



The New Science of Vocabulary: How AI Can Support Language Learning

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TextProject

Overview: Using AI to....

Analyze

Analyze School Texts and Tasks



Select

Select Specific Words & Texts



Enhance

Enhance Explicit Vocabulary Instruction



1. Analyzing Vocabulary in School Texts



PHONEMIC AWARENESS

PHONICS

FLUENCY

VOCABULARY

COMPREHENSION

Oxford Unabridged Dictionary

- 282,500
root or head
words

- 326,000
derivatives &
phrases

- 47,150
obsolete
words

And this doesn't include the
multiple meanings of words.

Long-standing Approach in Selecting Words to Teach: “Cherry-picking”

slender

gallant

chimed

preparations

flickered

concluded



slender
gallant
chimed
preparations
flickered
concluded

Research on the efficacy of “cherry-picking vocabulary”:

- on comprehension (Wright & Cervetti, 2017)
- on vocabulary (beyond taught words) (Cervetti et al. (2023)

AI & Shifts in Opportunities for Vocabulary Learning

Available Corpora

(Large Collections of Words
from Texts)

1st Corpora for educators : *Thorndike's Teacher's word book*, based on 5 million words from the *Bible*, *Farmer's Almanac* and some children's books like *The Secret Garden*)

THE TEACHER'S WORD BOOK

By EDWARD L. THORNDIKE
Professor of Educational Psychology, Teachers College
Columbia University

Second Edition
January, 1927

PUBLISHED BY
Teachers College, Columbia University
NEW YORK CITY
1921

A to Acre					
a	208	1a1	abuse	21	3b
Aaron	6		abyss	9	
abandon	17	4a	academy	9	
abash(ed)	4		accent	14	4b
abate	10	5b	accept	47	2a
abbey	9		acceptance	9	
abbot	7		access	11	5b
abdomen	5		accessory	4	
Abe	3		accident	26	4a
abed	5		accidental	5	
Abel	5		accommodate	10	5b
abhor	14	4b	accommodation	8	
abide	18	4a	accompaniment	3	
ability	16	4a	accompany	34	2b
abject	7		accomplish	31	2b
able	70	1b	accomplishment	5	
aboard	15	4b	accord	16	4a
abode	17	4a	accordance	8	
abolish	10	5b	according	48	2a
abominable	9		accordingly	20	3b
abomination	5		accost	5	
abound	10	5b	account	63	1b
about	172	1a1	accumulate	3	
above	101	1a3	accurate	3	
Abraham	14	4b	accursed	13	5a
abridge	4		accusation	8	
abroad	23	3a	accuse	22	3b
abrupt	7		accuser	5	
absence	22	3b	accustom	26	3a

Corpora of School Text Available in 2020s

- TASA database (Zeno et al., 1995): Contains \approx 17 million words from Grade 1-college texts with grade-level data
- TextProject's TextBase: Consists of \approx 9 million words from trade books and content area, leveled, and decodable texts. Words are distributed across 6 grade bands:
 - K-1: 750,00
 - 2-3: 1,750,000
 - 4-5: 1,650,000
 - 6-8: 1,765,000
 - 9-10: 1,260,000
 - 11-College-and-Career Reading: 1,750,000

AI & Shifts in Opportunities for Vocabulary Learning

**Available Databases of
Word Features**

Word Zone Profiler, 2000

Word	High Frequency	Count	Decodability
a	HF	54	1
all	HF	3	6
and	HF	12	3
around		1	8
backpack		3	8
bark		1	6
bat		1	2
be	HF	2	1
bear		2	5
bears		1	5
bell		1	6
bet		1	2
big		1	2
bird		3	6
blue		1	5
book		1	7
boy		1	7
brown		1	7
bug		1	2
butterflies		1	8
butterfly		7	8

Word	Frequency	Word Length	UFunction	WordZone	Supercluster	Megacluster	Age of Acquis	Dispersion	Complex Moi	Number Mor	Academic Vo	Academic Vo	Family	Rime Family	POS	Mean Concrete
a	54	1	24070	1	3i.1	10	2.893384	0.9982	24070	1					Article	1.46
all	3	3	3370	1	3g.3	10	4.239515	0.993	3370	1			all o	5	Determiner	2.27
and	12	3	27594	1	27b.1	8	4.569882	0.9972	27594	1			and a	11	Conjunction	1.52
around	1	6	812	2	2x.6	6	5.944635	0.9488	970.8567	9			N/A		Adverb	1.96
backpack	3	8	1	7	22a.10	12	5.38	0.5716					N/A		Noun	4.96
bark	1	4	33	4	19d.1	2	5.17	0.7438	48.0554	6			N/A		Noun	4.52
bat	1	3	16	5	34c.2	13	4.85	0.7618	36.6359	9			at a	8	Noun	5
be	2	2	5272	1	50a.1	14	5.11	0.9733	36725	9	633	4416	e		Verb	1.85
bear	2	4	122	3	4e.7	11	3.58	0.7342	175.3104	18			ear e	22	Noun	4.88
bears	1	5	122	3	4e.7	11	3.58	0.7885	175.3104	18			ear e	22	Noun	4.88
bell	1	4	58	4	19b.2	2	3.89	0.8452	69	3			ell e	37	Noun	4.96
bet	1	3	17	5	42c.4	4	7	0.4367	19	3			et e	36	Verb	3.1
big	1	3	517	2	3a.3	10	2.89	0.8135	598.5284	6			igi	73	Adjective	3.66
bird	3	4	121	3	4j.1	11	3.52	0.7461	222.457	7			ird er	N/A	Noun	5
blue	1	4	162	3	58a.1	10	3.53	0.856					ue u	85	Adjective	3.76
book	1		290	3	15c.1	13	3.68	0.9521	480.2457	11			ook u	32	Noun	4.9
boy	1		292	3	9c.1	5	3.67	0.7393	513.7697	7			oy oi	86	Noun	4.76
brown	1		128	3	58a.1	10	4.196887	0.8545					ow ow	7	Name	4.48
bug	1		13	5	4k.1	11	3.79	0.5543		5			ug U	N/A	Noun	5
butterflies	1			6	4k.1	11	3.67	0.6488					N/A	N/A	Noun	4.93
				6	4k.1	11	3.67	0.7162					N/A	N/A	Noun	4.93

