

RESEARCH BRIEF: MATCHING INTERVENTIONS TO STUDENT LEARNING STAGES

Introduction

The Instructional Hierarchy (IH) presents a framework for determining students' learning stages for a new, targeted skill or concept and using this information to select the best-fit interventions.¹ This system continues to present an effective approach for developing and maintaining skills since its introduction in 1978.² Although researchers and educators now use a variety of hierarchy models and stages, the standard stages of 1) acquisition, 2) fluency, 3) generalization, and 4) adaptation continue to appear throughout variations.³ Put simply, the IH and similar frameworks guide teachers in knowing “what to do when...”⁴

To support general education teachers with identifying and developing students' learning, Hanover Research (Hanover) presents this report. The report begins with a brief overview of the IH, followed by sections detailing each stage's goal, observations that indicate a student's stage, and key interventions to enable stage progression. Additionally, this report concludes with a table that provides an overview of the IH, to which teachers may refer for quick and actionable instructional support.

Recommendations

- **Pre-plan interventions to help students progress from one learning stage to the next.** Lesson plan templates, co-planning protocols, and other materials should incorporate the IH and the content-specific strategies teachers will use to support students in moving from acquisition to adaptation;
- **Practice identifying student learning stages through observation and assessment.** Incorporate IH scenarios and role-playing into professional development opportunities and data meetings;
- **Discuss the appropriate matching of learning stages and interventions during observation debriefs.** Ask classroom observers to specifically provide feedback about the application of IH and related interventions during lessons; and
- **Use the IH and interventions with fidelity before referring students for higher tiers of support.** Ensure that appropriate Tier 1 interventions tied to learning stages are used before recommending a student for Tier 2 or Tier 3 interventions.

Key Findings

- **The IH includes four main stages: acquisition, fluency, generalization, and adaptation.** Through these stages, students become more familiar with a target skill and learn to apply the skill more easily and in more situations. Although teachers should use different interventions at each stage according to student needs, all stages incorporate teacher-given feedback, praise, and encouragement. Other interventions—such as modeling, drilling skills, providing a checklist, and articulating core elements—apply only to the acquisition, fluency, generalization, and adaptation stages, respectively.
- **In the first two stages, acquisition and fluency, interventions support students with becoming aware of and comfortable with a target skill.** Common interventions in the acquisition stage include teacher demonstrations; models and visual representations; prompts; thinking out loud; the cover, copy, and compare activity; and feedback. Once students reach the fluency stage, best-fit interventions change and include guided and independent activities, skill drills, overlearning, ongoing practice, timed fluency tests, and feedback.
- **Interventions for the generalization and adaptation stages involve students identifying and practicing the target skill in new situations and settings.** Common interventions for students in the generalization stage include providing practice opportunities, identifying new applications, creating a checklist, and giving feedback. Interventions for the adaptation stage, however, include articulating core elements of the target skill, practicing new applications, and giving feedback. In these last two stages, students work on applying the target skill more widely and without confusion.
- **Teachers may use observations and assessment data to determine students' learning stages.** For example, students in the acquisition stage do not perform the target skill with a high level of accuracy, and students in the fluency stage need to work on completing the target skill faster while maintaining accuracy. Students in the generalization stage often confuse the target skill with learned skills in new situations, and those in the adaptation stage may still require prompting to use a target skill in a new setting. Additionally, data from timed fluency tests may help determine if students meet fluency benchmarks or if they remain in the acquisition stage and require acquisition interventions.

The Instructional Hierarchy

The IH includes four main learning stages: acquisition, fluency, generalization, and adaptation.⁵ These stages stem from the idea that students' academic skills can develop more quickly if teachers follow a structured process for prompting students and responding to student outcomes. The IH also describes "specific procedural strategies to employ as students' academic responding progresses from not having the knowledge/skills to responding accurately to stimuli to stimulus generalization."⁶ Using the IH provides teachers with an alternative to the "wait to fail" approach, and identifying students' learning stages provides teachers with the following three pieces of information:⁷

- When to increase task difficulty or accelerate learning content;
- What type of instruction, practice, and feedback to provide to students; and
- How to maximize instructional time for the greatest effect.

