

Issues to be addressed in reaching FTI early reading goals

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Education for All Fast Track Initiative
(c/o World Bank)

**All Children Reading by 2015:
From Assessment to Action
Washington, DC
April 12-14, 2010**

Consistent Evaluation finding: The schools of the poor may teach very little

Some schools closed, open late

- about 30% of the time in Mali -1999
- Teachers often absent, come late, stop work early
- Few if any books in class
- Class time spent in little activity
 - copying
 - engaged in incomprehensible material
 - playing outside
 - Many principals, ministry officials, supervisors complacent

Poorer students cannot read well until the end of primary (if then)

This presentation will discuss

- The basics of how reading develops in the brain
- How is reading taught most efficiently
- What textbooks should offer
- What teachers must know
- Help that can be obtained from technology
- The importance of informing citizens
- conclusions

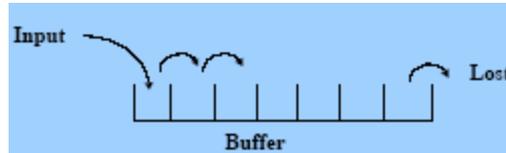
The fluency paradox: Minimum reading speed needed for comprehension

If you don't read fast enough,
by the end of a sentence you
forget the beginning!

Why does this happen?

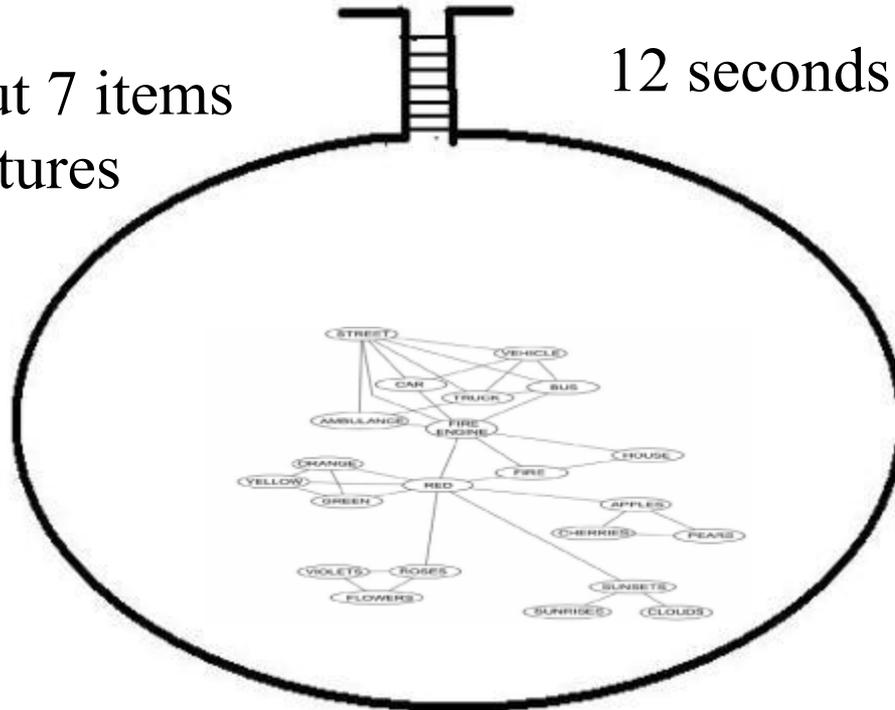
Short-term memory

Crucial for reading comprehension



About 7 items
4 pictures

12 seconds at most



Long-term memory



To read an average sentence in
an 'average' language roughly..
7 items in 12 seconds...

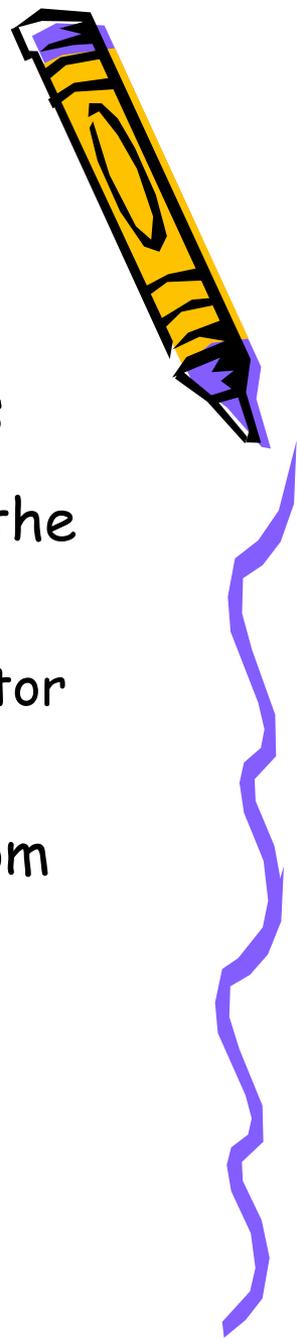


- students must read at least a word per 1-1.5 second
- with 95% accuracy (correlates .87 with speed).
- 45-60 words per minute minimum

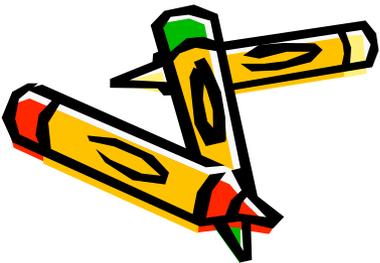


7 words in 12 seconds equals 45-60 words per minute!

To get through the narrow opening the mind creates chunks of information

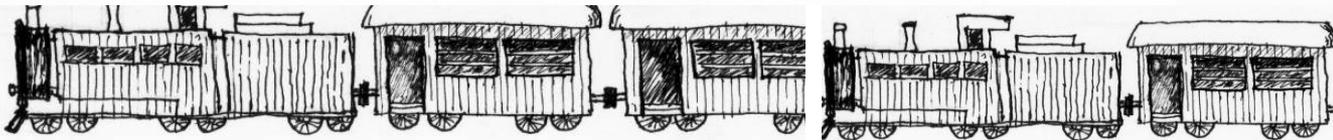
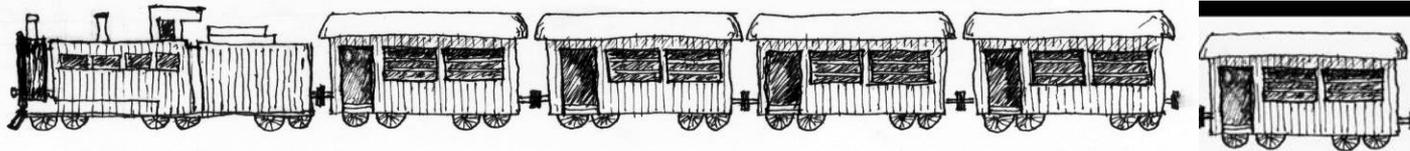


- Letters and other small items combine into chunks that pass as one through working memory
- To become chunks, small items must be practiced to the point of fluent performance
 - We must act in milliseconds!
 - Vast implications for reading, math calculations, motor skills
- This is how children decode ever larger units - from syllables to words
- How do students get to fluency?



Chunking to overcome short-term memory limitations
This is one reason why phonics are more efficient than whole
word methods.

The poor may start from smaller chains than the better off



The brain becomes "programmed" for automatic reading



- Nerve "wiring" develops in children's brains
(*"White matter" needed for reading and larger working memory-Nagy et al. 2005*)
- The visual word form gets activated
- The brain identifies entire words rather than single letters
- Long and short words are read equally fast (silently)
- Speed rises to 250+ words per minute
- People can't help but read
- They pay attention to message rather than the

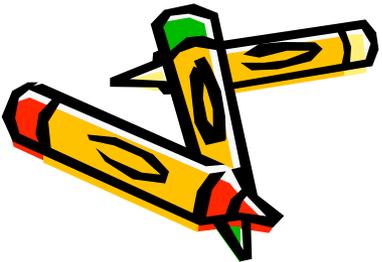
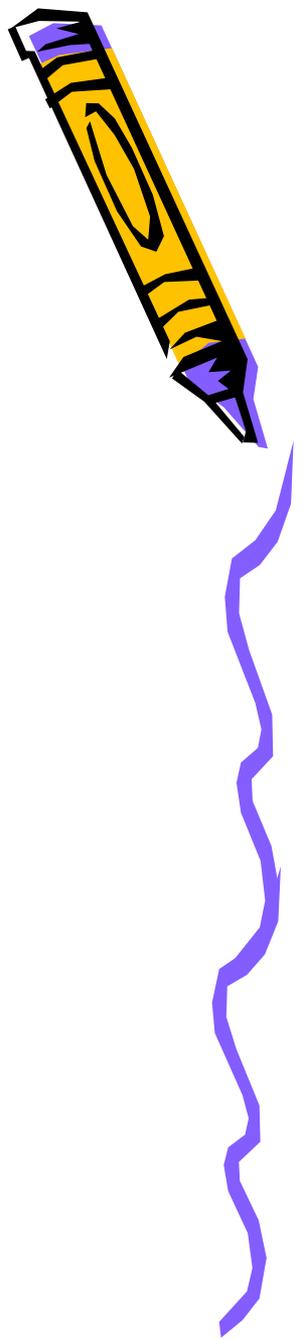


Practice in youth configured your brain for automaticity

- Why can you read this?

