

Identification of Learning Gaps Through Item Analysis

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Identification of Learning Gaps through Item Analysis

Learning Objectives:

- Understand the ramifications of the COVID-19 pandemic on student's academic and language development
- Understand the importance of conducting item analysis when identifying weaknesses
- Gain an understanding of the features of the WJ IV and WIIP program for pinpointing areas of struggle for instructional programming

THURSDAY
SEPTEMBER 14
10:00 AM PT / 12:00 PM CT / 1:00 PM ET
Speaker: Tammy L. Stephens, PhD

WIIP Woodcock
Johnson IV

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✧ COVID-19 Implications on Learning



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The Headlines Speak Volumes



EDUCATION

6 things we've learned about how the pandemic disrupted learning

Updated June 22, 2022 · 12:54 PM ET

Heard on *All Things Considered*



Cory Turner

Schools face coronavirus action plan

Expensive car drivers more dangerous to pedestrians



Concern grows after illness spreads across Europe

COMMENTARY
The pandemic has had devastating impacts on learning. What will it take to help students catch up?
Megan Kuhfeld, Jim Soland, Karyn Lewis, Emily Morton
March 3, 2022



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The Impact of COVID-19 Regression Causes, Degree, and Challenges

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Academic year 2020–21 was perhaps the most challenging for educators and students (Dorn et al., 2021; Ludewig et al., 2022; Wyse et al., 2020).



The Broad Educational Fallout

- Schools, universities, and testing centers closed (Gewertz, 2020);
- Many pre-school services including school lunch programs were suspended or limited (Wheeler & Hill, 2021).
- Childcare was largely limited to essential workers (Wheeler & Hill, 2021).
- Reduced services were available to (special needs) students (Haderlein et al., 2021; Wheeler & Hill, 2021).

Teacher Challenges and Responses



Teachers grappled with how to instruct and communicate with students, provide quality education, and assess their academic progress (Wyse et al., 2020).

Individual approaches to instruction and assessment varied as did teachers' level of participation (Hamilton et al., 2020).

Many teachers greatly reduced the amount of instruction, practice, and assessment provided to their students (Hamilton et al., 2020).

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Student Challenges and Responses



In extreme cases, some students could not access any materials provided by their teachers (Goldstein, Popescu, & Hannah-Jones, 2020).

Only 40 percent of K–12 students were in districts that offered any in-person instruction (which mostly occurred during the latter phase of the pandemic) (Dorn et al., 2021).

High schoolers have become more likely to drop out of school and less likely to continue with further education (Dorn et al., 2021).

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In April 2020, Pew Research found that 40% of low-income parents said their children relied on public Wi-Fi to complete schoolwork due to unstable or no internet connections at home (Vogels et al., 2020).



Other Student Challenges (Haderlein et al., 2021)

- Approximately 55.1 million K–12 students had to learn remotely or had no access to education.
- Low-income families were less likely to have access to the technology required to participate in online learning.
 - Only 2/3 of households with an annual income less than \$25,000 per year had computers and internet access.
 - 22% reported internet connections were slow or dropped frequently.
- Low-income parents were more likely to be essential workers.



Parental Challenges and Responses

- Parental assistance and support of student learning varied (Wyse et al., 2020).
- More than 35 percent claim they are very or extremely concerned about their children's mental health (Dorn et al., 2021).
- In early May, nearly one quarter of parents reported they did not interact with a teacher and approximately 30% never received feedback from a teacher (Haderlein et al., 2021).
- Garbe et al. (2020a) found parents were overwhelmed by having to help their children learn and maintain motivation.

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Geographical Differences



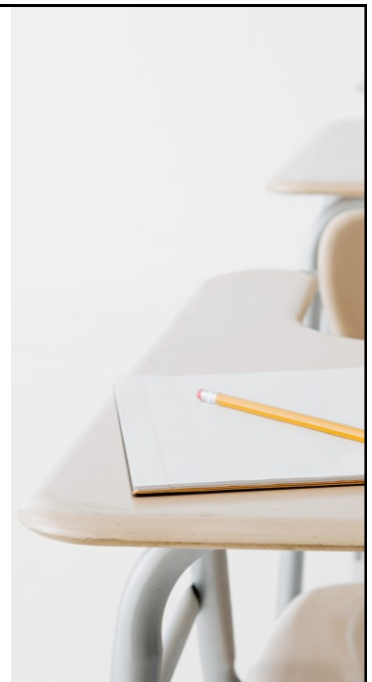
Schools that struggled to provide high-quality learning under normal conditions found it even harder to teach effectively during the pandemic (Schweig et al., 2022).



