

# Fluid Reasoning (Gf)



Fluid reasoning is the ability to think logically and solve novel problems, independent of learned knowledge. It involves flexible, abstract thinking and problem-solving skills essential for academic and occupational success.

Students with deficits in fluid reasoning may struggle to understand abstract concepts, identify patterns, and think flexibly to solve novel problems. These challenges can impact academic performance in subjects that emphasize reasoning, analysis, and application of knowledge.

| STRATEGY CATEGORY                      | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| Break down problems into smaller steps | <ul style="list-style-type: none"><li>● Provide scaffolding by breaking down complex problems into smaller, more manageable steps.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Use visual aids and manipulatives      | <ul style="list-style-type: none"><li>● Use graphic organizers, manipulatives, and experiential activities to support conceptual understanding and demonstrate relationships</li><li>● Use models, examples, and graphic organizers to present information visually</li><li>● Provide environmental supports like problem-solving charts, procedural lists</li><li>● Provide tools to help categorize objects and concepts</li><li>● Provide guided practice with a list of guiding questions</li><li>● Regularly planned activities to sort, classify, categorize and determine relevant/irrelevant information</li><li>● Provide study guides and practice tests</li><li>● Use semantic maps to organize key vocab and prior knowledge</li></ul> |
| Encourage verbal explanations          | <ul style="list-style-type: none"><li>● Ask the student to verbalize their thought process and explain their reasoning.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Teach problem-solving strategies       | <ul style="list-style-type: none"><li>● Explicitly teach and model various problem-solving strategies, such as working backwards, looking for patterns, or using analogies.</li><li>● Utilize analogies, similes, and metaphors when presenting tasks</li><li>● Explicitly teach metacognitive strategies, such as memorable mnemonics, to assist in drawing conclusions</li><li>● Offer guided lists for implementing procedures and formulas</li><li>● Provide expanded answer keys explaining correct vs. incorrect responses</li><li>● Demonstrate more than one way for solving a problem</li></ul>                                                                                                                                           |
| Develop cognitive flexibility          | <ul style="list-style-type: none"><li>● Use open-ended tasks that require creative, adaptive thinking and considering multiple perspectives.</li><li>● Use demonstrations that externalize the reasoning process</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Emphasize transfer of learning         | <ul style="list-style-type: none"><li>● Help students recognize underlying principles and apply knowledge to different contexts.</li><li>● Provide various examples of how the rule or procedure can be used across different situations, use concrete/real-life examples</li><li>● Tie new concepts to previously mastered ones, teach new information in groups or families</li></ul>                                                                                                                                                                                                                                                                                                                                                            |

| SKILL AREA | IMPACT OF FLUID REASONING DEFICITS                                                                                                                                                                                                                                                                                                                                                                                                                                                             | EVIDENCE-BASED INTERVENTIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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| READING    | <ul style="list-style-type: none"> <li>● Struggle with making inferences and drawing conclusions from text, which is crucial for reading comprehension.</li> <li>● Difficulty understanding abstract concepts, metaphors, and figurative language often found in literature.</li> <li>● Struggle analyzing and synthesizing information from multiple sources.</li> </ul>                                                                                                                      | <ul style="list-style-type: none"> <li>● Explicit instruction in comprehension strategies teaches specific techniques, models their use, and encourages students to verbalize their thought processes.</li> <li>● Graphic organizers and visual aids help students organize information and understand abstract concepts.</li> <li>● Reciprocal teaching engages students in structured dialogue to promote active learning and metacognitive skills.</li> <li>● Text structure instruction teaches students to recognize and use organizational patterns to aid comprehension.</li> <li>● Vocabulary instruction explicitly teaches words, especially abstract or figurative language, using strategies to build knowledge.</li> </ul>                                                 |
| WRITING    | <ul style="list-style-type: none"> <li>● Difficulty organizing ideas, developing logical arguments, and structuring written work coherently.</li> <li>● Struggle to generate novel ideas, make connections between concepts, and think creatively during the writing process.</li> <li>● Difficulty adapting their writing style to different genres or purposes.</li> </ul>                                                                                                                   | <ul style="list-style-type: none"> <li>● SRSD explicitly teaches writing strategies, including goal-setting and self-monitoring, and improves skills for students with learning disabilities.</li> <li>● Teach the steps of planning, drafting, revising, editing, and publishing.</li> <li>● Graphic organizers and visual aids help students organize ideas, structure writing, and understand abstract concepts.</li> <li>● Explicit instruction in writing genres and text structures teaches students to recognize and use organizational patterns, improving their writing skills.</li> <li>● Teach academic and domain-specific vocabulary and encourage the use of precise language.</li> <li>● Focus on building skills in sentence structure, syntax, and grammar.</li> </ul> |
| MATH       | <ul style="list-style-type: none"> <li>● Difficulty solving novel or complex math problems that require recognizing patterns, applying rules, and using logical reasoning.</li> <li>● Struggle to understand and work with abstract mathematical concepts, such as algebra or geometry.</li> <li>● Struggle to transfer mathematical knowledge to new situations or word problems.</li> <li>● Difficulty with mental manipulation of numbers, quantities, or spatial relationships.</li> </ul> | <ul style="list-style-type: none"> <li>● Explicit problem-solving instruction teaches specific techniques, models their use, and provides guided practice.</li> <li>● The CRA sequence uses concrete, representational, and abstract models to develop deeper math understanding.</li> <li>● Schema-based instruction teaches students to recognize and apply problem-solving patterns.</li> <li>● Visual representations and graphic organizers help students represent concepts and organize information.</li> <li>● Develop a strong foundation in number recognition, counting, and basic operations.</li> <li>● Break down concepts into smaller steps and provide extensive practice with teacher guidance.</li> </ul>                                                            |

## Benefits of providing evidence-based interventions

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| <b>Academic Success</b> <p>Fluid reasoning abilities are closely linked to higher-order thinking skills, such as problem-solving, critical thinking, and making inferences, which are essential for success across various academic subjects, including reading, writing, and math.</p> <p>Without appropriate interventions, students with fluid reasoning deficits may struggle to keep up with the increasing complexity of academic content as they progress through school.</p> | <b>Skill Development</b> <p>Fluid reasoning is a key component of general intelligence and plays a vital role in the development of various cognitive skills, such as abstract thinking, pattern recognition, and logical reasoning.</p> <p>Interventions that target fluid reasoning can help students develop these essential skills, which are transferable to various aspects of life, including problem-solving in everyday situations.</p> | <b>Lifelong Implications</b> <p>Strong fluid reasoning abilities are associated with better decision-making, adaptability, and the ability to navigate novel or complex situations.</p> <p>Individuals with well-developed fluid reasoning skills are better equipped to adapt to changing environments, learn new skills, and tackle unfamiliar challenges throughout their lives.</p> |