BASIC SKILLS TEACHER PROFILE

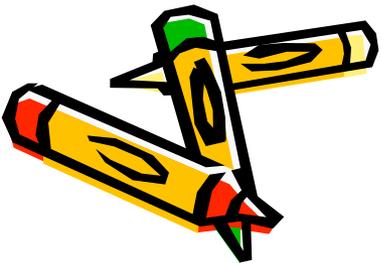
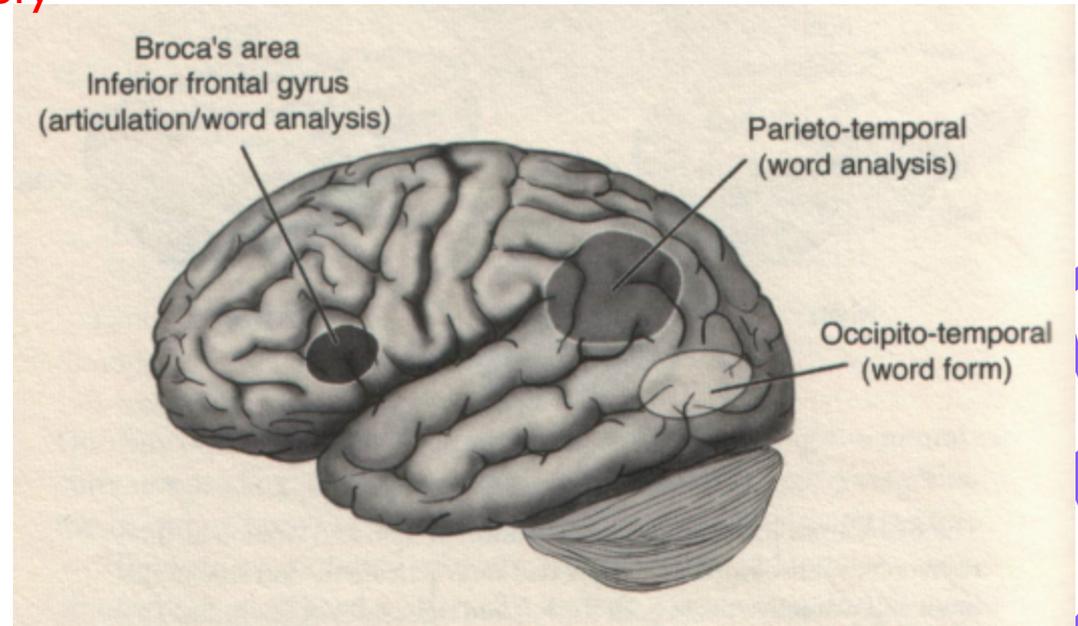
STUDENT ACADEMIC COMMENTS



When people become fluent,
a special area in the brain gets
activated (called visual word form)

3 primary reading areas in the brain:
2 for single letters, slow reading
1 for automatic reading

All 3 are used simultaneously



Reading automaticity: Critical to acquire

(the literacy vaccine!)

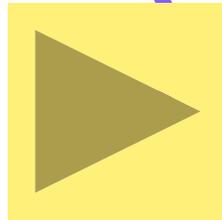
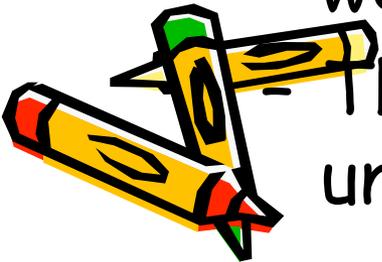
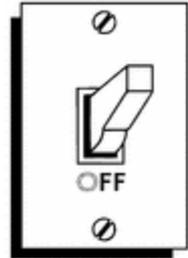
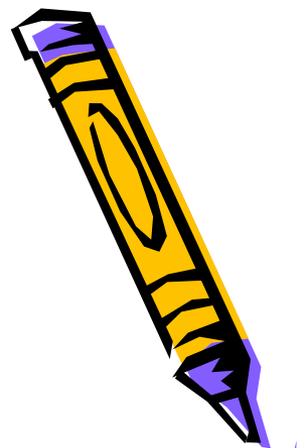
Almost an 'on-off" switch

Consistent pairing of sounds and letters

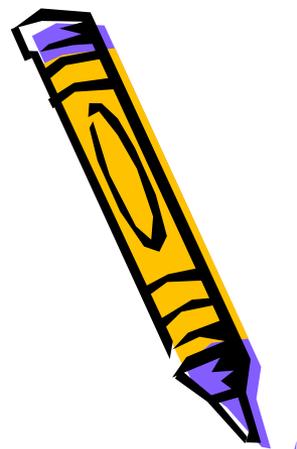
Practice

- Brings reaction time down to about 50 milliseconds per letter
- With 2 hours of daily practice children may pass from the off state to on in 6 weeks (India)

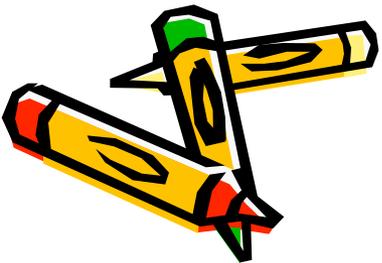
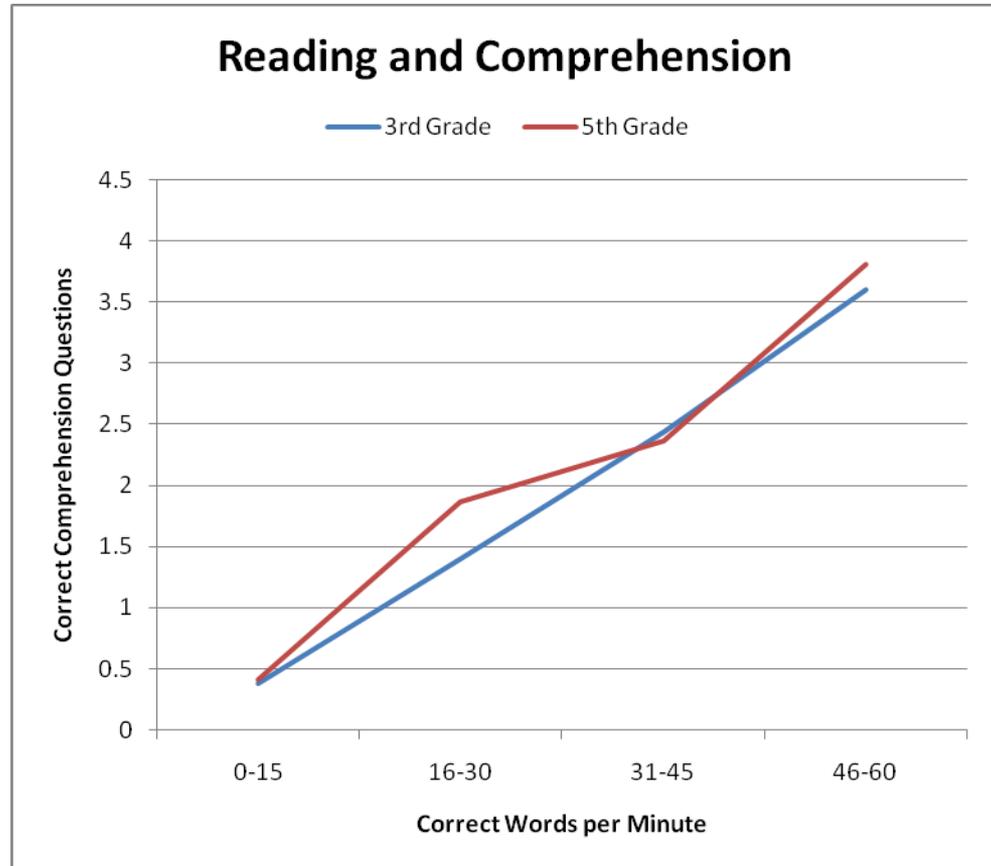
- Then students read fast enough to understand text



Relationship between reading and comprehension



- Ghana:
- Early Grade Reading Assessment



Why 60 words per minute by the end of grade 2?

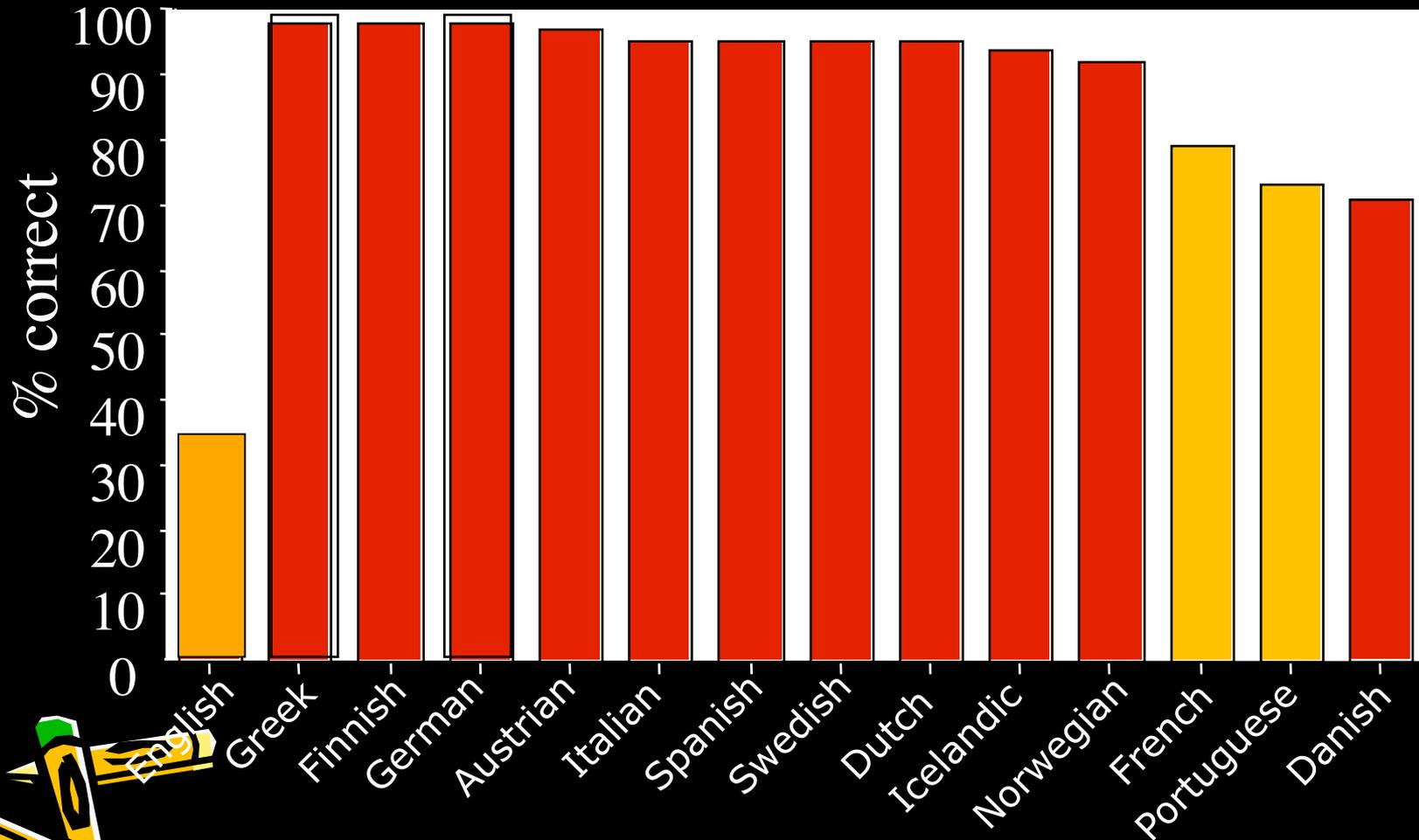
OECD reading study of 16 countries
Latin and Greek scripts