While nearly all U.S. schools closed in March 2020, school re-opening approaches varied widely throughout the 2020-21 school year (Halloran et al., 2023).



Camp and Zamarro (2021) found that the manner that the school year was conducted was largely explained by school district offerings, political partisanship, and rates of local COVID-19 outbreaks.



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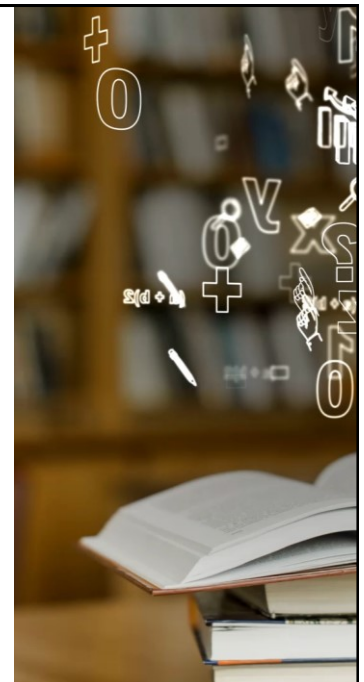
McEachin and Atteberry (2017) estimate that 25–30 percent of the learning achieved during the school year is lost due to summer vacations.

COVID-19's impact is expected to be similar or greater.



K-12 Student Learning Loss During COVID

- According to a national average, students lost (Dorn et al., 2021):
 - 5 months in mathematics;
 - 4 months in reading.
- Widened pre-existing opportunity and achievement gaps and hit historically disadvantaged students hardest.
- **Students who moved on to the next grade lacked knowledge that is necessary for academic success, and students who had to repeat a year are much less likely to complete high school or go on to college (Dorn et al., 2021).**





Studies of Academic Impact of COVID



- **Achievement gaps appear to be greatest for early grades**, most likely because **growth in math and reading ability tends to be highest at this age** (Wyse et al., 2020).
- Curriculum Associates' i-Ready in-school assessment results of more than 1.6 million elementary school students across more than 40 states shows that **students scored ten points behind in math and nine points behind in reading** (Dorn et al., 2021)

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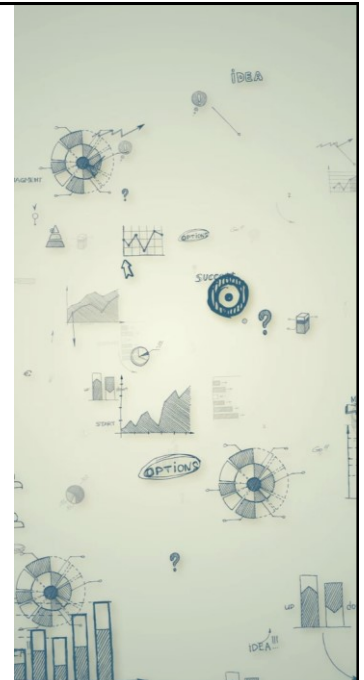
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Additional Studies of COVID Regression

- State-administered tests and MAP assessments from NWEA showed **large declines in both math and reading compared to earlier testing** (Halloran et al., 2023).
- In the spring of 2022, National Assessment of Educational Progress (NAEP) scores showed **historic drops relative to 2019** (Fahle et al., 2023). In these tests, as in the state assessments, we observed the largest declines in math (an 8-point decline in Grade 8) (NAEP 2022a) and smaller declines in reading (3-point declines in both Grade 4 and Grade 8) (NAEP 2022b).



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Geographic Differences and the Implications on Academic Regression

- Urban and suburban students had more access to instruction than rural students by as much as 20 percentage points (Haderlein et al., 2021).
- Math declines in 2021 ranged from 32% points in Massachusetts to 4% points in Idaho and Wyoming, demonstrating differences by state (Halloran et al., 2023).
- Academic regression was higher in lower-income and minority districts and in districts which remained remote or hybrid for longer during the 2020-21 school year (Fahle et al., 2023).

