

*CogAT*<sup>®</sup> Next-Step Planning Tool

# RESEARCH AND DEVELOPMENT GUIDE

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## About This Guide

The purpose of this guide is to document the research base, design choices, and validation that informed the CogAT<sup>®</sup> Next-Step Planning Tool. It is intended for educators, administrators, and research partners who want transparency into how the tool works and how it was developed.

For additional support, visit the [CogAT Next-Step Planning Tool webpage](#), reach out to your assessment consultant, or contact Riverside Insights<sup>®</sup> Customer Service at (800) 323-9540 or via chat at [riversideinsights.com](https://riversideinsights.com).



## What Is the CogAT Next-Step Planning Tool?

Educators often ask: “*What’s next after testing? How can I effectively use CogAT data in my classroom?*”

The CogAT Next-Step Planning Tool was developed to answer these questions. It extends the long-standing purpose of CogAT—providing a fair and comprehensive view of reasoning abilities—into supporting instructional differentiation by identifying student profiles of strengths and weaknesses.

Rather than simply combining scores and algorithms, the CogAT Next-Step Planning Tool leverages three components to transform cognitive reasoning ability scores into practical instructional supports.

- **Standard age scores (SAS):** standardized measures of verbal, quantitative, and nonverbal (figural) cognitive reasoning abilities.
- **Data-driven student groupings:** suggested groupings based on CogAT SAS, created through a clustering process that identifies students with similar reasoning profiles in ways that are practical for classrooms.
- **AI-guided content generation:** a large language model, informed by curated CogAT instructional resources, that generates suggested strategies and adaptable activities.

Together, these components support educators by turning cognitive reasoning ability scores into actionable insights that can be adapted to their classroom contexts.



## Why Use CogAT Data in the Classroom?

Before exploring how the CogAT Next-Step Planning Tool works, it is important to ask: “*Is using CogAT data in the classroom valid, and what research supports its use?*”

Research shows that ability and achievement together explain performance better than either measure alone, allowing educators to identify potential that may be underestimated by achievement data (Lohman, 2006; Lohman, 2012). Ability measures like CogAT also reduce the impact of language and cultural background, providing a fairer way to surface strengths among

multilingual learners, students with disabilities, and those from underserved groups (Hemmler et al., 2022; Lohman, 2012, Part 8).

Studies further show that reasoning profiles highlight areas of potential and challenge, which can reliably guide instructional differentiation (Callahan et al., 2022; Lohman et al., 2008). Longitudinal findings also demonstrate that the cognitive strengths identified by *CogAT* in youth are often linked to later expertise in those same domains (Lubinski & Benbow, 2006; Makel et al., 2016; Park et al., 2007).

These findings confirm that *CogAT* offers a valid and meaningful foundation for instructional use. The *CogAT* Next-Step Planning Tool builds on this foundation by making reasoning profiles and SAS actionable for teachers through grouping, strategies, and adaptable activities.



## How the *CogAT* Next-Step Planning Tool Works: Core Components

### 1. SAS and Cognitive Strengths

The basis of the *CogAT* Next-Step Planning Tool is the SAS, a nationally normed, age-based standard score provided by *CogAT*. SAS enables fair comparisons among students of the same age by reducing the influence of maturity differences. Because it uses a common scale, a given SAS has the same interpretation across different forms and test administrations, providing consistent meaning regardless of where or when a student is tested.

Because *CogAT* reports SAS in three domains—verbal, quantitative, and nonverbal (figural) reasoning—it produces a profile that reflects both a student’s overall level of reasoning and how they perform in each area. These profiles highlight areas of relative strength and difference, giving educators useful information to plan targeted instructional activities that build on strengths and provide scaffolds where needed.

The *CogAT* Next-Step Planning Tool identifies strengths and weaknesses by applying a statistically rigorous process to interpret each student’s profile. SAS are converted to z scores using the formula  $z = (SAS - 100) / 16$ , which standardizes performance relative to national norms. Each domain is then compared to the student’s median SAS across the three domains, which serves as the reference point for the student’s overall pattern of reasoning. A domain that sits 0.5 standard deviations or more above the median but below 1.0 standard deviations is marked as a mild strength, while one that sits 1.0 or more above is identified as a significant strength. Similarly, domains that fall 0.5 to 1.0 or 1.0 or more standard deviations below the median are marked as mild or significant weaknesses, respectively.

This approach is objective, individualized, and consistent with *CogAT*’s established ability profiles. Rather than labeling students as “good” or “bad” at a subject, it highlights relative cognitive strengths and areas where additional scaffolding may be helpful. These structured insights form the foundation for grouping, helping to ensure that students are matched with peers who share similar cognitive patterns.

## 2. Data-Driven Groupings for Students

Leveraging these profiles, the *CogAT* Next-Step Planning Tool applies a clustering process to suggest student groupings. This process identifies students with similar reasoning patterns and creates groups that are both instructionally practical and grounded in data.

While each student's SAS profile forms the basis for grouping, the algorithm does not weigh every feature equally. Instead, it adjusts the relative importance of different factors so that the suggested groups align more closely with classroom needs.

- **Primary reasoning domain:** The domain most relevant to the chosen lesson objective—verbal, quantitative, or nonverbal (figural)—is given greater emphasis. For example, in a math lesson the grouping process will typically emphasize quantitative reasoning although verbal or nonverbal (figural) reasoning may be more directly relevant depending on the standard.
- **Relative strengths and weaknesses:** Cognitive strengths are considered with moderate influence so that students with similar profiles are more likely to be placed in the same group without overshadowing their overall ability levels. For example, two students with comparable quantitative ability who also each show a strength in verbal reasoning are more likely to be grouped together.