Seymour et al. 2003

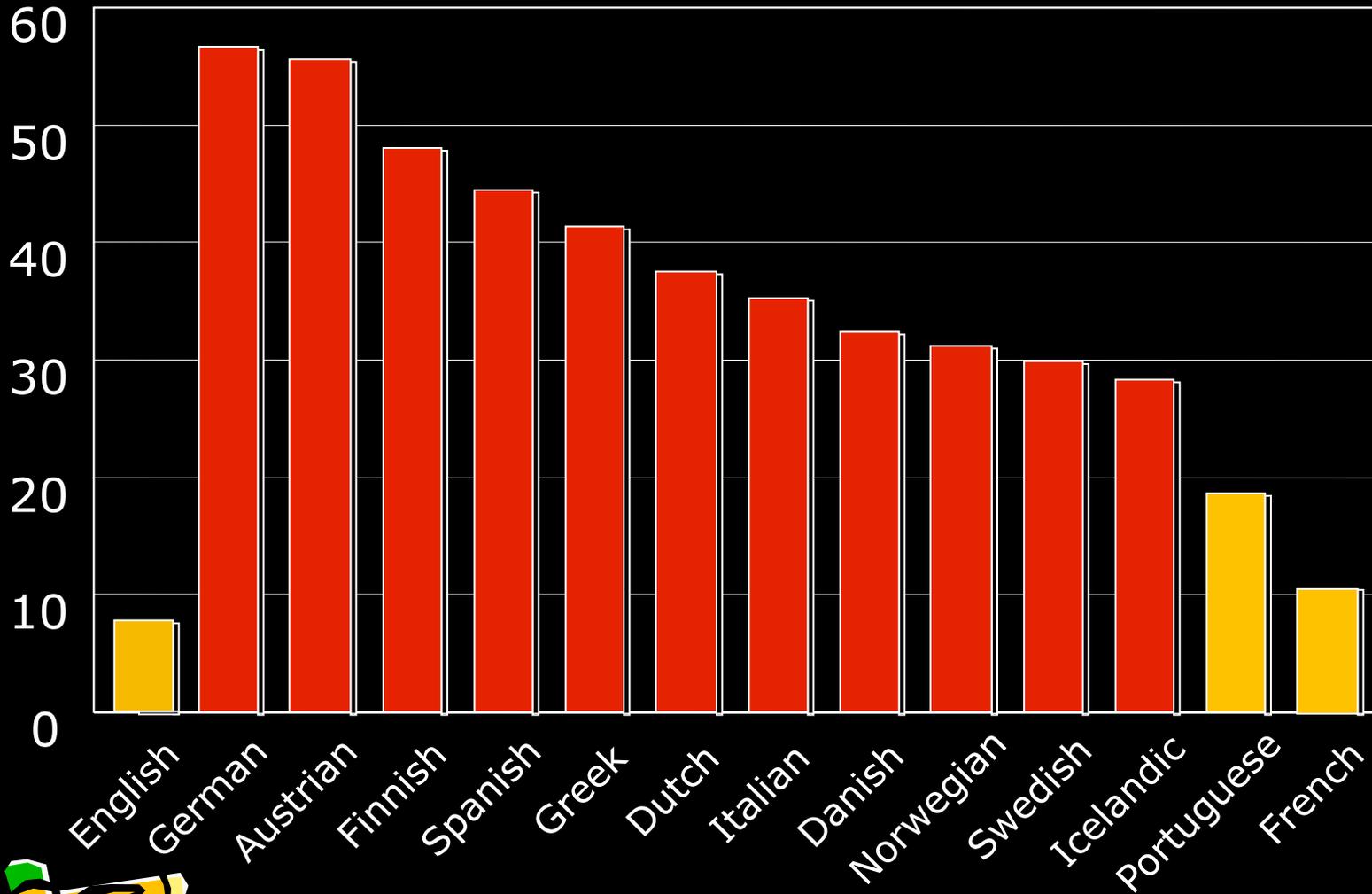
Middle-class students
Best-case scenario

Reading level after 1 year of instruction

Reading lists of words



Items per minute when reading word lists



$$r_{\text{accuracy/speed}} = .87$$

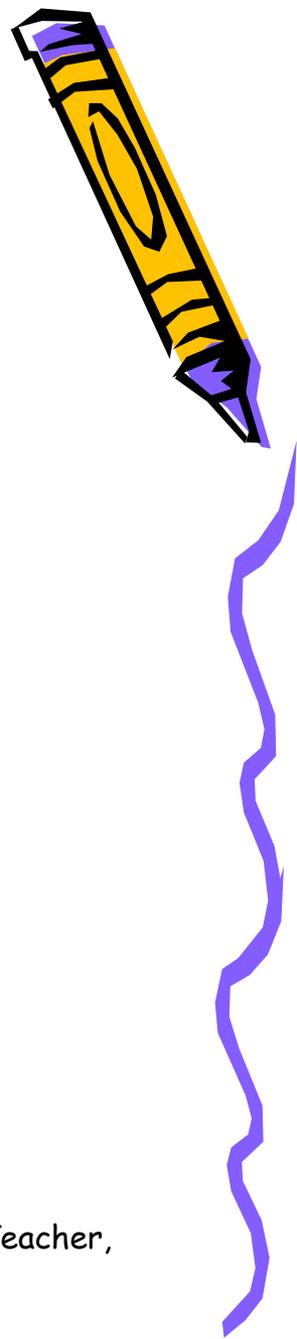
Seymour et al. (2003), British Journal of Psychology



U.S. Oral Reading Fluency Norms connected text - Spring

Hasbrouck and Tindal (2006)

Grade	50 th %ile	25 th %ile	10 th %ile
1	53	28	15
2	89	61	31
3	107	78	48
4	123	98	72
5	139	109	83
6	150	122	93
7	150	123	98
8	151	124	97



U.S. Oral Reading Fluency Norms: A Valuable Assessment Tool for Reading Teachers." *The Reading Teacher*, 59, 2006

New monitoring indicator from neurocognitive research



- 60 words per minute for all
 - In just about every language and script:
- By the end of grade 1 students should "crack the code"
- By the end of grade 2 *at the latest* students should read common words fluently
- Students in grade 7 (1st secondary year) should read about 120-150 words per minute and give a summary of what they



read



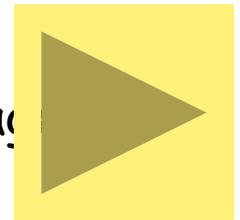
Students becoming fluent late
may always read slowly
have limited comprehension



- If they finally learn reading in grade 6
 - They may read 70 wpm in grade 8
 - They get no more books by grade 8
- They will read little secondary school
 - university or teacher training colleges
 - They cannot read fast enough to consult sources

Or read volumes of text

- At 110 words per minute, it takes 5 minutes per page



Los cinco burros

Don Tomás compró cuatro burros. Montó en uno y volvió a su casa.

Por el camino los contó : uno, dos y tres. No contaba el que montaba.

35 words per minute

Ya en su casa dijo a su mujer :

-Mira, he comprado cuatro burros y traigo sólo tres. Me han robado uno.

-¡Qué raro! -dijo la mujer-.

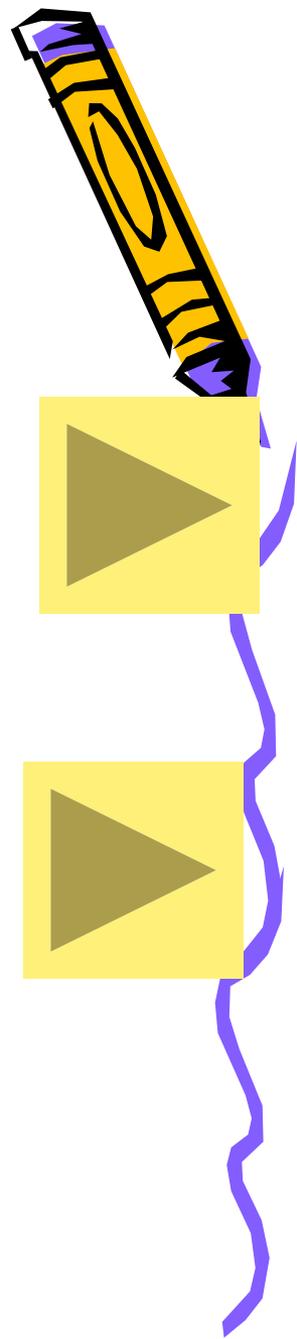
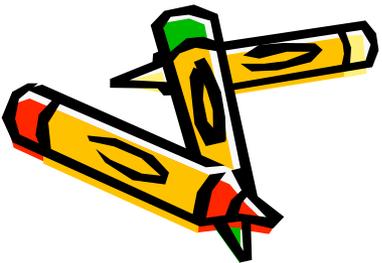
Tu no ves más que tres, pero yo veo cinco.



Sound (OLE2)

Reading fluently enough to understand? 60 wpm correctly?