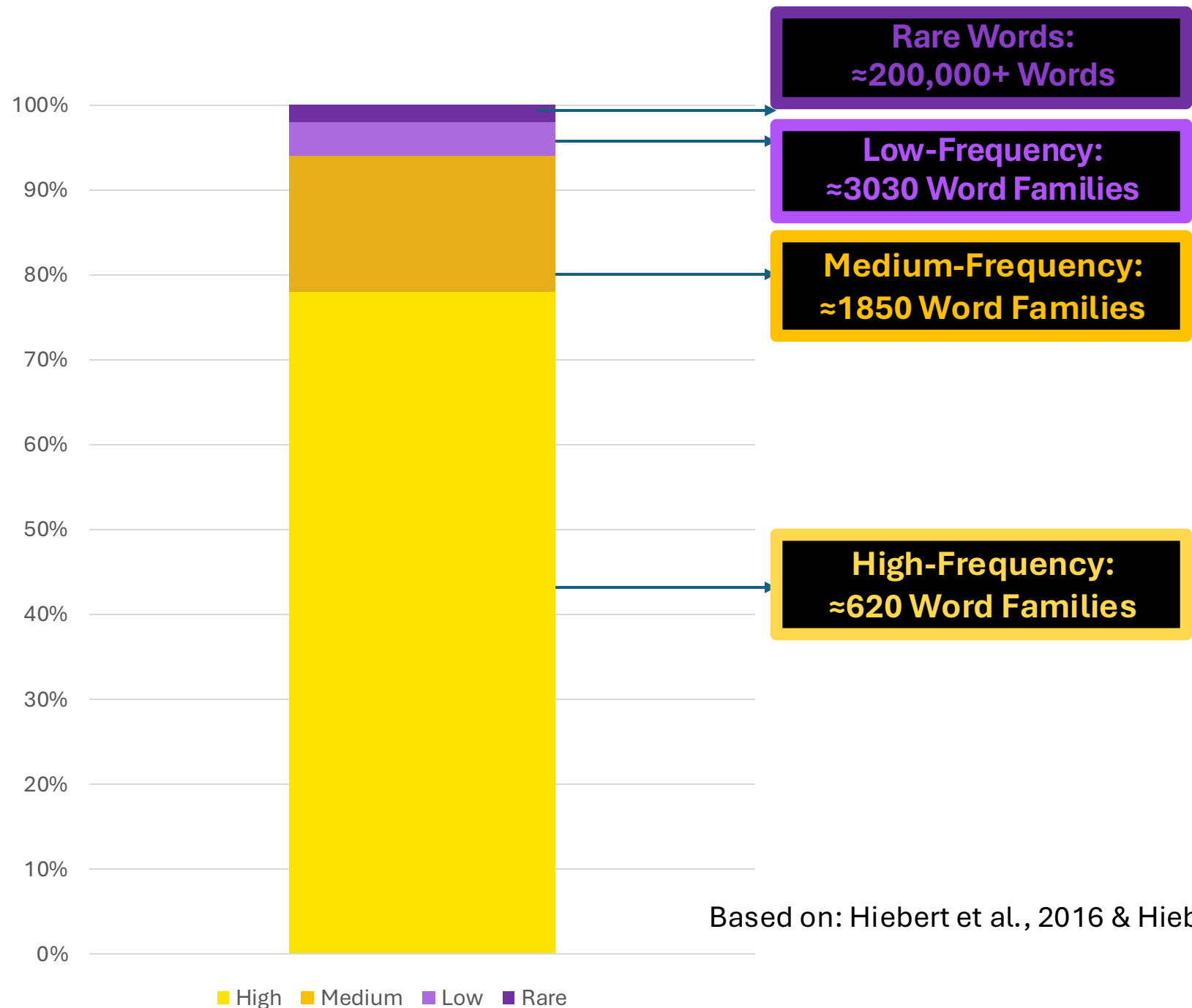
Word Zone
Profiler, 2020

Word	Freq_HAL	AoA_Kuper	AoA_LWV	AoA_Glasgow	Freqtraj_TASA	Cumfreq_TASA	DPoS_Brys	NLett	OLD20	OLD20F	Orth_N	Orth_N_Freq	Orth_N_Freq_G	Orth_N_Freq_G_Mean	Orth_N
	16.177	2.893384	2.01871		0.185579101	10.10967809	Article	1	1.45	9.831	5	13	0		
ill	14.346	4.239515	3.48872969	1.807	-0.19898142	7.912225988	Determiner	3	1.2	8.693	9	6.8	0		
and	16.187	4.569882			0.318048484	10.19212895	Conjunction	3	1.25	9.101	11	9.4	0		
backpack	7.567	5.38			-1.88449054	-1.355794054	Noun	8	3	5.872	0				
bat	8.775	4.85	4.68593011	2.922991657	-1.79491442	1.342308296	Noun	3	1	9.45	26	9.1	15	10.6	
years	9.031				-0.97922601	2.735553143	Noun	5	1.1	7.727	20	7.5	2	10.9	
bet	10.306	7	6.78685054		-2.24244546	1.662282169	Verb	3	1	10.158	21	10	9	12.2	
big	12.093	2.89	2.83	563	-1.50526193	5.736890943	Adjective	3	1.1	8.74	19	8.5	0		
bird	9.856	3.52	3.72	2.097	-1.35181422	3.957040527	Noun	4	1.75	8.476	5	6.6	0		
blue	11.396	3.53	3.3	1.882	-0.89060314	4.368437232	Adjective	4	1.75	7.722	6	6.3	0		
boy	10.665	3.67	2.99	1.424	-1.35398419	5.011019009	Noun	3	1	8.508	20	8.4	3	11.6	
comp	10.846	4.106887	2.91	1.339	-0.84037152	4.090860612	Name	5	1.6	7.882	8	6.9	0		
					-2.08833269	1.365572612	Noun	3	1.05	8.434	20	8.5	4	12.2	
					0.95169584	0.509089712	Noun	11	4.4	5.45	0				
					0.4595	0.707422968	Noun	9	3.25	5.577	0				

