

EFFECTIEF LES GEVEN

“To see what is in front of one's nose needs a constant struggle.” (Orwell, 1946)

1 DE WETENSCHAPPELIJKE BASIS OVER LEREN & INSTRUCTIE

2 EEN AANTAL FUNDAMENTELE DIDACTISCHE PRINCIPES

3 UITDAGINGEN VOOR ONS ONDERWIJS

1

DE WETENSCHAPPELIJKE BASIS OVER LEREN & INSTRUCTIE

Een gigantisch experiment

1

DE WETENSCHAPPELIJKE BASIS OVER LEREN & INSTRUCTIE

PROJECT FOLLOW THROUGH



- 200 000 students verspreid over 178 scholen in 'low-income communities' (1968 - 1976), met een budget \$500 miljoen destijds (3,7 miljard volgens inflation calculator)
- 22 didactische modellen werden getest, te categoriseren in ...
 - a **cognitive-conceptual category** emphasising problem-solving skills;
 - an **affective-cognitive category** emphasising positive attitudes to learning and "learning to learn" skills;
 - a **basic skills category** emphasising fundamental skills in reading, maths, spelling and language.

FOLLOW THROUGH PROGRAM SPONSORS		I-7
5.1	Sponsor 2: Far West Laboratory	I-8
5.2	Sponsor 3: University of Arizona	I-9
5.3	Sponsor 5: Bank Street College	I-10
5.4	Sponsor 7: University of Oregon	I-11
5.5	Sponsor 8: University of Kansas	I-12
5.6	Sponsor 9: High/Scope Educational Research Foundation	I-13
5.7	Sponsor 10: University of Florida	I-14
5.8	Sponsor 11: Educational Development Center	I-15
5.9	Sponsor 12: University of Pittsburgh	I-16
5.10	Sponsor 14: Southwest Educational Development Laboratory	I-17

EDC Open Education Follow Through Program Education Development Center

The Model

The EDC Open Education approach seeks to stimulate learning by providing children with a great variety of materials and experience within a supportive emotional environment. The sponsor believes children learn at individual rates and in individual ways, and teachers should adapt approaches to encourage individual progress and responsibility in learning.

The sponsor believes that there is no uniform way to teach reading, writing, or arithmetic skills, and no uniform timetable for all children to follow. Children are not compared with other children and do not receive standardized tests. Consequently, EDC classrooms and teachers vary greatly. Teachers often divide classrooms into interest areas where children may work part or all of the day. Traditional subjects important in the open classroom may be combined with these interest groups. The teacher may work with the entire class, small groups, or individuals. Parents sometimes serve as classroom aides and assist in curriculum planning. In sum, the EDC Model is more a philosophy than a technique.

Direct Instruction Model University of Oregon College of Education

The Model

The Direct Instruction Model is a behaviorally oriented educational program. It utilizes a tightly controlled instructional methodology and highly structured teaching materials. Its aim is to accelerate the learning of disadvantaged children in reading, language, and arithmetic. Although the instruction is programmed, the emphasis is placed on the children's learning intelligent behavior rather than specific pieces of information by rote memorization. The Direct Instruction approach uses a fast moving series of programmed questions and answers. Teachers present specified questions to elicit a verbal child response. Proper responses are reinforced and wrong answer corrected according to specified procedures. These questions, answers, and correction procedures are contained in the Direct Instructional System in Arithmetic and Reading (Distar) materials published by Science Research Associates (SRA). Noncore subjects are generally introduced after mastery of basic skills.

PROJECT FOLLOW THROUGH

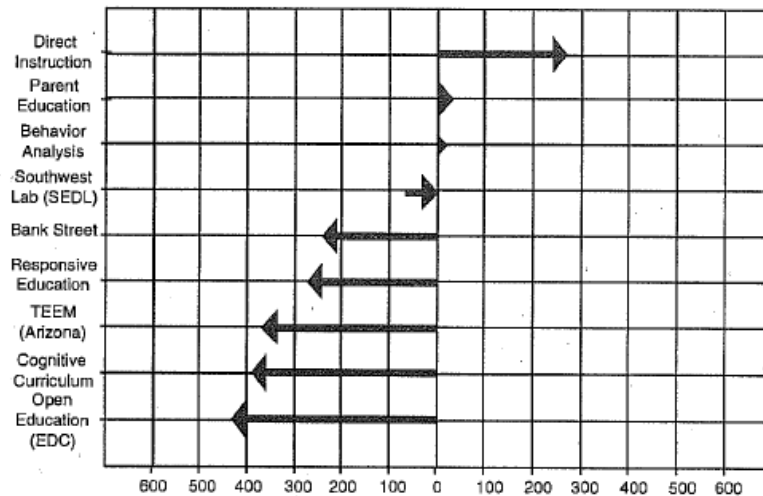


Figure 1

for basics measures (word knowledge, spelling, language, math computation)

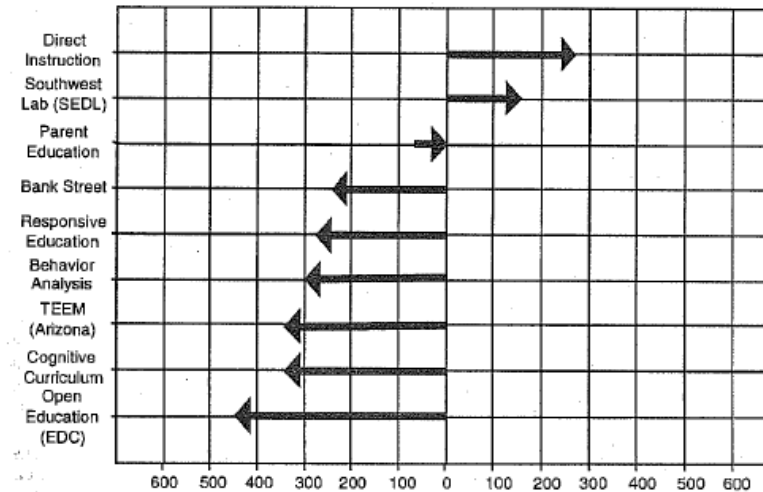


Figure 2

SO's for cognitive measures (reading comprehension, math concepts, math problem solving)

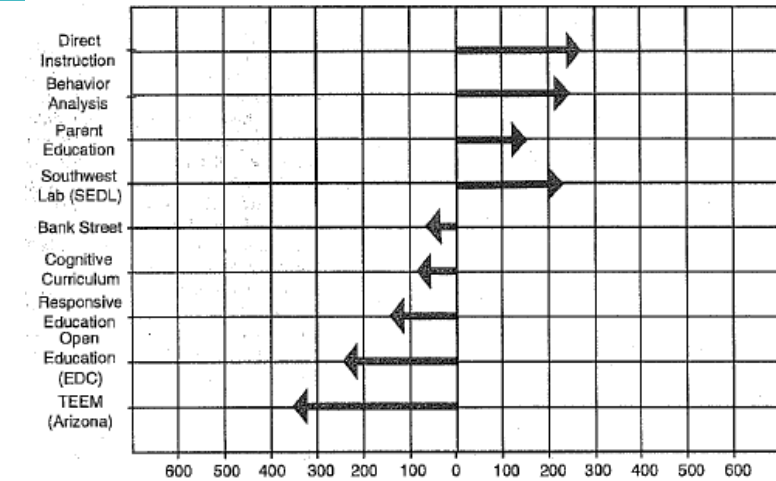
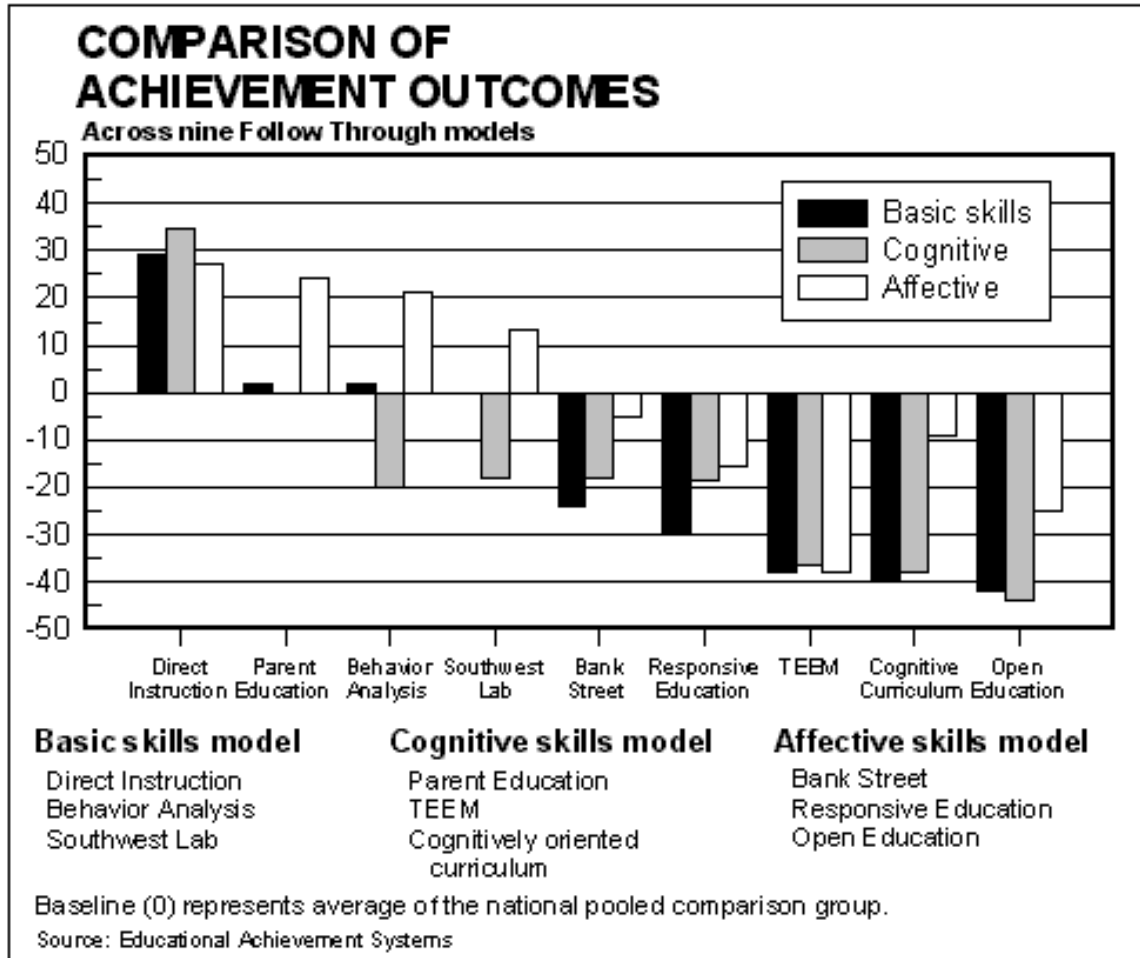


Figure 3

for affective measures (cooperation, self-esteem, intellectual achievement, responsibility scale)

Getest op ...

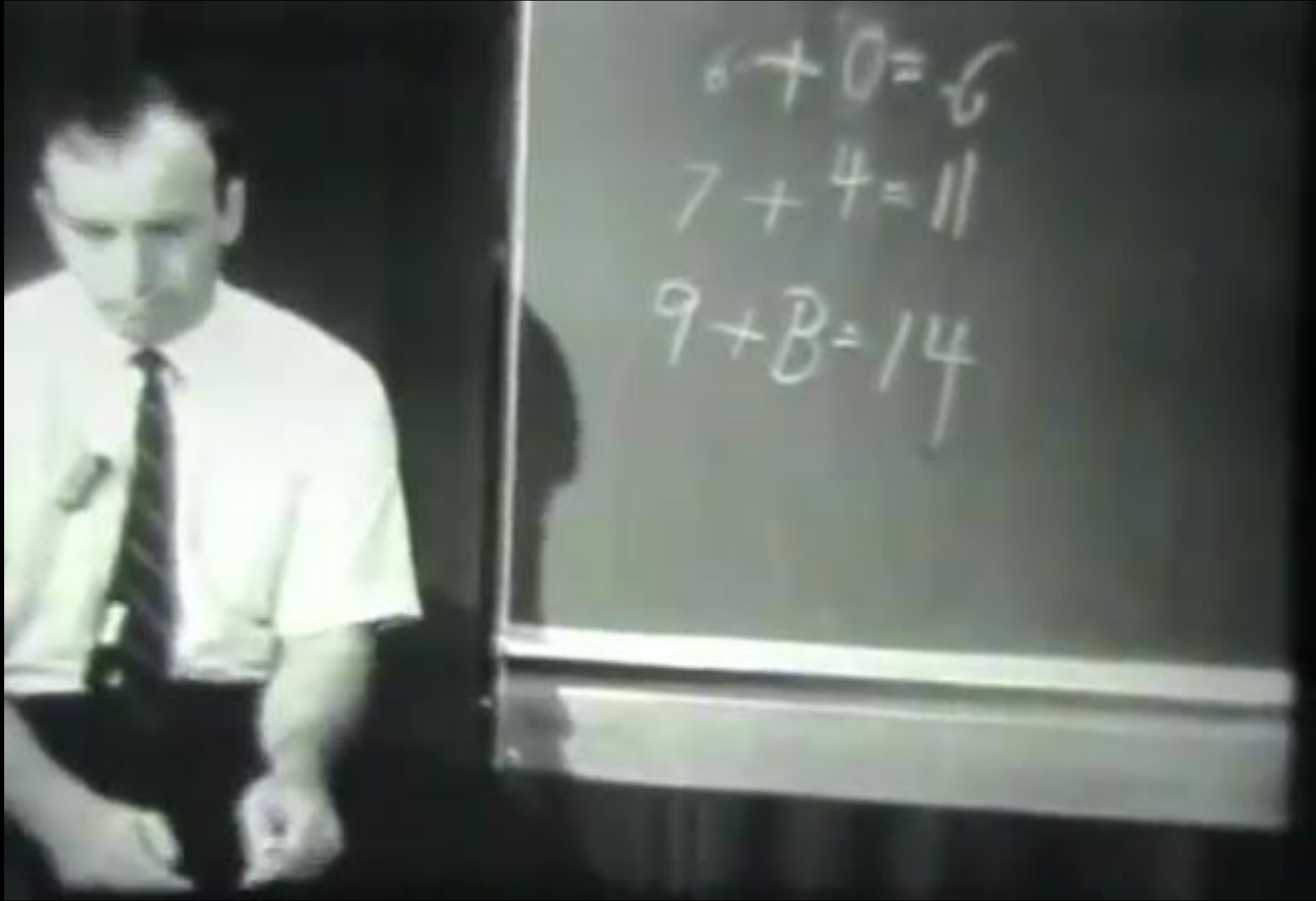
- basiskennis- en vaardigheden (woordenschat, spelling, rekenen ...)
- Hogere orde cognitieve vaardigheden (begrijpend lezen, problem solving)
- Affectieve outcomes (samenwerking, zelfwaarde en verantwoordelijkheidszin)



The Washington Times

According to former Commissioner of Education, Ernest Boyer, "Since only one of the sponsors (Direct Instruction) was found to produce positive results more consistently than any of the others, it would be inappropriate and irresponsible to disseminate information on all the models..."