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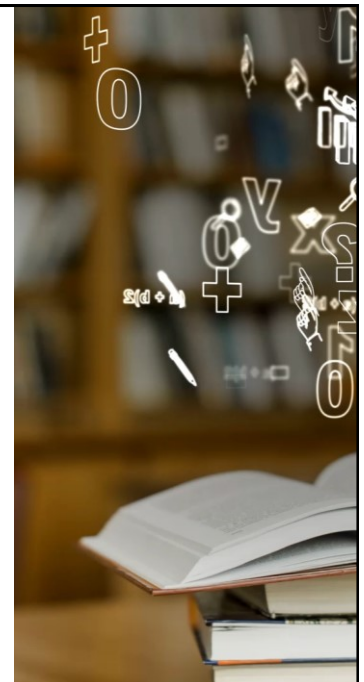
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Important Findings of COVID Regression

- Learning losses are not driven by differences in family resources, but by differences in district and community-level factors (Fahle et al., 2023). In short, school poverty more strongly predicts performance and progress during the pandemic (Schweig et al., 2022).
- Learning losses associated with remote and hybrid instruction were larger in communities with higher employment rates. These suggest that remote learning may have been particularly difficult when adults were less able to help students (Fahle et al., 2023).



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What Now?

- Local education agencies (LEAs) must develop human resources to provide supports to students and schools in need (Schweig et al., 2022).
- Districts need to make concerted investments and financial allocation to enhance student learning over the coming years (Fahle et al., 2023).
- Some controversial measures may need to be taken, such as adding an extra period of math or reading instruction or extending the school year (Fahle et al., 2023).

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ONGOING COVID-19 Implications on Students

- Remote Instruction
- Severe Staff Shortages
- Absenteeism
- Quarantines
- Mental Health Issues
- Increased Violent Behaviors
- **Significant Loss of Instruction**

COMMENTARY

The pandemic has had devastating impacts on learning. What will it take to help students catch up?

Megan Kuhfeld, Jim Soland, Karyn Lewis, Emily Morton
March 3, 2022



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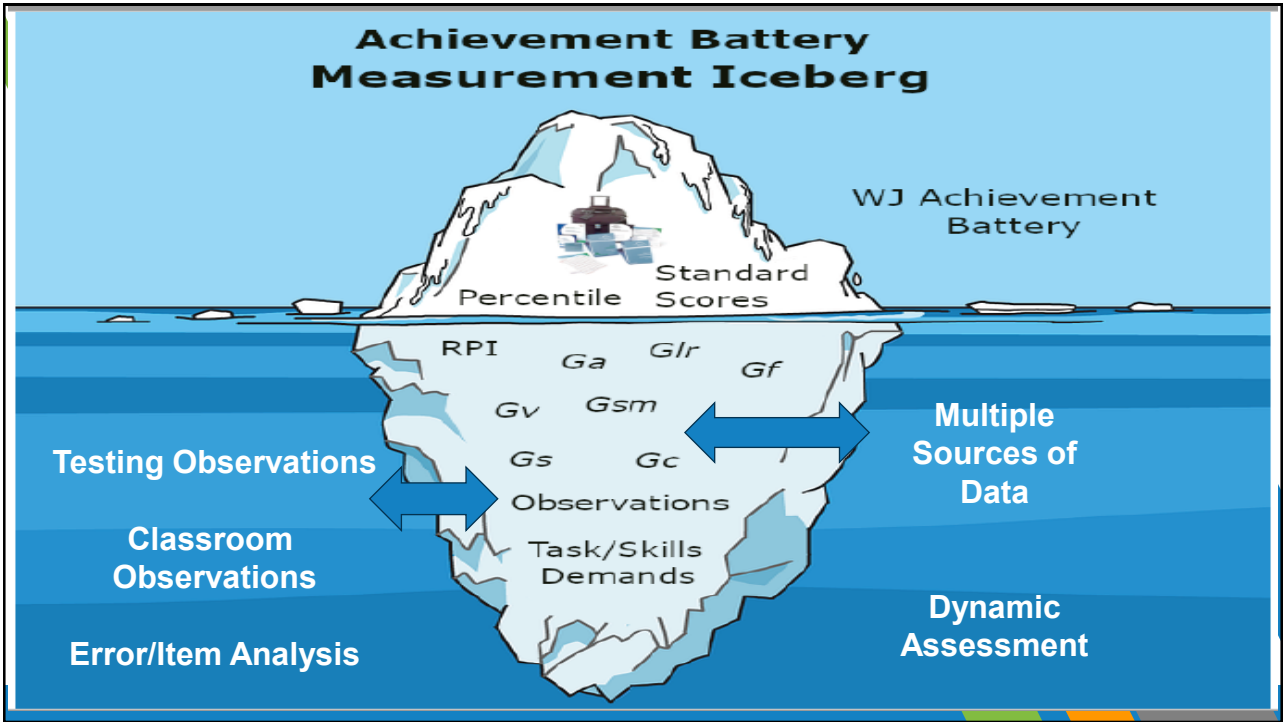
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What Can Teachers & Evaluators Do to Pinpoint Specific Weaknesses & Facilitate Growth in Academic Learning?



