Why STE(A)M?

Digna Couso i Èlia Tena (2024). Why STE(A)M? Some ideas to think and share about the main reasons to develop STEM educations in schools.

Why STE(A)M?

In the following, you will find cards with some common statements that people use to justify why is STE(A)M education useful for in primary and secondary school.

1. **Read them carefully and think individually:**
   - *What are the 4 most relevant statements for you? And the 4 you consider less relevant?.*
   - *What are the main reasons for considering them the most/least important? Justify the selection of these statements.*
   - *Considering them, choose the one you consider the most important one, and the other you consider the least important. Justify why do you think that.*

2. **Share your thoughts with a group of 3–4 people.**
   - *Could you select again the 4 considered more relevant and the 4 considered less relevant for all of you after the discussion?*
   - *What are the main reasons to consider them as the more/less relevant? Justify the selection of these statements.*
   - *Considering them, choose the one all of you consider the most important one, and the other that you consider the least important. Justify, why do you think that?*

3. **Finally, share the group ideas with the rest of the class.**
   - *Do you all agree to any specific statement?*
   - *What happens with the most/the least relevant statement? There is any coincidence?*
   - *Do you all disagree in any specific statements?*
   - *There is any statement in which some of you agree and some disagree?*
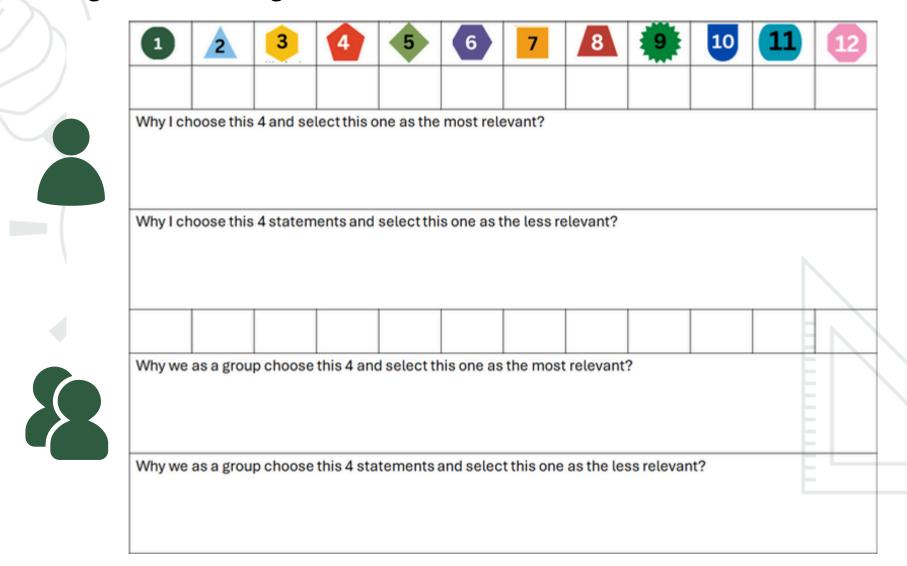
Students' tool to report their own ideas

To promote pre-service teachers to report their ideas and also to make them aware on their changes the following tool have been shared:

1	2	3	4	5	6	7	8	9	10	11	12

Why I choose this 4 and select this one as the most relevant?

Why I choose this 4 statements and select this one as the less relevant?

Why we as a group choose this 4 and select this one as the most relevant?

Why we as a group choose this 4 statements and select this one as the less relevant?

Share and Talk about our ideas

The following table can be used to collect all groups ideas at the end of the activity and to initiate a discussion around the statements

	1	2	3	4	5	6	7	8	9	10	11	12
Group A												
Group B												
Group C												
Group D												
Group E												
Group F												
...												

The Example of the UAB pre-service teachers

In the following table, you could see an example on what pre-service students in their 4th year of their Bachelor at UAB identify as most or less relevant on "WHY STEAM"?

	1	2	3	4	5	6	7	8	9	10	11	12
Group A	⊖	✓		✓	✓✓	⊖	✓			⊖		⊖⊖
Group B	⊖			✓		✓	✓		⊖	⊖	✓✓	⊖⊖
Group C		⊖		✓✓	✓			⊖	✓	⊖	✓	⊖⊖
Group D	⊖			⊖	✓✓	⊖	✓	✓			✓	⊖⊖
Group E	⊖	✓	✓	✓	⊖					⊖⊖	✓✓	⊖

The Example of the UAB in-service teachers

In the following table, you could see an example on what pre-service students in their 4th year of their Bachelor at UAB identify as most or less relevant on "WHY STEAM"?