SCOPE, 2024

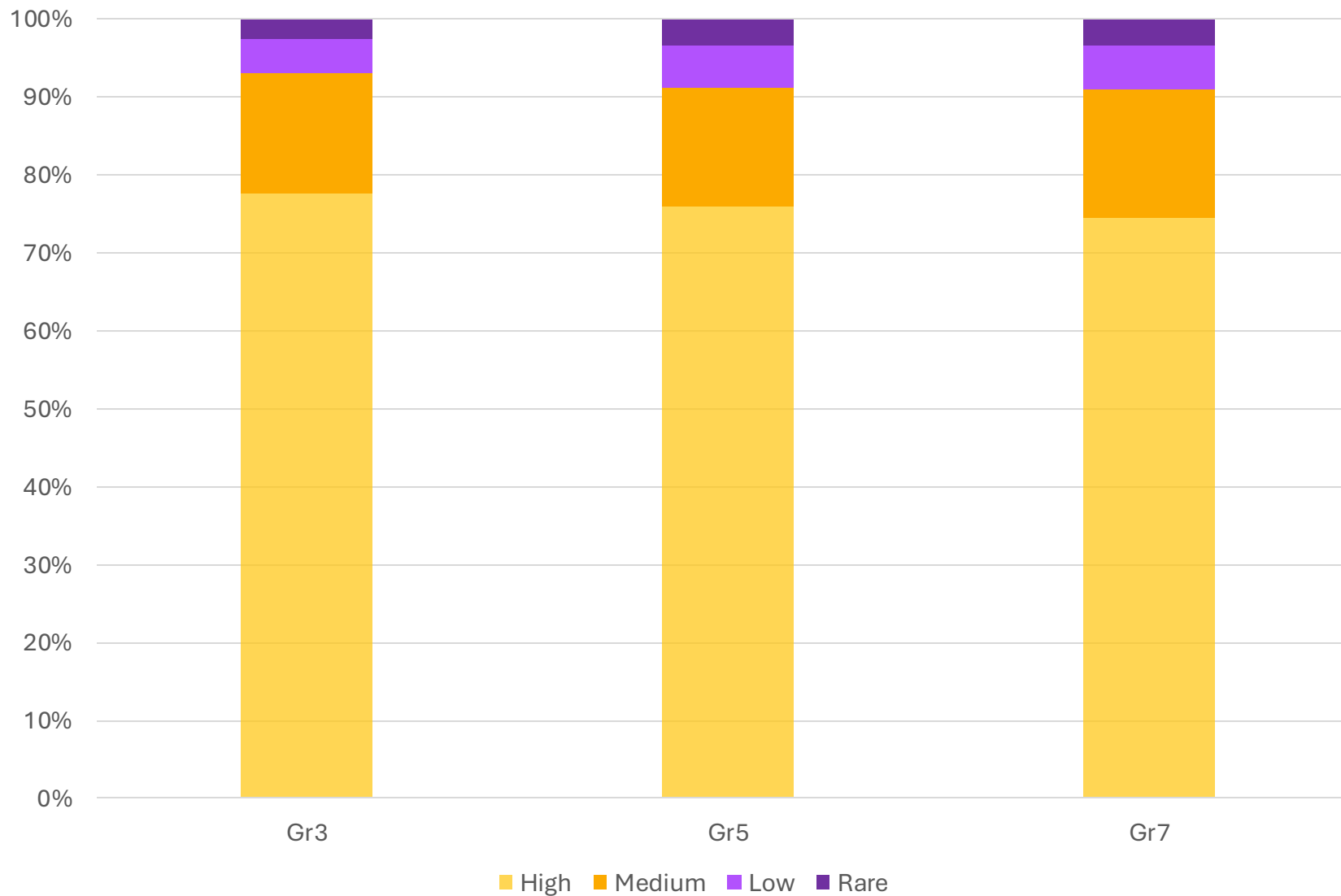
0	ba'te-flaj,	4.93	6.452	6.765	6.37	5										
11765	kae'n	4.55			3.63	8										
157.7375		174.163	655	256	1617	616	10	1	0.6	0.529	12	8.523	0.9			
119.5593333		148.221	543	275	2325	925	20	2.2	0.35	0.011	6	6.23	0.011262728			
98.0575		105.545	701	143	1442	288	16	1.94	0.75	0.212	18	8.237	0.98			
32.702		35.488	11	8	45	33					0		0.9			
108.66		124.58	200	40	483	115	20	2.15	0.2	0.076	0		0.9			
81.3715		95.041	357	97	950	279	20	1.95	0.58	0.12	19	9.786	0.89			
0.429195	0.465329232	0.435940449	0.985815603	0.006918239	1	0.035532995	0.952380952	0.596129558	0.999346405	0.258823529	0.010463862					
1	0.251485917	0.512246239	1	0.030660377	1	0.238095238	0.820512821	0.617853687		0.294117647	0.011262728					
0.518858828	0.911330432	0.733133433	0.985815603	0.780530973	0.991967871	0.714285714	1	0.894520032	0.999346405	0.336091453	0.935606061					
0.294171745	0.37104175	0.50583686	0.91517478	0.573636597	0.863303438	0.848158131	0.552828359	0.750620261	0.701366249	0.285486903	0.874588705					
0.45623436	0.441891875	0.571463014	0.91517478	0.536628932	0.998832786	0.848158131	0.541707435	0.768100413	0.701366249	0.311862529	0.959091111					
0.978628837	0.992299186	0.967598598	0.893358634	0.481889205	0.931099476	0.559027778	0.74267101	0.72160922	0.91953125	0.99511122	0.962962963					

Word Distribution in School Texts



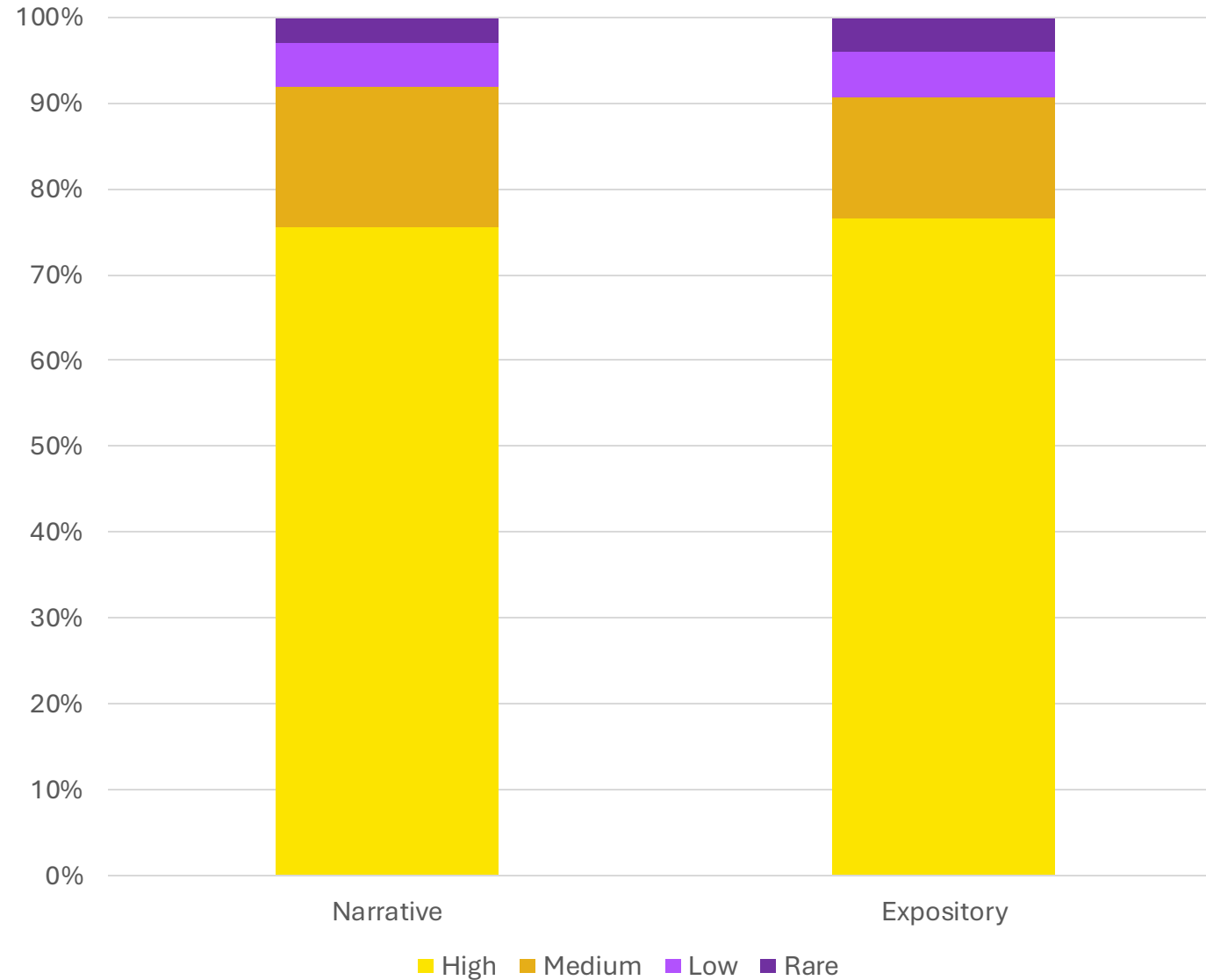
Based on: Hiebert et al., 2016 & Hiebert, 2024