Teachers should use observations and assessment data to identify students' learning stages. For example, a teacher may see that a student can accurately complete a task using the target skill, but the student completes the task slowly. Such observations indicate that a student is in the second learning stage, fluency, and is learning to retain the skills involved in the task, combine the skills with other abilities, and work as fluently as classmates.⁸ Alternatively, teachers may use assessment data, such as reading rate (i.e., the number of words read correctly per minute) and reading accuracy (i.e., the percentage of words read correctly) within a given timeframe (e.g., one-minute intervals). Teachers then use reading rate or accuracy percentage benchmarks to determine students' skill levels (e.g., 85 percent accuracy or above may indicate fluency) and choose an intervention to further develop skills towards generalization.⁹

Although the IH applies to a variety of content areas and skills, empirical literature and best practices typically refer to studies and strategies for reading, math, and behavior.¹⁰ Furthermore, these resources often refer to interventions for young children; however, the IH or a similar framework may apply to any age group or content area (e.g., university-level nursing students).¹¹

Similar Models and Frameworks

As noted in the introduction, teachers and researchers may use alternative frameworks to understand student learning stages and support skill development; however, these **other systems align with the IH despite expanding or reducing the number of stages or naming stages differently.**¹² The following figure presents other learning stage frameworks that strongly resemble the IH and demonstrate success in empirical studies.

Alternatives to the Instructional Hierarchy

NAME	NUMBER OF STAGES	STAGES COMPARED TO THE IH	EVIDENCE OF EFFECTIVENESS
Gagne's Nine Events of Instruction	Nine	The stages include gain attention, inform learners of objectives, stimulate recall of prior learning, present stimulus, provide learner guidance, elicit performance, provide feedback, assess performance, and enhance retention and transfer. The first five events appear to align with the acquisition stage, and the last four events appear to align with fluency, generalization, and adaptation.	<ul style="list-style-type: none"> ▪ Yusuf, 2013¹³ ▪ Miner et al., 2015¹⁴
Van Hiele Model	Five	The stages support geometric thought development and include recognition, analysis, ordering, deduction, and rigor. These stages, while particular to math, align nearly one-to-one with the IH stages, with the final two appearing to pertain to adaptation.	<ul style="list-style-type: none"> ▪ Choi-Koh, 1999¹⁵
Skill retention theory	Three	The stages include declarative, which aligns with acquisition, consolidation, which aligns with fluency, and tuning, which aligns with generalization and adaptation.	<ul style="list-style-type: none"> ▪ Kim, Ritter, and Koubek, 2013¹⁶

Source: Multiple sources cited within the figure.

Stage I: Acquisition

During the first learning stage of the IH—acquisition—students begin to learn a target skill and work toward performing the skill accurately and without support. According to the Calhoun County School District, which divides this stage into awareness and acquisition, students at this stage learn the following elements:¹⁷

- What the skill is;
- The steps involved;
- How the skill is useful;
- When to use the skill; and
- How to perform the skill accurately.

Teachers may identify students in this stage by looking for inconsistent or inaccurate use of the target skill.¹⁸ To support students at this stage, teachers may draw on the interventions in the following figure.

Interventions for the Acquisition Stage

Give Demonstrations	Use Models and Visual Representations	Use Prompts
Think Out Loud	Use the Cover, Copy, and Compare Activity	Give Feedback

Source: Multiple sources cited throughout this section.

The first intervention, **demonstrating**, involves the teacher showing students how to complete the target skill and providing context for when to use it.¹⁹ A teacher may demonstrate the skill alone, with students simultaneously, or with students in a pattern of demonstration and imitation.²⁰

