3.6 FLEXIBILITY

3.6.1 Challenge Dice

Brief description, and rules of the implementation of the learning activity

The “Challenge Cube” is a learning activity of varying length for children ages 6 and older that develops their cognitive flexibility. Its basic version is a support tool that can help children when they get stuck on a task. In that case, the children throw a special dice with instructions such as “Draw it!” or “Ask for help!” This encourages them to try different approaches and apply various strategies instead of giving up on completing the task. Furthermore, even the basic version can significantly reduce the fear of failure.

To develop cognitive flexibility, we use it by the teacher creates an unexpected, unplanned situation for the children during problem-solving or their current activity by asking every kids to roll the “challenge dice” at a given moment. At that moment, the children – depending on what the challenge dice shows – must immediately switch their problem-solving strategy or method, no matter where they are in their current solution.

This controlled and enforced change develops children’s cognitive flexibility playfully, while also strengthening their confidence in problem-solving and their creativity. It also teaches children that there can be more than one solution to a problem. If we use the challenge dice in a way that allows children to learn the “instructions” on the dice sides, we give them the opportunity to prepare themselves for potential changes, which is also an important aspect of cognitive flexibility.

Skill focus

- **Primary Skill Focus**
  - Flexibility
- **Complementary/Secondary Skill Focus**
  - Creativity
  - Problem-solving
  - Curiosity, sense of wonder and openness

Age group	Student number	Duration
6 + years old	class size	variable

Proposed step by step implementation of the learning activity

1. Students work individually or in pairs to solve tasks related to the lesson content.
2. When the teacher signals, regardless of whether the student is on the right track or not in completing the task, they have to roll the Challenge Cube.
3. Based on the result, they apply another strategy and try the task again.
4. The teacher observes throughout the process but does not give direct answers; rather, they support independent problem-solving.

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5. At the end of the lesson, a short discussion can take place: Which challenge helped you the most? How did it feel to try again?

Indoor/Outdoor Classroom layout notes

Primarily an indoor activity, desks or tables are needed for rolling the cube. No special classroom arrangement is required.

How does this learning activity develop this particular skill?

This learning activity focus on two major elements of flexibility: understanding and handling new circumstances, and Growth mindset and shifting strategy what includes “openness to the change” As a result of this, the activity develops students’ flexibility by

- encouraging them to try alternative approaches when a solution does not work (e.g., different methods, visualization, asking for help),
- practicing the use of multiple thinking strategies so that students don’t get stuck in a single, habitual pathway,
- fostering openness to others’ ideas and solutions, for example, by accepting peer support or working together to find answers,
- introducing cognitive flexibility in a playful way, making adaptation and experimentation feel natural and enjoyable,
- reducing anxiety around making mistakes by shifting the focus from being error-free to exploring and testing possible solutions.

What do we want to achieve regarding primary skill development (student understanding and/or behaviour)?

As a result of completing this task, students will:

- be able to accept that a task can have multiple solutions and become willing to try new strategies,
- be able to do not rigidly stick to a single approach but shift their thinking more easily when their first attempt fails,
- be able to adapt flexibly to learning situations, for example, when task conditions change or new information emerges,
- become more open to different perspectives or ideas, whether from peers or the teacher,
- solve problems with greater confidence, as they experience that there is more than one path to a solution,
- become more patient and persistent in their learning, viewing failure not as an endpoint but as an opportunity to try again.

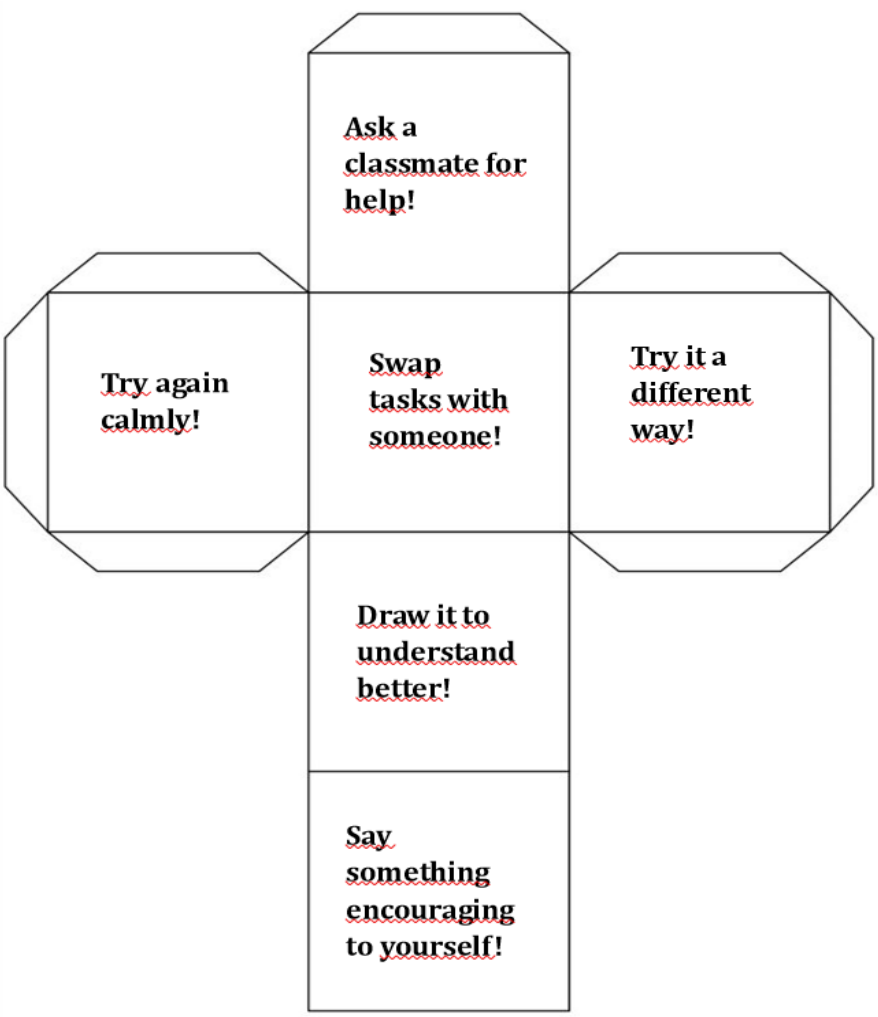
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Suggested use, and practical subject-related examples