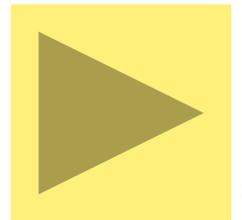
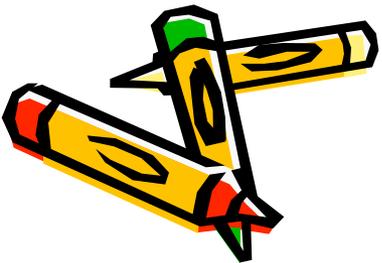
- **Rural Indonesia grade 2**
 - simple spelling rules, good class time use
- **Rural Niger - best 6th grader, graduating in 3 weeks**
 - Study only in French, time use uncertain



Experiments in poor countries show big gains in a few months



- The overall "recipe":
- Special time for reading, 1-2 a day
- Systematic instruction of all script aspects
- Phonological awareness exercises
- Synthetic phonics
- Practice !
- Individual feedback, even for 1 minute a day
- Class time use to engage students in decoding, not just verbal repetition



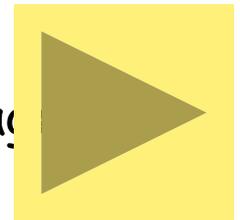
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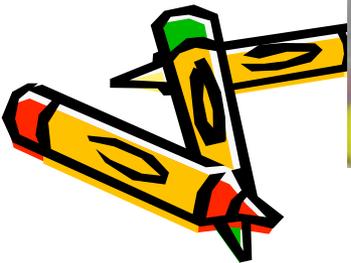
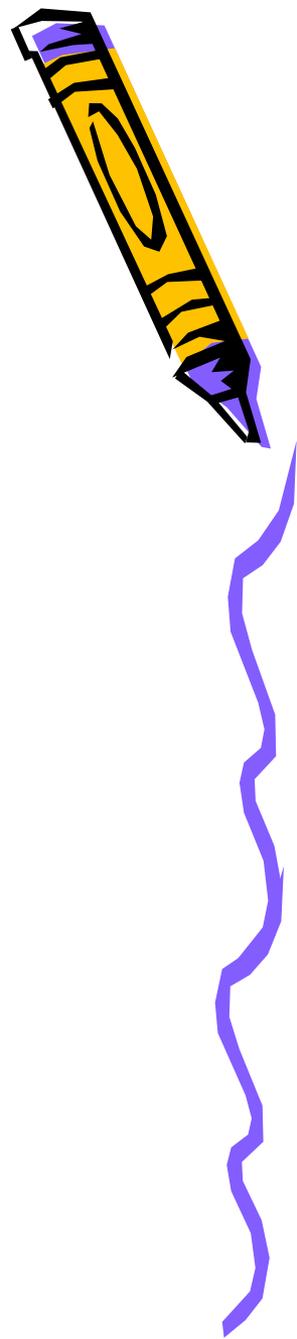
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Help from peers



Some scripts have more complex
designs
some languages have more complex
spelling

complexity affects the time
needed to acquire
automaticity
(various studies)

Complex visual patterns in various languages and scripts

(Psycholinguistic grains)

English

through, caught, bake, often, saw, sew

French

Ils etaient, oiseau, mois, etant

Bengali

jomi – earth

জেমি

boithak – meeting

বৈঠক

koThin - difficult

কঠিন

Complex designs of “more ink”:

Students of other syllabic scripts face the same difficulties

Bengali

Sinhala

Lao

Khmer

Latin

oka

ko

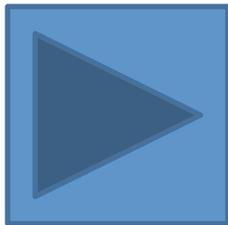
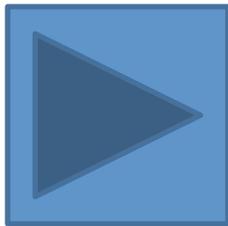
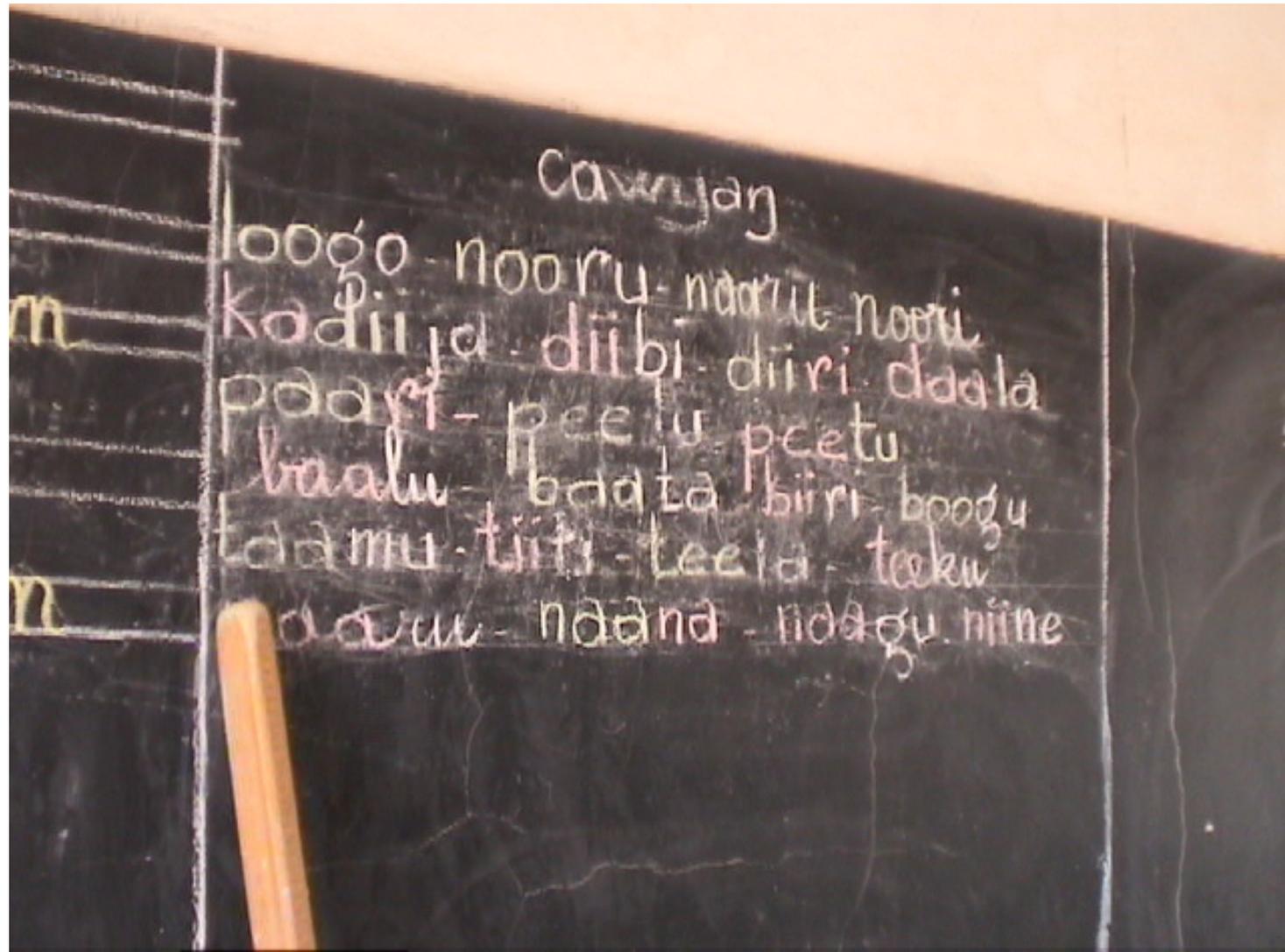
oka:

Koh
(kuoh)

kau

kō

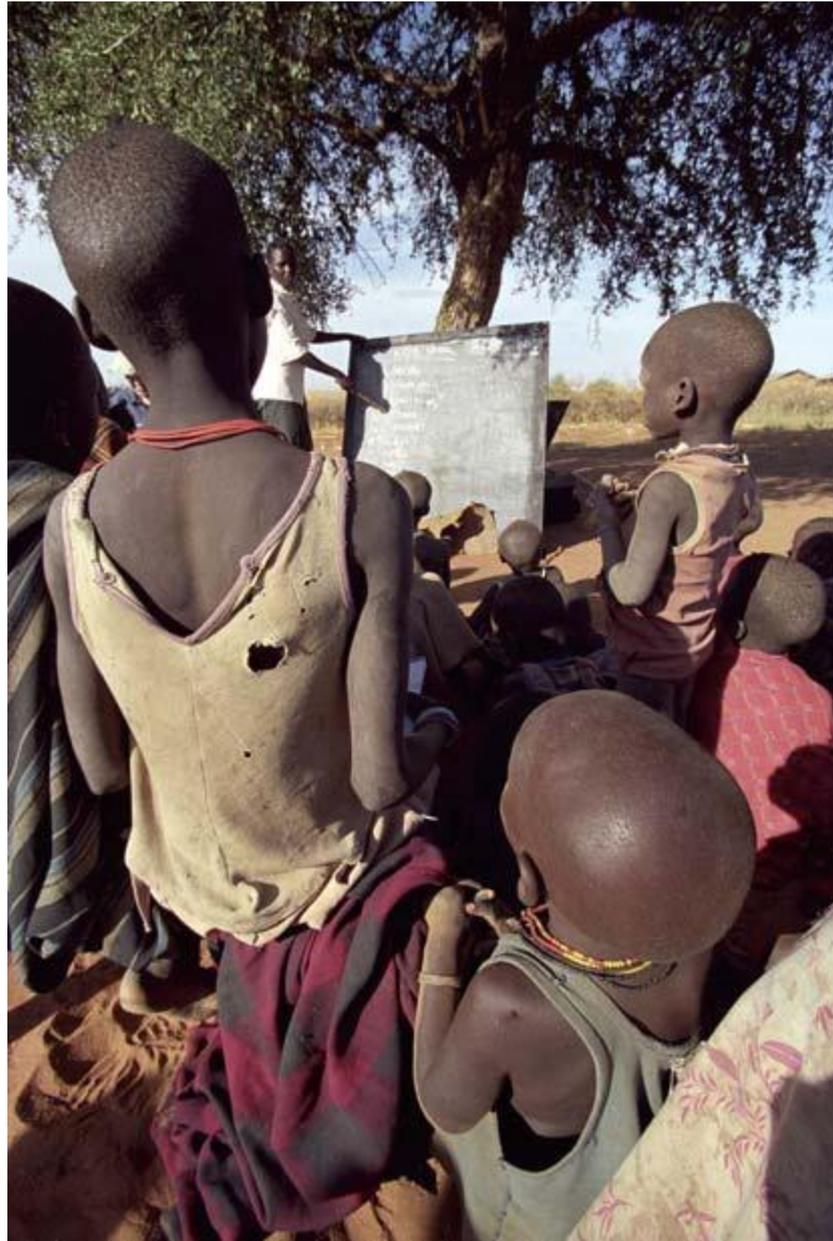
African languages have regular spelling
can be automatized in a few months
Fluency to other languages transfers within the same script



Malawi
What impresses you most about this scene?



Do these students discriminate among letters of the fuzzy blackboard from this distance?



India: Proximity to blackboard and to teacher can engage more students more of the time



What do grade 1 textbooks need
to teach students reading?

