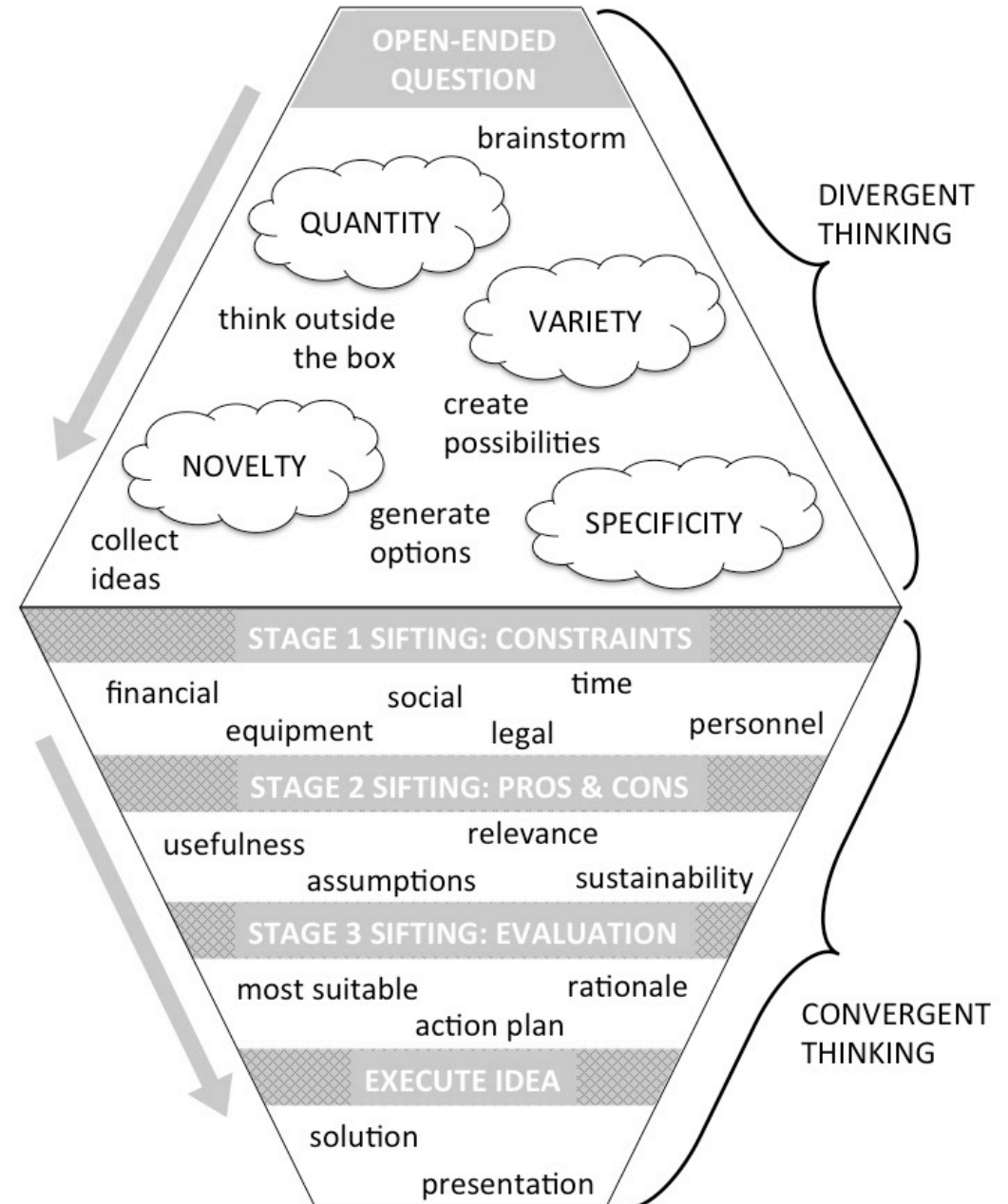# How to Teach: **Divergent Thinking**

WHAT'S THE BIG IDEA?

