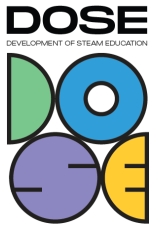


TEMPLATE for BEST PRACTICE EXAMPLES



1. **Name of the project:** STEAM JAM
2. **Subjects covered from STEAM areas:** biology, chemistry, physics, arts
3. **Target group (age range and size of the group):**
15-18 years, size of group 5-30
4. **Duration of the activity:** one month
5. **Key words:** STEAM, jam, entrepreneurship
6. **Key sentence describing context of the activity, followed by short description (200 words):**

Making jam is not an easy technological process.

Students have the opportunity to find out more about the jam making craft and explain the role of chemistry and physics in creating a jam. They should be encouraged to choose some unusual flavors like banana and carrot. They then have to learn more about pectin and which fruits and vegetables are rich in it - what is going on in the process of jam making, why sugar is good for conserveness? And, finally, they use art to create a uniquely designed jar.

In the last part they have to plan costs of production and create a business plan.

7. **Description of the activity environment, including the list of materials and tools needed:**

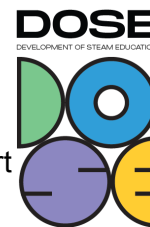
The lectures can be held in classrooms that can accommodate a cooking stove. The students learn about role of pectin, osmosis when adding sugar, and thermodynamics of cooking. They are then split in groups with tasks to create their own flavor of jam, design their own jars with jam, and calculate the cost of producing to determine the price.

Materials needed: cooking stove or other heat source for cooking, pots, sugar, various fruits and vegetables, pectin, grate, knife, spoons, jars, paper, printer, computer.

8. **Step by step, detailed description of the activity, including teaching and learning strategies:**

STEP 1

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The teacher gathers all needed materials for the class and prepares the classroom for the start of the activity. Note that the first activity will last at least two hours or more.

STEP 2

A sample of grated fruits is taken and a small amount of sugar is added to show students those fruits will release water in a process called osmosis. We propose use of carrots, apples, pineapple, and other fruits in order to explain the osmosis process better. The same process is used to conserve jam, as bacteria are also losing water in osmosis when sugar concentration is high.

STEP 3

After fruits have released water, we can place them on an electric oven and cook. When cooking jam, we can use cooking a thermometer to watch over the temperature. A simple graph of temperature over time can be drawn.

A suggested experiment is to try to make jam with low pectin fruits like berries and add different amounts of pectin. After jam is cooked, we can determine how adding more or less pectin influences the structure.

Another activity that can be done is determining level of pectin as described on following [link](#)

STEP 4

The chemistry teacher explains the chemical process of dissolving of sucrose into fructose and dextrose. Pectin is one of complex sugars as well.

One could ask students in what aggregate state is jam? It certainly is not solid and we can't call it liquid either.

We heat up jars, pour jam in it, close them and turn them upside down. When they cool down we can notice that they are much harder to open. The pressure of air inside the jar decreases as jars with jam cool down as predicted by Guy-Lusac's law.

STEP 5

For homework students are split in groups. Each group gets three tasks.

Which jam flavor would you like to try? Create it and bring it to the class to test it.

How would you pack your jam? Design a unique jar with the logo of your imaginary jam producing company.

Calculate the costs, explore other companies, determine the price, create a SWOT analysis and prepare your business plan.

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In this way students use practical work to emphasize on what they have learned in class.

This will take 2 to 3 weeks.

STEP 6

Students bring samples to classroom. A jam tasting competition is open to choose best tastes.

After that we discuss about the design and how to choose best one and improve it.

And finally, we go on creating a mutual business plan to organize a selling activity.



STEP 7

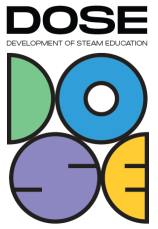
Create the jam, create a jar for the jam, and organize the selling activity.

9. Learning objectives/competencies:

Our first goal is to help students get more experience on connecting STEAM and real life.

To help our students go further, we suggest helping them establish a student company that makes jams of unusual tastes. In order to do this, they have to calculate the price of jam, profits,

TEMPLATE for BEST PRACTICE EXAMPLES



develop a marketing plan, and all other things that a company has to do. In that way we included bussines and arts as two more additions, making this a STEAM activity.

Furthermore, it turns out that jam making is a cultural thing. Each country has its own favorite jam. From Serbia's traditional plum jam, England's strawberry's jam, to some unusual like pomegranate or carrot (favorite in middle east).

Objectives are listed as follow:

Students learn more about technology in the food industry
Students practice tasks at home
Students combine arts in creating a well-designed jar
Students learn more about starting a home-based business.

10. Evaluation/Assessment guidelines:

Students will prepare posters with presentations of what they have learned during this activity. We propose Canva for this activity and creating a rubric to help evaluate the posters and presentations. Teachers can use, but should not be limited to, following criteria:

1. Knowledge: (e.g. students presented the role of physics and chemistry in jam making precisely and concisely)
2. Communication: (e.g. students presented the poster clearly)
3. Team work: (e.g. all students participated in the poster presentation, roles are divided equally and everybody is participating)

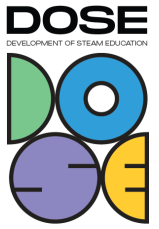
In our case we opted for an unusual evaluation. Students entered a contest for a best student company. For that, they had to learn more new things. Jam had to be prepared exactly the same, so they had to use help from a food technologist. Other things they had to learn were all business related (market research, promotion, pricing...)

11. Lessons learned:

Practical work is sometimes not taken into account when working with students. Sometimes students have trouble when it comes to hands-on activities. This is why this lesson is important, especially at STEP 5.

Another thing is that creating a business plan will help students get more context with real world application of STEAM but at the same time students find it difficult to do it, since it is not something they have learned before. However, learning by doing is sometimes best method.

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12. Additional information/Links:

<https://youtu.be/2CRflvXZr1c>

13. Contact person:

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