Fully Exploit Data from NRT



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Investigating Beyond the Standard Score to Inform Instruction - Wally

Woodcock-Johnson IV Tests of Achievement Form A (Norms based on age 12-5)

CLUSTER/Test	W	AE	RPI	Proficiency	SS (95% Band)
READING	498	10-1	66/90	Limited	88 (82-94)
Letter-Word Identification	506	11-0	77/90	Limited to Average	94 (87-101)
Passage Comprehension	490	8-11	53/90	Limited	81 (70-91)
MATHEMATICS	485	9-0	29/90	Limited	76 (69-83)
Applied Problems	488	9-1	42/90	Limited	81 (72-90)
Calculation	483	9-0	19/90	Very Limited	76 (68-84)
WRITTEN LANGUAGE	495	9-8	58/90	Limited	85 (79-91)
Spelling	506	10-10	72/90	Limited to Average	92 (85-99)
Writing Samples	484	8-2	43/90	Limited	79 (70-88)

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Investigate Student's Intact Skills vs. Skill Weaknesses Using Item Analysis

Get the MOST out of Using Norm-Referenced Standardized Tests

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What is Item Analysis

- **Item analysis** is the process of investigating student's correct and incorrect responses on test items to pinpoint areas of strengths and weaknesses.
- Should be used with other data sources to inform instructional programming (e.g., interventions or goals/objectives)
- Provides a more in-depth understanding of specific skill deficits than can be obtained using a standard score alone

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Using Item Analysis to Inform Instruction

Benefits

- Identifies strengths and weaknesses in academic skills
- Provides specific data with regards to where interventions/instruction should target
- Provides further support when establishing patterns of strengths and weaknesses

Disadvantage

- Time consuming when item/error analysis is done by hand



Item Analysis – Applied Problems (Wally)

Simple division
Simple division



multiplication
multiplication



Time lapse
Simple division
probability



Multiplication
Probability
Median
Percentages
fractions



Test 2 Applied Problems

8 items: 6 lowest correct
5 items: 5 highest incorrect

Score 1.0

1	1 finger
2	2 hands
3	2 bananas
4	2
5	1
6	3
7	2
8	1
9	3
10	2
11	2
12	5 dots
13	3
14	2
15	4
16	7:00 and 2:00
17	5
18	7
19	4
20	5
21	pencil and candy
22	2
23	10 cents
24	2
25	12
26	5
27	4
28	50 cents
29	6
30	14
31	2
32	90
33	280
34	9
35	5
36	4
37	4
38	3
39	16
40	\$6.75
41	3.00
42	2 cup
43	4
44	200
45	100 dollars
46	8
47	6

48	6.4
49	24
50	12 minutes
51	90.3
52	2
53	415 dollars
54	$y = 4 - 2x$
55	between $5\frac{1}{2}$ and 6 inches
56	$16\sqrt{3}$ square inches

Number Correct (0-56)

Qualitative Observation

On Applied Problems, which of the following best characterizes the individual's performance? (Mark only one response.)

- 1. Solved problems with no observed difficulties (good comprehension and analytical abilities)
- 2. Solved initial problems with no observed difficulty but demonstrated increasing difficulties solving the latter items (typical)
- 3. Appeared to have limited understanding of grade- or age-appropriate math application tasks
- 4. None of the above, not observed, or does not apply

Whisper to self a lot.