Divergent thinking is the process of generating multiple ideas to maximize the range of possible solutions, applications, examples, etc. It is the initial stage of creative problem solving where learners have the space and freedom to explore out-of-the-box ideas, take risks, push beyond obvious answers, probe deeper, and defy some of the conventional boundaries and constraints of a particular discipline. Typically, divergent thinking involves brainstorming, collecting spontaneous and random associations with a given topic, and increasingly expansive ideation. This stage is usually followed by convergent thinking in which learners critically sift through the collection of possible solutions by considering realistic limitations and feasibility, comparing positive and negative attributes, and evaluating for usefulness. Divergent thinking unfolds and broadens; convergent thinking narrows down and focuses, filtering the set of creative options to identify and clarify the next step. The challenge during divergent thinking is pushing through the initial blockers, blinders, and biases, and resisting the natural inclinations to turn toward convergent thinking prematurely.

WHY IS DIVERGENT THINKING IMPORTANT?

- Opens possibilities of innovative ways to solve more complex problems, overcoming the tendency of many learners to only work within the confines of first impressions or latent assumptions.
- Fosters empathic understanding of difference and appreciation of varying perspectives.
- Builds on learners' curiosity, encouraging experimentation, risk taking, perseverance through failure, and self-expression.
- Develops creativity, which is often cited as one of the most in-demand skills by employers.

THE CREATIVE PROBLEM SOLVING PROCESS

OPEN-ENDED QUESTION

brainstorm

QUANTITY

think outside the box

VARIETY

create possibilities

NOVELTY

generate options

SPECIFICITY

collect ideas

DIVERGENT THINKING

STAGE 1 SIFTING: CONSTRAINTS

financial social time
equipment legal personnel

STAGE 2 SIFTING: PROS & CONS

usefulness relevance
assumptions sustainability

STAGE 3 SIFTING: EVALUATION

most suitable rationale
action plan

EXECUTE IDEA

solution

presentation

CONVERGENT THINKING

HOW DO I HELP STUDENTS LEARN TO THINK DIVERGENTLY?

PRINCIPLE	PRACTICES
Structure and Guide the Process	• Choose a topic, problem, or open-ended question (e.g., What doesn't work the way I would want it to? What has changed about _____? Why has _____ changed? Who did the change affect? What are all the possible ways _____ could be used?, etc.). • Have students first brainstorm individually to stimulate thinking before moving into a group exercise. • Provide guidance and motivation for students to initially focus on quantity of ideas over quality. • Help students understand that divergence is about *creating* choices, and convergence is about *making* choices. Be careful not to start converging during the divergent thinking stage.
Encourage risk-taking and originality	• Affirm curiosity when it arises and praise individuals for their unique ideas (e.g., refer to their ideas later as "Sally's solution" or "Andrew's question"). Read more about encouraging intrinsic motivation. • Emphasize that there are no boundaries or constraints during this phase; students can go for unusual, out-of-the-box ideas. • Support the strange and remind students that sometimes the best solutions are the unexpected ones.
Create an open and intellectually fertile environment	• Maintain an environment where no idea is wrong in this phase, giving examples of the breadth of thinking desired. • Defer any criticism and judgment. Provide guidance and encouragement when ideas are blocked. • Talk about the process of learning – share how a problem statement can be interpreted differently by different people, which can lead to varying perspectives and a richer pool of ideas from which to draw. • Encourage all voices to be heard by first having students write down their own ideas (e.g., on sticky notes, index cards, mind-mapping, or free writing). This prevents people from forgetting their ideas as they wait for an opportunity to speak, lets them focus on listening during the group exercise, and also signals to the group when others have more to say.

WHERE CAN I FIND OUT MORE?

- AAC&U VALUE rubric for assessing relevant elements of creative thinking. https://www.aacu.org/value/rubrics/creative-thinking
- Bereiter, C., & Scardamalia, M. (2003). Learning to work creatively with knowledge. *Powerful learning environments: Unravelling basic components and dimensions*, 55-68.
- Idea generation: https://www.cleverism.com/idea-generation-divergent-vs-convergent-thinking/
- IEEE Xplore (November 2016) **-** Teaching and Learning of Divergent and Convergent Thinking through Open-Problem Solving in a Data Structures Course
- Sietske W. Kleibeuker, Carsten K.W. De Dreu and Eveline A. Crone (2013) – Developmental Science
- University of Washington – Strategies of divergent thinking