for the *Proportions & Averages* lesson, cooperation with the physics teacher and the music teacher was necessary. Collaborating with a designer was key to creating the *Inverse of a Function* experiment.

The Smart Hands approach should use a STE(A)M framework as soon as a subject is created, it can be used in different lessons and different subjects.
You can use the example of the lesson plan "Make it Sound" creating a Monochord, in a maths lesson for exploring the mathematical concepts mentioned above, while a physics teacher can use the monochord for exploring the sound frequencies and the music teacher can use the monochord for discussing music intervals and scales with the pupils.

7. How to start Smart Hands in your school

1. Brainstorm with your teachers

Discuss what your teachers already do to inspire pupils and what they would like to add to let the pupils experiment and use their hands to make the subjects tangible and better understandable. Would they like to be able to have a club with a few pupils? Would they like to cooperate with another teacher to design their combined lessons or to share for example a musician to help a maths and physics teacher to explain the sound of a monochord?

2. Organise a session with teachers using the Smart Hands START KIT

You can use the START KIT as a cooperation tool for teachers in order to share their knowledge between each other. Par example the chemistry teacher explains how to make natural dyes to an art teacher and the art teacher shares the knowledge of light in art to a physics teacher.

The cards can be used to create a multi-subject / multi-disciplinary project to address a societal or regional topic from different subjects.

You can also ask teachers only to add an Action card to their lessons to start with.

3. Combine lessons

If two or three teachers combine their lesson for a Smart Hands lesson you can also try to do so also in the time frame to be able to have a two or three lesson hour block.
Teachers involved in the Smart Hands project came up with this solution they use themselves.

4. Add hands-on within your lessons

Rick Lei (Principal of OSG Singelland, Surhuisterveen, NL) has integrated the hands-on lesson by reducing one subject in the school year. It has been filled in by the practice-learning subject.

"Now we have 'technology en toepassing' (technology and application), a subject at school in which problems from the work field are the starting point in which pupils learn how to find solutions from different approaches. They learn how to solve problems and how to analyse them.
The Technology and Application has started in 2021 and is now a formal subject that is part of the exams. The standard lessons are 45 minutes and the Technology and application will be organised in blocks of 2 or 3 lessons and in total 5 till 7 hours per week."
Rick Lei

5. Create a club

Some schools create a club for one afternoon per week or month in which different subjects become hands-on. These clubs can be run by different teachers combining their lessons together.
If you do not have a work shop available at your school you can also co-operate with an existing initiative, maker space, FabLab or design studio to hire the work shop and be able to invite the professionals to share their knowledge by giving workshops.

6. Add hands-on activities during the rest or pause of the class

Small steps can already help within your busy curriculum. Most of the involved teachers say it works well in project classes and let pupils work in small groups using material that can be facilitated by school. Practical activities can be done at home or in the school lab after the regular school hours and reflected during general discussions among pupils and teacher guidance.
You can use Smart Hands sequences of lessons, because pupils need to rest during the class.

Through these practical moments they also understand better and more deeply. For example ask pupils to design a 3D image of the subject of a lesson that has been taught if you can combine your subject matter to art, geometry, technology or craft.

7. Make a class room suitable for different kinds of experimenting
It can start with a chemistry lab, or art class room. Even a basic class room with a big cupboard with paper, cardboard, textile waste, scissors, rope, sewing equipment, glue, markers, matches, popsicle sticks and glue can mean a lot for a start.
Make it a Smart Hands project, work with different teachers and pupils to develop solutions and make prototypes!

"We will redecorate a theoretical class-room into a make-room so pupils can learn by doing"
Camelia Moldovan

8. Hands-on examples of lessons head x hands

Below you can find some examples of teachers with different subjects worked together on a theme. Some examples are related to the Smart Hands START KIT.
In the first column you will find the Theme card, the leading subject, the next column shows the Action to make the theme visible and tangible. And in the last row the teacher who co-operated with the teacher.