The basic problem we face is that the most popular models in education today (those based on open classrooms, Piagetian ideas, language experience, and individualized instruction) failed in Follow Through. As a result there are many forces in the educational establishment seeking to hide the fact that Direct Instruction, developed by a guy who doesn't even have a doctorate or a degree in education, actually did the job. To keep those promoting popular approaches from hiding very important outcomes to save their own preconceptions will take formidable help from persons like yourself. We hope it is not too late.



$$6 + 0 = 6$$
$$7 + 4 = 11$$
$$9 + 5 = 14$$

Lesson 126

TASK 1 **ROTE COUNTING** Counting in the Teens

Group Activity

- a. Listen. You're going to start with eight and count (pause) forward.
- b. Counting forward from eight. Get it going. Raise your hand. When *eeeight* is firm, drop your hand. 9, 10, 11, 12, 13. Stop. Good counting forward.

To correct	If the children stop counting before reaching 13, say: I didn't say stop. Let's try it again. Repeat a and b.
------------	--

Individual Test

Call on several children for a and b.

TASK 2 **FIGURING OUT FACTS** Completing Statements

Group Activity

- a. Write these problems on the board.

m	☺
$6 + 0 =$	<input type="checkbox"/>
$6 + \square =$	<input type="checkbox"/>
$6 + \square =$	<input type="checkbox"/>

You're going to figure out the answers to some problems.

- b. Point to each under *m*. Some of my numerals are missing. Point to each under the smiling face. All your numerals are missing. Let's figure out the missing numerals.

Lesson 2

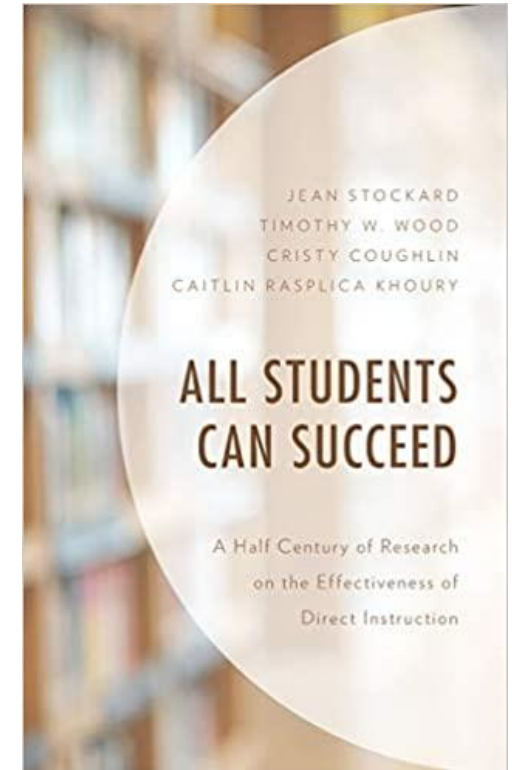
- a. (Display **United States Map C**;) [1:2A]



- Let's review the states of the United States.
 - How many states are there in all? (Signal.) 50.
 - How many states touch other states? (Signal.) 48.
 - How many states do not touch other states? (Signal.) 2.
 - When the United States first became a nation, there were not 50 states. How many were there? (Signal.) 13. (Repeat step b until firm.)
 - You learned some of the first states. I'll point to a state on the map. You tell me the name of the state.
 - (Point to 9.) What state? (Signal.) *New Hampshire.*
 - (Point to 6.) What state? (Signal.) *Massachusetts.*
 - (Point to 13.) What state? (Signal.) *Rhode Island.*
 - (Point to 5.) What state? (Signal.) *Connecticut.*
 - (Point to 11.) What state? (Signal.) *New York.*
 (Repeat step c in random order until firm.)
 - Which of those states is the smallest of all the states? (Signal.) *Rhode Island.*
 - Which of those states has the largest city? (Signal.) *New York.*
 - What is the name of the largest city? (Signal.) *New York City.* (Repeat step d until firm.)
- e. (Display;) [1:2B]

9 6 13 5 11

- Directe Instructie (Engelmann & Becker, 2001) is een systeemmethode voor onderwijs die voorziet in het curriculum, didactische aanpak, monitoring van de resultaten maar ook training van de leraar.
- Het kenmerkt zich o.a. door zorgvuldig geplande en gescripte lessen, met leerstof in behapbare delen, om foutloos te communiceren en misconcepties te vermijden
 - Leerlingen krijgen les in groepen met vergelijkbaar.
 - De aandacht van de leerlingen is gevestigd op de leraar.
 - Actieve deelnemen aan de les (zowel in groep als individueel).
 - Antwoorden geïnitieerd door leraar.
 - Snelle feedback and verbetering.
 - Fluks tempo in de lessen.
- Ook nu nog in gebruik en steevast effectief (Stockard et al, 2018) maar niet vrij van kritiek.



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DE WETENSCHAPPELIJKE BASIS OVER LEREN & INSTRUCTIE

Een gigantisch experiment
Lerareneffectiviteitsonderzoek

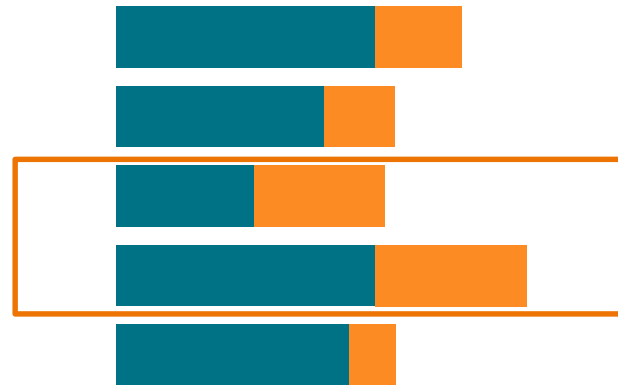
As a result, they have described for us a kind of invisible, ghost-like person who, in fact, may not exist. She has been found to be cooperative, sympathetic, poised. She is well-groomed, healthy, imaginative, and cooperative. She gets along with her co-workers and her principal and she gets her reports in on time. As one of my friends said, 'she has the same characteristics we expect from a good bar girl.'



START
SCHOOLJAAR



INSTRUCTIE



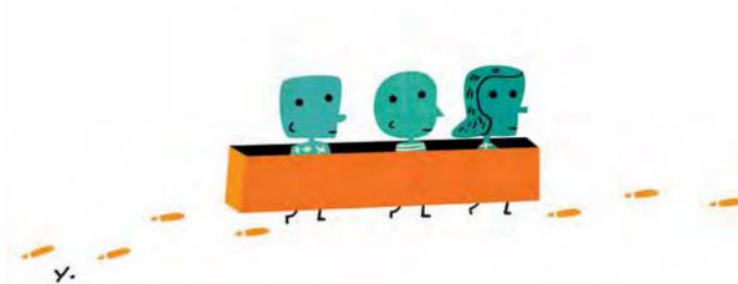
EINDE
SCHOOLJAAR

TABLE 1
SIGNIFICANT OR NEAR SIGNIFICANT PROCESS VARIABLES
FROM AN ANALYSIS OF VARIANCE ACROSS
THE TOP AND BOTTOM NINE TEACHERS

Variables	p Value	X High	X Low
Number of Students	.0001	26.70	21.34
Time Teacher Taught "Whole" Class	.1001	40.47	35.83
*Time Going Over Homework	.0656	4.98	8.19
*'Classroom Climate'	.0771	2.00	2.26
*Clarity	.0135	4.06	3.53
*Average Accountability	.0424	3.46	3.15
*Average Alerting	.0350	3.90	3.59
Discipline Question ²	.0656	0.11	0.35
Direct Question	.0113	14.07	28.26
Process Question	.0131	2.72	7.53
Correct Response	.0533	38.70	50.98
Wrong Response	.0017	5.39	11.39
No Response	.0058	1.37	3.26
Student Response Followed by Teacher Praise	.0046	2.74	14.09
Negates Wrong	.0088	1.51	3.29
Repeats Question	.0295	1.39	2.78
Student Initiated Work Related Contact; Teacher Gives Process Feedback	.0654	4.41	1.56
Student Initiated Work Related Contact: Teacher Gives Feedback	.0004	17.65	9.30
Teacher Initiated Work Related Contact: Type Feedback Unknown	.1072	0.02	0.24
Teacher Initiated Behavior Related Contact: Teacher Gives Warning	.0081	1.75	3.37
Teacher Initiated Behavior Related Contact: Teacher Gives Criticism	.0548	0.30	0.67
Total Teacher Initiated Work Related Contacts	.0383	3.01	5.96
Total Teacher Initiated Behavior Related Contacts	.0853	4.22	5.85
Total Teacher Initiated Contacts	.0129	7.23	11.83
Total Student Initiated Work Related Contacts	.0004	23.44	11.80
Total Student Initiated Contacts (Work and Procedural)	.0003	25.35	13.41

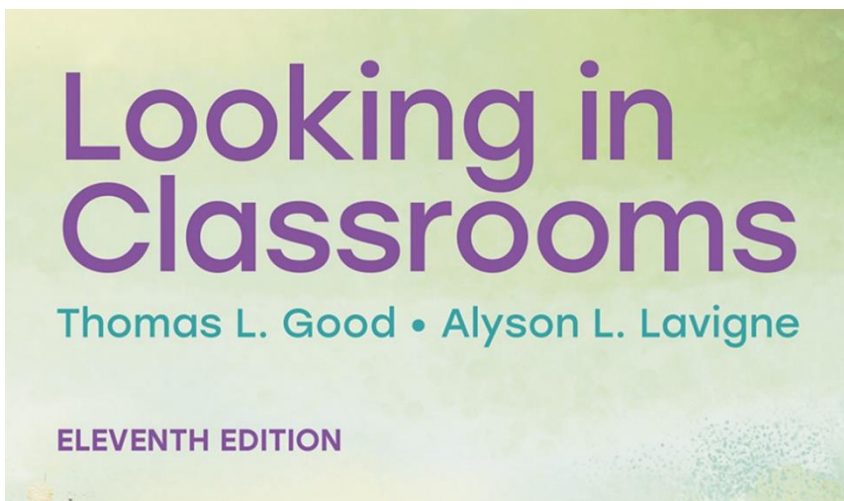
Principles of Instruction

Research-Based Strategies That All Teachers Should Know



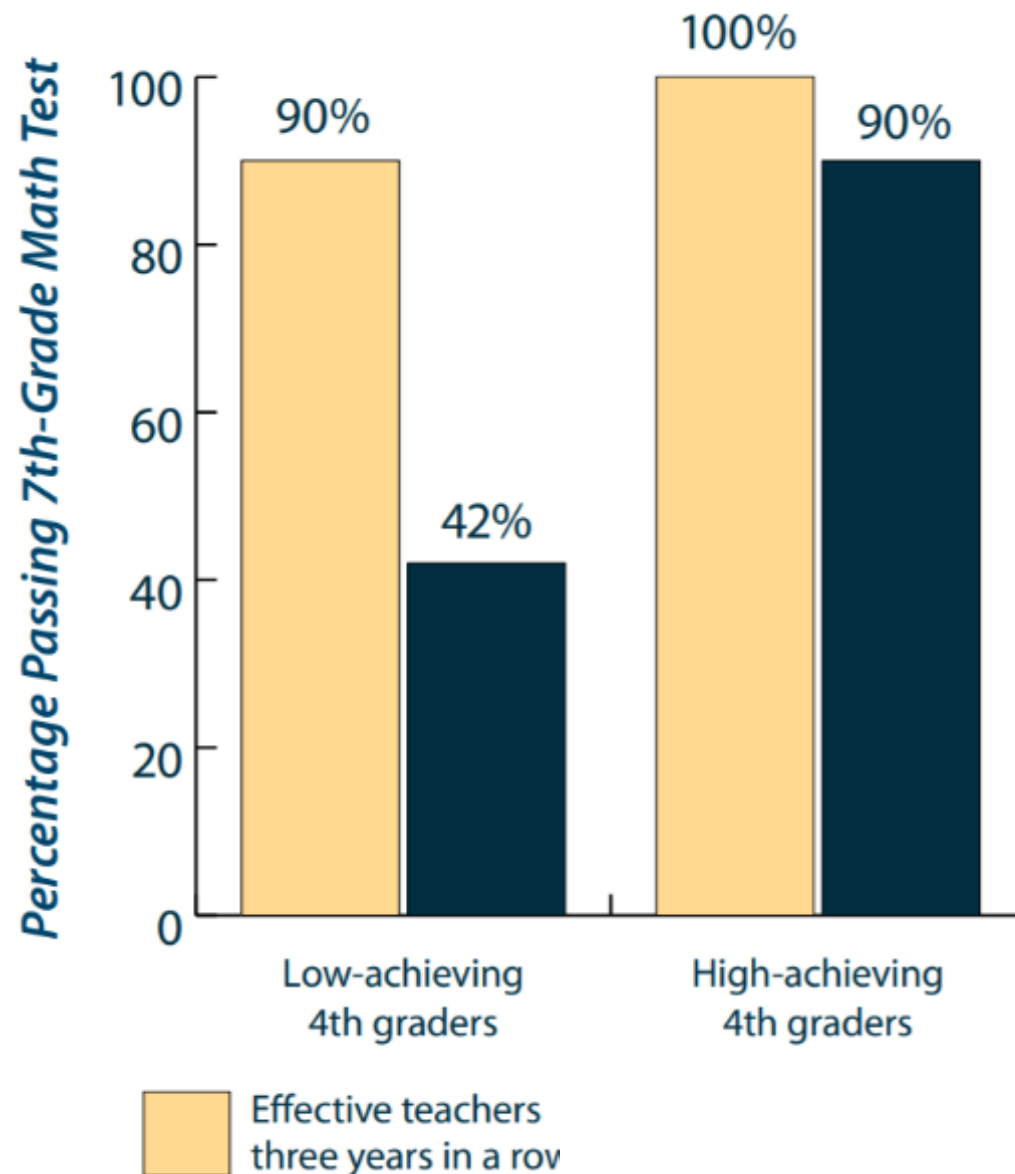
BY BARAK ROSENSHINE

directe instructie (little di)



17 Principles of Effective Instruction

- Begin a lesson with a short review of previous learning.
- Present new material in small steps with student practice after each step.
- Limit the amount of material students receive at one time.
- Give clear and detailed instructions and explanations.
- Ask a large number of questions and check for understanding.
- Provide a high level of active practice for all students.
- Guide students as they begin to practice.
- Think aloud and model steps.
- Provide models of worked-out problems.
- Ask students to explain what they have learned.
- Check the responses of all students.
- Provide systematic feedback and corrections.
- Use more time to provide explanations.
- Provide many examples.
- Reteach material when necessary.
- Prepare students for independent practice.
- Monitor students when they begin independent practice.