The Challenge Cube can be used in any lesson where students are solving tasks and may need to try a new approach when they get stuck.

- The student rolls the cube, and the challenge (e.g., “Draw it!”, “Try a different way!”, “Ask for help!”) supports flexible thinking and encourages persistence.
- It works well, for example,
  - in math lessons for solving text-based exercise,
  - in science or environmental studies for interpreting processes,
  - or in language lessons for reading comprehension or spelling practice.
- The activity teaches students in a playful way that problems can be approached in multiple ways, and that thinking can be flexible, creative, and diverse.
- It is important that the texts on the dice can be changed according to the given situation/task. Dice rolling can be used not only in the context of a subject, but also in relation to a class/group situation (e.g., in the case of a given situation, conflict, or problem solving) to develop divergent and lateral thinking.

The following diagram provides an example of the type of "attitude-changing" instructions that we can give. Please note that this is only an example. Always adjust the instructions to the specific circumstances and task.



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Materials and tools needed for implementation

- A die (traditional or paper-folded, possibly customized for a specific subject).
- A list of challenges associated with the die (displayed on the board, on cards, or written/stuck onto the die).
- Worksheets or practice exercises related to the subject being studied (e.g., math, science, etc.).
- (Optional) A worksheet or journal for students to record which challenges they tried and how these helped them.

Guiding questions

- What other way could you use to solve this task?
- What would you do differently if you tried again?
- How did it feel to change your problem-solving strategy?
- How does it feel to leave the familiar thought path/comfort zone?
- How can a peer or a new idea help you move forward?
- Why is it important not to give up if your first attempt doesn't succeed?

Tips and Tricks for dealing with challenges

- **Challenge:** The student doesn't understand the instruction on the die (e.g., "Try a different way!").
  Tip: It's helpful to go through each challenge together when introducing the activity and provide concrete examples for clarification.
- **Challenge:** The student feels disappointed when they don't succeed on the first try and find it hard to stay motivated to try again.
  Tip: Emphasize that the goal is not a perfect solution, but rather to explore different approaches.
- **Challenge:** Students often automatically choose the "ask for help" option.
  Tip: It's important to actively encourage the use of other challenges too, for example by prompting students to try independently first.
- **Challenge:** Fast-finishing students may become underchallenged if they complete the task too quickly.
  Tip: For these students, you can assign an extra challenge - solving the task using a different strategy - to further develop cognitive flexibility.

Difficulty level tailoring

The Challenge Cube activity can be flexibly adapted to students' levels of cognitive flexibility, age, and prior learning experience. Differentiation can be achieved by adjusting task complexity, the nature of the challenges on the cube, and the pedagogical role of rolling the cube in response to a teacher signal.

- **Beginners (6-7 years old):** – Learners with low flexibility: For students with low flexibility, particularly younger or less experienced learners, simpler and shorter tasks with clearly structured challenges are recommended. Rolling the cube after a teacher signal should be predictable and clearly announced in advance, emphasizing that changing strategies is valuable even when the student is progressing in the right direction. The labels on the cube can be adapted to students' abilities and the subject content, while the teacher provides active

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support in interpreting and applying the challenges. At this level, the activity is best implemented in individual or pair work.

- **Advanced learners (8-9 years old):** – Learners with moderate flexibility: At the level of moderate flexibility, more complex, multi-step tasks can be introduced. Rolling the cube in response to a teacher signal serves to practice consciously interrupting an already functioning solution process and trying an alternative strategy. The cube's labels may vary by subject or task type. In pair or group work, students work on a shared task while experimenting with different problem-solving strategies and sharing the effects of these strategies with one another, thereby deepening the development of cognitive flexibility.
- **Experts (9–10 years old):** – Learners with high flexibility: Students with high flexibility can engage with complex, multi-step problems in individual or group settings. Rolling the cube after a teacher signal is used to deliberately reorganize thinking, even when the solution process is progressing successfully. In group work, students intentionally apply different strategies to the same problem, then compare their effectiveness and reflect on how strategy switching contributed to understanding and problem-solving.

Debriefing and Reflection questions

- Which challenge was the most difficult, and why?
- What new solutions did you try that hadn't occurred to you before?
- How did your thinking change during the activity?
- How did you feel when you had to change your problem-solving strategy?
- How can you apply what you've learned in other situations?

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