Word Distribution by Grade Levels

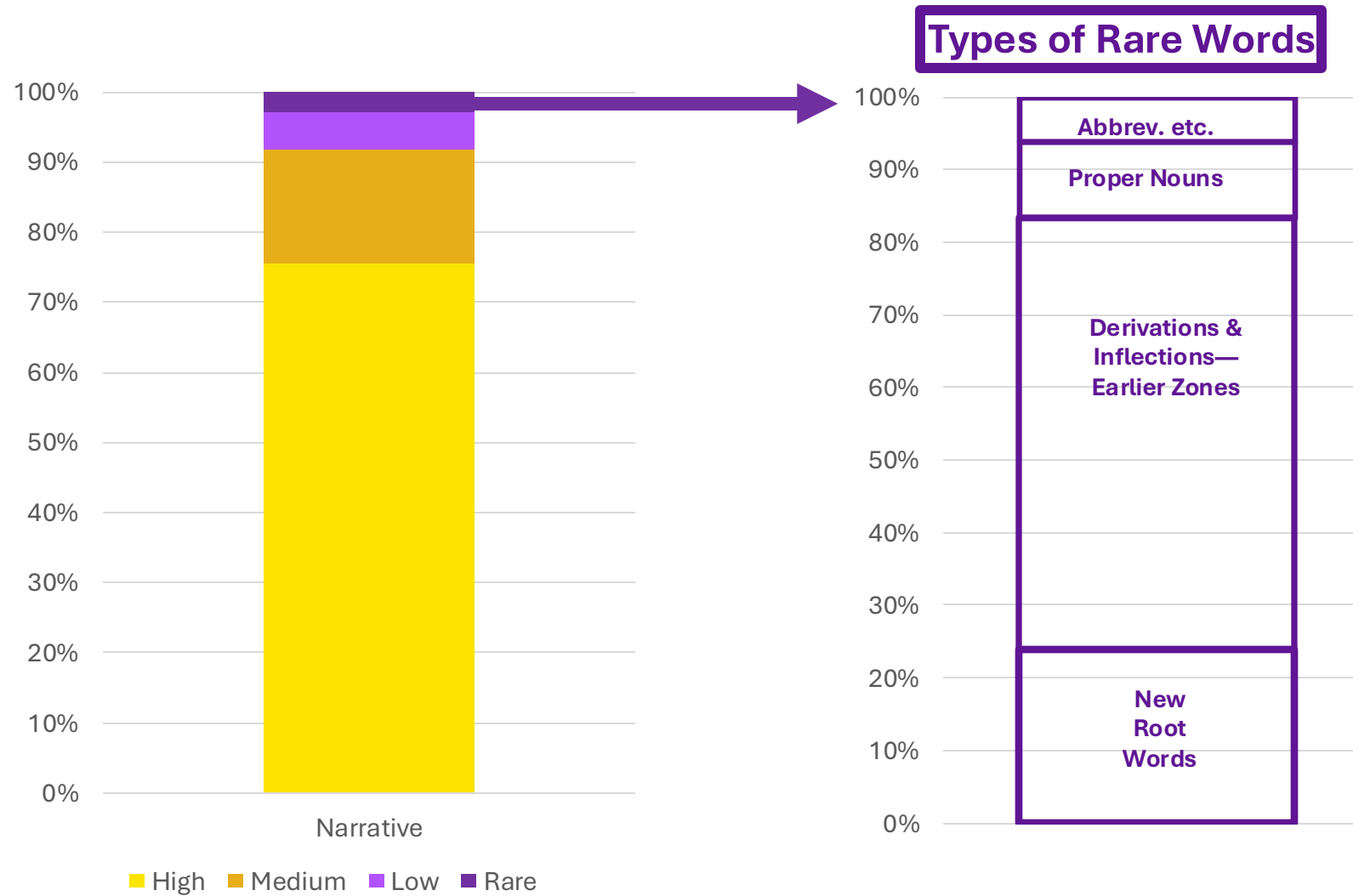


From Hiebert et al. 2024

Word Distribution by Genre (Gr.5)



Word Distribution: Types of Rare Words (Narrative, Gr.5)

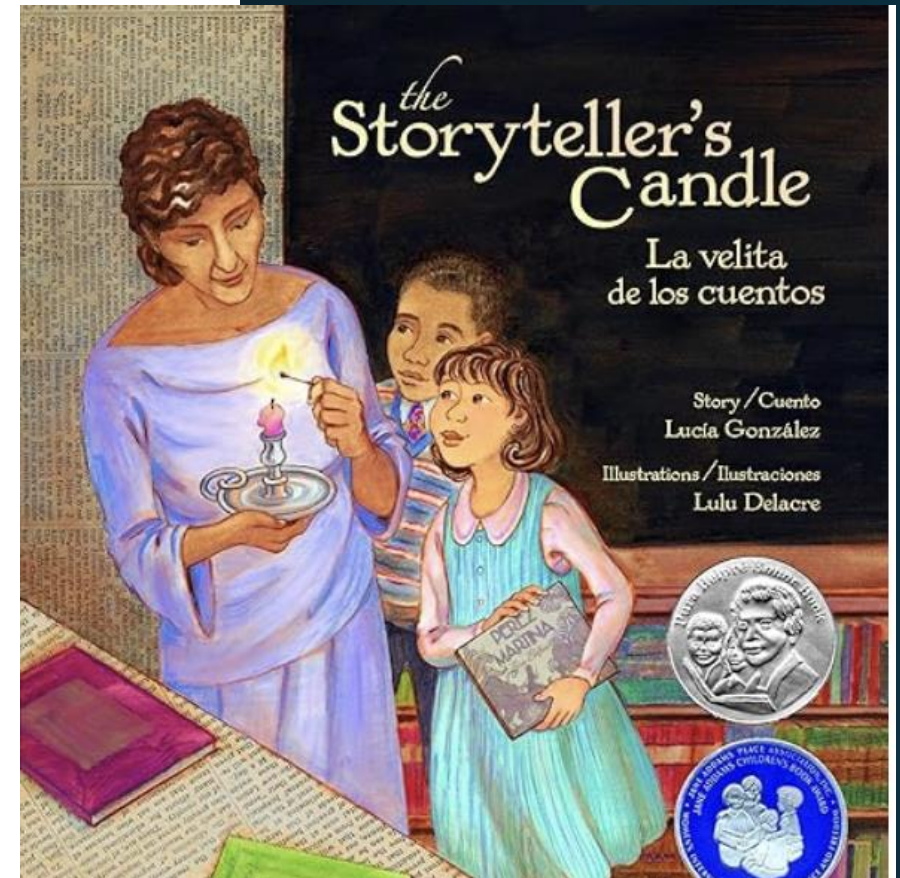




2. Using AI to Select Specific Words & Texts

Using Findings from Research on Word Features to Select the Words to Teach: An Alternative to Cherry Picking Vocabulary

- slender
- gallant
- chimed
- preparations
- flickered
- concluded



Support from AI: Questions & Specifications

FH: Claude, I'm a third-grade teacher. Many of my students are not at the level of vocabulary required for strong comprehension. I'm working with a story entitled The Storyteller's Candle. The story is about a librarian creating a celebration for an immigrant community on an important holiday. I've picked out some of the words in the story that may be challenging for my students.

Can you help me in identifying **which of these words are ones that may be challenging** for students but **are also words that will extend beyond third grade and support their reading in the middle grades and beyond:**

announcement, parade, chimed, characters, costumes, applause, gallant, fiesta, preparations, event, rehearsed, donations, celebrated, decorations. **I also want to help my students' background knowledge on the topic of what is part of a performance like a play.**

Let me help analyze these words from multiple angles - their long-term academic value, their role in building knowledge about performances, and their importance to the story itself.