1

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Een gigantisch experiment
Lerareneffectiviteitsonderzoek
Cognitieve en onderwijspsychologie



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Contents lists available at SciVerse ScienceDirect

Journal of Applied Research in Memory and Cognition

journal homepage: www.elsevier.com/locate/jarmac



Target Article

Inexpensive techniques to improve education: Applying cognitive psychology to enhance educational practice

Henry L. Roediger III*, Mary A. Pyc

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Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology

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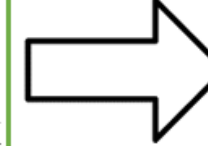
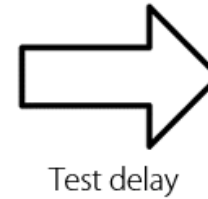
SAGE

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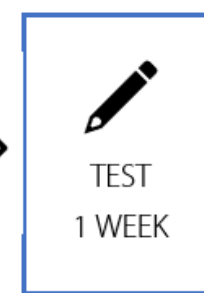
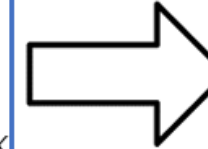
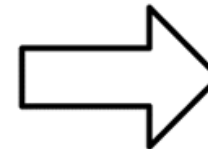
DE WETENSCHAPPELIJKE BASIS OVER LEREN & INSTRUCTIE

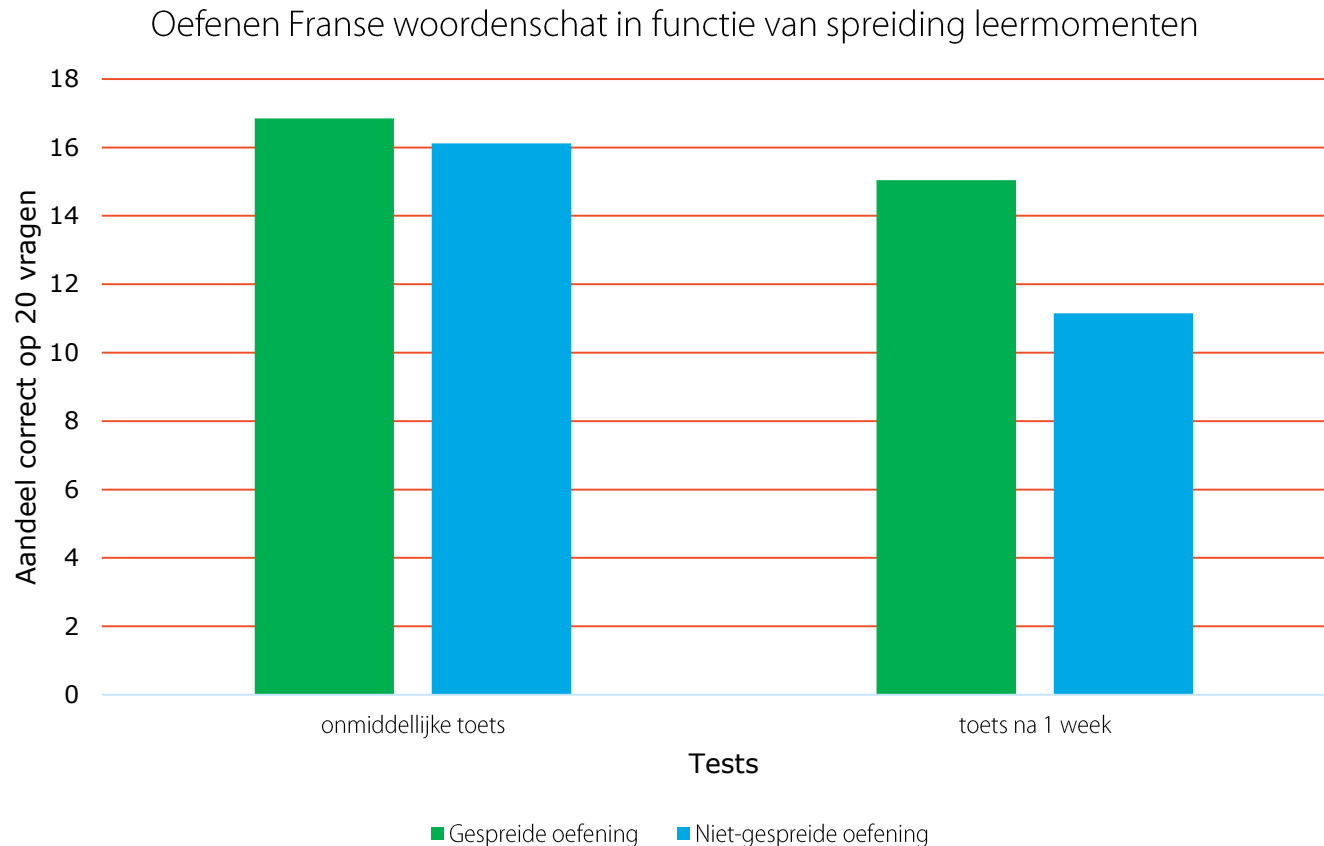
EXPERIMENTEEL ONDERZOEK IN COGNITIEVE- EN ONDERWIJSPSYCHOLOGIE

DISTRIBUTED PRACTICE

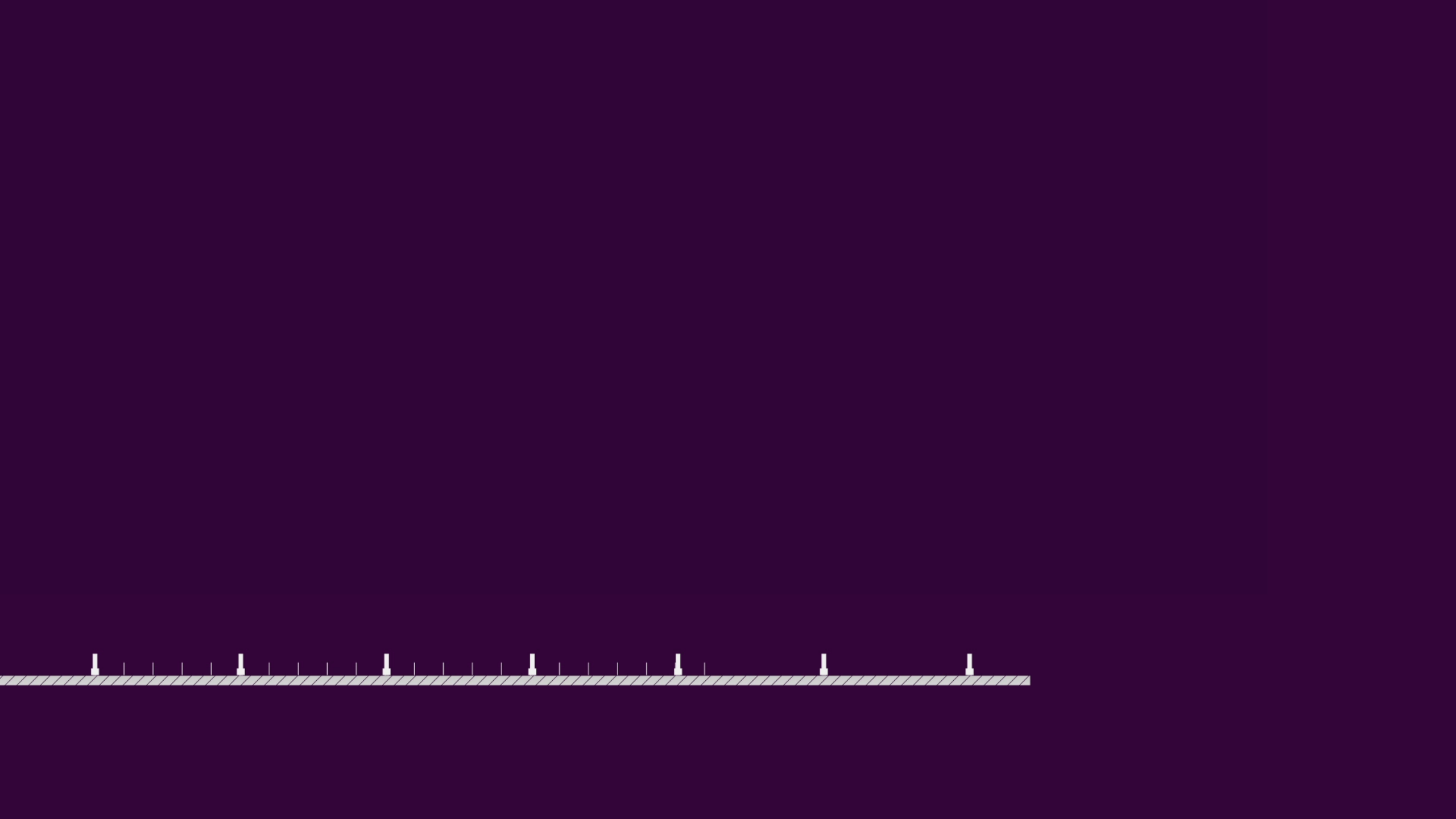


MASSED PRACTICE

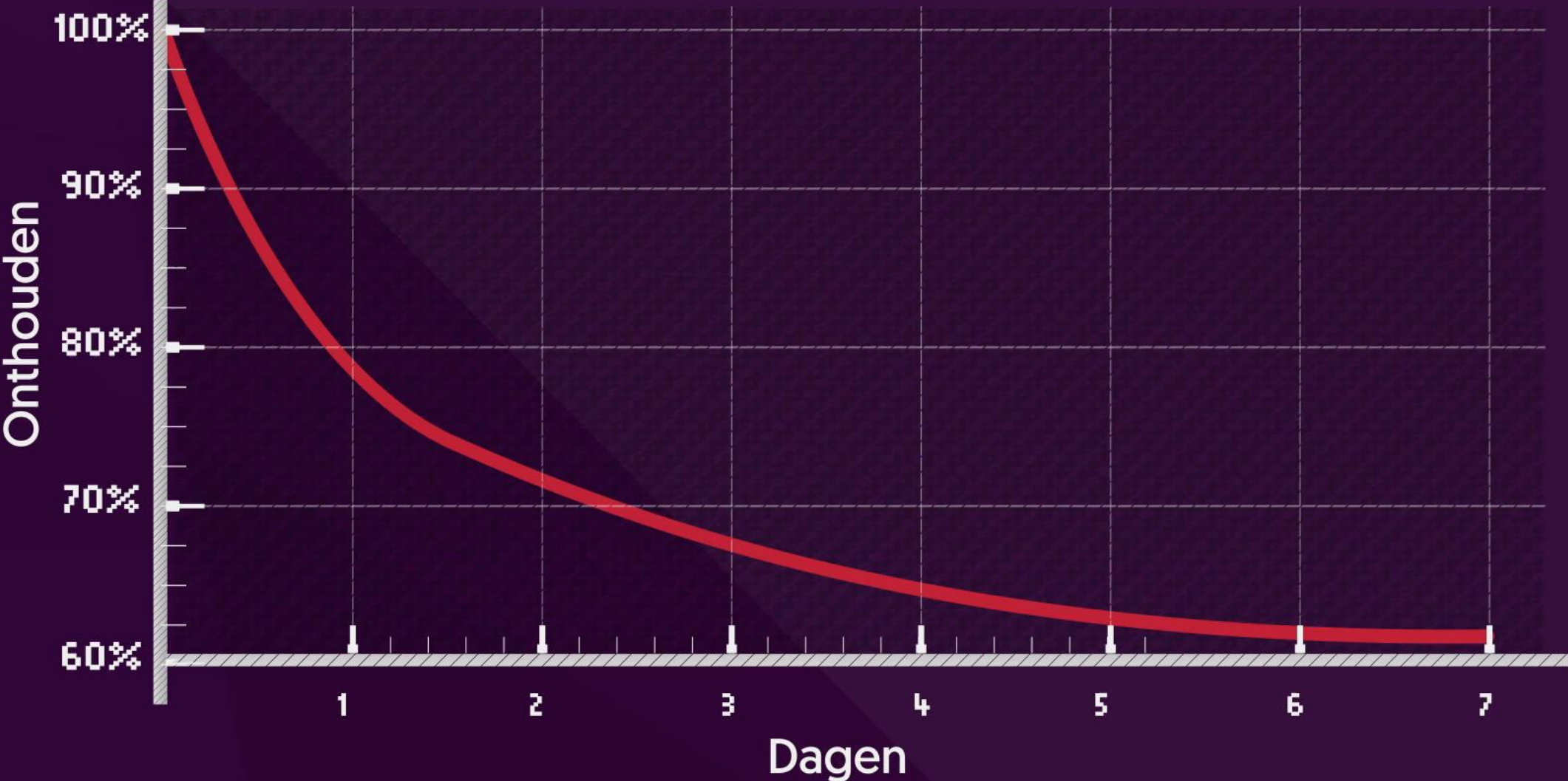




Spacing effect: Het spreiden van oefenmomenten in de tijd heeft een positief effect op het langetermijngeheugen in vergelijking met even lang oefenen op één moment.