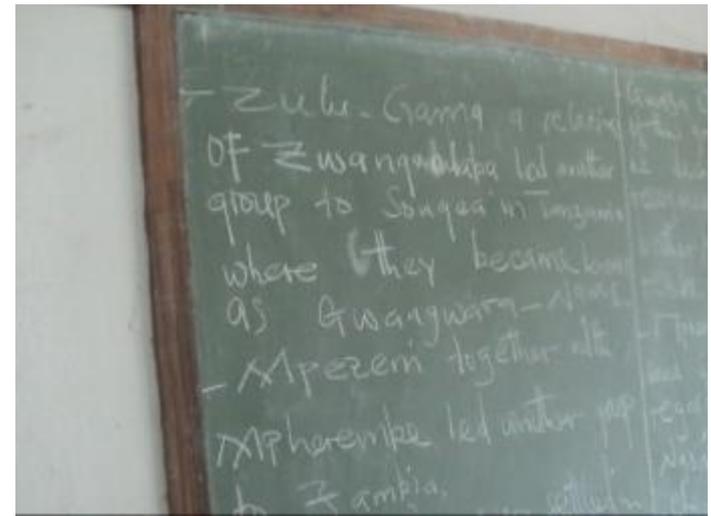
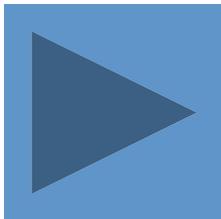
Middle-class children have many books
The poor may only have one – the textbook

Textbook considerations

- Can they be distributed? Costs should be low
- Does every student get one?
- Amount of text: enough to give basic automaticity
 - Has not yet been measured
- Do pictures really matter? What size?
 - Often they are large and the words are few
- Do colors really matter? Research unknown
- Probably students don't drop out because books are black and white

Lack of textbooks translates into loss of time at all levels

- Due to a lack of knowledge and materials, teachers do very few activities
 - But they can follow a textbook
- Teacher boredom:
How many of us would spend 20 years in blackboard transcription?



Analogies to automatize small units

Brain takes this up well

“Traditional” method worked for a good reason

	a	e	i	o	u	Letter	Fatha	Qasra	Dhamma
B	ba	be	bi	bo	bu	ض	ضَ	ضِ	ضُ
C	ca	ce	ci	co	cu	ص	صَ	صِ	صُ
D	da	de	di	do	du	ث	ثَ	ثِ	ثُ
F	fa	fe	fi	fo	fu	ق	قَ	قِ	قُ
G	ga	ge	gi	go	gu	د	دَ	دِ	دُ
H	ha	he	hi	ho	hu	ش	شَ	شِ	شُ
Etc						س	سَ	سِ	سُ
						cte			

The utility of analogies discovered in multiple countries: Greek literacy book 1860

— 10 —

ΜΑΘΗΜΑ ΤΡΙΤΟΝ.

Φωνήεντα.

α ε η ι ο υ ω

Σύμφωνα.

β γ δ ζ θ κ λ μ ν ξ π

ρ σ τ φ χ ψ.

ΣΗΜ. Συνείθισον τὸ παιδίον νὰ διακρίνη τὰ φωνήεντα ἀπὸ τὰ σύμφωνα.

— 11 —

ΜΑΘΗΜΑ ΤΕΤΑΡΤΟΝ.

Συλλαβαὶ ἐκ φωνήεντος καὶ συμφώνου.

α	ε	η	ι	ο	υ	ω
αβ	εβ	ηβ	ιβ	οβ	υβ	ωβ
απ	επ	ηπ	ιπ	οπ	υπ	ωπ
αφ	εφ	ηφ	ιφ	οφ	υφ	ωφ
αδ	εδ	ηδ	ιδ	οδ	υδ	ωδ
ατ	ετ	ητ	ιτ	οτ	υτ	ωτ
αθ	εθ	ηθ	ιθ	οθ	υθ	ωθ
αγ	εγ	ηγ	ιγ	ογ	υγ	ωγ
ακ	εκ	ηκ	ικ	οκ	υκ	ωκ
αχ	εχ	ηχ	ιχ	οχ	υχ	ωχ
αλ	ελ	ηλ	ιλ	ολ	υλ	ωλ
αμ	εμ	ημ	ιμ	ομ	υμ	ωμ
αν	εν	ην	ιν	ον	υν	ων
αρ	ερ	ηρ	ιρ	ορ	υρ	ωρ
ας	εσ	ησ	ισ	οσ	υσ	ωσ



Using pictures in grade 1 books if untaught letters are needed



Whole language in Egypt

أَسْطُوَانَةٌ أُسْرَةٌ أُذُنٌ

إِطَارٌ إِبْرِيْقٌ إِوَزَةٌ

(٧) ضَعِ دَائِرَةَ حَوْلَ الْكَلِمَةِ الَّتِي بِهَا (أ) :

(١) (أَكَلَ - ذَهَبَ - خَرَجَ) (ب) (شَرِبَ - سَأَلَ - قَمَرٌ)

(ج) (ضَرَبَ - جَلَسَ - أَمَامَ)

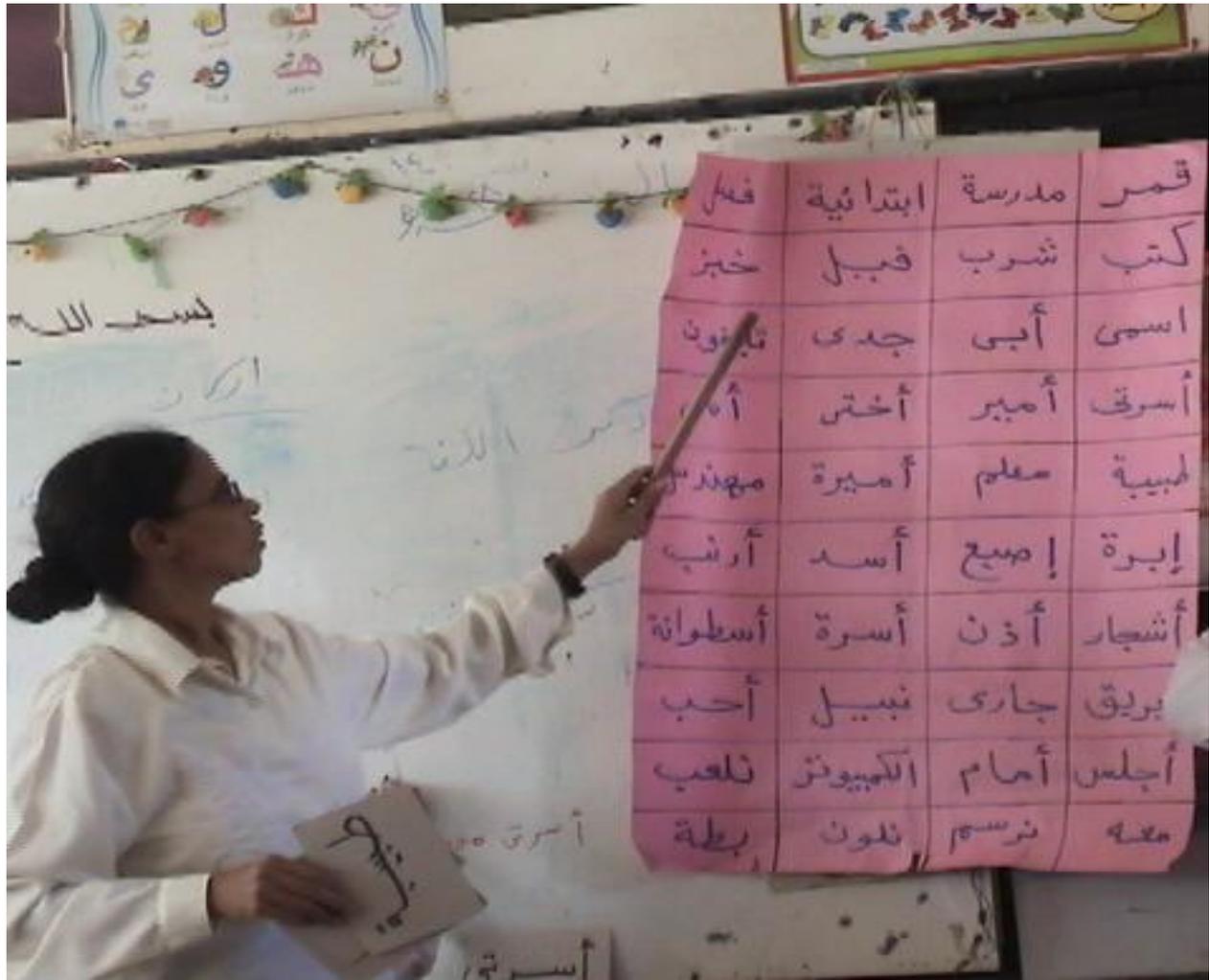
(٨) اَكْتُبِ الْحُرُوفَ النَّاقِصَةَ: (أ - إ - أ - أ) :