Item Analysis – Calculations (Wally)

Simple 1-digit addition →

2-digit subtraction w/o regrouping →

Simple division →

→
Addition w/regrouping decimals
Subtracting simple fractions
Division with decimals
Addition of simple fractions
division

Test 5 Calculation

Base: 6 lowest correct
Ceiling: 6 highest incorrect

Score 1, 0

A 1
B 3

1	4
2	3
3	7
4	2
5	7
6	5
7	9
8	5
9	1
10	10
11	9
12	4
13	11
14	6
15	11
16	3
17	16
18	16
19	76
20	20
21	15
22	0
23	68
24	3,148
25	2
26	3
27	91
28	384
29	84
30	11,305
31	3
32	\$5.30
33	2
34	51
35	4
36	1
37	51
38	-112
39	30
40	343
41	28
42	$\frac{36}{3}$

43	2
44	$\frac{3}{4}$
45	10
46	10
47	5040
48	Slope = 3 and y-intercept = -4
49	1
50	60°
51	-4
52	30
53	360
54	10
55	2000x
56	$15 \sin^2(5x - 3) \cos(5x - 3)$
57	$x_1 = \frac{\pi}{3} + k\pi$ where $k \in \mathbb{Z}$ and $x_2 = \frac{2\pi}{3} + k\pi$ where $k \in \mathbb{Z}$

Number Correct (8-57)
Qualitative Observation
On Calculation, which of the following best describes the rate and automaticity of the individual's performance? (Mark only one response.)

- 1. Worked too quickly
- 2. Solved problems quickly with no observed difficulties (fluent and automatic)
- 3. Solved initial problems quickly with no observed difficulties but demonstrated less automaticity with the latter items (typical)
- 4. Solved problems slowly and demonstrated less automaticity with the latter items
- 5. Worked very slowly and relied on use of strategies that appeared to be inefficient for age or grade level (nonautomatic)
- 6. None of the above, not observed, or does not apply



Streamlining the Item Analysis Process to Identify Strengths & Weaknesses with the WJ IV ACH & The WIIP



WJ IV Interpretation and Instructional Interventions Program (WIIP)

What is it?

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WJ IV Interpretation and Instructional Interventions Program (WIIP)

More than ever, the identification of learning gaps require we take a deeper look at the skill deficits students have and provide appropriate instruction to help close the gaps.



Created to meet practice needs linking WJ IV assessment results with instructional interventions



Created out of a need for enhancement and quality changes to a student's educational programming.



Legal and regulatory mandates designed to improve educational outcomes
NCLB, 2001
IDEA, 2004

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WJ IV Interpretation and Instructional Interventions Program (WIIP)



Helps educators meet legal and regulatory mandates



Supports a widely used, comprehensive assessment (WJ IV Suite of Assessments: COG, OL, ACH, and ECAD)



Provides evidence-based interventions based on individual needs



Facilitates data-based decision making



WJ IV Interpretation and Instructional Interventions Program (WIIP)

Convenient web-based entry via Riverside Score

Increased number of interventions and accommodations (over 500 in the WIIP database)

Streamlined comprehensive report

Option to include more interpretive detail for tests and clusters

Dyslexia and ECAD report options

WJ IV Interpretation and Instructional Interventions Program (WIIP)

- Comprehensive report options
- Qualitative checklists
- Hundreds of formative and evidence-based interventions
- **Formative interventions for five ACH tests (over 400 in the WIIP database)**
- Interventions for oral reading errors

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Item Analysis Feature – WJ IV ACH


Available for five tests in the *WJ IV Tests of Achievement* Forms A, B, and C:

- **Letter-Word Identification**
- **Applied Problems**
- **Spelling**
- **Calculation**
- **Word Attack**

If error types are tallied for Test 8: Oral Reading, a formative intervention for each error type is available.