First, let's look at the publisher's selected words:

- "slender" - Limited academic utility, mainly descriptive
- "gallant" - Literary word but limited modern use
- "chimed" - Specific to sound, limited academic use
- "preparations" - ✓ HIGH VALUE - used across subjects and contexts
- "flickered" - Specific to light/movement, limited academic use
- "concluded" - ✓ HIGH VALUE - important for academic writing and reading

Now, from your additional words, here are the most valuable ones for long-term academic success:

1. "announcement" - ✓ HIGH VALUE - formal communication across contexts
2. "event" - ✓ HIGH VALUE - used across all subjects
3. "preparations" - ✓ HIGH VALUE (overlaps with publisher list)
4. "celebrated" - ✓ HIGH VALUE - cultural and historical contexts
5. "donations" - ✓ HIGH VALUE - civic and social studies contexts

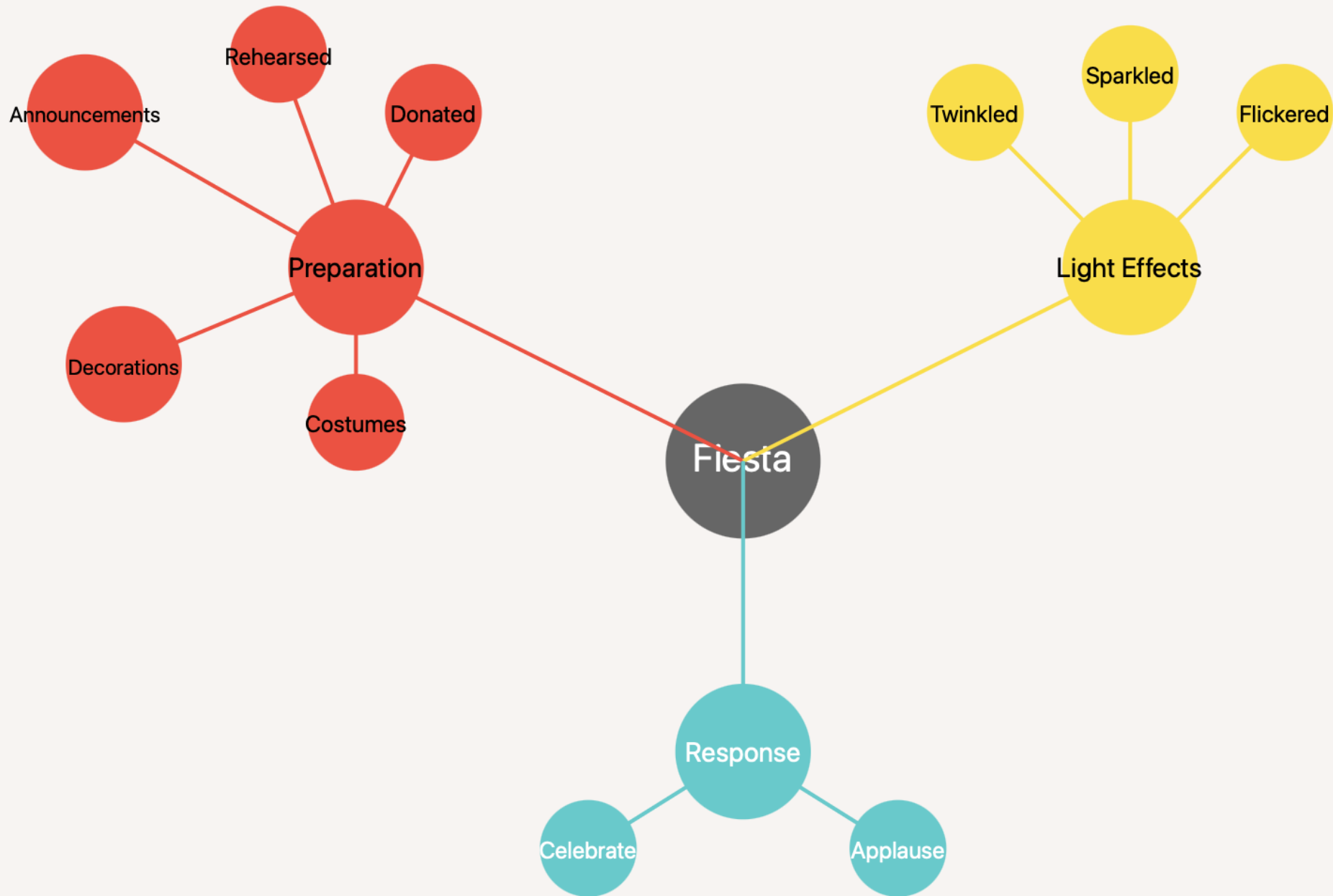
For building knowledge about performances, these words form a crucial conceptual cluster:

1. "rehearsed" - Understanding performance preparation
2. "characters" - Understanding story elements and roles
3. "costumes" - Understanding visual representation
4. "applause" - Understanding audience participation
5. "decorations" - Understanding setting creation

Cultural celebration vocabulary that builds background knowledge:

1. "fiesta" - Understanding cultural celebrations
2. "celebrated" - Understanding commemoration
3. "event" - Understanding organized gatherings

AI's Graphic Representation of the Vocabulary

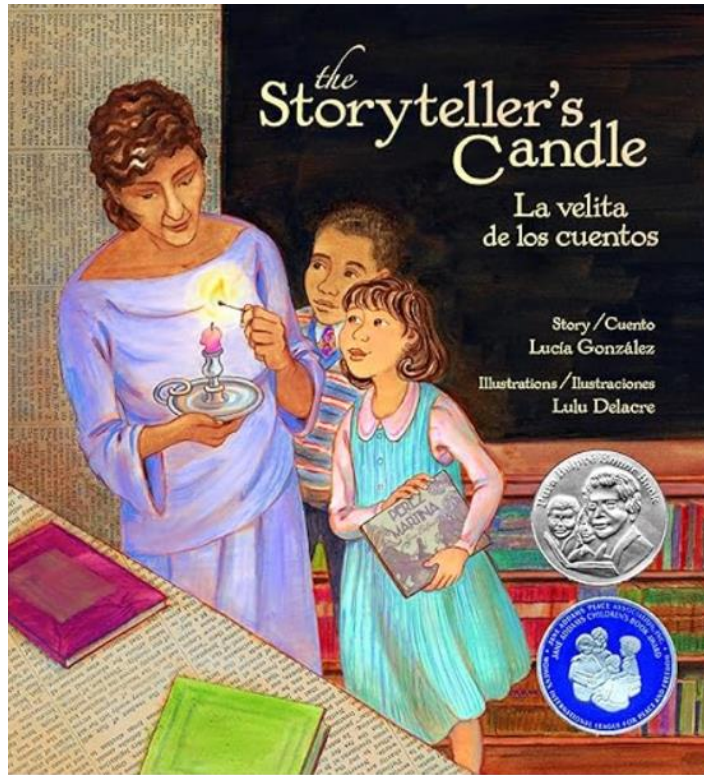




3. Using AI to Enhance Explicit Vocabulary Instruction

Additional Opportunities with Story Vocabulary

(The Storyteller's Candle)



	Original Text (Storyteller's Candle)
announcement	2
applause	1
celebrated	1
costumes	2
decorations	1
donated	1
fiesta	2
preparations	3
rehearsed	1

Activity 1: Generating Additional Texts with Target Vocabulary

FH

Can you write a story of 500 words about a fiesta that includes the words rehearsed, announcements, donated, preparation, decorations, costumes, celebrate, applause. The story is for third graders who aren't the greatest readers. If you can repeat the listed words (including using morphological relatives), that would be great.