...بُرَّةٌ - ر...س - ...مى - ...رَبُّ

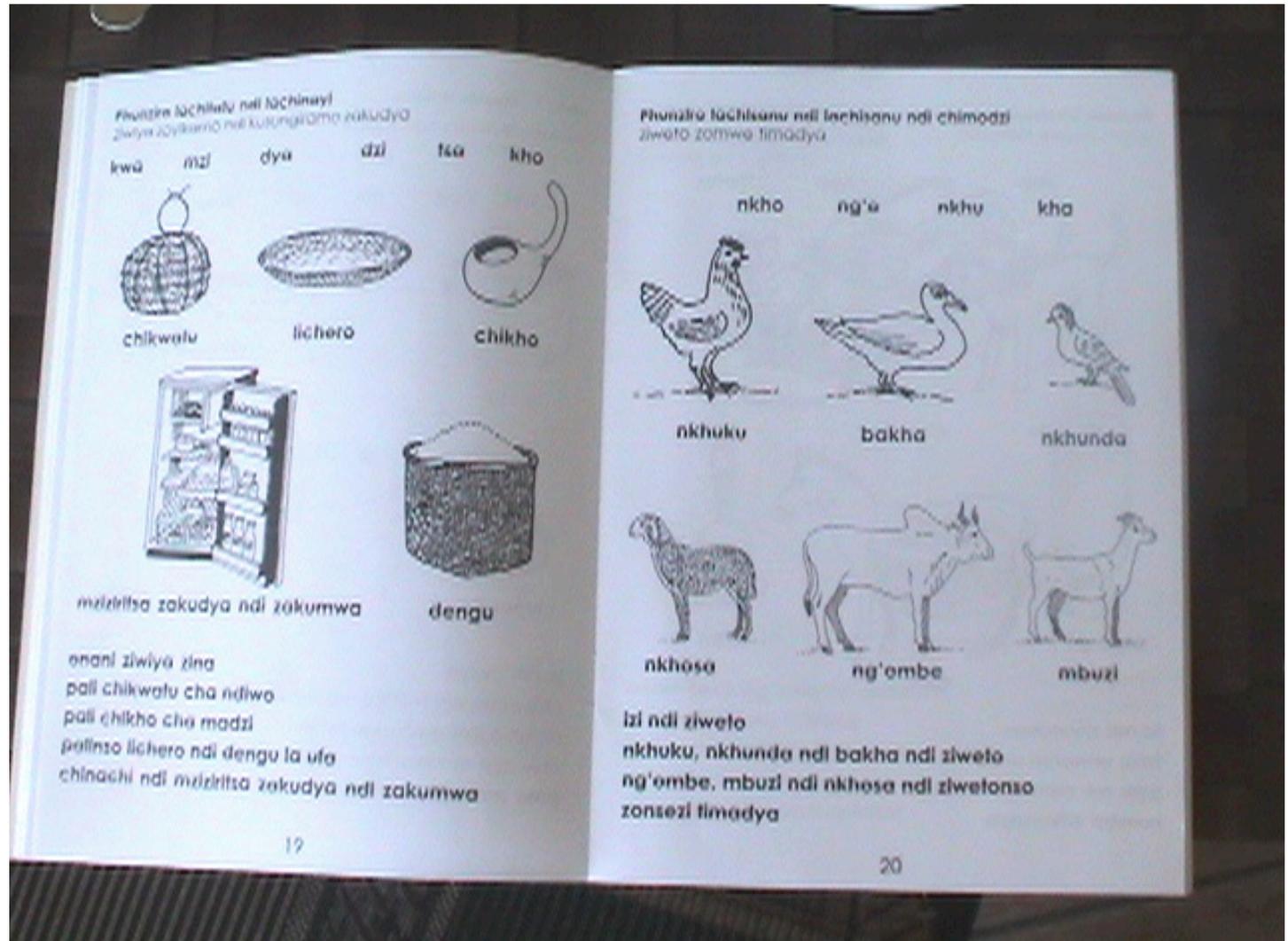
(٩) عَبِّرْ عَنِ الصُّوْرِ التَّالِيَةِ شَفَهِيًّا:

Egypt: Grade 1 whole-word reading “active learning” class

(without vowels children may identify entire words as particular shapes)

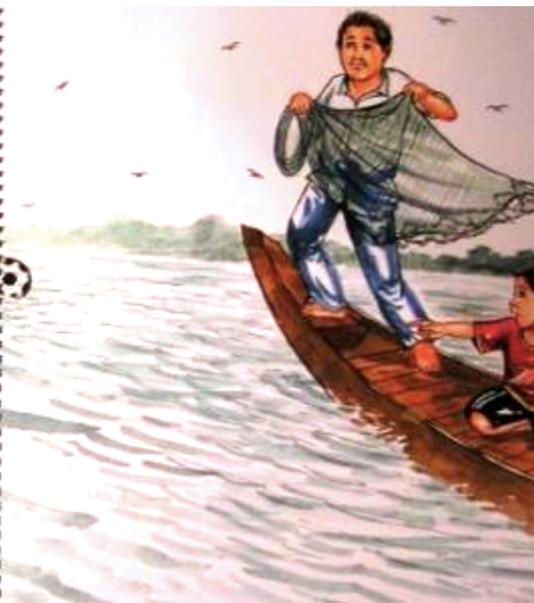


Whole language in Malawi (Chichewa)





កន្លែងនេះគ្មានត្រីសោះ ។
ម៉ែ! យកបាល់ឱ្យខ្ញុំផង ។



ពុក! បង់សំណាញ់ទៅ ។



— eu amo a mamã

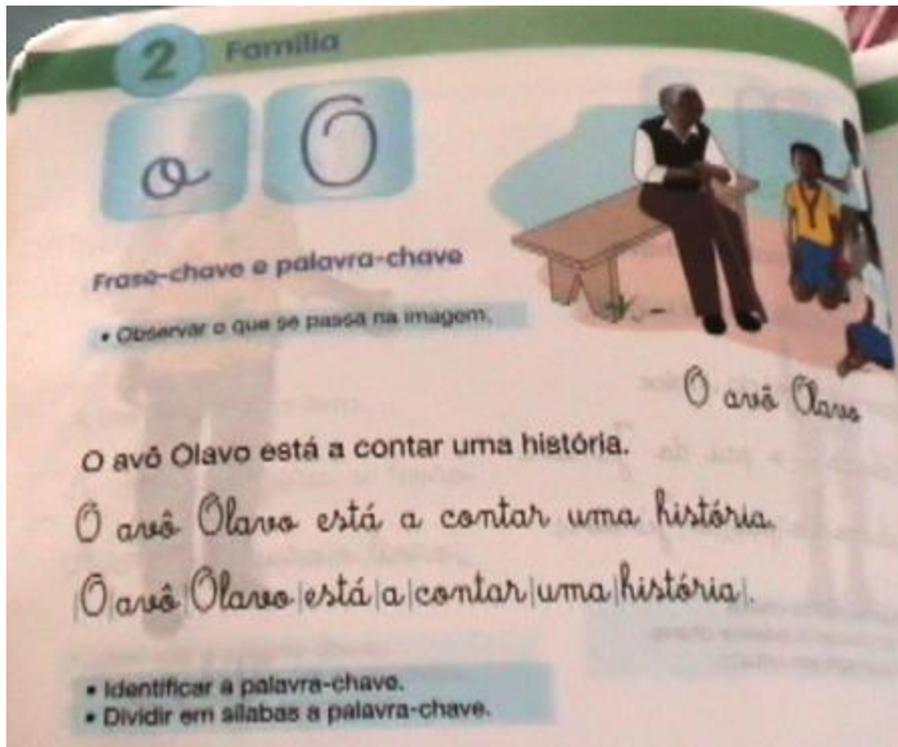
— eu amo a Mimi

— eu amo o Mimo

o Mimo é o meu ...

a Mimi é uma me ...

Students just “sketch” letters (Mozambique)



The child tried to draw an O: “O sapo”

The brain's rules for recognizing object similarity

- Mozambique and Angola teach calligraphy early on.
- Calligraphic and printed letters cannot be seen as equivalent initially, only after extensive practice

e ≠



E ≠



Actividade

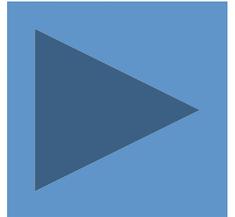
Escrever a palavra correspondente



A galinha



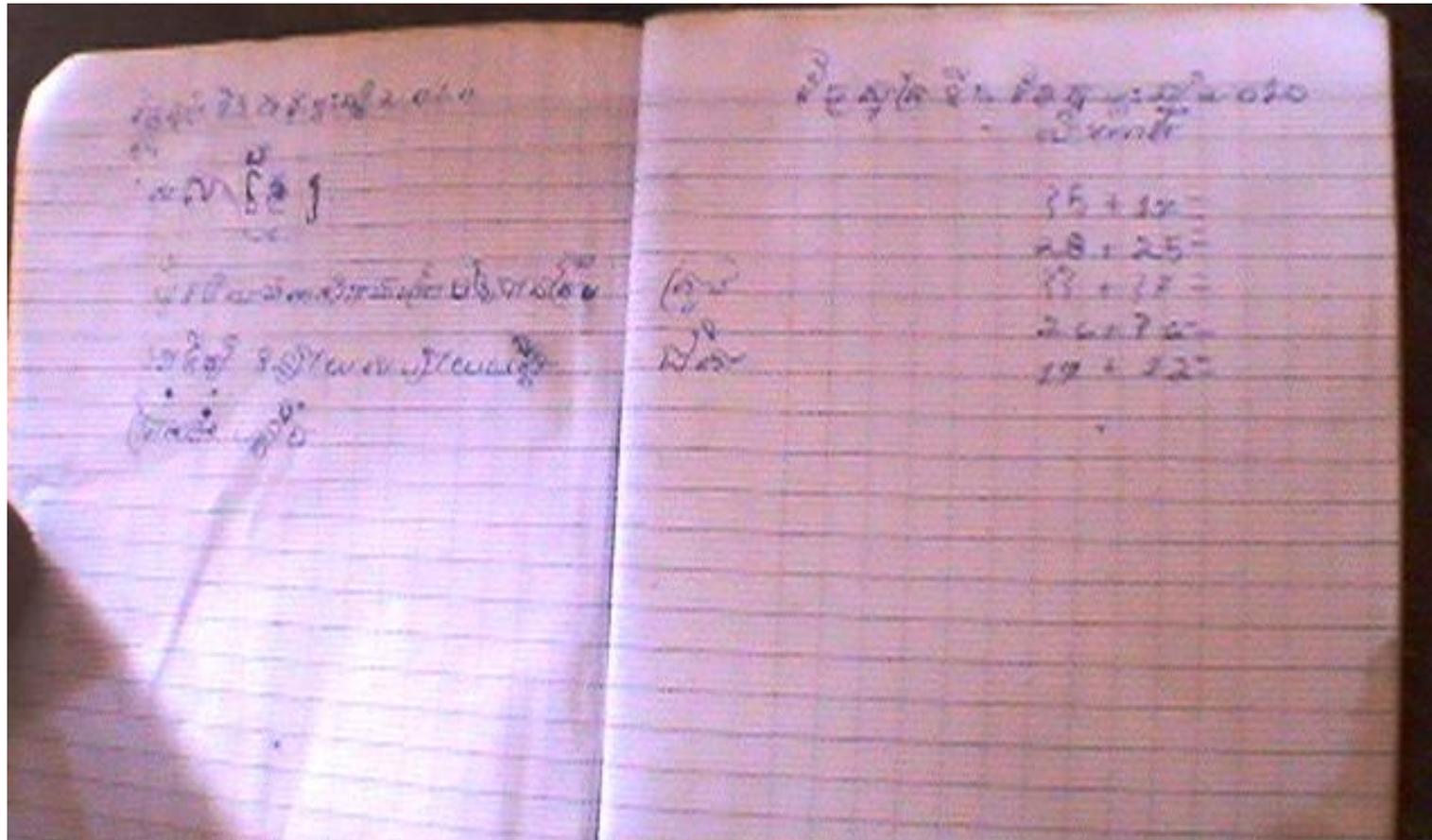
6 laranja



Actividade

Observar as imagens e escrever as sílabas.