Teaching physics

Theme card	Action card	Co-teacher
Gravity	Dance/Theatre: calculate fall and rise	Dance or theatre teacher
Light	Painting: research the effect of pigments, dye and varnish in 19th century paintings	Art (history) teacher
States of matter	Object design materialisation of products	Craft or art teacher
Motion	Dance/Theatre or Object design: calculate the movements of a body or rocking chair	Theatre or design teacher
Electricity	Object design: design a lamp made out of waste material	Design teacher
Sound frequencies	Make music: create a monochord	Music teacher

Teaching history

Topic	Action card	Co-teacher
A regional historic war	Experiment: 3D map of the region with the different landscapes, villages where it took place. Make small models of the different characters.	Geography and art teacher
A regional historic special event	Dance/Theatre: Theatre role-play of the event with all the specific characters. Design the scene, specify the characters, design the costumes, research on the	Theatre or art teacher

Teaching maths

Theme card	Action card	Co-teacher
Proportions & Averages	Make music: Create a monochord with a tin, wood and rope. Four monochords with different lengths (45 cm, 60 cm, 67.5 cm and 90 cm). Then, the pupils used the monochords to explore the musical proportion, the harmonical average, and the relationship between the lengths of the monochords, the sounds and the frequencies, so they explored three mathematical concepts: proportion, harmonical average and relationship/ function.	Music teacher and craft teacher
Trigonometry	Object design: Create a table using wood joints (in wood and 3D printing) Create different wood joints and use maths to make the calculations: - Butt Joint - Half Lap Joint - Rabbet Joint - Dovetail Joint - The Sliding Dovetail Joint - The Mortise & Tenon Joint	Craft or art teacher
Pascale's triangle	Object design: Make the triangle visible using waste material found in the school Result, see picture on next page.	Craft or art teacher


PASCAL'S TRIANGLE
Visible Maths- Smart Hands
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
21 35 35 21

Teaching literature

Topic	Action card	Co-teacher
Leonardo da Vinci	Object design: Build a bridge from waste material	Craft or art teacher
Literature characters	Experiment: Creating flat and round characters, described by English theoretician Edward Morgan Forster in "Aspects of the Novel" (1927)	Maths teacher
Play a character	Dance/Theatre: Create a performance to learn to dance and move on stage. Make the clothes for the performance from textile waste that can be painted and easily cut and sewn. pupils will love to work with their own hands to design their costumes and they will also better understand the character and the plot, and also develop communication abilities.	Choreographer, art or theatre teacher

HEAD TO HANDS

The Smart Hands approach also works the other way around. To add theory and societal elements to practical learning.
Below you can find some examples of teachers with different subjects worked together on a theme. Some examples are related to the Smart Hands START KIT.
In the first column you will find some practice subjects, the next column shows what 'head' elements can be linked. And in the last row suggestions what teachers (or professional) can co-operate.

Topics	**head**	**Co-teacher**
Metal working	Sustainability, circular economy: Create a sustainable Christmas tree from old bicycle wheels and make decorations from textile waste	Sociology
Electricity	Create different floor lamps from waste material or Christmas lights in the circular Christmas tree.	Physics and art teacher
Furniture making	Calculating wood connections, 3D printing using maths	Maths and craft teacher
Furniture making	Design a Thonet chair, bending wood for mini chairs, using popsicle sticks and steam	Physics and design or art teacher
Furniture making	Create a "wood map". Knowledge of different woods from local and global trees	Biology and art teacher
Furniture making	Create a map of different continents using waste material of the school itself.	Geography and art teacher
Furniture making	Design a chair from the 19th century combined with 3D prints. Research the tools that were present in the 19th century and what effect this had to the typical designs of that time. Add a 3D printer to these tools and design the chair with a 3D printed element.	Art history and teacher with 3D printing knowledge


Plastic
Electronics
Clay
Paper / Card Stock
Fabric
Body
Light
Experiment
SMART HANDS

9. The Smart Hands START KIT

The START KIT helps teachers to develop multidisciplinary lessons.

The cards in the kit gives stepping stones for teachers to work together with fellow teachers from other school subjects. Also very usefull to create ideas for multi-disciplinary lessons or workshops.

We have develop a handy deck of cards we like to call the Smart Hands START KIT. It enables you to quickly develop your own STEAM lessons covering various school subjects. It comes with instructions how to use it so you can get started right away

Smart Hands Cards instructions

Why do we suggest you use these cards?

These cards can be used to brainstorm together with other teachers teaching other subjects to create multi-disciplinary lessons or workshops. It is also about teaching how to include using the fine motor skills of the hands in learning how to make objects, hold tools and work with different materials. The main focus of using these cards is to combine the head to the hands and make lessons more tangible and easier to understand. Also to make pupils more motivated to learn.