Vergeetcurve



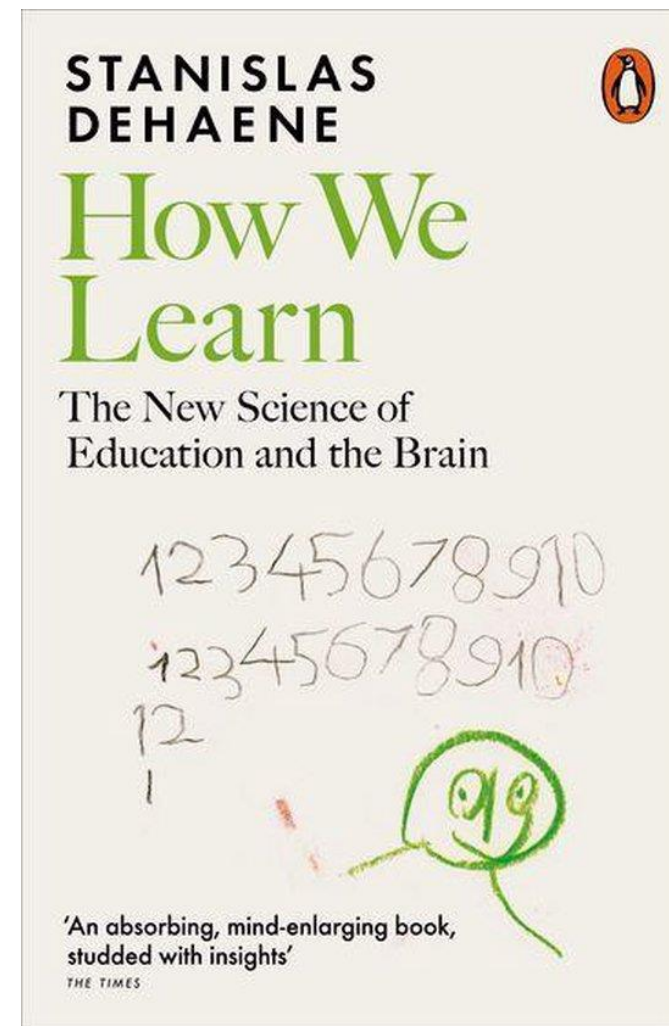
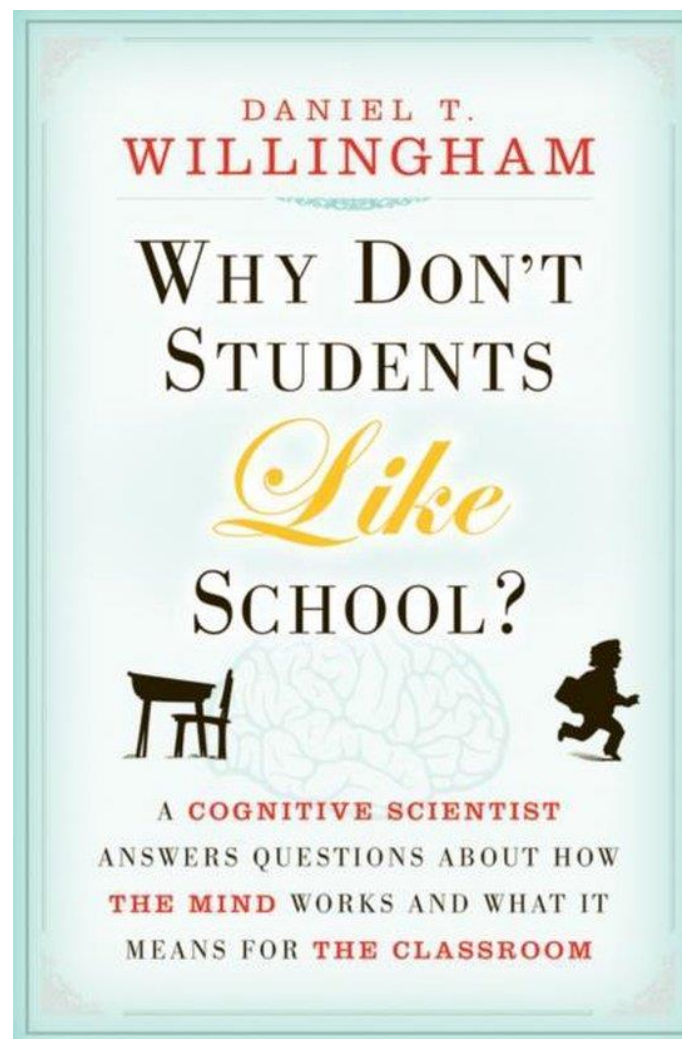
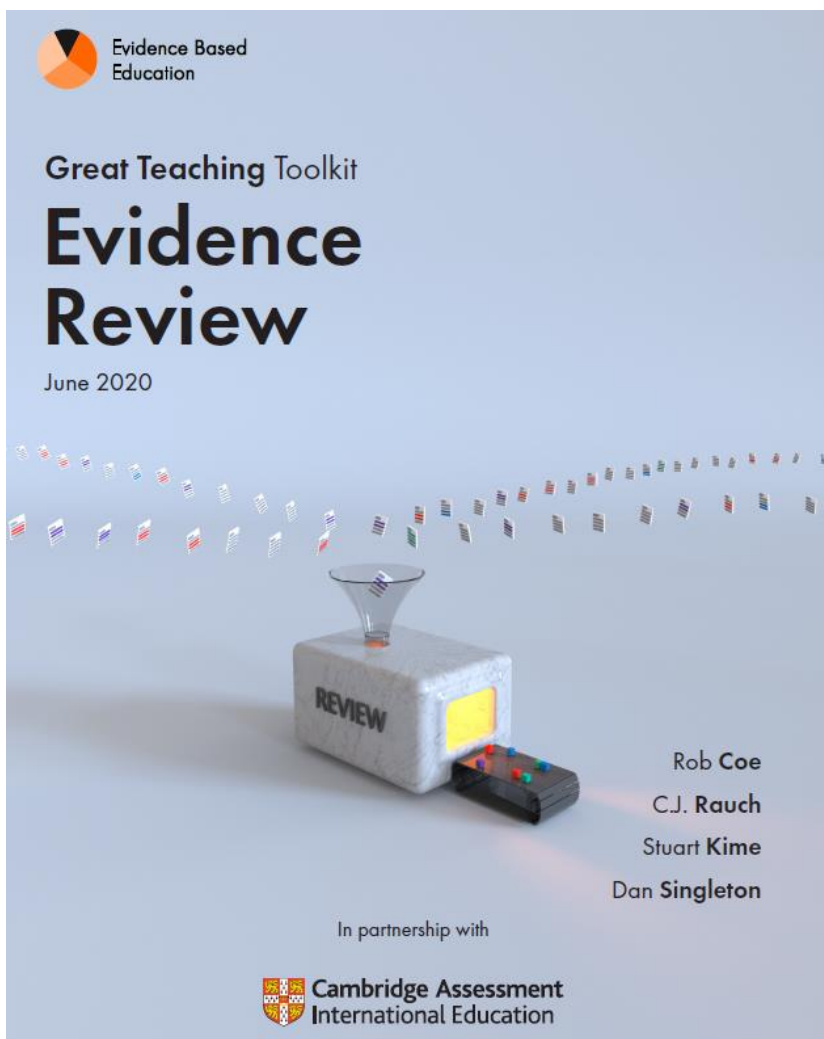
Testing effect	Testing enhances learning, particularly when the tests are aligned with important content.
Spacing effect	Spaced schedules of studying and testing produce better long-term retention than a single study session or test.
Exam expectations	Students benefit more from repeated testing when they expect a final exam.
Generation effect	Learning is enhanced when learners produce answers compared to having them recognize answers.
Organization effects	Outlining, integrating, and synthesizing information produces better learning than rereading materials or other more passive strategies.
Coherence effect	Materials and multimedia should explicitly link related ideas and minimize distracting irrelevant material.
Stories and example cases	Stories and example cases tend to be remembered better than didactic facts and abstract principles.
Multiple examples	An understanding of an abstract concept improves with multiple and varied examples.
Feedback effects	Students benefit from feedback on their performance in a learning task, but the timing of the feedback depends on the task.
Desirable difficulties	Challenges make learning and retrieval effortful and thereby have positive effects on long-term retention.
Manageable cognitive load	The information presented to the learner should not overload working memory.
Imperfect metacognition	Students rarely have an accurate knowledge of their cognition, so their ability to calibrate their comprehension, learning, and memory should not be trusted.
Discovery learning	Most students have trouble discovering important principles on their own, without careful guidance, scaffolding, or materials with well-crafted affordances.
Self-regulated learning	Most students need training in how to self-regulate their learning and other cognitive processes.

17 Principles of Effective Instruction

Begin a lesson with a short review of previous learning.

- Present new material in small steps with student practice after each step.
- Limit the amount of material students receive at one time.
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- Provide systematic feedback and corrections.
- Use more time to provide explanations.
- Provide many examples.
- Reteach material when necessary.
- Prepare students for independent practice.
- Monitor students when they begin independent practice.

Contiguity effects	Ideas that need to be associated should be presented contiguously in space and time.
Perceptual-motor grounding	Concepts benefit from being grounded in perceptual motor experiences, particularly at early stages of learning.
Dual code and multimedia effects	Materials presented in verbal, visual, and multimedia form richer representations than a single medium.
Testing effect	Testing enhances learning, particularly when the tests are aligned with important content.
Spacing effect	Spaced schedules of studying and testing produce better long-term retention than a single study session or test.
Exam expectations	Students benefit more from repeated testing when they expect a final exam.
Generation effect	Learning is enhanced when learners produce answers compared to having them recognize answers.
Organization effects	Outlining, integrating, and synthesizing information produces better learning than rereading materials or other more passive strategies.
Coherence effect	Materials and multimedia should explicitly link related ideas and minimize distracting irrelevant material.
Stories and example cases	Stories and example cases tend to be remembered better than didactic facts and abstract principles.
Multiple examples	An understanding of an abstract concept improves with multiple and varied examples.
Feedback effects	Students benefit from feedback on their performance in a learning task, but the timing of the feedback depends on the task.
Negative suggestion effects	Learning wrong information can be reduced when feedback is immediate.
Desirable difficulties	Challenges make learning and retrieval effortful and thereby have positive effects on long-term retention.
Manageable cognitive load	The information presented to the learner should not overload working memory.
Segmentation principle	A complex lesson should be broken down into manageable subparts.
Explanation effects	Students benefit more from constructing deep coherent explanations (mental models) of the material than memorizing shallow isolated facts.
Deep questions	Students benefit more from asking and answering deep questions that elicit explanations (e.g., why, why not, how, what-if) than shallow questions (e.g., who, what, when, where).
Cognitive disequilibrium	Deep reasoning and learning is stimulated by problems that create cognitive disequilibrium, such as obstacles to goals, contradictions, conflict, and anomalies.
Cognitive flexibility	Cognitive flexibility improves with multiple viewpoints that link facts, skills, procedures, and deep conceptual principles.
Goldilocks principle	Assignments should not be too hard or too easy, but at the right level of difficulty for the student's level of skill or prior knowledge.
Imperfect metacognition	Students rarely have an accurate knowledge of their cognition, so their ability to calibrate their comprehension, learning, and memory should not be trusted.
Discovery learning	Most students have trouble discovering important principles on their own, without careful guidance, scaffolding, or materials with well-crafted affordances.
Self-regulated learning	Most students need training in how to self-regulate their learning and other cognitive processes.
Anchored learning	Learning is deeper and students are more motivated when the materials and skills are anchored in real-world problems that matter to the learner.



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DE WETENSCHAPPELIJKE BASIS OVER LEREN & INSTRUCTIE

CONVERGEREND BEWIJS

01



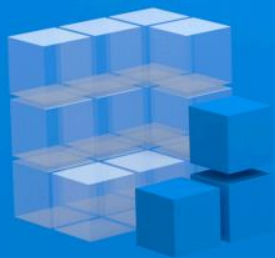
Great teachers understand the content they are teaching and how it is learnt

02



Great teachers create a supportive environment for learning

03



Great teachers manage the classroom to maximise opportunity to learn

04



Great teachers present content, activities and interactions that activate their students' thinking

2

BOUWSTENEN VOOR EFFECTIEF LEREN

De rol van voorkennis en het curriculum

De kracht van het voorbeeld

Betrokkenheid door leren, oefening en feedback

Sturen van zelfstandig leren

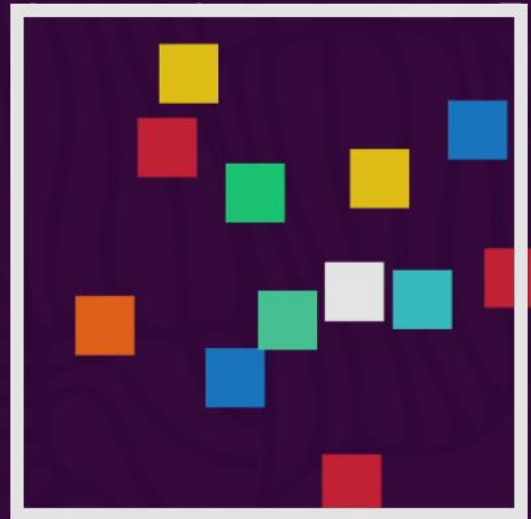
Poco moto.
pp
pp
Led. * *Led.* * *Led.* *
1. 2.
6
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VABHKS VOTRVBOVSOA
VRTABVVBSOAHOVOKS
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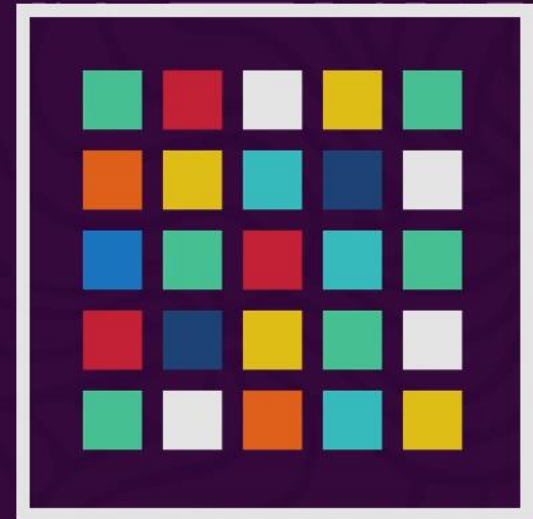
Omgevingsprikkels