Illiterate students writing “art”



ເຮັງ ເງ ແ້ງ ແງ



ເພາກເບັງ



ຮ້ອນເພງ



ຕີກະແລ້ງ



ເພາກແຕງ

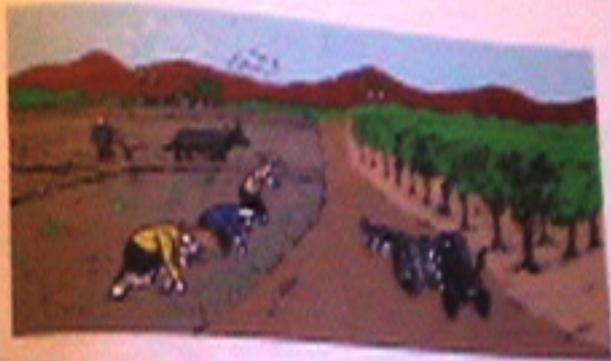


ເບັງ ເພງ ກະແລ້ງ ແຕງ

ປາເຮັງ ໂຕເອງ ແມງແຄງ ສະແຕງ



ເບັງ ເພງ ກະແລ້ງ ແຕງ



ໂນນ້ຳມີປາ ໂນນາມີເຂົ້າ

ເປັນຜ່າເວົ້າ ພໍ່ແມ່ພາຖີ

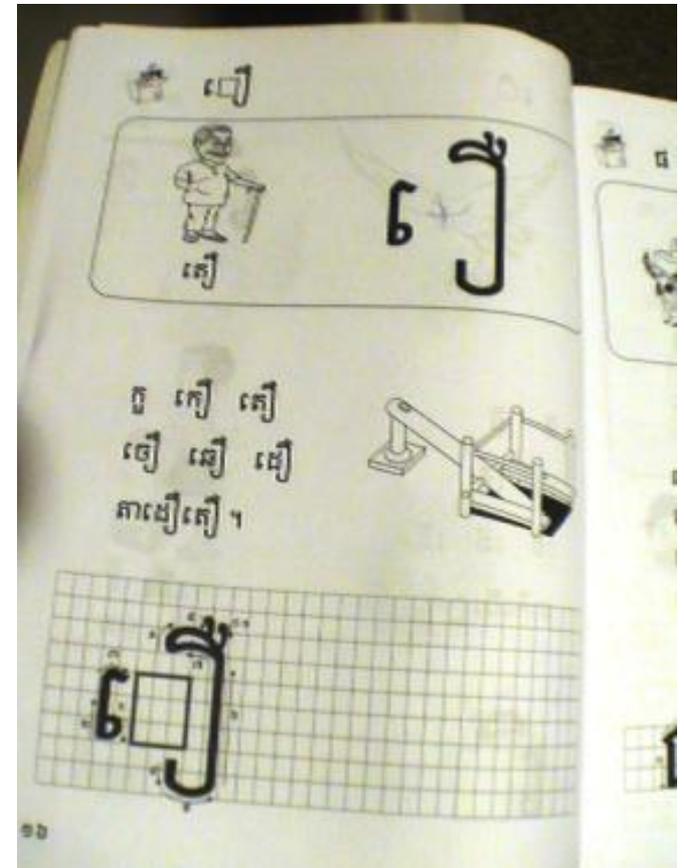
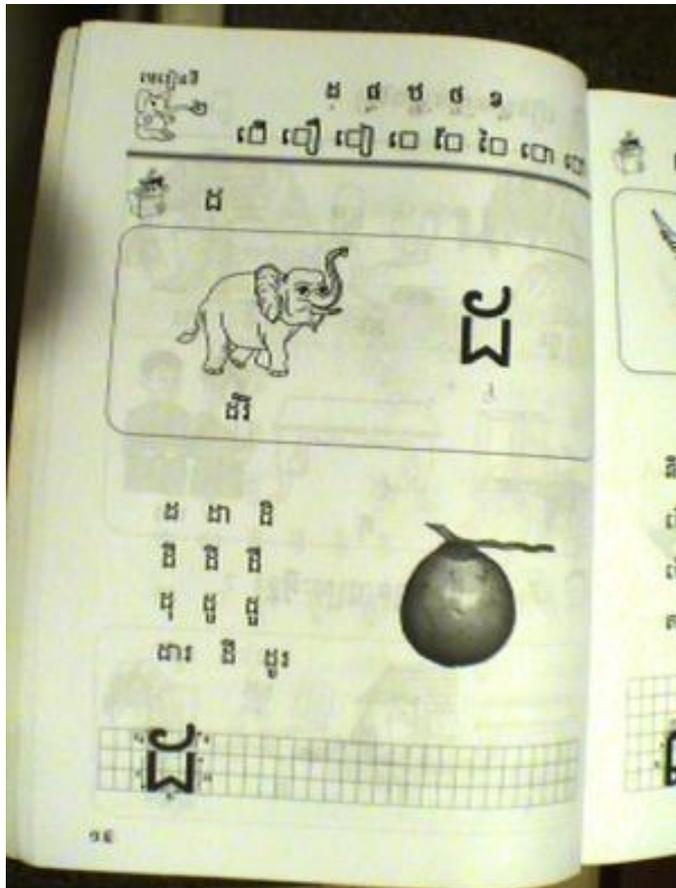
ຢ່າໄດ້ ຍ່າມີໂຫວ້ ອໍ່ເອົາປີແບ່ງ

ແຂງໂຕ ມີຢ່າງໍ້ ລໍ່ຖ້າແບ່ງເອົາ ແຕ້ນາ



Cambodia: Grade 1 textbook: very little practice per letter, few pages

- Same issue with most new textbooks worldwide



Pictures should demonstrate something about the letter

Baby's mouth
pronounces
oooo

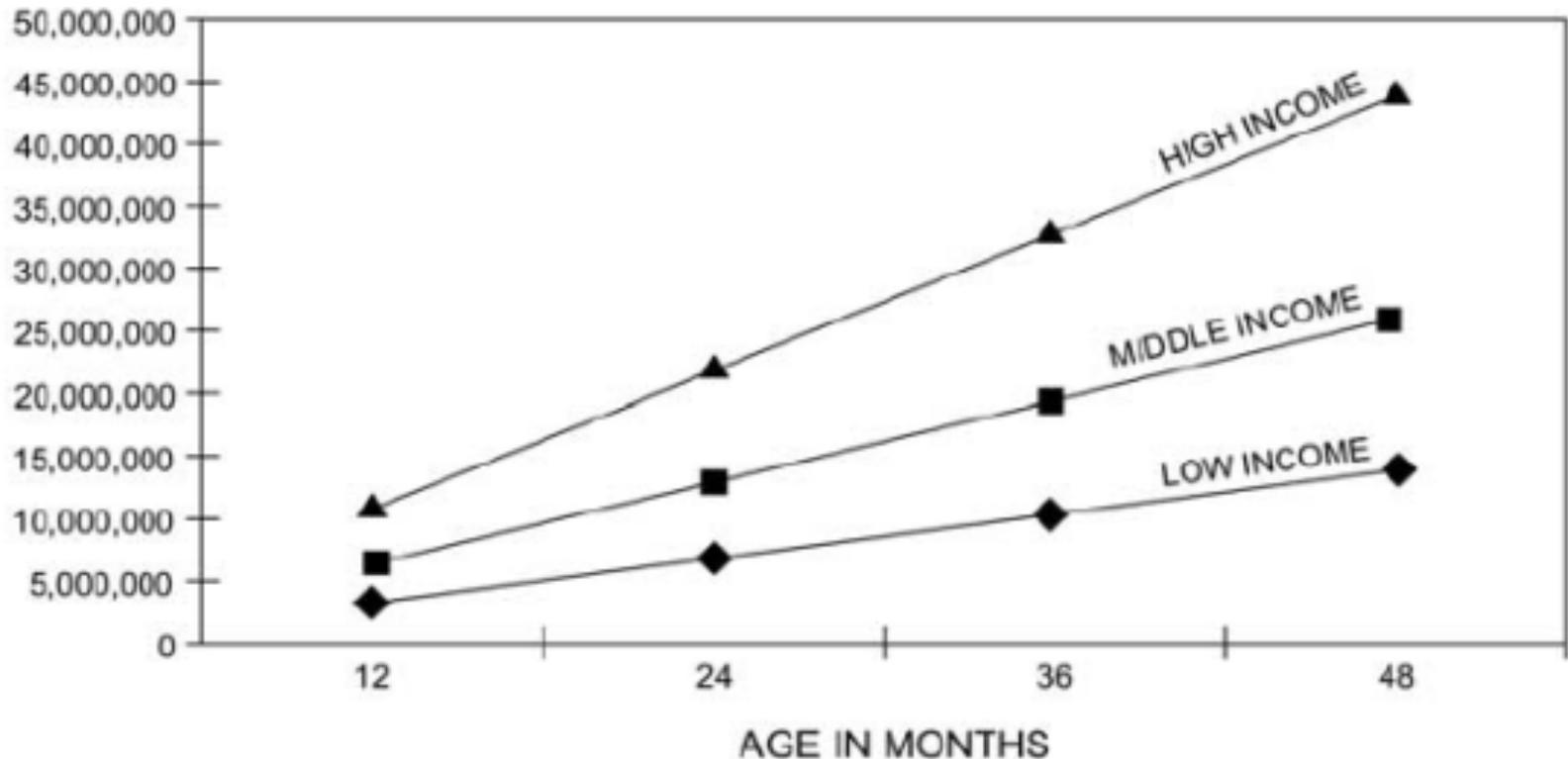


Language of instruction

- Many benefits for children who don't know the official language
- Comprehension, more knowledge
 - Less dropout
- Less wastage of government budget
 - « word superiority effect » in reading

Number of words that poor and richer students hear in the US – applicable to minority languages