The decorations for the fiesta made the school gym look like magic.

The Best Fiesta Ever

Maria could not wait for her school's big fiesta. For weeks, her class had rehearsed their special dance. Now they knew every step by heart.

On Thursday, Mrs. Rodriguez made her final announcement to the class: "Remember, tomorrow is our spring fiesta!" Everyone cheered at the end of the announcement.

Early on Friday morning, preparations began. Maria and her friends helped with the preparations by hanging ribbons and balloons. Next it was time to put on the costumes that the students and their families had made. Maria loved her costume, which was a beautiful red dress that sparkled when she spun around.

The gym soon filled with family and friends who had come to celebrate. Maria's heart was racing, but she remembered how much they had rehearsed. She knew they were prepared.

The music started. Maria's class danced just like they had rehearsed. When the dance ended,

the applause was so loud it made Maria's heart swell with pride.

After the performance, the fiesta continued. Families had donated food to make the party even more of a celebration. Tables were filled with these donations: tacos, rice, beans, cookies, and cakes. The decorations seemed to shine even brighter as everyone enjoyed the feast.

"This is the best fiesta ever!" Maria thought as she looked at all the happy faces, the beautiful decorations, and her friends in their costumes.

At the end of the party, Mrs. Rodriguez announced: "Thank you to everyone who helped make this fiesta so special. Your donations, preparation, and hard work made this a day we will never forget!"

As Maria left the fiesta, she knew she would always remember how it felt to dance in her shiny costume, see all the pretty decorations, and hear that wonderful applause. This had been the best celebration ever!



The Best Fiesta Ever

FH

Can you write a story about third graders putting on a play? Include the words applause, rehearsed, decorations, announcements, and costumes--repeating these words or morphological family members (e.g., applause, applaud; rehearse, rehearsal) at least two times each. The text is intended for third grade students who are not the greatest readers. Can you make the text at least 450 words and make it engaging so that an unmotivated student will want to reread it.



The third graders wore animal costumes for their big show.

The Dancing Zoo Animals

Today was an exciting day for me at school. Our third-grade class put on the play “The Dancing Zoo Animals.” For two weeks, we had daily rehearsals to learn our parts for the play. Mrs. Cooper, our teacher, made an announcement before the play began: “Remember, we’ve rehearsed this many times. You are all well prepared for the performance!”

But all of us were too busy looking at one another’s costumes to be worried. Jake had the part of an elephant and his costume was gray with big floppy ears. My penguin costume was black with a very big white bowtie. Sofie’s costume was the tallest of all. That’s because she was a giraffe.

We had all helped make the decorations for the play. The stage on the gym was filled with paper trees and big boxes. We had painted them to look like rocks. We had also strung up lights which made the decorations sparkle.

Finally, the gym was full of our families and friends. The music started. We all danced out onto the stage just like we had practiced in rehearsals.

Jake’s elephant trunk made everyone laugh as he pretended to spray water at the audience. When Sofia the giraffe pretended to eat leaves from the paper trees, all the visitors laughed again. My favorite part was when I and the other four penguins waddled in a line and then did a slide move that we had rehearsed.

At the end of the show, everyone in the audience applauded. Some people in the audience even stood up to give us more applause! Mrs. Cooper made one last announcement: “You were great in rehearsals but your performance this afternoon was even greater.”

After the show, we had cookies and juice in our classroom. We were getting hot inside our costumes. But no one wanted to take off their costumes. We were enjoying the celebration of our success!



The Dancing Zoo Animals

Repetition of Vocabulary in Texts

	Original Text (Storyteller's Candle)	Best Fiesta	Dancing Animals	Total Repetitions
announcement	2	3	2	7
applause	1	2	2	5
celebrated	1	3	1	5
costumes	2	4	6	12
decorations	1	3	2	6
donated	1	3	1	5
fiesta	2	7		9
preparations	3	5	3	11
rehearsed	1	3	5	9

Activity 2: Generating Semantic Grids

FH Can you make a semantic grid with the words flickering, sparkled, twinkle and 5 other words that have varied degrees of intensity in the same semantic category. Can you ensure that 2 of the new words are ones that students who are not great third-grade readers can read?

FH Can you list the words with the most intense (blaze) at the top of the list and make the words in different colors (against a black background)--the most intense word in red.

blaze

flash

sparkled

gleam

flickering

shine

twinkle

glow

FH

Now can you make a semantic grid for words in the semantic family of the word announce. I want 7 words, 3 of which are ones that struggling third-grade readers can read.

shout*

proclaim

broadcast

announce

notify

tell*

say*

Activity 2b: Adding Morphological Families to Semantic Families

FH

Can you make a mind map of all of the morphological relatives for the word announcements.

announce

Verb Forms

announces
announced
announcing

Noun Forms

announcer
announcers
announcement
announcements

Re- Forms

reannounce
reannounced
reannouncing
reannouncement

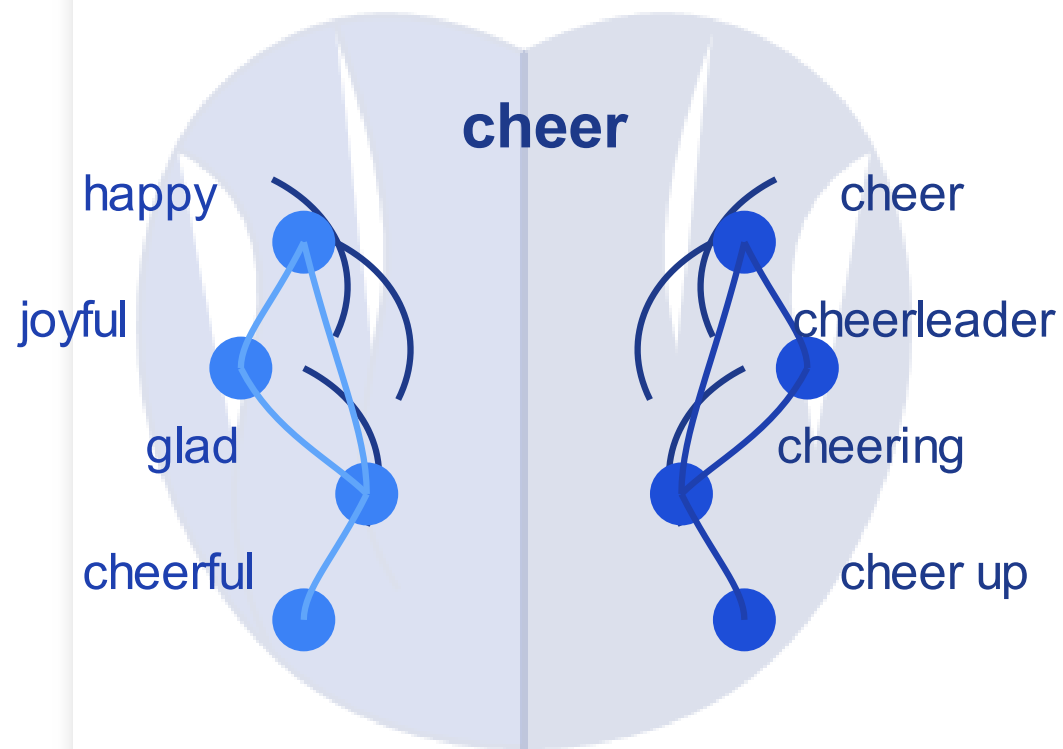
Pre- Forms

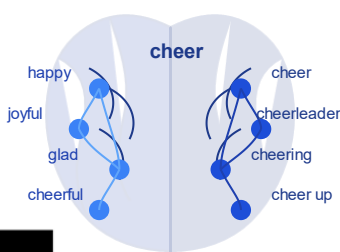
preannounce
preannounced
preannouncing
preannouncement