Models and visual representations also support students in the acquisition stage, particularly for math skills. Teachers may model how to do a full problem on a board and leave the solution visible for students to reference.²¹ Providing visual representations demonstrates success when teachers and students use visuals as well as when only teachers use visuals. The Center on Instruction reviews 12 empirical studies at the elementary, middle, and high school levels to support its finding that visual representations help students with disabilities learn math.²² Additionally, a high school-specific study published in *The Journal of Educational Research* analyzes a student learning geometry using computer-based instruction. The student's performance outcomes show that visuals and symbols support a high school student throughout a lesson on triangles. Early in the lesson, the student uses visuals to recognize isosceles triangles before he uses properties (i.e., measuring two equal sides) to identify the shape.²³ Visuals continue to be relevant in future stages of this study, but “the role of active visualization was most crucial and effective” during the first learning stage.²⁴

Teachers may also **prompt** students to use a target skill either before they need to use it or as they use it.²⁵ Prompts may increase as students perform a task, occur throughout a task, or decrease throughout a task.²⁶ The following figure describes different types of prompts.

Types of Prompts

PROMPT	DESCRIPTION
Verbal Prompts	Teachers/practitioners make statements that help learners acquire target skills (e.g., “You might need to try it a different way,” “Write your name”).
Gestural Prompts	Teachers/practitioners make movements that cue learners to use a particular behavior or skill (e.g., pointing to the top of the paper where the learner needs to write his name).
Model Prompts	Teachers/practitioners perform the target skill or behavior. Full model prompts can be verbal if the skill being taught is verbal, or they can be motor responses if the skill being taught involves moving a body part.
Physical Prompts	Teachers/practitioners touch learners to help them use the target behavior or skill (e.g., tapping a learner's hand to cue him to begin writing his name, teacher putting hand over learner's hand to help her write her name).
Visual Prompts	Teachers/practitioners provide pictures of events that provide learners with information about how to use the target skill or behavior (e.g., task analysis checklist, transition picture card).

Source: National Professional Development Center on Autism Spectrum Disorders²⁷

Through the **thinking out loud** intervention, teachers or students explain their steps as they perform the target skill to clarify a process or task.²⁸ This approach demonstrates effectiveness in reading comprehension, as shown by an article published in the *Review of Educational Research*. As an instructional approach, thinking out loud supports students' reading comprehension because it "focuses their attention and requires that they spend more time thinking about what they are reading."²⁹

Additionally, the **cover, copy, and compare** (CCC) intervention demonstrates support with math facts and vocabulary. During this intervention, students review information (e.g., a new word) on a worksheet. They then use a blank piece of paper or index card to hide the information (i.e., cover), reproduce the information from memory (i.e., copy), and uncover the original information to check their accuracy (i.e., compare).³⁰ **This intervention demonstrates effectiveness in reading development throughout Grades K-12 as it can apply to English and foreign language vocabulary lessons.**³¹ In a 2019 study published in *Mid-Western Educational Researcher*, CCC increases scores on beginner-level Spanish vocabulary tests in a sample of 121 high school students. CCC impacts student test outcomes more significantly when the intervention requires students to draw a picture of the word before beginning the CCC process.³²

The sixth common acquisition intervention, **giving feedback**, involves teachers correcting students, praising appropriate use of the target skill, and encouraging student effort.³³ Providing immediate feedback ensures that students have a strong foundation as they continue to develop the skill. Additionally, praise and encouragement provide motivation.³⁴ The following figure describes three types of feedback that teachers may give to guide skill development.

Types of Feedback

FEEDBACK	DESCRIPTION
Scoring Feedback (Quantitative Feedback)	The teacher tells the student the number of times he did a certain task correctly. The disadvantage of this type of feedback is that it tends to underestimate the child's achievement and does not give useful information regarding what the child can or cannot do.
Descriptive Feedback (Qualitative Feedback)	The teacher emphasizes how the student did what he was supposed to do. For example, if a teacher asks a student to give three reasons for completing an action, and the student gives only one, the scoring feedback would rate the student's performance as 1/3. In such a case, descriptive feedback would try to look for the quality of the one argument that was given—whether it was persuasive, appropriate, and reasonable.
Analytic Feedback	Teachers give analytic feedback by dividing the task done by the student into its simpler sub-tasks and then giving feedback concerning each sub-task.

