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Amase

Advanced Materials science for Advanced STEM Education

AMASE learning materials



NATIONAL CENTRE FOR
SCIENTIFIC RESEARCH "DEMOKRITOS"



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Amase educational cards



All AMASE learning materials are summarized in an AMASE educational card, containing:

- an abstract
- keywords
- the target group
- the central wondering
- a summary
- the Sustainable Development Goals involved
- a table of contents
- the coloured STEM helix



Amase educational cards

Learning Activity Introduction Amase Educational Card



New materials: apple leather



Abstract

The STEM project 'New materials' is about making leather from vegetable materials. The history of new materials, contemporary research into new materials and the social importance of apple leather are discussed. In each case, some theoretical background is given.

Keywords

apple leather, senses, coating, biomimicry, substance properties, social importance,...



For whom?

age: 12-16 years

This project aims mainly at:
STEM-Wonder
STEM-Exploration
STEM-Focus



Central Wondering

Can we make leather from vegetable materials?

Summary

In this project we start with the introduction of different types of "new" materials. We do this on the basis of a bookwidget, which shows the evolution of various "new" materials throughout history. We then delve deeper into contemporary research through a new scientific technique called biomimicry. After this, we make a link with a number of social problems related to leather to get to the core of the project, namely the production of apple leather. The students will develop a step-by-step plan for the production of apple leather and put it into practice. After the production of apple leather, the students will also carry out various tests on the substance properties of apple leather. Ultimately, they form a decision about applicability in everyday life.

Can we make leather from vegetable materials?



Table of Learning Activities

How do materials and techniques evolve?

- Set the Scene: film fragment, visual input
- Philosophical conversation
- On discovery
- Raising wondering questions
- Expert speaks
- On discovery
- Central wondering

How and why is apple leather made?

Why is apple leather made?

- Set the scene
- Exploring

How is apple leather made?

- Get to work

What properties should apple leather have?

- Set the Scene: visual input
- Philosophical conversation
- Exploring activity
- Get to work
- Exploring activity
- Get to work
- Philosophical conversation
- Expert speaks

Conclusion

- Synthesis, looking back to central wondering,
- Answer to the central wondering



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► Set the scene

<https://www.youtube.com/watch?v=a9Kkk2Kce7A>



An introduction to the project or a new element of the project
e.g. by a video

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Philosophical conversation



Philosophical conversation

Students think and discuss about a certain topic with real arguments.

The conversation is guided by the teacher and introductory questions

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 On discovery!!



On discovery

Students go on discovery.

This can be by:

- *blended tools such as e.g. bookwidgets*
- *handson activities*

The teacher acts as a coach

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? Raising Wondering Questions



Raising wondering questions is an important pedagogical principle, because it stimulates the students to find the answer to those questions.

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Wat does our scientist say?



Biomimicry

"Biomimicry is taking a design challenge and then finding an ecosystem that's already solved that challenge, and literally trying to emulate what you learn."

Janine Benyus

It is important to learn from scientists.

AMASE Pedagogical elements



Get to work!

Making leather from apples, how do you do that?



Task:

Search the internet to see if you can find a ready-made method for making apple leather.

If you have found a working method, answer the following questions:

i) For what application is the recipe you found?

ii) Can the apple leather also be used as a replacement for the animal leather in this way? Why/why not? Tip: Think back to where you can find leather in your house.

iii) What qualities should the leather have?

Get to work!

We would like to introduce our method for making apple leather to you.



Cut the apple into small cubes of about 1 cm².



Mix the cubes into a fine paste.



Boil the sauce for about 20 minutes in au bain-marie.



Strain the purée using a handkerchief to remove all the water.

Students use what they have learnt to make something real.
They are encouraged to think by themselves, not just following a recipe.