Werkgeheugen



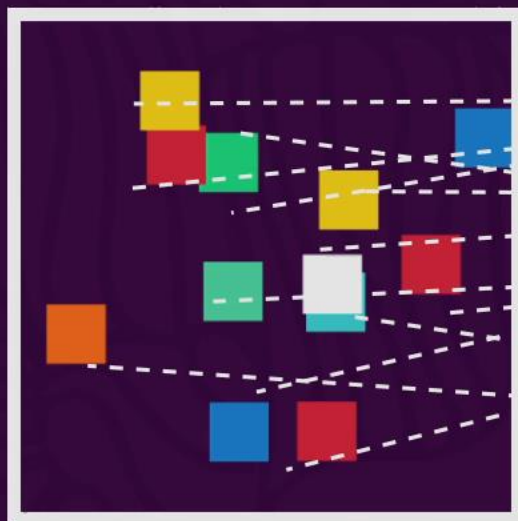
Langetermijngeheugen



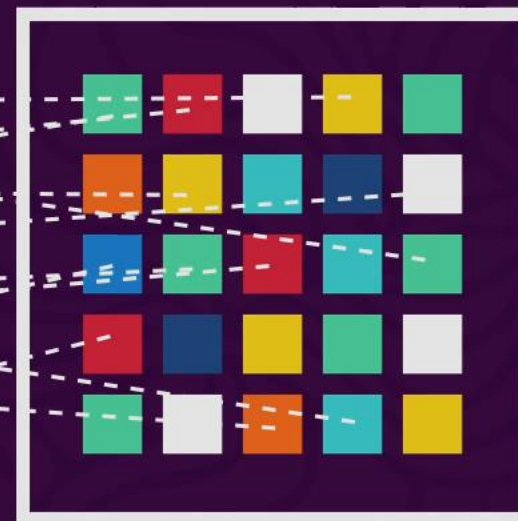
Omgevingsprikkels



Werk geheugen



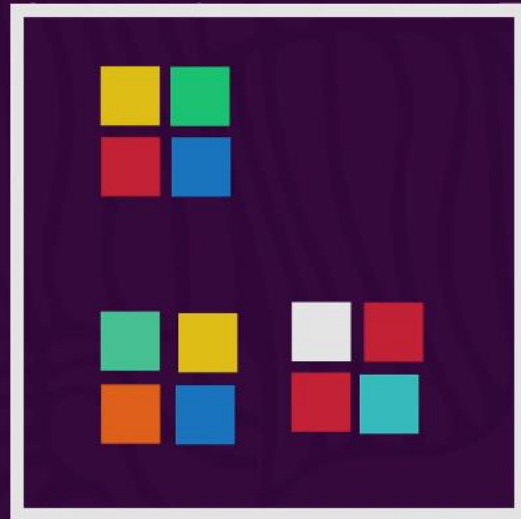
Langetermijn- geheugen



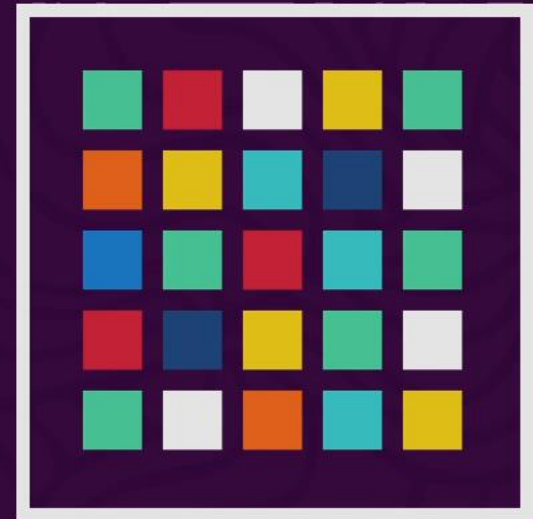
Omgevingsprikkels



Werkgeheugen



Langetermijngeheugen



M11 - VIERHOEKEN IN DE RUIMTE
alle begrippen die we nodig hebben

M12 - VIERHOEKEN TEKENEN
Tekenen op papier en in Geogebra

M13 - KUBUS EN BALK ONTVOUWEN
Een training voor je ruimtelijke inzicht

M14 - VIERHOEKEN IN DE RUIMTE
Geen fouten meer tegen de omzettingen

Waarna we kunnen inzoomen op ...

**M15 - RECHT-
HOEK EN BALK**

**M16 - VIERKANT
EN KUBUS**

**M17 -
TRAPEZIUM-
RUIT**

WAT JE AL KUNT

- vierhoeken herkennen in ruimtefiguren
- hoeken meten
- rekenen met hoeken
- het bepalen van de som van de hoeken van een driehoek

WAT JE LEERT IN DEZE MODULE

- verschillende vierhoeken definiëren zoals: trapezium, parallellogram, ruit, rechthoek en vierkant
- rekenen met hoeken in een vierhoek
- vierhoeken schetsen en tekenen
- omtrek en oppervlakte van vierhoeken berekenen
- herkennen van de eigenschappen bij de soorten vierhoeken

IN DE KIJKER

Je werkt op 1 mm of 1 graad nauwkeurig.

WISKUNDETAAL

- een trapezium
- een gelijkbenig trapezium
- een rechthoekig trapezium
- de benen van een gelijkbenig trapezium
- een parallellogram
- een ruit
- een rechthoek
- een vierkant
- de diagonalen in een vierhoek



The Cold War

Context

At the end of World War II, the world was split into two factions; The **Western Bloc** a group of countries under capitalist rule, comprised of the United States and its allies, some of whom would later become **NATO**, and the **Eastern Bloc** - led by the USSR (known as the Soviet Union) and communist countries, some of whom would later sign the **Warsaw Pact**. An imaginary **Iron Curtain** divided east and west.

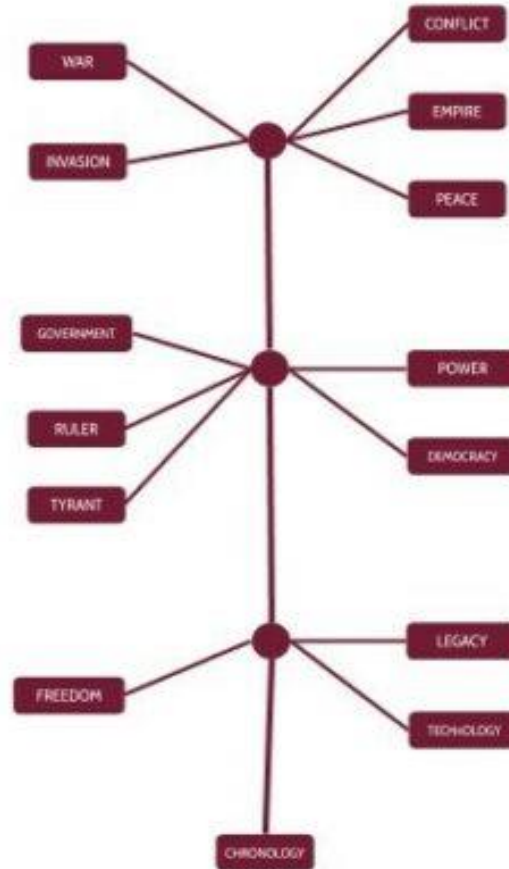
These two factions would spend the next 40+ years engaged in a stand-off - both the United States and the USSR had developed nuclear weapons - and knew that attacking the other would lead to **M.A.D. (mutually assured destruction)**. There were incidents of **brinkmanship** and **proxy wars** fought in Korea and Vietnam, as the USA became increasingly concerned about a **domino effect** as neighbouring countries would fall to **communist** rule.

With the fall of the **Berlin Wall** in 1989, and the collapse of the USSR in 1991, the Cold War came to an end, as the world sought a more harmonious approach to co-existence.

Vocabulary

Capitalism	An economic system based on private ownership
Communism	An economic system based on community ownership
Democracy	A political system where people vote for their representatives
Totalitarianism	A political system where one person holds complete power
Government	A group of people responsible for running a country
Rebellion	Fighting against someone who is in power
Guerilla Warfare	A method of fighting using ambushes, raids and surprise.
Nuclear Weapon	A weapon of mass destruction powered by a nuclear reaction.
Soviet Union	A communist country comprised of Eastern European republics.
Missile	A weapon that is projected (fired) at a target.
Blockade	Sealing off a place to prevent movement of goods or people.
Brinkmanship	Pushing a situation to the brink of disaster to achieve an advantage.
Domino Theory	A theory that if one country fell to communism, others would follow.
Iron Curtain	The imaginary line dividing free and communist countries in Europe.
Satellite Nations	Nations under the control of the Soviet Union
Detente	Lessening of military and diplomatic tensions between countries.
M.A.D.	Mutually Assured Destruction
NATO	North Atlantic Treaty Organisation
Warsaw Pact	A defence pact between the USSR and neighbouring countries
Allies	Countries that are committed to military cooperation and defence.

Key Concepts



Significant People

- John F. Kennedy** 35th President of the USA
- Dwight Eisenhower** 34th President of the USA.
- Joseph Stalin** Communist leader/dictator of the USSR after WWII
- Nikita Khrushchev** Stalin's successor as leader of communist USSR
- Winston Churchill** Prime Minister of the UK: 1940-45 and 1951-1955
- Fidel Castro** Led the communist revolution in Cuba
- Harry S. Truman** 33rd President of the USA
- Ho Chi Minh** Communist leader of the Viet Minh in Vietnam

USA, NATO & Its Allies

USSR & Its Allies

Neutral/Non-aligned





Frans: iemand leuke intro voor de Futur Simple?

12 reacties



BOUWSTENEN VOOR EFFECTIEF LEREN

DE ROL VAN HET CURRICULUM

Kindergarten	
Overview of Topics	2
Language Arts	3
World History and Geography	12
American History and Geography	13
Visual Arts	15
Music	16
Mathematics	18
Science	20
Grade 1	
Overview of Topics	24
Language Arts	25
World History and Geography	35
American History and Geography	37
Visual Arts	39
Music	41
Mathematics	43
Science	45
Grade 2	
Overview of Topics	50
Language Arts	51
World History and Geography	61
American History and Geography	63
Visual Arts	66
Music	68
Mathematics	70
Science	73

Core Knowledge Sequence

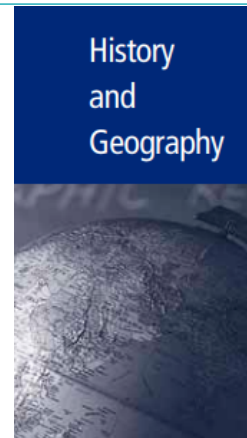
Content and Skill Guidelines for Grades K–8



BOUWSTENEN VOOR EFFECTIEF LEREN

DE ROL VAN HET CURRICULUM

Overview of Topics	Grade 7
<p>English</p> <p>I. Writing, Grammar, and Usage</p> <p>A. Writing and Research</p> <p>B. Speaking and Listening</p> <p>C. Grammar</p> <p>D. Spelling</p> <p>E. Vocabulary</p> <p>II. Poetry</p> <p>A. Poems</p> <p>B. Elements of Poetry</p> <p>III. Fiction, Nonfiction, and Drama</p> <p>A. Short Stories</p> <p>B. Novels</p> <p>C. Elements of Fiction</p> <p>D. Essays and Speeches</p> <p>E. Autobiography</p> <p>F. Drama</p> <p>G. Literary Terms</p> <p>IV. Foreign Phrases Commonly Used in English</p> <p>History and Geography</p> <p>I. America Becomes a World Power</p> <p>II. World War I: "The Great War," 1914–1918</p> <p>A. History</p> <p>B. Geography of Western and Central Europe</p> <p>III. The Russian Revolution</p> <p>A. History</p> <p>B. Geography</p> <p>IV. America from the Twenties to the New Deal</p> <p>A. America in the Twenties</p> <p>B. The Great Depression</p> <p>C. Roosevelt and the New Deal</p> <p>V. World War II</p> <p>A. The Rise of Totalitarianism in Europe</p> <p>B. World War II in Europe and at Home, 1939–45</p> <p>C. World War II in the Pacific, and the End of the War</p> <p>VI. Geography of the United States</p>	<p>Visual Arts</p> <p>I. Art History: Periods and Schools</p> <p>A. Impressionism</p> <p>B. Post-Impressionism</p> <p>C. Expressionism and Abstraction</p> <p>D. Modern American Painting</p> <p>Music</p> <p>I. Elements of Music</p> <p>II. Classical Music: Romantics and Nationalists</p> <p>A. Romantic Composers and Works</p> <p>B. Music and National Identity</p> <p>III. American Musical Traditions (Blues and Jazz)</p> <p>Mathematics</p> <p>I. Pre-Algebra</p> <p>A. Properties of the Real Numbers</p> <p>B. Linear Applications and Proportionality</p> <p>C. Polynomial Arithmetic</p> <p>D. Equivalent Equations and Inequalities</p> <p>E. Integer Exponents</p> <p>II. Geometry</p> <p>A. Three-Dimensional Objects</p> <p>B. Angle Pairs</p> <p>C. Triangles</p> <p>D. Measurement</p> <p>III. Probability and Statistics</p> <p>Science</p> <p>I. Atomic Structure</p> <p>II. Chemical Bonds and Reactions</p> <p>III. Cell Division and Genetics</p> <p>IV. History of the Earth and Life Forms</p> <p>A. Paleontology</p> <p>B. Geologic Time</p> <p>V. Evolution</p> <p>A. Evolution</p> <p>B. Natural Selection</p> <p>C. Extinction and Speciation</p> <p>VI. Science Biographies</p>



History and Geography: Kindergarten

Teachers: In kindergarten, children often study aspects of the world around them: the family, the school, the community, etc. The following guidelines are meant to broaden and complement that focus. The goal of studying selected topics in World History in Kindergarten is to foster curiosity and the beginnings of understanding about the larger world outside the child's locality, and about varied civilizations and ways of life. This can be done through a variety of means: story, drama, art, music, discussion, and more.

The study of geography embraces many topics throughout the *Core Knowledge Sequence*, including topics in history and science. Geographic knowledge includes a spatial sense of the world, an awareness of the physical processes that shape life, a sense of the interactions between humans and their environment, an understanding of the relations between place and culture, and an awareness of the characteristics of specific regions and cultures.

WORLD HISTORY AND GEOGRAPHY

I. Geography: Spatial Sense (working with maps, globes, and other geographic tools)

Teachers: Foster children's geographical awareness through regular work with maps and globes. Have students regularly locate themselves on maps and globes in relation to places they are studying. Children should make and use a simple map of a locality (such as classroom, home, school grounds, "treasure hunt").

- Maps and globes: what they represent, how we use them
- Rivers, lakes, and mountains: what they are and how they are represented on maps and globes
- Locate the Atlantic and Pacific Oceans.
- Locate the North and South Poles.