Source: Indira Gandhi National Open University³⁵

Additionally, effective feedback typically has the following features: accurate, periodic, immediate, detailed, and positive and constructive.³⁶

Stage II: Fluency

In the second IH learning stage—fluency—students work toward retaining the target skill, combining this skill with other learned skills, and reaching peers’ skill level. For *reading* fluency, research published in the *Journal of Adolescent and Adult Literacy* highlights that fluency and comprehension do not necessarily have a causal relationship. However, improvements in fluency could significantly increase high school students’ reading comprehension.³⁷ Teachers can identify students at this stage by looking for those who respond correctly to tasks that use the target skill but do so slowly.³⁸ To support students at this stage, teachers may draw on the interventions in the following figure.

Interventions for the Fluency Stage

Assign Guided and Independent Activities	Drill Target Skills	Support Overlearning
Provide Ongoing Practice	Use Timed Fluency Tests	Give Feedback

Source: Multiple sources cited throughout this section.

Guided and independent activities support fluency by providing opportunities for practice and opportunities to respond.³⁹ These activities should be short but frequent and may include group work, which promotes discussion and increases opportunities to respond.⁴⁰ An example of a guided practice activity includes the teacher assigning 10 math problems and asking students to complete about three problems on their own. The teacher then checks these first few problems and asks the students to finish the problem set if the initial answers are correct. This strategy allows proficient students to move ahead and identifies a smaller group of students who require more targeted support.⁴¹ Activities may also require students to work alone. This independent work reduces the amount of prompting and support that students receive, while still enabling teachers to check work and prevent students from repeating a skill incorrectly.⁴²

Like guided practice, fluency interventions should include **drilling skills** so that students learn to complete the target skill quickly, easily, and with accuracy. Because during the fluency stage, students can complete the task but do so slowly, drilling provides an opportunity for students to become more comfortable with the skill and respond almost automatically.⁴³ Additionally, **verbal drilling exercises prove more effective than written drilling exercises**, as verbal drilling allows for faster, more frequent responses, and students have more opportunities to solidify the target skill.⁴⁴

Overlearning also supports students as it ensures that students retain fluency after the teacher presents the target skill.⁴⁵ To support overlearning, teachers may use drilling activities for multiple days after initially teaching the skill, assign practice activities as homework, and integrate practice activities into classwork.⁴⁶ Overlearning through these activities, also called “massed review,” supports *retention*, which sometimes appears in IH resources as a separate learning stage.⁴⁷ Similarly, **ongoing practice** through “distributed review” and increasing the length of time that students use the target skill supports long-term retention of skills and skill *endurance*.⁴⁸ Endurance also occasionally appears as a separate stage.⁴⁹ Ongoing practice includes similar activities, but students engage in these activities throughout the remainder of the school year (e.g., one activity every few weeks) and for increasing periods.⁵⁰

Furthermore, **timed fluency tests** and **explicit time drills** support fluency and serve as effective interventions and data sources. During these tests, students receive a set amount of time to complete as much of a task as possible (e.g., reading a passage, completing math problems). When time runs out, teachers may assess accuracy or speed, or teachers may continue with another timed interval to further drill the target skill before assessing performance.⁵¹ To use timed tests for improving reading fluency and overlearning, teachers may set a testing goal beyond standard benchmarks “to give the student an additional margin of reading fluency to promote long-term skill retention.”⁵² A 2010 meta-analysis published in *School Psychology Review* uses 17 studies to analyze the impact of acquisition and fluency interventions, including timed tests, on math outcomes. Researchers find that timed tests prove more effective for math students at the fluency stage than at the acquisition stage, and the CCC intervention proves more effective for students at the acquisition stage than the fluency stage.⁵³

Like the acquisition stage, teachers must **give feedback** and praise to students in the fluency stage. Feedback should refer to fluency and accuracy, while praise and encouragement should commend and motivate students.⁵⁴

To support reading fluency assessments, teachers may use a fluency rubric, such as the one linked below.⁵⁵

[Reading Fluency Rubric](#)

Stage III: Generalization

The goals of the third IH learning stage—generalization—include students using the target skill in multiple settings and situations and not confusing the target skill and learned skills. Teachers may identify this stage by observing students accurately and fluently using the skill, incorrectly applying the skill to new settings and situations, and confusing the target skill with similar learned skills.⁵⁶ To support students at this stage, teachers may draw on the interventions in the following figure.