Together, these adjustments ensure that groups are formed around the skills most relevant to the lesson while still considering students' broader reasoning patterns.

Because the initial grouping is based on statistical similarity, the results are not always perfectly practical for classrooms. To address this, the *CogAT* Next-Step Planning Tool includes a rebalancing step. The system attempts to form groups within a range of three to six students—sizes that are generally small enough to be manageable but large enough to support collaboration. It also checks that students within a group are reasonably close in their SAS performance so that the resulting suggestions remain instructionally coherent. When needed, groups are adjusted to meet these constraints while maintaining cognitive similarity.

The result is a set of suggested groups that reflect natural similarities in reasoning while also being workable for real classroom use. These are not directives but recommendations, and they are intended to give teachers a research-based starting point that they can refine with their knowledge of students and classroom dynamics.

## 3. AI-Guided Instructional Generation

Once groups are formed, the *CogAT* Next-Step Planning Tool uses an AI engine to generate instructional suggestions tailored to each group's reasoning profile. This process is powered by a large language model informed by curated *CogAT* instructional resources, professional learning materials, and structured instructional templates. In practice, this means the model is given a defined knowledge base and clear instructions that guide its behavior, limiting it from producing irrelevant or unfounded content and keeping outputs anchored in established practices.

The effectiveness of this approach comes from the way large language models process information. They can adapt to context and follow detailed instructions, which allows the *CogAT* Next-Step Planning Tool to generate strategies and activity starters that are aligned to

both cognitive profiles and the specific learning objective. For example, a group with stronger nonverbal (figural) reasoning might be encouraged to begin with diagrams, visual models, or hands-on tasks, while a group with stronger verbal reasoning might receive prompts to engage in discussion or written explanations.

This adaptability extends beyond the first set of outputs. After the initial strategies or activities are generated, educators can continue the dialogue with the embedded assistant—which can be found in the Q&A section of the app—to refine, expand, or adjust the content. In this way, the AI functions less like a one-time generator and more like a thought partner that supports iteration and responsiveness to classroom realities.

## Safeguards and Privacy

Safeguards are built into the process. Student names are anonymized during processing, and no personal data is stored or retained by the model. The system operates in line with Riverside's [Terms of Use](#) and established privacy standards, ensuring that recommendations are delivered responsibly.

## Responsible Use

The outputs from this process are not intended to replace teacher planning or decision making. Errors and misclassifications can occur, so teachers should review suggested groupings, verify them against current classroom evidence (e.g., formative assessments, work samples, observations), and use professional judgment to adjust them to reflect individual needs, accommodations, and context.



## Validation and Testing

The design of the CogAT Next-Step Planning Tool has been examined through large-scale simulations and pilot use with educators to confirm that the methodology produces instructionally usable results. The goal of this testing was not to measure student outcomes but to ensure that the tool's internal processes are sound and that educators find the outputs practical.

Validation and evaluation are ongoing to maintain consistently high-quality outputs. Riverside Insights conducts continuous reviews of the model's performance, gathers educator feedback, and revises assumptions, weightings, and procedures as needed to sustain accuracy, usefulness, and fairness in classroom settings.

## Simulation Testing

Simulations were conducted across a variety of classroom scenarios, including different class sizes, ability distributions, and reasoning domains. These tests confirmed that the grouping algorithm consistently formed clusters that were both manageable in size and cognitively coherent, producing results that align with typical classroom constraints.

## Beta Testing with Educators

Early versions of the CogAT Next-Step Planning Tool were piloted with teachers in different grade levels and subject areas. Educators provided feedback on both the usability of the groupings and the usefulness of the instructional suggestions. Teachers consistently noted two main benefits: reduced planning time and increased confidence in their ability to differentiate instruction. These findings suggest that while outcomes have not yet been studied, the tool provides tangible support in day-to-day instructional planning.

## Reliability and Transparency

The grouping process has been tested for consistency. When the same classroom data and the same instructional objective are provided, the CogAT Next-Step Planning Tool produces stable results: the suggested groups remain consistent across repeated runs. This ensures that outputs are reproducible and not dependent on random variation in the clustering process.

At the same time, transparency is critical. Large language models remain prone to occasional irrelevant or less-useful suggestions, and not every detail of classroom context can be captured in the data provided to the system.



## Key Findings

Testing and pilot use of the CogAT Next-Step Planning Tool highlight several consistent benefits for educators.

- **Ability data made actionable.** CogAT reasoning scores, long established as valid measures of student ability, can be translated into practical instructional supports through the combination of SAS interpretation, clustering, and AI-guided content generation.
- **Reliable groupings.** The grouping process consistently forms groups that are instructionally practical and cognitively coherent, giving teachers a trustworthy starting point for differentiation.
- **Time savings and confidence.** Teachers reported that the CogAT Next-Step Planning Tool reduced the time needed to plan differentiated instruction and increased their confidence in working with students whose reasoning strengths vary widely.
- **Ease of use.** Educators reported that the tool made CogAT data more approachable and easier to apply in classroom planning.
- **Guidance, not prescription.** The system provides suggestions and starting points, not fixed answers. Outputs are most effective when treated as supports that teachers adapt and refine using their own expertise and knowledge of classroom context.



## AI Use Guidance

For responsible use of AI features, please review the [Terms of Use](#) and follow your district's AI policies and procedures.



## Support and Resources

Riverside Insights is committed to collaborating with our valued partners to make adoption easy.

- The [CogAT Next-Step Planning Tool webpage](#) is continuously refreshed with resources for using the tool effectively.
- Reach out to your assessment consultant for support on approaches for adoption and implementation.
- For technical support, contact Riverside Insights Customer Service at (800) 323-9540 or chat with us at [riversideinsights.com](https://riversideinsights.com).



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