II. An Overview of the Seven Continents

Teachers: Help children gain a beginning geographic vocabulary and a basic sense of how we organize and talk about the world by giving names to some of the biggest pieces of land. Introduce children to the seven continents through a variety of methods and media (tracing, coloring, relief maps, etc.), and associate the continents with familiar wildlife, landmarks, etc. (for example, penguins in Antarctica; the Eiffel Tower in Europe). Throughout the school year, reinforce names and locations of continents when potential connections arise in other disciplines (for example, connect Grimm's fairy tales to Europe; voyage of Pilgrims to Europe and North America; story of "Momotaro—Peach Boy" to Asia [Japan]; study of Native Americans to North America).

- Identify and locate the seven continents on a map and globe:
 - Asia
 - Europe
 - Africa
 - North America

Note: In later grades, children will continue to learn about all the continents as well as specific countries and peoples.

2

BOUWSTENEN VOOR EFFECTIEF LEREN

De rol van voorkennis en het curriculum

Het gebruiken van voorbeelden

Bieden van zorgvuldig gekozen oefenkansen

Betrokkenheid door leren en feedback

**GEDACHTEGANG
VAN DE LERAAR**

**UITLEG DOOR
DE LERAAR**

**UITGEWERKT
VOORBEELD**



OBJECTIVE A

To solve an equation of the form $ax + b = c$



Point of Interest

Evariste Galois, despite being killed in a duel at the age of 21, made significant contributions to the study of equations. In fact, there is a branch of mathematics called Galois theory that explores what kinds of equations can be solved and what kinds cannot.



Take Note

Note that

$$\frac{x}{4} = \frac{1}{4}x$$

The reciprocal of $\frac{1}{4}$ is 4.

To solve an equation of the form $ax + b = c$, it is necessary to use both the Addition and Multiplication Properties to simplify the equation to one of the form $variable = constant$.

HOW TO 1

Solve: $\frac{x}{4} - 1 = 3$

$$\frac{x}{4} - 1 = 3$$

$$\frac{x}{4} - 1 + 1 = 3 + 1$$

$$\frac{x}{4} + 0 = 4$$

$$\frac{x}{4} = 4$$

$$4 \cdot \frac{x}{4} = 4 \cdot 4$$

$$1x = 16$$

$$x = 16$$

The solution is 16.

- The goal is to simplify the equation to one of the form $variable = constant$.

- Add the opposite of the constant term -1 to each side of the equation. Then simplify (Addition Properties).

- Multiply each side of the equation by the reciprocal of the numerical coefficient of the variable term. Then simplify (Multiplication Properties).

- Write the solution.

EXAMPLE 1

Solve: $3x + 7 = 2$

Solution

$$3x + 7 = 2$$

$$3x + 7 - 7 = 2 - 7$$

$$3x = -5$$

$$\frac{3x}{3} = \frac{-5}{3}$$

$$x = -\frac{5}{3}$$

The solution is $-\frac{5}{3}$.

- Subtract 7 from each side.

- Divide each side by 3.

YOU TRY IT 1

Solve: $5x + 8 = 6$

Your solution



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Tel. 03-5537-2200
www.boucheron.com

松崎煎餅

MEN'S SHO



4°C

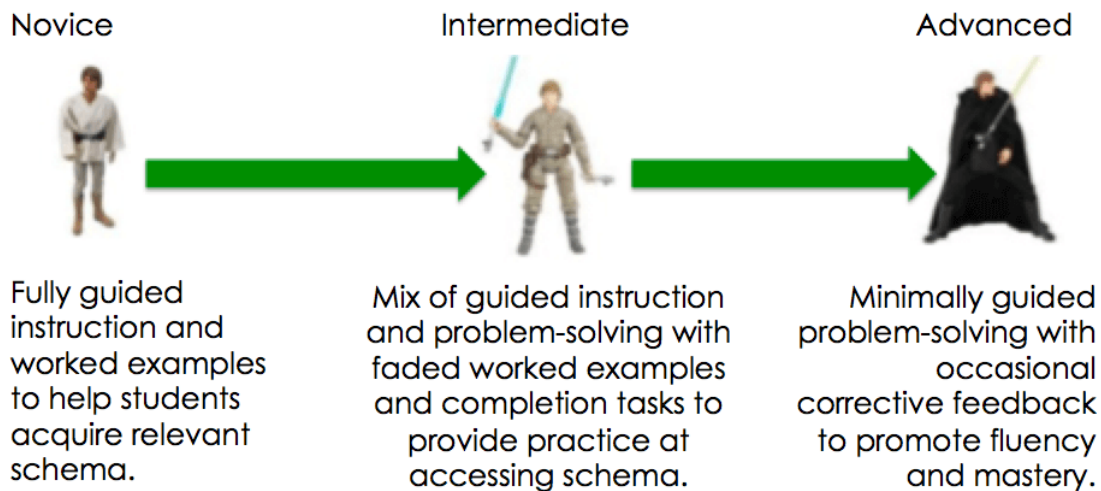
OHZO
7th floor



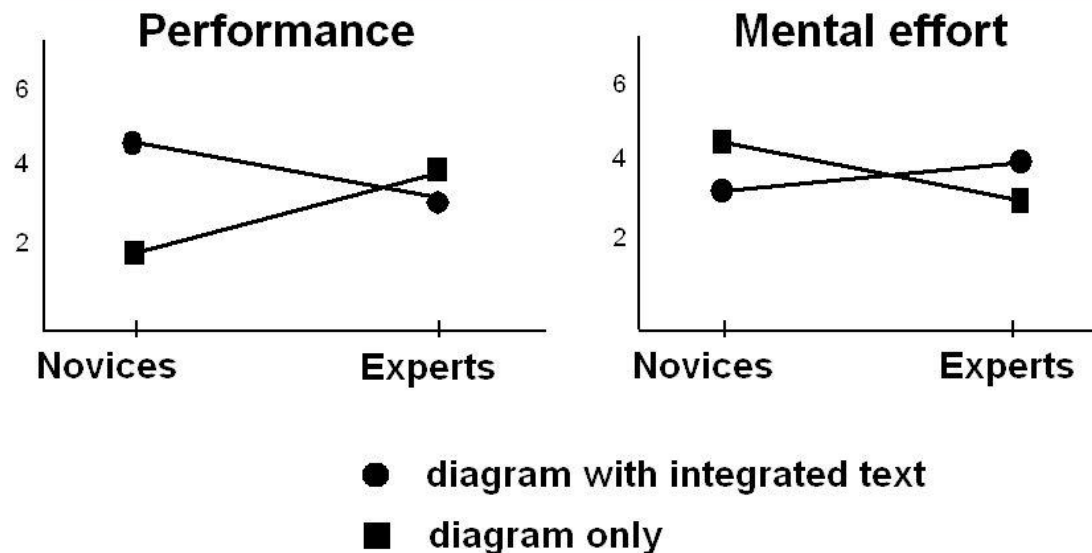
2

BOUWSTENEN VOOR EFFECTIEF LEREN

DE KRACHT VAN HET VOORBEELD



What instruction is best for whom? (Expertise reversal effect)