Interventions for the Generalization Stage

Provide Practice Opportunities	Identify New Applications	Provide a Checklist	Give Feedback
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Source: Multiple sources cited throughout this section.

Practice opportunities also demonstrate importance at the generalization phase; however, practice during generalization also aims to: 1) expand the setting and situations in which students use the target skill; and 2) ensure that students do not confuse the target skill with similar learned skills.⁵⁷ Activities should require students to use the target skill while interacting with a wide range of people, working with varied materials, and visiting different settings.⁵⁸

At the high school level, students may use advanced computer technology to practice and support generalization and target skill applications. For example, one study that analyzes a student’s geometry skills demonstrates skill development through open-ended exploratory problems and notes the student “could generalize and synthesize the concepts associated with centers through active visualization using his previously developed knowledge.”⁵⁹ Additionally, teachers should present new uses and settings for the target skill and can work with parents to **identify new applications** outside of the classroom.⁶⁰ Teachers can also collaborate to incorporate the skills from one class into activities in another.⁶¹

Whether using the target skill in school, at home, or in another environment, teachers may **provide a checklist** that includes common errors that students make while performing the skill. Furthermore, teachers and students can work one-on-one to edit the checklist to fit individual student needs. Once crafted, students may refer to the checklist after completing an assignment but before submitting it. This checklist reminds students to look for common errors and fix them without teachers’ prompting.⁶²

Lastly, **giving feedback** also supports the generalization stage and includes encouragement to use the target skill in new settings and praise for novel applications.⁶³

Stage IV: Adaptation

The final IH learning stage—adaptation—does not have a unique goal but represents a continuous stage in which students maintain the target skill across settings and situations and apply the skill in new ways without support. Students at this stage accurately and fluently use the skill and can use the skill in new settings and situations without support, but may not modify the skill correctly in every new circumstance.⁶⁴ To support students at this stage, teachers may draw on the interventions contained in the following figure.

Interventions for the Adaptation Stage

Articulate Core Elements	Assign Practice Opportunities with New Adaptations	Give Feedback
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Source: Multiple sources cited throughout this section.

Because adaptation is an ongoing stage, having students articulate core elements of the target skill at the end of a lesson can support future applications in unfamiliar situations.⁶⁵ This type of discussion may begin with a direct question of the core elements of the skill or include more open-ended questions, such as:⁶⁶

- What did you learn in today’s lesson that you did not know yesterday?
- Why is that learning important to you?








At this stage, teachers continue to provide practice opportunities but with **new adaptations**. Distributed review that uses the skill with modifications for new settings and situations also supports adaptation.⁶⁷

Furthermore, teachers must continue to **give feedback** to students on how they use the target skill in new situations. This feedback includes correcting students when they use the skill inaccurately, praising students for a correct use of the skill in a new setting, and encouraging students in the following two ways:⁶⁸

- To use the skill in novel situations; and
- To set goals for adapting the skill when applicable to novel or challenging situations.

The Instructional Hierarchy at a Glance

The following table presents each learning stage of the IH, including the stage's goals, observations that indicate the students' learning stage, and strategies for transitioning students to the next stage.

 LEARNING STAGE	 OBSERVATIONS	 INTERVENTIONS	 GOAL
Acquisition	<ul style="list-style-type: none"> ▪ Begins to learn the skill ▪ Unable to perform the skill reliably or with a high level of accuracy 	<ul style="list-style-type: none"> ▪ Demonstrate the skill ▪ Use models and visuals ▪ Prompt ▪ Use the thinking out loud strategy ▪ Use the cover, copy, and compare activity ▪ Give feedback 	<i>The student can perform the skill accurately with little support.</i>
			
Fluency	<ul style="list-style-type: none"> ▪ Gives accurate responses to a learning task ▪ Performs a learning task slowly, haltingly 	<ul style="list-style-type: none"> ▪ Assign guided and independent activities ▪ Drill the skill ▪ Support overlearning ▪ Provide ongoing practice ▪ Use timed fluency tests ▪ Give feedback 	<i>The student learns the skill well enough to retain, combine with other skills, and perform as well as peers.</i>
			