Un- Form

unannounced

My Neural Neighborhoods





My Neural Neighborhood: *The Storyteller's Candle*

broadcast

Verb Forms

broadcasts
broadcasted
broadcasting

Noun Forms

broadcaster
broadcasters
broadcast
broadcasts

Re- Forms

rebroadcast
rebroadcasts
rebroadcasted
rebroadcasting

shout*

proclaim

broadcast

announce

notify

tell*

say*

proclaim

Verb Forms

proclaims
proclaimed
proclaiming

Noun Forms

proclaimer
proclaimers
proclamation
proclamations

Ex- Forms

exclaim
exclaimed
exclaiming
exclamation
exclamations

announce

Verb Forms

announces
announced
announcing

Noun Forms

announcer
announcers
announcement
announcements

Re- Forms

reannounce
reannounced
reannouncing
reannouncement

Pre- Forms

preannounce
preannounced
preannouncing
preannouncement

Un- Form

unannounced

notify

Verb Forms

notifies
notified
notifying

Noun Forms

notifier
notifiers
notification
notifications

Pre- Forms

prenotify
prenotified
prenotifying
prenotification

Activity 3: Assessing Students' Vocabulary and Automaticity

The School Play

The school play was coming soon! Every day after lunch, the ____ (crew, kids, staff) in Mrs. Smith's class rehearsed their ____ (books, songs, lines). Tom's dad donated snacks for ____ (everyone, nowhere, outside), and Zoe's mom helped make ____ (not, the, far) decorations for the stage. When ____ (new, old, the) big night came, all the ____ (students, writers, farmers) wore their costumes.

The principal ____ (took, made, kept) an announcement before the show ____ (walked, jumped, started): "Welcome to our winter ____ (test, play, game)!" The children acted out ____ (your, some, their) parts perfectly. At the end, ____ (one, the, few) crowd gave them loud applause.

____ (Since, After, Until) the show, the whole class ____ (searched, wandered, celebrated) with cookies and juice. Everyone agreed it ____ (felt, was, ran) the best play ever!

Target Vocabulary

fiesta

applause

donated

rehearsed

celebrated

costumes

decorations

announcement

1. Tom _____ his old books to kids who needed them at school.
2. The class _____ their songs every day until they knew all the words.
3. At the _____, there were fun games and lots of good food to eat.
4. The crowd gave loud _____ when the little dog did its trick.
5. We put up birthday _____ like balloons and streamers all over the house.
6. The teacher made an _____ about the field trip next week.
7. The kids put on their Halloween _____ and went to get candy.
8. We _____ with cake and ice cream when my team won the game.

Morphological Family Members

Fill in the blank with the correct word.

Words to choose from:

announced

announcement

announced

announces

announcer

unannounced

1. The baseball _____ spoke clearly into the microphone.
2. The principal made an _____ about the pizza party.
3. My cousin made an _____ visit with her new puppy.
4. The teacher _____ the winner of the art contest every Friday.
5. Mom _____ that we could get ice cream after dinner.
6. The student is _____ the weekly lunch menu over the speakers.

Semantic Family Members

Fill in the blank with the best word.

Words to choose from:

broadcast	notify	announce	shout
proclaim	say	tell	

1. The TV station will _____ the football game live across the country.
2. The school will _____ parents by email if there is a snow day.
3. The principal will _____ important news over the speakers about the fire drill.
4. The coach had to _____ instructions to the players during the noisy game.
5. The king will _____ his daughter as the new ruler of the kingdom.
6. Can you _____ your name clearly when it's your turn?
7. I need to _____ you something important about the class party.

Potential Problems: AI for Vocabulary Instruction

Generating text with consideration of vocabulary requires clarity of curriculum and developmental progression.

“The lowest hanging fruit”: An even larger world of worksheets; fewer opportunities to deal with complex texts.

Knowledge is the commodity of the digital age. Fatuous texts and worksheets can be a barrier to knowledge acquisition as well as a deterrent to motivation and learning.

AI Generated

Snow Art

Snow falls soft and white. It lands on trees and roofs. Look at the snowflakes on your glove. Each one is a little star!

You can cut paper to make snowflakes. Fold the paper and snip small bits. Open it to see your star shape!

You can also draw a snowy day. Use a white crayon on blue paper. Add a big snowman. Does your snowman wear a hat? Snow is cold, but your art is warm and fun!



AI Assisted

Level 2: Art in Weather

The Patterns of Snowflakes

If you live in or visit a place where it snows, you can try to catch a snowflake. You need to do this very fast because snowflakes melt quickly from the heat of your hand.

Snowflakes are too little for you to see their patterns with just your eyes. You need a big glass lens to see the snowflakes. Through the lens, you will see that each snowflake has its own pattern. Some look like the lace on a party dress. Some snowflakes have thin lines that branch out like trees. No two snowflakes look the same, but they all have six sides.

Make Your Own Snowflakes

- Take a sheet of white paper and fold it in half and then fold it in half two times more.
- Now cut small shapes along the sides.
- When you open your paper, you'll find a snowflake with six sides.




A sheet of paper that is folded three times can be cut to make a snowflake.


Weather in Art



Vocabulary Automaticity Using Linked Text
Level 2: Art in Weather



Level 2: Art in Weather



Cloud Pictures in the Sky

Look up at the clouds floating in the bright blue sky. Sometimes clouds seem to make a picture as they float by. A cloud might make you think of a rabbit with long ears, a fish with fins moving back and forth, or a dragon with wings spread wide. Even tiny clouds can look like something special, like boats sailing across the blue sea. Huge clouds can look like giant ice cream cones, reaching to the top of the sky.


Make Your Own Cloud Art

- You can create your own cloud shapes. Start with blue paper for the sky. Use cotton balls for puffy clouds. Pull the cotton balls apart to make long, streaky clouds or stack them up for tall tower clouds.
- You can also paint cloud shapes with white paint and a sponge. For wispy clouds, tear white paper into long, thin shapes.

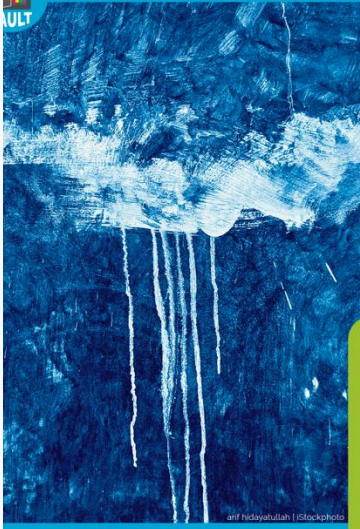
VAULT | iStockphoto

Caption

8



Level 2: Art in Weather



Rain Patterns

Look out a window when it rains. Drops of rain fall on the window. Each drop starts small and round. Some drops seem to race each other down the glass. When they meet, the drops join and slide down the window together.