ICLEPS 29 August 2005

2

BOUWSTENEN VOOR EFFECTIEF LEREN

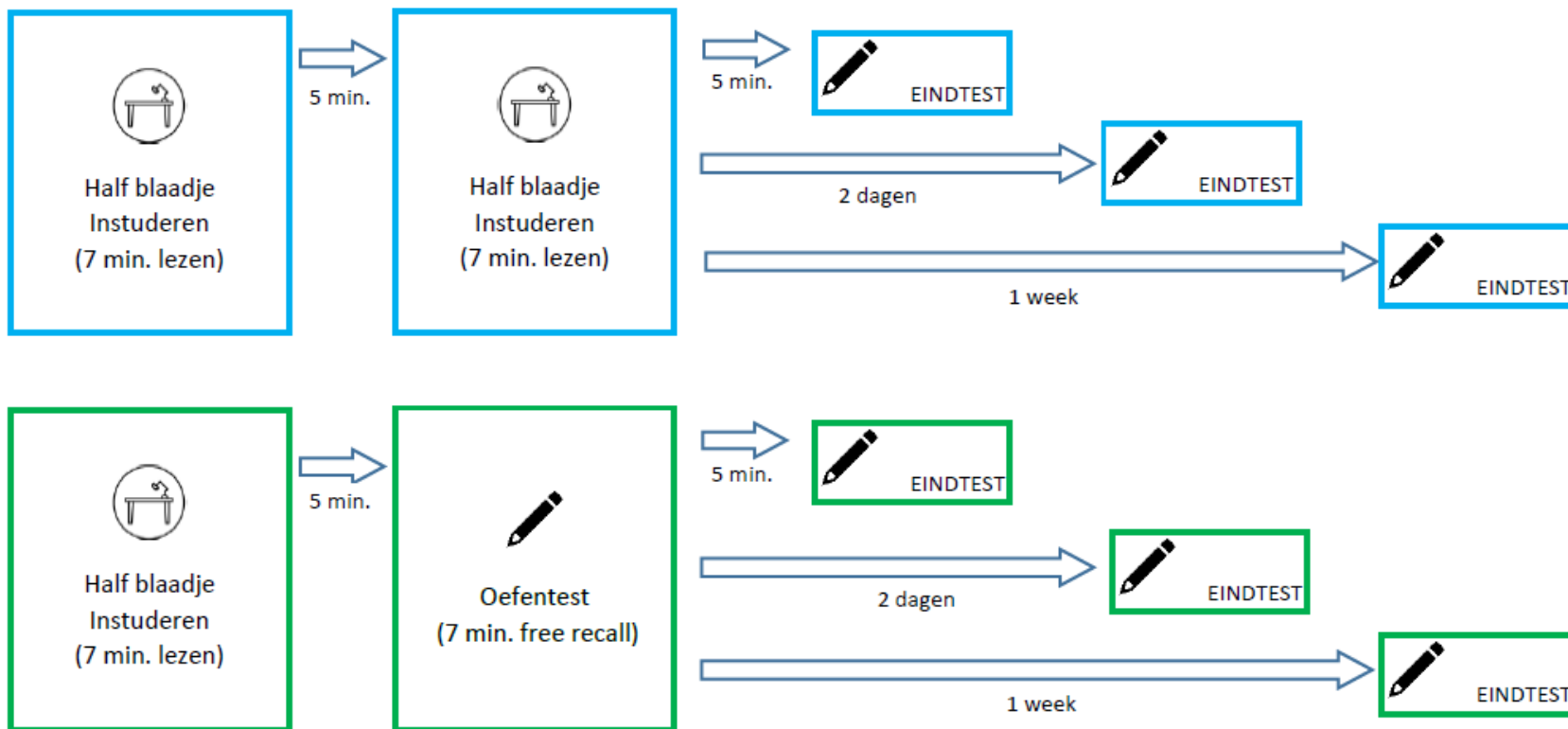
De rol van voorkennis en het curriculum

De kracht van het voorbeeld

Betrokkenheid door leren, oefening en feedback

Sturen van zelfstandig leren

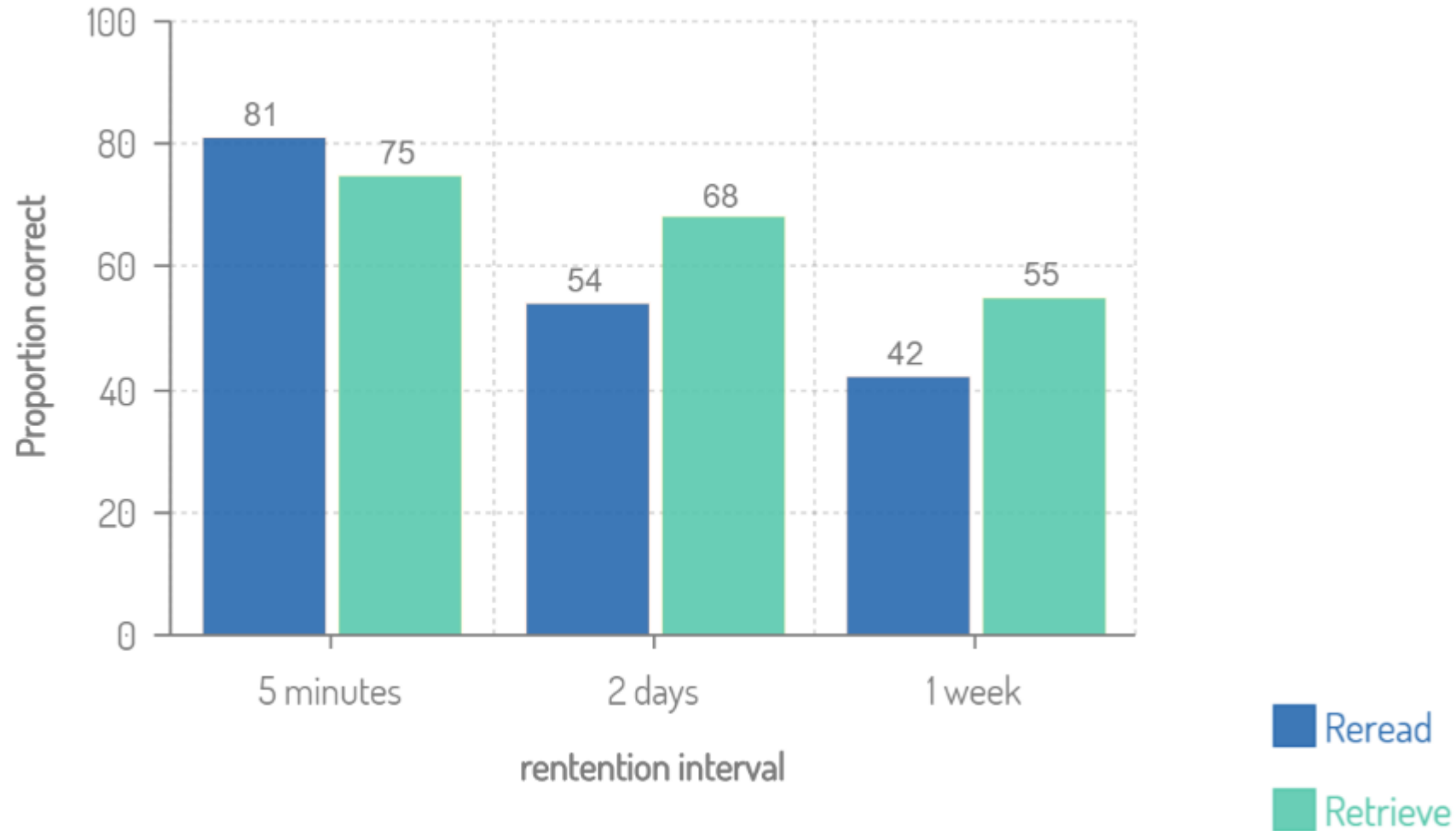
EXPERIMENT 1

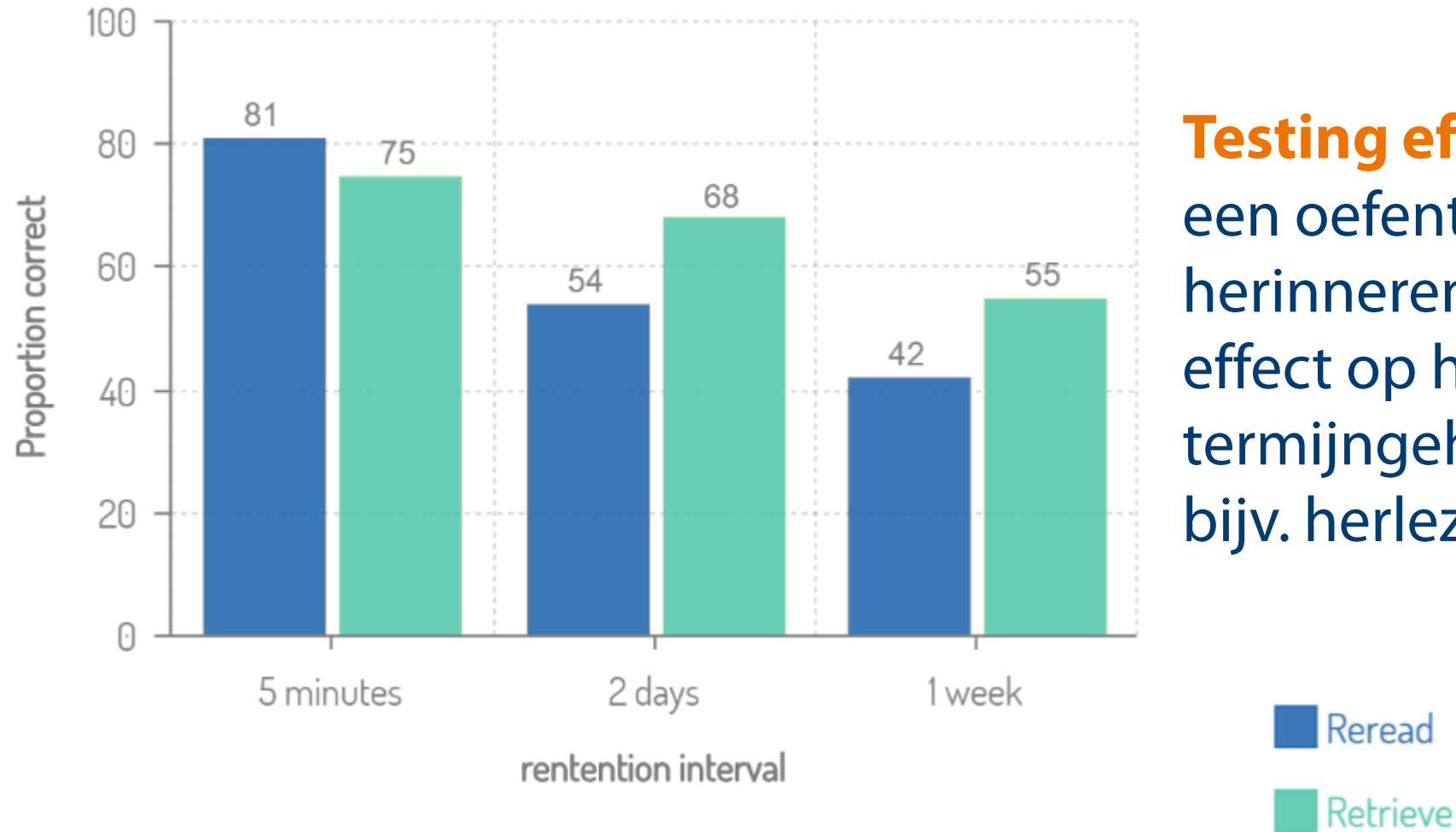


2

BOUWSTENEN VOOR EFFECTIEF LEREN

BETROKKENHEID DOOR LEREN, OEFENING EN FEEDBACK





Testing effect: het maken van een oefentest (trachten iets te herinneren) heeft een positief effect op het lange termijngeheugen (meer dan bijv. herlezen).





Educational Psychology Review

Table 1 Evidence on the effectiveness of generative learning strategies in different age groups

	University students	Secondary-school students	Fourth/fifth-grade students	Below fourth-grade students
Concept mapping	Favorable	Favorable	Favorable	Insufficient
Explaining	Favorable	Favorable	Mixed	Mixed
Predicting	Favorable	Favorable	Favorable	Favorable
Questioning	Favorable	Mixed	Mixed	Unfavorable
Testing	Favorable	Favorable	Favorable	Favorable
Drawing	Favorable	Favorable	Unfavorable	Unfavorable



Think

about the question



Pair

with your partner



Share

your ideas with others

ARTICLE **OPEN**

Does pre-testing promote better retention than post-testing?

Alice Latimier^{1,2}, Arnaud Riegert³, Hugo Peyre^{1,4,5}, Son Thierry Ly³, Roberto Casati² and Franck Ramus¹

Compared with other learning strategies, retrieval practice seems to promote superior long-term retention. This has been found mostly in conditions where learners take tests after being exposed to learning content. However, a pre-testing effect has also been demonstrated, with promising results. This raises the question, for a given amount of time dedicated to retrieval practice, whether learners should be tested before or after an initial exposure to learning content. Our experiment directly compares the benefits of post-testing and pre-testing relative to an extended reading condition, on a retention test 7 days later. We replicated both post-testing ($d = 0.74$) and pre-testing effects ($d = 0.35$), with significantly better retention in the former condition. Post-testing also promoted knowledge transfer to previously untested questions, whereas pre-testing did not. **Our results thus suggest that it may be more fruitful to test students after than before exposure to learning content.**

npj Science of Learning (2019)4:15 ; <https://doi.org/10.1038/s41539-019-0053-1>

WHOLE-CLASS-FEEDBACK

Who impressed me?
 [redacted] got the language timeline right!
 [redacted] were really successful on the analysis question.

Medieval Literature BASELINE

**Key timeline content:
LEARN THIS!**

SPELLINGS

1. Germanic
2. semantic
3. Medieval
4. alliteration
5. Beowulf
6. Geoffrey Chaucer
7. Arthur

Common punctuation and grammar errors:

- Students writing numbers as digits, not words (this is only OK if you are writing a date)
- a lot is ALWAYS two separate words!
- Possessive apostrophe: the people's treasure
- Capital letters for proper nouns (such as languages, time periods and places)
e.g. Battle of Hastings, Beowulf, English, French, Romans, Latin, Old English, Anglo Saxon

Medieval Literature Timeline

476-800
Fall of Rome / Dark Ages
 Sometimes call the Migration period, when many tribes moved across Europe (such as the Saxons who moved to Britain). This was after the fall of the Holy Roman Empire.

800-1066
Anglo Saxon Period
 The period in which the idea of 'England' was formed, people wrote legal, religious and literary documents in the Old English language.

1066-1300
Early Middle English Period
 A period of great change during which the language of the elite was French, and English was relegated as a language of common people. English changed dramatically to include more Latinate influences.

1300-1500
Late Middle English Period
 A period where English as a language started to regain its dominance in English life. Writers such as Chaucer, Langland and Malory wrote poetry influenced by ideas of religion and chivalry.

1500-1700
Early Modern English Period
 More usually called the 'Renaissance' period, this is where the English language developed to the earliest recognisable version of Modern English. Shakespeare, Marlowe and Johnson write in this language.

Analysis structure: WHAT, HOW, WHY

WHAT:

- The writer was talking and describing a dragon that was angry.
- The writer ~~am~~ talks about all the people being scared.

HOW

- Interesting structure.
- Technical devices
- Structure
- "One of the ways of doing this"
- Dig deeper.

WHY

- "The writer wants to do"
- "The writer tries to achieve"
- "What's the big idea?"
- "What exactly does the writer want us to think?"

Handwritten notes:

- Quote
- Trying to get us to think about something and infer
- Tried to make us ask questions about the text.
- Metaphor - Fancy language.
- Alliteration - Pathetic parody
- Simile
- onomatopoeia.
- vocab (powerful)
- write wants to challenge us.
- change our mind
- emotional response
- educate us
- Change our minds
- change our behaviour and the way we think

Yr 10 WHW Paragraph

Jack
Beth
Paris
George

- Comma splicing
- Keep in same paragraph
- Don't use 'quote'
- Capital letters for characters' names.
- Use vocabulary we are learning in class
- Use present tense.
- Use quotation marks even for stage directions

“Het moet **harder werken** zijn **voor de leerling** dan voor de leraar”

“Als leerlingen de feedback niet gebruiken om het de volgende keer beter te doen doen, dan was het gewoon **tijdverlies**”

Dylan Wiliam

3

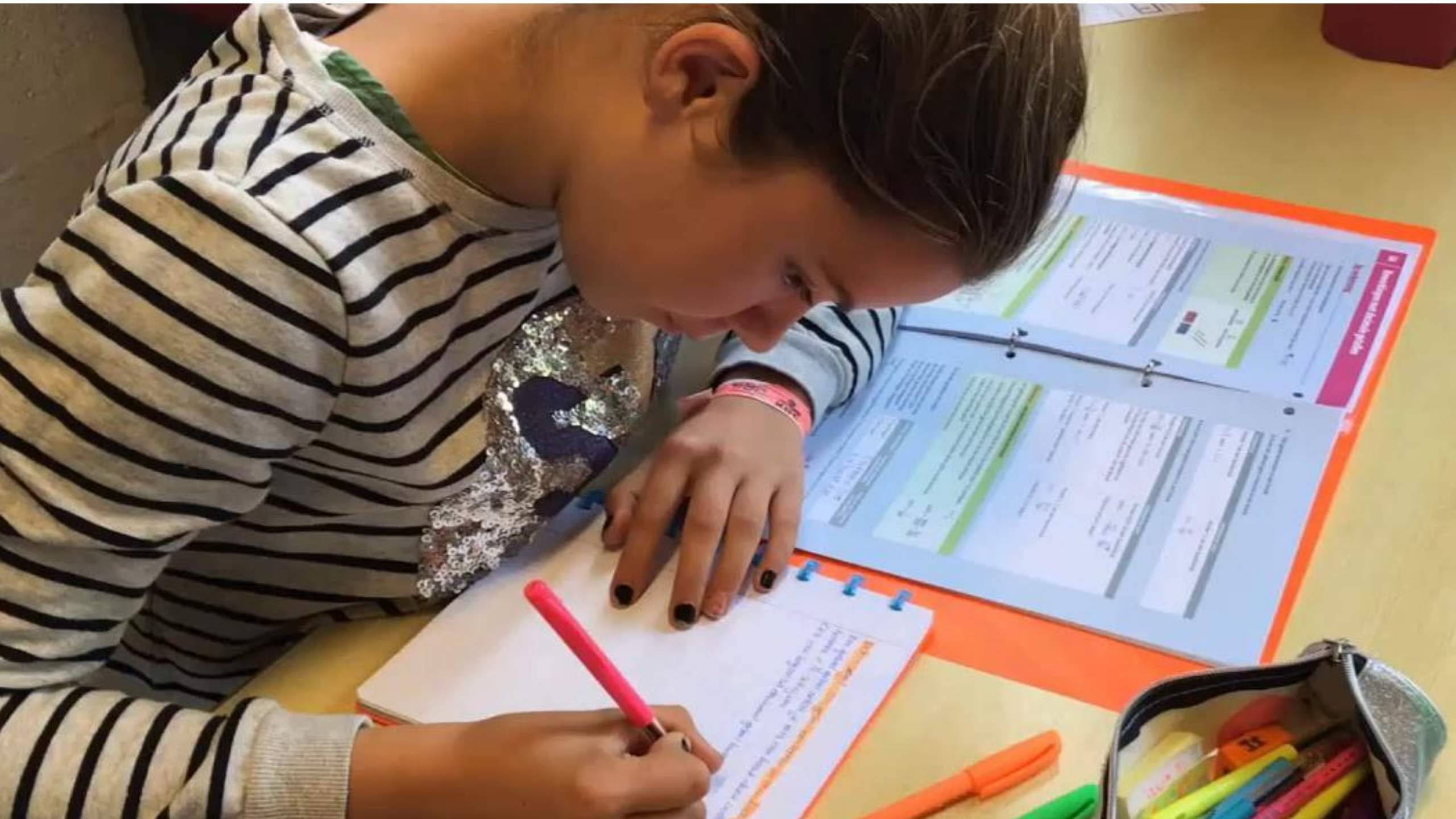
BOUWSTENEN VOOR EFFECTIEF LEREN

De rol van voorkennis en het curriculum

De kracht van het voorbeeld

Betrokkenheid door leren en feedback

Sturen van zelfstandig leren



Handwritten text in pink header

Pages from a binder with text and diagrams, including a flowchart and a table.

Handwritten notes in a spiral notebook, including the phrase "The first step is..."





STUREN VAN ZELFSTANDIG LEREN

- Laat steeds verklaren waarom het voorbeelden zijn van een bepaald begrip. Je weet als leraar dan pas zeker dat je leerlingen de bepalende kenmerken begrijpen, en dat ze niet alleen maar de concrete voorbeelden leren.
- Kies in de mate van het mogelijke voorbeelden uit verschillende vakken en interessegebieden. Zo spreek je de voorkennis van zo veel mogelijk leerlingen aan.
- Benoem samen ook tegenvoorbeelden, verschillen en gelijkenissen met andere concepten.

VOORBEELDEN UIT HUN LEEFWERELD? JA EN NEE!

Probeer de hobby's, achtergronden, bezorgdheden, interesses van je leerlingen te achterhalen, zodat je de leefwereld, toekomstbeelden en andere interesses van je leerlingen kunt verwerken in je les. Leerlingen voelen zo dat onderwijs en hun wereld niet zo ver van elkaar staan als ze soms vermoeden. Maar blijf vooral ook niet steken in de leefwereld van de leerlingen, die kennen ze immers al. Onderwijs kan net de leefwereld van het kind openbreken en hun blik verruimen. Breng je leerlingen naar werelden die ze nog niet kenden!