Ideas when to use the cards

- Below are some examples in which the cards could really help.
- To set up a workshop or a series of lessons in which you would like to work multi-disciplinary;
- To work together with stakeholders on a societal or regional matter;
- To add some extras to your existing lesson to inspire and motivate your pupils/pupils;
- To add a practical lesson within your curriculum to teach more craft skills;
- To add some A to STEM lessons;
- To add a STEM subject to your practice lesson.

What card do I start with?

Choosing a category to start with is also your choice. Some teachers thought it worked best to start with the Theme cards, others started with the Bigger Picture cards. If you work on a workshop with a societal goal, you can best start with the Bigger Picture and work on challenges concerning food waste, sustainability, climate change, etc. If you Want to add some practice within your own subject, you can start with a Theme card that is closest to your lesson and ask the other teachers in your group to contribute.

Using the cards, the brainstorm

1. Define why you will use the cards: for a workshop, a lesson or a cooperation with stakeholders?
2. Create a pair or a small group of three or four teachers from different subjects.
3. Choose how you will work with the cards: open or closed.
4. Choose which card is leading considering your working scenario (see Ideas when to use the cards) and select the cards from the other categories.
5. Change a card or add a joker card.
6. Take 5 - 7 minutes to choose your final cards
7. Individually write down some ideas of activities
8. Present all the ideas and combine the similar ideas.
9. Share your ideas and start to brainstorm for the final project.

10. The Cards

The four categories of cards

1. **Theme:** cards about themes of the different subjects that are taught like geometry, brain, light.
2. **Material& Technology:** these cards will make the task visible and tangible.
3. **Action:** what will be done with the material and technology, what will be the outcome.
4. **Bigger Picture:** these cards represent society. What are the issues in the world or in your region?

You can also use:

- Joker: you can add this card to your selection to focus more on a subject that you are working on or link it to a question from the work field.

- Empty Card: you can also add your own theme, action, material & technology and bigger picture card Teacher interviews

THEME

Geometry

Originally developed to model the physical world, geometry has applications in almost all sciences,
and in many more fields like art, architecture. What aspects of geometry would you like to showcase? Think of symmetry, patterns, shapes, factals, modular structures)

MATERIAL & TECHNOLOGY

Fabric

A person uses fabric every day. We sleep on and below fabric, we open curtains in the morning, the clothes you put on, a table cloth, the seat of the car or bicycle saddle. We also Throw away a lot of fabric.
With fabric you can:

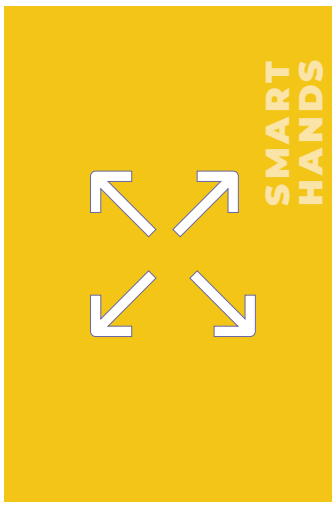
1. cut it into stripes to weave, macrame, knit or make knots
2. make small dolls or avatars
3. sew it together to make clothes or costumes

\+ ***What are fabrics made of, where do fabrics come from?***

ACTION:

Object Design

Design and prototype an object that reflects on your theme. It can be a teaching instrument, an art-work or an installation. Think about the ways students will interact with your object. Try co-creating this object with them.



BIGGER PICTURE

Sustainability

People have gotten used to use some products only once and then throw it away.

Quite a waste, because this product is valuable! A lot of effort and energy has been put into making this product and material it is made of. So, let's use the product or the material as long as possible!

So what can you do? Choose one of these options: Redesign, Reduce, Reuse, Repair, Refurbish or Recycle. Add it to the tasks in making an item.

11. Some examples of combinations

Teacher team 1: Maths x History x Art

Bigger Picture card: Food Waste
Theme card: Colour
Action card: Experiment
Material card: Paper

Outcome: Challenge for pupils: make a story-telling campaign poster on Fast Food using the calculations of how much food is thrown away, how many km food travels for your fast food and how much it used to be 50 years ago.

Teacher team 2: Maths x Physics x Crafts

Bigger Picture card: Helping Younger Pupils Learn
Theme card: Space
Action card: Object Design
Material card: Plastic

Outcome: Challenge for pupils to make Space related models out of plastic or plastic waste. . Examples could be rovers, a model of the solar system, space ships, space suits and much more...

Inspired?

Hopefully we have inspired and convinced you?

Kind regards,

School leaders, teachers and experts from:

SMART HANDS

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