When you are outside in the rain, watch as a puddle of water forms. When a drop of rain hits the puddle, it makes rings in the water. The rings get big and fade away. More drops make more rings and the puddle gets bigger.


Make Your Own Rain Art

- You can make a picture that looks like rain. First, put on an old shirt so you do not get paint on you.
- Get blue paper, white paint, a big brush, and water. Mix the white paint with water to make it runny.
- Hold your brush high over the paper. Let the paint drip down.
- Some drops of paint will run fast, some slow. Some drops will meet and mix up. Your rain painting looks just like the rain outside.


arif hedayatullah | iStockphoto

Caption

10



Level 2: Art in Weather



Look at the Wind!

Wind is air that moves. When air flows fast or slow, we call it wind. This moving air can push and pull things, like the leaves and branches on trees. The wind can send leaves falling from trees. Wind can make the tops of tall trees bend left and right. When the wind gets strong, flags can snap in the air.

Make Your Own Wind Art

- You can make a picture that shows the way in which the wind moves. First, put some black paint in the middle of a page.
- Next, get a straw. Now blow through the straw at the paint. The paint will run across the page, just like the wind in the trees.
- Tip the page up or down to make the paint flow. Blow soft and blow hard to see what the wind can do.
- When you are done, you will have art that looks just like the wind's path.

Nicole Tagalaba | Dreamstime

Caption

6



Level 2: Art in Weather



Light Makes Rainbows

Watch what happens when the sun shines through a glass of water. All the colors of the rainbow seem to dance on the wall. You can see red, orange, yellow, green, blue, and purple.

On a hot day, you might see spots of color in the water as you spray plants with a hose. When it rains, water drops in the sky can split sunlight into a big rainbow. Even the light through your window can make tiny rainbows on the floor when it shines through a vase or a glass cup.

Make Your Own Rainbows

- You can make a rainbow with a glass of water, a mirror, and a flashlight in a dark room. The mirror goes inside the glass of water. The mirror needs to be on its side facing out.
- Put the glass of water with the mirror on a table. Turn out the lights. Make sure no light is coming through the windows.
- Now turn on the flashlight and shine it through the side of the glass toward the mirror. If you put your hands on the table beside the glass, a rainbow will cover your hands.

Williamphoto | Adobe Stock

Sunlight that shines through a bottle of water can make a rainbow of colors.

4

A Quality Distinction in AI's Narratives & Informational Texts



The Last Year-Round Resident of Cedar Point

The evacuation notice came on a Tuesday in Margaret's mailbox, just like any other piece of mail. The sky outside looked perfectly unthreatening. It was a brilliant blue with only a few clouds on the horizon.

"Mandatory evacuation by Thursday 6 PM," she read aloud to her empty living room. "Due to predicted storm surge..."

Local officials had made it clear: this was a mandatory order, not a suggestion. Yet the weather had been perfect all week, making the warning feel almost silly. But there was something ominous about those distant clouds on the horizon. The clouds seemed to get bigger and darker even as she watched.

Margaret had lived on Cedar Point for forty years. She had taken all the proper precautions each hurricane season. She'd stocked supplies and reinforced windows and doors. She'd taken those same precautions over the past week. If all precautions had been taken, surely that was enough!

But Margaret had also watched the neighbors' houses empty one by one over the years, as families moved inland after each big storm. Several homes had been demolished by previous hurricanes.

Many of the remaining cottages were filled with visitors at different times over the year. But Margaret was the last year-round resident on her stretch of beach. The isolation usually felt like a gift, but today it overwhelmed her. It felt like she carried the weight of being the only one left to watch the sea rise.

Her daughter had been calling all morning, leaving increasingly urgent voicemails. "Mom, I saw the evacuation order. Please get out. Don't argue this time."

Margaret looked out at her husband's old fishing boat at the dock just beyond her kitchen window. She'd watched it survive three hurricanes, though the last one had come close to demolishing it. When he was alive, John had always refused to move it during storms. He always said that the boat was safer in the water than on land.

"The sea knows how to hold its own," he used to say. But Margaret wasn't so sure anymore. The storms were getting stronger, more ominous with each passing year. She felt the isolation more keenly now than ever before, standing alone in her kitchen while everyone else had fled inland.

She picked up her phone and dialed her daughter's number, watching the clouds grow bigger and bigger over the water. Sometimes surrender wasn't really surrender at all, but a different kind of strength: the strength to recognize when the tide had finally turned.



Hurricanes, Typhoons, and Cyclones: One Storm, Many Names

In some places the storms are called hurricanes, in other places typhoons and, in still other places, cyclones. Near Japan and China, the storm is called a typhoon. If it's in the Atlantic Ocean (like near Florida), we call it a hurricane. If it's around India or Australia, it's called a cyclone.

No matter which name is used, these storms form in the same way and look the same.

This kind of storm starts with really warm ocean water that is as warm as a bathtub. This warm water heats up the air above it, making it rise. As this warm air goes up, more air rushes in below to replace it. The Earth's movement makes this air start spinning, like water going down a drain. At the center of the spinning wind and heavy rain is a calm area called the eye of the storm.

The storm starts with strong winds and heavy rain. The winds blow at very high speeds. The wind pushes a huge wall of water onto land. This wall of water is called a storm surge.

Then comes a calm period. This is the eye of the storm. If you're in the eye of the storm, it might seem safe. It might last 15 minutes or up to an hour. The sky might even clear up. But the storm is not over. The second half of the storm hits right after. The winds and heavy rain return.

These storms, called hurricanes in the southeastern United States, have caused a lot of damage. Hurricane Katrina (2005) was the most destructive hurricane in recent American history, causing great harm to people and property. Hurricane Harvey in 2017 also caused serious damage. Because of what we learned from Hurricane Katrina, we got better at evacuating people and responding to emergencies during hurricanes like Harvey.

Summary: Using AI to....

Analyze

Analyze School Texts and Tasks



Select

Select Specific Words & Texts



Enhance

Enhance Explicit Vocabulary Instruction



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Strategies, tools, and texts to bring beginning and struggling readers to proficient levels of literacy

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More to Read and/or Hear (for free!):

- Hiebert, E. H. (2020). The core vocabulary: The foundation of proficient comprehension. *The Reading Teacher*, 73(6), 757-768.
- Hiebert, E. H. (2024). Unpacking automaticity: Scaffolded texts and comprehension. *Journal of Adolescent & Adult Literacy*.
- Revolutionizing Vocabulary Learning: AI's Contributions to Word Selection in Education <https://textproject.org/vocabulary-learning-and-ai/>
- The Science of Word Zones: How Big Data is Building Better Readers <https://textproject.org/word-zones-science/>
- Using Story Structure for Comprehension and Enhancing Vocabulary <https://textproject.org/story-structure-and-vocabulary/>
- Terminology, Texts and Teachers in an AI World: Possibilities and Problems <https://textproject.org/terminology-texts-teachers-ai/>

Sincerest thank you for
your time & commitment!



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