Wat onderzoek ons vertelt

worked example effect

Als voorbeelden deel uitmaken van de instructie, is het leereffect groter dan wanneer het leren plaatsvindt louter via het oplossen van oefeningen (zelfs met goede begeleiding). Dit heet het *worked example effect* en is volgens John Sweller, de bedenker van de cognitieve-belastingtheorie, het meest gekende en onderzochte effect van de theorie.² We benadrukken dat het worked example effect alleen maar geldt voor voorbeelden waarbij nieuwe principes of theorie vooraf werd(en) gepresenteerd, en dus niet voor voorbeelden die gebruikt worden om van daaruit nieuwe principes te 'ontdekken'. Het effect treedt dus op als je eerst uitlegt wat het begrip 'erosie' betekent, en daarbij verschillende voorbeelden laat zien en bespreekt.

Stel dat leerlingen een nieuw soort oefeningen moeten leren oplossen. Wanneer ze meteen volledige oefeningen voorgeschoteld zouden krijgen die ze bovendien zelfstandig moeten oplossen, dan zouden ze gedwongen

CORNELL-METHODE

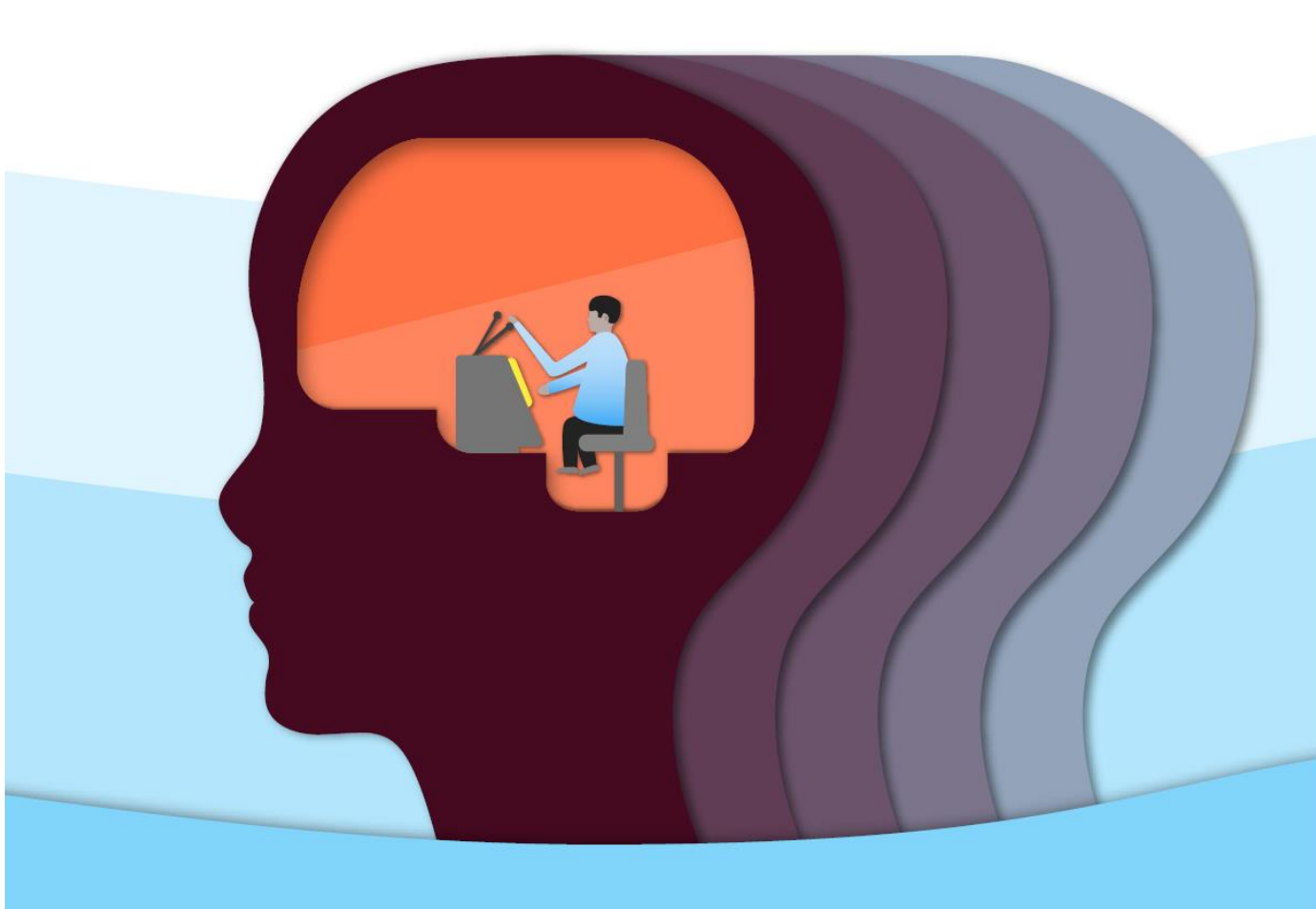
ONDERWERP VAN DE LES	
<p>KERNWOORDEN KERNVRAGEN Hierover wil ik meer kunnen vertellen....</p>	<p>NOTITIES Hier noteer ik alle belangrijke informatie bij de kernbegrippen links.</p> <ul style="list-style-type: none"> • Noteer naast elk kernwoord de belangrijke punten. • Gebruik korte kernachtige zinnen. • Maak tekeningen / schema's en schrijf hier de belangrijke info bij. • Laat voldoende ruimte tussen de tekeningen of zinnen (overzicht). • Gebruik opsommingen indien mogelijk. • Bewaar de structuur van de les.
<p>BEGRIPPEN</p>	
<p>VRAGEN</p>	
<p>NAMEN</p>	
<p>DATUMS</p>	
<p>6 cm 15 cm</p>	
<p>SAMENVATTING</p>	

Deze samenvatting studeren? Dek het rechterdeel af en probeer je zo veel mogelijk te herinneren. Check nadien je antwoorden en vul aan.

2

BOUWSTENEN VOOR EFFECTIEF LEREN (OP AFSTAND)

STUREN VAN ZELFSTANDIG LEREN



- 1 Activating Prior Knowledge
- 2 Explicit strategy instruction
- 3 Modelling of learned strategy
- 4 Memorisation of strategy
- 5 Guided practice
- 6 Independent practice
- 7 Structured reflection

Student Teacher



3

UITDAGINGEN VOOR ONS ONDERWIJS

Generieke vaardigheden als doel of als middel?

De publieke perceptie van kennis

Constructivisme beschouwen als didactiek

Concepten binnen didactiek die vloeien met wetenschap én praktijk

UITDAGINGEN VOOR ONS ONDERWIJS

GENERIEKE VAARDIGHEDEN ALS DOEL OF ALS MIDDEL?

EXPERIMENTAL EVIDENCE SHOWS THAT AN EXPERT DOES NOT THINK AS WELL OUTSIDE HER AREA OF EXPERTISE, EVEN IN A CLOSELY RELATED DOMAIN. SHE IS STILL BETTER THAN A NOVICE, BUT HER SKILLS DO NOT TRANSFER COMPLETELY.

Educ Psychol Rev (2014) 26:265–283
DOI 10.1007/s10648-013-9243-1

REVIEW ARTICLE

Domain-Specific Knowledge and Why Teaching Generic Skills Does Not Work

André Tricot • John Sweller

EDUCATION:
FUTURE FRONTIERS

OCCASIONAL PAPER SERIES

How to Teach Critical Thinking

Daniel T. Willingham

DE KNOPE EN HOE ZE WORDEN DOOR

Illustratie van een knoop

Achter de concrete voorstellen die nu ter tafel liggen zit een overwegend veel denk- en studiewerk, discussie en overleg. Maar er moesten veel knopen worden doorgehakt. Zodra daarover consensus bestaat valt het eindtermen wel mee. Een overzicht van de doorgehakte knopen.

■ VIJF BELANGRIJKE KEUZES

In de nieuwe eindtermen kiest men resoluut voor vijf belangrijke principes.

1. Minder specialisatie en meer **brede basisvorming**.
2. Minder accent op kennis en het cognitieve, meer op waarden, het affectieve en de **persoonlijkheidsvorming**.
3. Minder theorie en zuiver intellectualisme, meer praktisch, toepassing en **aandacht voor het levensechte**.
4. Minder denken in aparte vakken, meer **vakoverschrijdend** werken en coördinatie tussen de verschillende vakken.
5. Minder mikken op geheugen, onmiddellijk resultaat en de korte termijn, meer aandacht voor wat **beklijft op lange termijn**.

hun eigen invalshoek hetzelfde onderwerp moeten aansnijden. Er moeten voortdurend bruggen worden geslagen.

In het basisonderwijs spreekt men zelfs niet meer over vakken. Er blijven slechts vijf «leergebieden» over.

In het secundair behoudt men vakken maar het overleg en de aandacht voor de samenhang zullen, als het goed zit, bij decreet worden vastgelegd.

STANDAERT: «We zullen de leerkrachten in het secundair onderwijs niet meteen van hun melk brengen en stuurloos maken. We hebben nu eenmaal een sterk vakkenonderwijs. De bevoegdheden, de classificatie, de begeleiding, de lesprestaties, de betaling... het steunt allemaal op vakken.



3

UITDAGINGEN VOOR ONS ONDERWIJS

CONSTRUCTIVISME ALS LEERTHEORIE VERWARREN MET INSTRUCTIETHEORIE



Just because they're engaged, it doesn't mean they're learning

CARL HENDRICK
WELLINGTON COLLEGE, UK; AUTHOR

JIM HEAL
DEANS FOR IMPACT, USA



Figure 1

Two Dimensions of Active Learning: Cognitive Activity and Behavioral Activity

		Cognitive activity	
		Low	High
Behavioral activity	Low		
	High		

Leerstijlen van Kolb

- Doener



Ik spring er
dover en
probeer het!

- Bezinner



Ik kijk vooral naar
anderen het doen en
vraag er om maar hun
aanzichten.

- Beslisser



Ik vraag iemand het
voor te doen en als het
niet lukt dan te helpen.

- Denker



Ik denk aan alles wat
"verstand" kan zijn en
"rekenen".

Inhoudelijk sterke lerarenopleiding- en professionalisering

(Robinson, 2001). Het creatieve of holistische denken, het non-verbale of het muzikale, het tekenen of het geheugen rond het toon houden, de emotionele gedachten zitten allemaal in de rechterhersen helft en wegen in schoolse evaluaties niet echt zwaar (Retting, 2005). Het competentiegericht denken wil echter nog een stap verder gaan en niet enkel alle competentiedomeinen aan bod laten komen, maar ook verbanden leggen tussen wat zich afspeelt in de linker- en de rechterhersen helft. Met andere woorden, het creatieve zou bijvoorbeeld binnen het talig functioneren een plaats moeten krijgen of het muzische binnen het logisch/ mathematische. Op die manier wordt bij kinderen en jongeren een ontwikkeling in de diepte nagestreefd, opdat ze in staat zullen zijn gepast en geïntegreerd te reageren bij het oplossen van nieuwe problemen.

EFFECTIEF LES GEVEN

“To see what is in front of one's nose needs a constant struggle.” (Orwell, 1946)

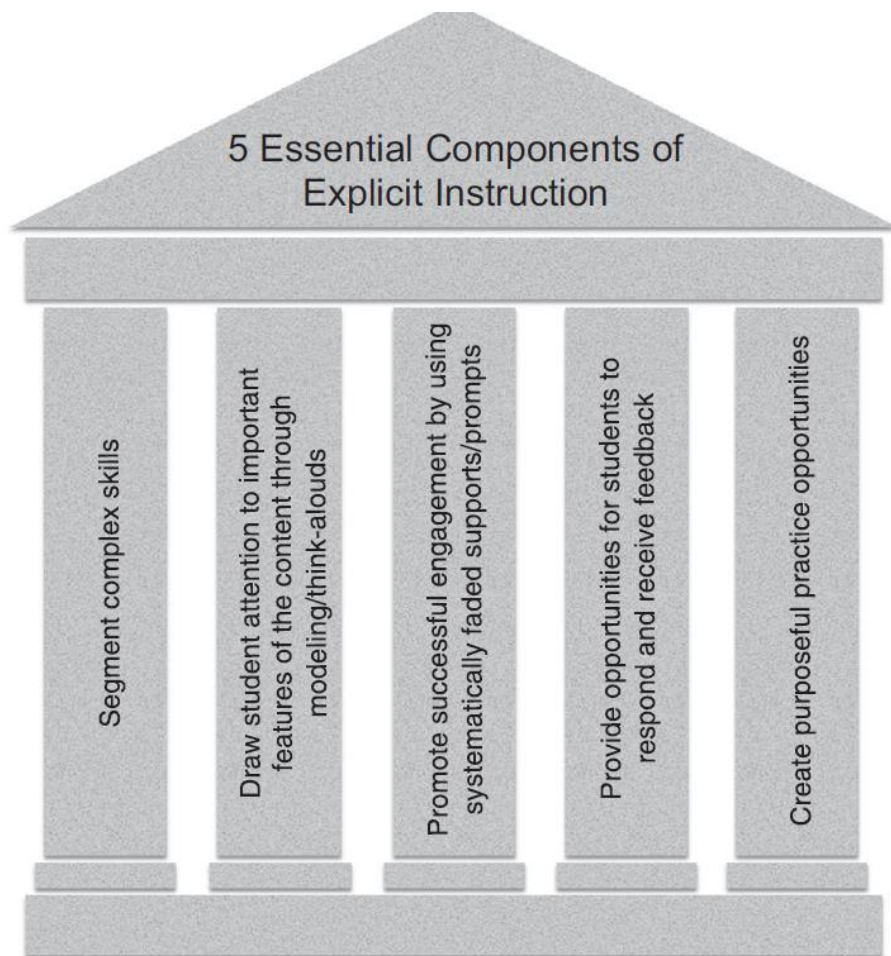


FIGURE 1 Five essential components of explicit instruction.

“Explicit instruction is a group of research-supported instructional behaviors used to design and deliver instruction that provides needed supports for successful learning

- through **clarity of language and purpose**, and reduction of cognitive load.
- It promotes **active student engagement**
- by requiring **frequent and varied responses**
- followed by appropriate affirmative and corrective **feedback**, and
- Assists long-term retention through use of **purposeful practice strategies**”.

Directe Instructie, directe instructie, expliciete instructie