HINTS FOR TRAINERS/TEACHERS

STEP 1 - INSPIRE

Hints for the trainers/teachers: Ensure that everyone presents themselves and identify if some information is missing. Invite trainees to talk about their students' traits, background and relationship with STEM (students with special needs, girls, racial minorities, and low socioeconomic background). Also, ask trainees if there are special policies or practices in their schools to promote equity and inclusion.

STEP 2 - CONTEXTUALISE & EMPHATHISE

Hints for the trainers/teachers: Try to encourage trainees' brainstorming while conducting the first step. There are no right or wrong answers, just different experiences and it is important that they are shared. If trainees get stuck or perform a relatively superficial analysis, try **to engage them in a deeper analysis by prompting the list of questions given in the associated checklist** without providing clues and orientations that will be given in the analyse section.

STEP 3 - ANALYSE

Hints for the trainers/teachers: This is individual work. Try to encourage your trainees to brainstorm as many potential issues as possible, trying to focus on the ones more closely related to equity and inclusion issues. Write down in a document those potential issues. Prior to that activity, you can suggest they read again the canvas of their group.

STEP 4 - DESIGN & IDEATE

Hints for the trainers/teachers: Trainees are expected to design strategies to make the activities more inclusive and equitable. If the group feels stuck, some strategies can be suggested as provided in the additional resources and strategies promoted within the checklist on inclusive design.

CONCLUDE

Hints for the trainers/teachers: The aim of this part is that one group can explain to the other members what they have designed and, at the same time, all trainees can have the opportunity to listen to what other groups have thought. To manage this exchange, one possibility is that one member of the group receives trainees from other groups, while the rest of the members of the initial group can circulate from one group to another ones. Members of the team who listen to the proposal are invited to give feedback. This is the easiest version to be carried out if the training is conducted on-site. If the training is online, you might consider setting up a collaborative space. In this space, for example, each group can upload a video where they explain to others what they have done and why, and invite the rest of the members to provide feedback.

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CHECKLIST - BEST PRACTICES

Have you considered how students with special needs might face difficulties in the accessibility to technology? You could possibly address some of those issues by:

- Varying the methods for response and navigation.
- Considering different platforms or programming languages for the same activity, according to their level of difficulty.
- Have high expectations of all your students. Research shows that students respond better when they feel that their teacher has faith in their abilities and is not focusing on their inabilities

Have you considered how students with special needs might have difficulties in understanding the purpose and what they are expected to do in the educational activities? You could possibly address some of those issues by:

- Considering a general routine that will be used in all activities.
- Providing clues, help when they are needed (not anticipating their potential issues). Adapt the designed scaffolding to the development of the activity.

- Analysing the level of difficulty of each of the tasks within the designed activities and order them from easy to difficult. Avoiding big jumps in the sequence.
- Considering optional repetition or skipping in the development of each task to achieve the demand.

- Promoting students' customization of their preferred communication.
- Expressing the same in a multimodal way (i.e. using text, images, videos).

- Considering automated speech-to-text software. Using captions to images and subtitles to videos.
- Providing equivalent alternatives and different learning paths. Considering different levels of achievement in the same activity focusing on each students' successes, but not forcing all students to succeed in the same level of difficulty in the demand.

- Considering different and additional "aids" to build an adaptive scaffolding (e.g. prompts for students, hints, additional materials, mentor texts, sample solution, pictographic hints, possible peer support...), and/or graphic organizers (concept maps, etc.).
- Considering different ways of students' participation: independent work, dyads, small groups... and how these collaborations will be managed to promote inclusion.

- Providing opportunities to show what they have learned.
- Providing opportunities to interact with peers, and establish rules for it. Being careful of the language used.
- Clarifying vocabulary and symbols. Illustrating difficult terms, provide visual hints (i.e. highlight patterns, main ideas, etc.).

CHECKLIST - BEST PRACTICES

Have you considered how women, racial minorities, and students from low socioeconomic backgrounds might feel that STE(A)M activities are "not for them"?

There is a biased representation of women, racial minorities, and students from low socioeconomic backgrounds in the image of what is a STEM person, which results in a stereotype threat. The white-male centralism of the stereotype of STEM people is also translated in the design of educational activities. You could possibly address some of those issues by:

- Considering using diverse cultural data sets.
- Equilibrating the representation of cultural/racial diversity in examples (i.e. names used, illustrations... etc.).
- Equilibrating the presence of girls/women.
- Equilibrating the presence of cultural groups.
- Using neutral and non-sex language when addressing students and when referring to STEM careers/activities.
- Using gender-neutral language to describe groups of students (instead of 'Now, guys' consider expressions like, 'Now, everybody').
- Equilibrating the role of students within the activity.
- Ensuring that everyone has the same opportunities to participate by providing different and changing roles in the group work, for example.
- Allowing exploring aspects of their own culture and/or gender identity concerning computing. For example, give students creative freedom to express culture and/or identity affiliations.
- Assessing and identifying integrated gender, racial, and/or cultural stereotypes and biases (in own teaching and in the way students' behave) and creating teachable moments by challenging these undermining stereotypes.
- Incorporating the gender perspective (in a broad sense, either in the language used and the role-model references). Increase the diversity of role models used by showing how women, people from diverse socio-cultural backgrounds have contributed to STEM (avoid showing male professional STEM and STEM as a masculine discipline).
- Giving time to students to think before allowing them to answer a question raised to the whole group. Choose different students to answer.
- Identifying and celebrating achievements for all students valuing their effort and strategies.
- Creating a common safe space. Building a "judgment-free zone". Students at disadvantage have fear participating in public spaces due to peer judgment.
- Providing opportunities for all to participate (by first thinking/writing, sharing with peers, etc.).
- Promoting collaborative learning rather than competitive learning. Provide constructive and formative feedback at all times.

CHECKLIST - BEST PRACTICES

Have you considered how students from diverse cultural backgrounds may have issues understanding the main language of the lesson?

- Consider using different languages: the dominant language of the school and their native language.

Have you considered how students from low socioeconomic backgrounds will have difficulties accessing the resources?

- Design activities with low-cost and accessible materials.
- Consider other materials to use.

Have you considered how to improve the design of your STE(A)M activities so they can be more aligned with the universal design for everyone?

Not all students will engage in the same way in robotics & computational thinking activities. You could possibly address some of those issues by:

- Promote different opportunities for engagement. Problematise the activity (is not about doing a task, but solving a particular problem).

- Possibility to adapt the activity into their own interests (setting the question to explore) and provide relevance, value, and authenticity. The teacher needs to explore what relevant questions students will be more inclined to answer. Provide equivalent alternatives and different learning paths.

- There is not only one solution but different and valid solutions. As well, consider possible different ways to carry out the activity. The teacher needs to explore how to make students' choose different paths in the same activity and help them to set appropriate and manageable goals to promote students' choice and autonomy.

- Students will need to know at all times what is expected from them, and what have they done. At different times within the same activity, the teacher needs to remember their students the aims of the activity and provide constructive feedback. Especially, focus on mastery-oriented feedback (praising achievements).

- Promote students' self-reflection about their successes throughout the activity. — Allow students to express what they have learned in different ways (e.g. presentation, video essay, drawing a comic... etc.).

- Allow revising and resubmitting assignments/tasks. - Not all students will express themselves in the same way within an activity.
- Consider multiple representations of information. Offer alternative means of expression.

- Not all students know the risks of using digital technologies. Consider the introduction of specific topics: Copyright law, Fair Use Act and Creative Commons matter (give credit to the original source); self-image on the Internet and related risks.