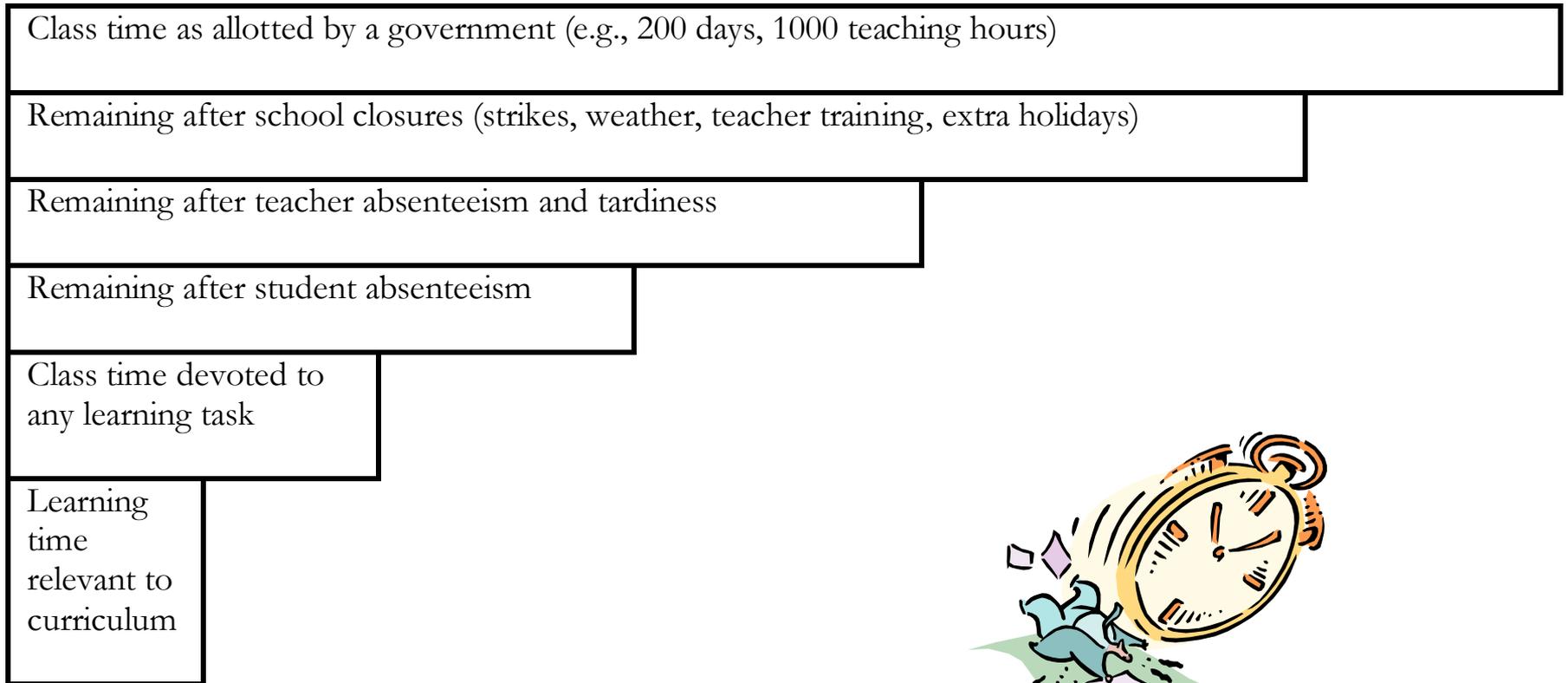
Hart and Riesley 1995



Long-Term Outcomes for Children with Different Language Experiences

- Rate of vocabulary growth at age three predicted expressive and receptive language skills at ages 9-10.
- In one year, preschool children in professional families were exposed to over *11 million words a year*,
- Children from working class families, *6.5 million words a year*, and
- Children from low SES families, *3.2 million words a year*.

Students read for about 12 minutes a day in some countries



Teacher off task (India)

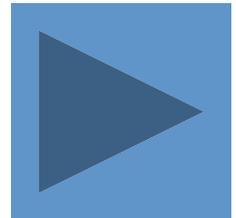
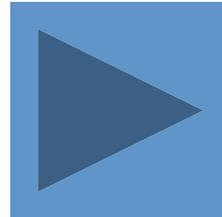
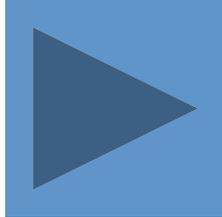
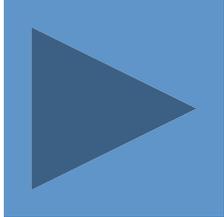


Teachers often don't have a clear idea what to do in reading

Cambodia blackboard
recitation

Niger – town
school

Mozambique – teacher
explains



May address the class at large and ignore all but the best
wast time

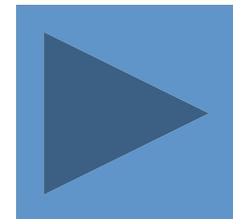
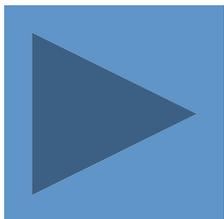
Single student on blackboard = off task time for many others

Teachers often finish early and illiterate children just wait for the bell (Cambodia)



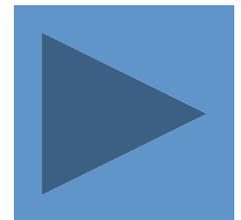
Teachers scribbling fast in grade 2

- Fluent readers do not realize that beginning learners need much more time to read
 - Particularly poorer students whose parents do not help
- Teachers berate students, say in front of them that they cannot learn
- Example from Nepal



Common strategy in many countries:
Let the better students read so that the weak
students will 'model' after them

- Is this possible?
 - Students cannot “memorize” large numbers of letters instantly
 - They need to link and practice 1-2 at a time
 - Like trains shown earlier
- Students who don't know letter values cannot learn them from others' fast reading
- Rural Mozambique

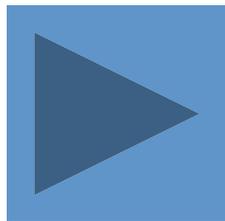


Laos: Grade 1 flash cards can bring letters closer to students unfortunately teachers rarely use them



Young students sit too far from the blackboard

Distance matters: visual, “social loafing” effect
Desks or benches cannot be moved for closer
distance



Technological help

Children need “repeaters”

“teachermate”

Cell phones

XO laptop

Other devices to teach letter sounds and values



How to train teachers so that they can teach reading?

Lately the teaching focuses on language reading is neglected, no special time for it

Teachers imitate their own teachers!

hear philosophies about modern methods

They may not realize that students need initially letter by letter instruction

Research suggests the power of audiovisual role modeling

Scripted lessons for weak teachers

How to implement?



Can teachers be trained in one year?

- If the usual teacher training schedules are followed, it may take years
- Much training is ineffective
- How to speed up? Make more effective?
- How to update the knowledge of trainers?
- Video-based instruction
- Audiovisual presentations - CDs



Informing citizens

- Poor people do not know what good schools teach
 - Don't know when their children should learn to read
- Tend to be satisfied
- A communication program is needed
- Create videos
- Show parents what good and poor readers sound like
 - Burkina Faso



If we plan using science and observations, reading for all can be achieved

- Set specific curricular time for reading
- Use phonics
- Use textbooks that actually teach the basics and have enough material for practice
- Training teachers on the issues that are known to fail students worldwide
- Plan for a one-year training time
- Teach through videos

Thank you for your time!

Extra slides

▶	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗
pi	pa	pu	pe	peh	poh	po	bi	ba	bu	be	beh	boh	bo
𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗
bi	ba	bu	be	beh	boh	bo	m̄bi	m̄ba	m̄bu	m̄be	m̄beh	m̄boh	m̄bo
⊕	△	𐎗	𐎗	𐎗	𐎗	◇		△		𐎗	𐎗	𐎗	◇
kpi	kpa	kpu	kpe	kpeh	kpoh	kpo		m̄gba		m̄gbe	m̄gbeh	m̄gboh	m̄gbc
𐎗	B	𐎗	𐎗	𐎗	△	□	𐎗	3	𐎗	𐎗	𐎗	𐎗	𐎗
gbi	gba	gbu	gbe	gbeh	gboh	gbo	fi	fa	fu	fe	feh	foh	fo
𐎗	3	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	E	𐎗
vi	va	vu	ve	veh	voh	vo	ti	ta	tu	te	teh	toh	to
𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	•	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗
di	da	du	de	deh	doh	do	li	la	lu	le	leh	loh	lo
•	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗
dj	d̄a	d̄u	d̄e	d̄eh	d̄oh	d̄o	ndj	nda	ndu	nde	ndeh	ndoh	ndo
𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	8
si	sa	su	se	seh	soh	so	zi	za	zu	ze	zeh	zoh	zo
𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗
ci	ca	cu	ce	ceh	coh	co	ji	ja	ju	je	jeh	joh	jo
𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗
nji	nja	nju	nje	njuh	njuh	njo	yi	ya	yu	ye	yeh	yoh	yo
𐎗	𐎗	⊙	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗	𐎗
ki	ka	ku	ke	keh	koh	ko	jgi	jga	jgu	jge	jgeh	jgoh	jgo

Syllabary by the Vai of Liberia

Vowels and consonants

N'ko of Guinea

Ⓜ	1	∩	b	Ʒ	F	Ɔ	Ɔ	∩	N	∧	Y	o	
da	ca	ja	ta	pa	ba	en	o	o	u	e	i	e	a
[d]	[tɕ]	[dʒ]	[t]	[p]	[b]	[n]	[ɔ]	[o]	[u]	[ɛ]	[i]	[e]	[a]
ϕ	▢	Ɔ	∩	Ɔ	Δ	Ɔ	Ɔ	Ɔ	∇	▢	∩	Ɔ	
ya	wa	h	na	ña	ma	la	ka	fa	gba	sa	ra	ra	
[j]	[w]	[h]	[n]	[ɲ]	[m]	[l]	[k]	[f]	[g̃b]	[s; ɕ]	[r]	[r]	

Extra letters for loanwords from European languages and Arabic

∇	ϕ	Ɔ	Δ	Ɔ	Ɔ	∇	∇
gh	yh	nh	mh	kh	[v]	[k̄p]	[g]
∇	∇	∩	Ɔ	▢	∩	∩	Ɔ
[y]	[ə]	[ŋ]	[R]	[ʃ]	[ʒ]	[z]	bh

Numerals

Ɔ	∩	∩	∩	∩	∩	∩	∩	∩	o
9	8	7	6	5	4	3	2	1	0

Punctuation

∩	∩
!	comma

Tone indication

∩	∩	∩	∩	∩	∩	∩	∩	∩
nasalization	long rising tone	long low tone	long high tone	long falling tone	short rising tone	short low tone	short high tone	