	1	2	3	4	5	6	7	8	9	10	11	12
Group A			⊖		✓		✓	⊖		⊖ ✓	✓ ✓	⊖ ⊖
Group B		✓		✓			✓	⊖	⊖	⊖ ⊖	✓ ✓	⊖
Group C	⊖	✓			✓ ✓	✓		⊖		⊖ ⊖	✓	⊖
Group D		✓ ✓	⊖		✓		✓	⊖		⊖	✓	⊖ ⊖
Group E		✓	⊖	✓	✓ ✓	⊖		⊖ ⊖			✓	⊖
	⊖	✓	⊖		✓					⊖	✓ ✓	⊖ ⊖

1

Science, math, technology, or engineering must be done, among other things, **because it is part of the current curriculum,** and they are essential skills for people.

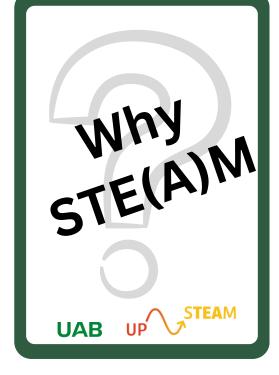Why STE(A)M

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2

Maths is considered an instrumental subject, such as languages. For this reason, it is essential to have enough hours in the schedule to dedicate to maths.
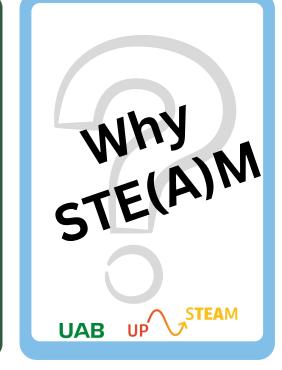
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3

We don't have enough diversity among people in the engineering, science, or mathematics degrees. Although aspirations for these degrees are developed mostly in high school, some of these ideas start in primary education.
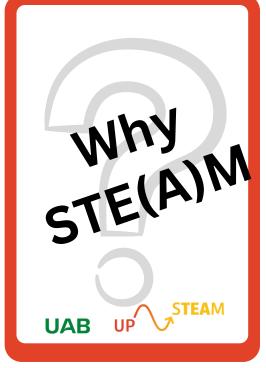
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21st century challenges are essentially scientific and technological issues, such as SDGs (Sustainable Development Goals). If we want students to address them, they need to learn science

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When working on concepts or practices from science, math, etc., **it helps to develop higher-order thinking skills,** such as critical thinking.

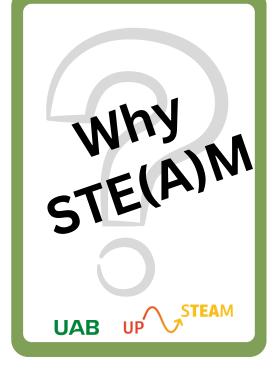Why STE(A)M?

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Rather than STEM, I think that STEAM is more relevant, or science, engineering, and maths **with Arts, in order to develop creativity,** which is very important.
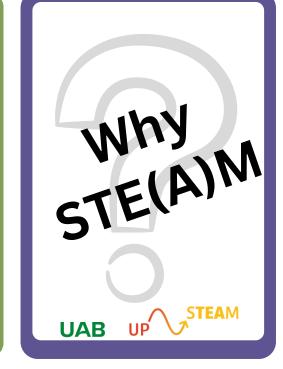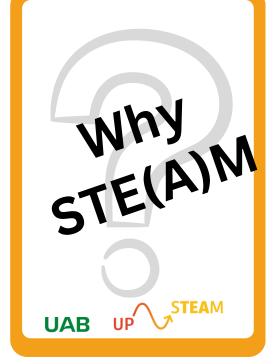
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People must learn at school **to take care of themselves, their environment, as well as the whole planet**. For this purpose, STEM-field content is essential.

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When science or maths are taught, it is often done for a specific target group of students, who are excellent in these subjects, leaving the other behind. It would be important not to prioritize them so heavily.

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It is a general culture knowing that **what we know is thanks to science:** for example, that we are living beings, why the sky is blue, why the Earth moves around the Sun,....

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Students who do not study science, maths, or engineering **are more susceptible to pseudosciences,** such as flat-Earth beliefs, anti-vaccine movements, or believing in horoscopes.

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Learning how to inquire/conduct an experiment or learning how to solve problems and build solutions is essential for all citizens, and this is primarily build in STEM.

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In the STEM subjects, it is often difficult to implement innovations. The content is abstract and complex, which doesn't allow us to contextualize them, and in the end, it tends to be quite traditional.

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