Generalization	<ul style="list-style-type: none"> ▪ Accurately and fluently responds ▪ May fail to apply the skill to new situations and settings ▪ May confuse new and old skills 	<ul style="list-style-type: none"> ▪ Provide practice opportunities ▪ Identify new applications ▪ Provide a checklist ▪ Give feedback 	<i>The student uses the skill across situations and settings and does not confuse the skill with similar skills.</i>
			
Adaptation	<ul style="list-style-type: none"> ▪ Is fluent and accurate in the skill ▪ Applies the skill in novel situations and settings without prompting ▪ Does not yet modify the skill to fit new situations 	<ul style="list-style-type: none"> ▪ Articulate the “big ideas” or core elements of the skill ▪ Practice new applications ▪ Give feedback 	<i>This phase is continuous without a specific goal.</i>

Source: *Intervention Central*⁶⁹

Caveat

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Endnotes

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- ⁴¹ Dell’Olio and Donk, Op. cit., pp. 84–85.
- ⁴² “Unit 6: The Process of Learning,” Op. cit., p. 68.
- ⁴³ [1] “Practice Activities Match Students’ Stages of Learning,” Op. cit., p. 3. [2] Wright, Op. cit., p. 2.
- ⁴⁴ Ardoin and Daly, Op. cit., p. 3.
- ⁴⁵ Wright, Op. cit., p. 2.
- ⁴⁶ Dell’Olio and Donk, Op. cit., p. 88.
- ⁴⁷ Wright, Op. cit., pp. 2–3.
- ⁴⁸ Ibid., p. 2.
- ⁴⁹ Ibid., p. 3.
- ⁵⁰ [1] Dell’Olio and Donk, Op. cit., p. 88. [2] Wright, Op. cit., p. 3.
- ⁵¹ Wright, Op. cit., pp. 2–3.
- ⁵² Ibid., p. 3.
- ⁵³ Burns, M.K. et al. “Meta-Analysis of Acquisition and Fluency Math Interventions With Instructional and Frustration Level Skills: Evidence for a Skill-by-Treatment Interaction.” *School Psychology Review*, 39:1, March 2010. pp. 71, 73, 78. Retrieved from EBSCOhost.
- ⁵⁴ “The Instructional Hierarchy: Linking Stages of Learning to Effective Instructional Techniques,” Op. cit.
- ⁵⁵ Linked item obtained from: Rasinski, T. “Fluency Rubric.” Timothy Rasinski. http://www.timrasinski.com/presentations/multidimensional_fluency_rubric_4_factors.pdf
- ⁵⁶ “The Instructional Hierarchy: Linking Stages of Learning to Effective Instructional Techniques,” Op. cit.
- ⁵⁷ Ibid.
- ⁵⁸ Figure text reproduced verbatim from: Wright, Op. cit., p. 3.
- ⁵⁹ Choi-koh, Op. cit., p. 307.
- ⁶⁰ “The Instructional Hierarchy: Linking Stages of Learning to Effective Instructional Techniques,” Op. cit.
- ⁶¹ “Practice Activities Match Students’ Stages of Learning,” Op. cit., p. 4.
- ⁶² Wright, Op. cit., pp. 3–4.
- ⁶³ “The Instructional Hierarchy: Linking Stages of Learning to Effective Instructional Techniques,” Op. cit.
- ⁶⁴ Ibid.
- ⁶⁵ Ibid.
- ⁶⁶ Bulleted text reproduced verbatim from: Dell’Olio and Donk, Op. cit., p. 86.
- ⁶⁷ “The Instructional Hierarchy: Linking Stages of Learning to Effective Instructional Techniques,” Op. cit.
- ⁶⁸ Bulleted text adapted from: Ibid.
- ⁶⁹ Figure adapted with text reproduced verbatim with modifications from: [1] Ibid. [2] Wright, Op. cit., pp. 1–4.