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Dashboard
Reports
Administration
Resources

WJ IV Tests of Achievement Form A and Extended

Name: Adam Sample Date of Birth: 08/18/2004 Age: 9 years, 4 months

School: Education: Organization:

Teacher: Occupation: Department: Use adjusted school year

Examiner: Date of Testing: 01/01/2014 Group ID: Grade: 4 . 4

Standard Battery

1. Letter-Word Identification	<input type="text" value="0"/>	<input type="button" value="Items"/>	<input type="text"/>
2. Applied Problems	<input type="text" value="0"/>	<input type="button" value="Items"/>	<input type="text"/>
3. Spelling	<input type="text" value="0"/>	<input type="button" value="Items"/>	<input type="text"/>
4. Passage Comprehension	<input type="text" value="0"/>	<input type="text"/>	<input type="text"/>
5. Calculation	<input type="text" value="0"/>	<input type="button" value="Items"/>	<input type="text"/>
6. Writing Samples	<input type="text" value="0"/>	<input type="text" value="a"/>	<input type="text"/>
7. Word Attack	<input type="text" value="0"/>	<input type="button" value="Items"/>	<input type="text"/>
8A. Oral Reading Items 1-5	<input type="text" value="0"/>	Errors:	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
8B. Oral Reading Items 6-10	<input type="text" value="0"/>	Errors:	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
8C. Oral Reading Items 11-15	<input type="text" value="0"/>	Errors:	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
8D. Oral Reading Items 16-20	<input type="text" value="0"/>	Errors:	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

Select items to enter item-level data

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Item Analysis for Informing Formative Instruction

Item-Level Data (1, 0) Requirement

Achievement Test 1 - Letter-Word Identification Item Data

<input type="text" value=""/>	1	<input type="text" value=""/>	10	<input type="text" value="0"/>	19	<input type="text" value=""/>	28	<input type="text" value=""/>	37	<input type="text" value=""/>	46	<input type="text" value=""/>	55	<input type="text" value=""/>	64	<input type="text" value=""/>	73
<input type="text" value=""/>	2	<input type="text" value=""/>	11	<input type="text" value="1"/>	20	<input type="text" value=""/>	29	<input type="text" value=""/>	38	<input type="text" value=""/>	47	<input type="text" value=""/>	56	<input type="text" value=""/>	65	<input type="text" value=""/>	74
<input type="text" value=""/>	3	<input type="text" value=""/>	12	<input type="text" value=""/>	21	<input type="text" value=""/>	30	<input type="text" value=""/>	39	<input type="text" value=""/>	48	<input type="text" value=""/>	57	<input type="text" value=""/>	66	<input type="text" value=""/>	75
<input type="text" value=""/>	4	<input type="text" value="1"/>	13	<input type="text" value=""/>	22	<input type="text" value=""/>	31	<input type="text" value=""/>	40	<input type="text" value=""/>	49	<input type="text" value=""/>	58	<input type="text" value=""/>	67	<input type="text" value=""/>	76
<input type="text" value=""/>	5	<input type="text" value="1"/>	14	<input type="text" value=""/>	23	<input type="text" value=""/>	32	<input type="text" value=""/>	41	<input type="text" value=""/>	50	<input type="text" value=""/>	59	<input type="text" value=""/>	68	<input type="text" value=""/>	77
<input type="text" value=""/>	6	<input type="text" value="1"/>	15	<input type="text" value=""/>	24	<input type="text" value=""/>	33	<input type="text" value=""/>	42	<input type="text" value=""/>	51	<input type="text" value=""/>	60	<input type="text" value=""/>	69	<input type="text" value=""/>	78
<input type="text" value=""/>	7	<input type="text" value="1"/>	16	<input type="text" value=""/>	25	<input type="text" value=""/>	34	<input type="text" value=""/>	43	<input type="text" value=""/>	52	<input type="text" value=""/>	61	<input type="text" value=""/>	70	<input type="text" value=""/>	79
<input type="text" value=""/>	8	<input type="text" value="1"/>	17	<input type="text" value=""/>	26	<input type="text" value=""/>	35	<input type="text" value=""/>	44	<input type="text" value=""/>	53	<input type="text" value=""/>	62	<input type="text" value=""/>	71	<input type="text" value=""/>	80
<input type="text" value=""/>	9	<input type="text" value="1"/>	18	<input type="text" value=""/>	27	<input type="text" value=""/>	36	<input type="text" value=""/>	45	<input type="text" value=""/>	54	<input type="text" value=""/>	63	<input type="text" value=""/>	72	<input type="text" value=""/>	81

Items left blank below the basal will be counted as correct for computing the raw score.

Raw Score

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Linking Assessment Results to Instructional Programming: Highlighting Skills Deficits Using Item Analysis

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Formative Interventions

Designed to improve day-to-day teaching and meet the specific needs of the student

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Formative Assessment is a process used during instruction to provide feedback which is used to adjust instruction.

Formative interventions provide item-level feedback after testing which can be used to address gaps in learning and differentiate instruction for specific student.

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Formative Interventions

Availability

Available for five tests in the *WJ IV* Tests of Achievement Forms A, B, and C:

- Letter-Word Identification
- Applied Problems
- Spelling
- Calculation
- Word Attack

If error types are tallied for Test 8: Oral Reading, a formative intervention for each error type is available.

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Formative Interventions

Other Information

- Generates formative intervention when unexpected error occurs
- Provides intervention for teaching specific skill or concept
- Based on sound teaching practices, but effectiveness is not necessarily backed by research as in evidence-based interventions

Unexpected Error: An incorrect response followed by one or more correct responses.

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Formative Interventions

Example 1

Test 1: Letter-Word Identification (*teaching closed/open syllables*)

John will benefit from learning about types of syllables. Review closed and open syllables with John. Explain that a **closed syllable** ends in a consonant and has a short vowel sound, whereas an **open syllable** ends in a vowel and has a long vowel sound. Present different, two-syllable words, some with closed syllables and some with open syllables. Write each word on the board and ask John to read each word aloud and draw lines or slash marks (/) between the syllables to divide it. Then ask John to underline the first syllable and tell you whether it is closed (ends on a consonant and has a short vowel sound) or open (ends on a long vowel sound).

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Formative Interventions

Example 2

Test 2: Applied Problems *(teaching simple multiplication word problems)*

Explain that multiplication helps us solve problems easily when groups are of equal size. Illustrate the principle using this example: Four children are playing tennis. Each child has five tennis balls. How many tennis balls are there altogether? Ask Missy to draw 4 children using stick figures and then to draw 5 tennis balls by each child. Point out that there are 4 groups of equal size in this problem, which can be represented by writing 4×5 . Present additional simple word problems requiring multiplication. Ask Missy to write a multiplication sentence for each problem. Remind her that she can draw pictures to help.

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WIIP Sample Results - Wally

Math Problem-Solving – Skills Deficit

Strategy instruction may improve Myles's ability to solve mathematical word problems. One simple strategy involves teaching Myles to

1. read the problem,
2. reread the problem to identify what information is given and to determine what he is trying to find out,
3. identify the operation to use and then use manipulatives to solve the problem,
4. write the numeric representation of the problem, and
5. solve the problem.

After teaching the steps to the strategy, provide Myles with a cue card that outlines the steps.

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WIIP Sample Results - Wally

Multiplication – Skills Deficit

Teach Myles the three properties of multiplication: commutative, associative, and distributive. The commutative property means that the product is the same regardless of the order of the multiplicands. For example, 2×3 results in the same product as 3×2 . The associative property deals with associating or grouping numbers in a problem. For example, in the problem $3 \times 2 \times 4$, Myles can first multiply (3×2) and then multiply that product by 4. Or Myles can multiply (2×4) first and then multiply that product by 3. Teach Myles that when three or more numbers are to be multiplied together, it does not matter which two are grouped together first. The distributive property means that the sum of two numbers times a third number is the same as the sum of each addend times the third number. For example, $(6 + 3) \times 4$ is the same as $(6 \times 4) + (3 \times 4)$. The distributive property also is helpful when Myles needs to decompose a multiplication problem into smaller problems that he understands. For example, he may not know 12×7 , but if Myles knows 10×7 and 2×7 , he can add those two products together to obtain the answer to 12×7 .



Summary

- The experiences related to COVID-19 has impacted student learning in traumatic ways – significant learning loss has been reported.
- Pinpointing exact skill deficits from the WJ IV Achievement will provide important details with regards to where instructional focus should be in order to remediate learning loss
- The WJ IV ACH and WIIP features streamline the investigation process and provide an efficient way to identify skill deficits and link them to formative instructional recommendations.
- Get the most information from the WJ IV tests by fully exploiting all information that can be gleaned from the test (e.g., testing observations, standard score, RPI, and item analysis) to ensure appropriate instructional programming.



Please take a few minutes to complete the survey



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